APPENDIX TO THE REPORT OF THE MINISTER OF AGRICULTURE

EXPERIMENTAL FARMS

REPORTS

OF THE

DIRECTOR	-	WM. SAUNDERS, C.M.G., LL.D.
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HORTICULTURIST	-	W. T. MACOUN
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ENTOMOLOGIST AND BOTANIST	-	JAS. FLETCHER, LL.D.
CEREALIST	-	C. E. SAUNDERS, PH.D.
POULTRY MANAGER	-	A. G. GILBERT
SUPT. EXPERIMENTAL FARM,	NAPPAN, N.S. -	R. ROBERTSON
" " "	BRANDON, MAN. -	N. WOLVERTON, B.A.
" " "	INDIAN HEAD, SASK. -	ANGUS MACKAY
" " "	AGASSIZ, B.C. -	THOS. A. SHARPE

FOR

1906

PRINTED BY ORDER OF PARLIAMENT

OTTAWA
PRINTED BY S. E. DAWSON, PRINTER TO THE KING'S MOST
EXCELLENT MAJESTY
1907

[No. 16—1907]

APPENDIX

TO THE

REPORT OF THE MINISTER OF AGRICULTURE

ON

EXPERIMENTAL FARMS

OTTAWA, March 30, 1907.

SIR,—I beg to submit for your approval the twentieth annual report of the work done, and in progress, at the several experimental farms.

In addition to my report, you will find appended reports from the following officers of the Central Experimental Farm:—From the Agriculturist, Mr. J. H. Grisdale; from the Horticulturist, Mr. W. T. Macoun; from the Chemist, Mr. Frank T. Shutt; from the Entomologist and Botanist, Dr. James Fletcher; from the Cerealist, Dr. C. E. Saunders, and from the Poultry Manager, Mr. A. G. Gilbert.

From the branch experimental farms there are reports from Mr. R. Robertson, Superintendent of the Experimental Farm for the Maritime Provinces, at Nappan, Nova Scotia; from Mr. N. Wolverton, B.A., Superintendent of the Experimental Farm for Manitoba, at Brandon; from Mr. Angus Mackay, Superintendent of the Experimental Farm for Saskatchewan, at Indian Head, and from Mr. Thomas A. Sharpe, Superintendent of the Experimental Farm for British Columbia, at Agassiz.

In these reports there will be found the results of many important and carefully conducted experiments in agriculture, horticulture and arboriculture, the outcome of practical and scientific work in the fields, barns, dairy and poultry buildings, orchards and plantations at the several experimental farms; also of scientific research in connection with the breeding of cereals and in determining their relative value; also of research work in the chemical laboratories bearing on many branches of agricultural and horticultural employment; and of information gained from the careful study of the life histories and habits of injurious insects and the methods by which noxious weeds are propagated and spread, together with the most practical and economical measures for their destruction. In the report of the Entomologist and Botanist will also be found particulars of the experiments and observations which have been made during the past year in connection with the apiary.

The large and constantly increasing demand by the farmers of the Dominion for the publications issued from the experimental farms, the rapidly extending correspondence, and the readiness shown by farmers everywhere to co-operate with the work of the farms in the testing of new and promising varieties of cereals, furnish gratifying evidence of the desire for information among this class of the community also of the high esteem in which the work of the farms is held. It is hoped that the facts brought together in the present issue will be found of much practical value to the Canadian farmer and fruit-grower, and that they may assist in advancing agriculture and horticulture in this country.

I have the honour to be, sir,
Your obedient servant,

WM. SAUNDERS,
Director of Experimental Farms.

To the Honourable
The Minister of Agriculture,
Ottawa.

ANNUAL REPORT OF THE EXPERIMENTAL FARMS

1906

REPORT OF THE DIRECTOR

WM. SAUNDERS, C.M.G., LL.D., F.R.S.C., F.L.S.

Another satisfactory harvest has been reaped and farming in Canada is in the ascendant. Many thousands of immigrants are flocking to our shores and millions of acres of virgin lands are being brought under crop. The mass of surplus food products available for export shows every year a marked increase while as yet the area of land under cultivation is relatively small. What these exports will amount to in the near future when the country becomes well settled and the acreage of crop much larger no one can foretell. This is a country of vast agricultural resources.

In the maritime provinces the hay crop has been in most districts above the average; wheat and oats have given a fair return but in some sections have been somewhat below the average; barley has given good returns. Indian corn has given excellent crops cut green for fodder; field roots have done fairly well, mangels being about an average crop and turnips below the average. Potatoes have done well.

In Quebec the hay crop has been less than an average and most grain crops have fallen a little short although the quality has been good. The output of dairy products has been large and the prices highly satisfactory.

In Ontario the wheat, both fall and spring, gave excellent crops, oats also and barley were the best crops had for many years, while field roots and Indian corn gave about an average return. The hay crop was a little below the average.

The pastures were rather short in midsummer, but they improved later on. The year on the whole has been a successful one with dairy farmers and cheese and butter have brought excellent prices.

In fruits, fall apples were abundant, but the crop of the winter sorts was less than an average one. Plums gave a light crop, but most other fruits an average return.

In the Northwest provinces the crops have averaged remarkably well. The weather was favourable at seeding and at harvest time and the grain was saved in good condition. The total crop areas and yields of 1906 in the three provinces, Manitoba, Saskatchewan and Alberta according to official returns were as follows:

	Bushels.	Acres.	Average yield per acre. Bushels.
Wheat..	94,110,626	4,614,827	20·39
Oats..	86,216,627	2,024,127	42·59
Barley..	20,779,734	591,393	35·13

This is an excellent showing.

CO-OPERATIVE EXPERIMENTS BY FARMERS THROUGHOUT CANADA.

Another distribution has been made from the experimental farms to Canadian farmers of samples of seed of high quality for the improvement of crops. In the endeavour to ascertain the relative merits of these different sorts as to their quality, productiveness and earliness in ripening, farmers everywhere have readily undertaken to co-operate with the experimental farms and to report the results at the close of the season. These joint efforts have been productive of much good and much information has thus been gathered in reference to the suitability of these different varieties to the climatic conditions prevailing in different parts of Canada.

During the past year nearly 48,000 farmers have joined in these co-operative tests. Many reports have been received expressing appreciation of the great value of this work.

The samples from the Central Experimental Farm during the distribution period have been sent out as follows: The samples of wheat and barley have weighed five pounds each, oats four pounds, sufficient of each of these cereals to sow one-twentieth of an acre. The samples of Indian corn, peas and potatoes have weighed three pounds each.

DISTRIBUTION BY PROVINCES.

Name of Grain.	Prince Edward Island.	Nova Scotia.	New Brunswick.	Quebec.	Ontario.	Manitoba.	Saskatchewan.	Alberta.	British Columbia.
Oats	630	1,196	1,820	5,842	2,314	580	817	557	132
Barley	99	408	293	1,947	718	241	300	177	46
Wheat	371	639	1,016	3,394	713	1,173	1,905	670	78
Peas	22	131	121	449	88	46	47	41	12
Indian corn	17	119	99	421	298	51	50	25	36
Potatoes	162	978	1,287	3,865	3,138	1,068	1,502	1,072	664
Total	1,301	3,471	4,636	15,918	7,269	3,159	4,621	2,542	968

Total number of samples distributed, 43,885.
Number of applicants supplied, 43,792.

Total number of packages of each sort distributed :—

Oats	13,888
Barley	4,229
Wheat	9,959
Peas	957
Indian corn	1,116
Potatoes	13,736
Total	43,885

The following list shows the number of packages which have been sent of the different varieties:—

Name of Variety.	Number of Packages.	Name of Variety.	Number of Packages.
OATS.		PEAS.	
Banner	3,922	Arthur	755
Wide Awake	2,695	White Wonder	112
Improved Ligowo	2,290	Daniel O'Rourke	38
White Giant	1,087	Golden Vine	27
Thousand Dollar	1,007	Prussian Blue	25
Waverley	782		
Danish Island	709	Total	957
Tartar King	594		
Abundance	406	INDIAN CORN.	
Black Beauty	262	Early Leaming	240
Goldfinder	92	Compton's Early	224
Welcome	42	Longfellow	220
		Selected Leaming	168
Total	13,888	North Dakota White	148
		White Cap Yellow Dent	59
BARLEY (Six-rowed).		Early Longfellow	57
Mensury	1,455		
Mansfield	634	Total	1,116
Odessa	616		
Claude	267	POTATOES.	
		Maggie Murphy	1,981
(Two-rowed.)		Carman No. 1	1,784
		Reeve's Rose	1,623
Standwell	722	Everett	1,196
Invincible	535	Rochester Rose	978
		Early White Prize	793
Total	4,229	Late Puritan	711
		Uncle Sam	694
SPRING WHEAT.		Burnaby Mammoth	682
Preston	2,707	Money Maker	651
Red Fife	2,134	Canadian Beauty	640
White Fife	1,255	American Wonder	632
Pringle's Champlain	953	Swiss Snow Flake	404
Huron	916	Dr. Maerker	278
Percy	792	Clay Rose	248
Laurel	599	Bovee	185
Stanley	561	State of Maine	161
Early Riga	42	Gold Coin	77
		Burpee's Extra Early	18
Total	9,959		
		Total	13,736

DISTRIBUTION OF SAMPLES FROM THE BRANCH EXPERIMENTAL FARMS.

Samples were also distributed from the Branch Experimental Farms, as follows:—

Experimental Farm, Nappan, N.S.		Experimental Farm, Brandon, Man.	
Spring wheat	100	Spring wheat	162
Oats	212	Oats	80
Barley	43	Barley	50
Peas	40	Peas	18
Potatoes	263	Potatoes	180
Buckwheat	17		
Total	675	Total	490

Experimental Farm, Indian Head, Sask.		Experimental Farm, Agassiz, B.C.	
Spring wheat	520	Oats	197
Oats	420	Barley	98
Barley	116	Peas	203
Peas	96	Potatoes	217
Flax, Rye and Spelt	53		
Potatoes	753		
Total	1,958	Total	715

By adding the number of farmers supplied by the branch farms to those supplied by the Central Farm we have a total of 47,723. The average number of samples sent out each year for the past ten years has been over 38,000.

It is remarkable how rapidly a supply of grain may be built up from a single four or five-pound sample. Take for instance, a sample of oats. The four pounds received will, if well cared for, usually produce from three to four bushels. This sown on two acres of land will at a very moderate estimate give one hundred bushels, and sometimes much more, but taking the lower figure as the basis for this calculation, the crop at the end of the second year would be sufficient to sow fifty acres, which at the same moderate computation would furnish 2,500 bushels, available for seed or sale at the end of the third year.

The critical point in these tests is the threshing of the grain at the end of the first season, and it is here that some farmers fail to get the full advantage of the experiment. The product of the one-twentieth acre plot is sometimes threshed in a large machine, which it is difficult to thoroughly clean, and in this way the grain becomes mixed with other varieties and practically ruined. At the Central Experimental Farm we thresh the produce of many of the small plots of grain by cutting off the heads, placing them in sacks and beating them with a stick, and winnowing until most of the chaff is got rid of, and the grain made clean enough for sowing.

Where the farmer is to use this seed for his own sowing it is not necessary that the sample be entirely free from chaff. It is, however, most essential if he is to get the full benefit of his experiment, that the grain be quite free from all admixture with other sorts. Farmers are expected to harvest the product of their experimental plot separately, and store it away carefully, threshing it by hand either with a flail or in such other manner as they may prefer. The results to be gained will abundantly repay the careful handling of the grain in this way.

Every season after the regular free distribution of the samples has been provided for the surplus grain grown on the experimental farms not required for sowing is sold to farmers in quantities of from 2 to 6 bushels or more each. In this way a considerable number of farmers are supplied every year with seed grain in these larger quantities, especially from the branch farms at Brandon and Indian Head.

SPECIAL EXPERIMENTS WITH FERTILIZERS.

In the Annual Report of the Experimental Farms for 1893, details were given on pages 8 to 24 of the results of a series of tests which had then been carried on for some years with the object of gaining information regarding the effects which follow the application of certain fertilizers and combinations of fertilizers on the more important farm crops.

These experiments have been continued, and a summary of the results obtained has been given each year, taking the average yield of crops from the beginning, adding the results for the current year, and then giving the average yield for the full time. These tests were undertaken on virgin soil, on a piece of land which was cleared for the purpose. For particulars regarding the clearing and preparing of the land for crop in 1887-88 and its subsequent treatment, the reader is referred to the earlier issues of this report.

VALUABLE INFORMATION GAINED.

From this long conducted series of tests some useful information has been gained.

These trials have shown that barn-yard manure can be most economically used in the fresh or unrotted condition; that fresh manure is equal, ton for ton, in crop-producing power to rotted manure, which, other experiments have shown, loses during the process of rotting about 60 per cent of its weight. In view of the vast importance of

(Photo F. T. Shutt.)

SEEDLING DAISIES, IN PERENNIAL FLOWER BEDS, CENTRAL EXPERIMENTAL FARM, OTTAWA.

making the best possible use of barn-yard manure, it is difficult to estimate the value of this one item of information.

When these experiments were planned, the opinion was very generally held that untreated mineral phosphate, if very finely ground, was a valuable fertilizer, which gradually gave up its phosphoric acid for the promotion of plant growth. Ten years' experience has shown that mineral phosphate, untreated, is of no value as a fertilizer.

Sulphate of iron, which at the time these tests were begun, was highly recommended, as a means of producing increased crops, has also been proven to be of very little value for this purpose.

Common salt, which has long had a reputation with many farmers for its value as a fertilizer for barley, while others disbelieved in its efficacy, has been shown to be a valuable agent for producing an increased crop of that grain, while it is of much less use when applied to crops of spring wheat or oats. Land plaster or gypsum has also proven to be of some value as a fertilizer for barley, while of very little service for wheat or oats. Some light has also been thrown on the relative usefulness of single and combined fertilizers.

CHANGES MADE IN THE EXPERIMENTS.

After ten years' experience had demonstrated that finely-ground, untreated mineral phosphate was of no value as a fertilizer, its use was discontinued in 1898. Prior to this it had been used in each set of plots in Nos. 4, 5, 6, 7 and 8, in all the different series of plots, excepting roots. In 1898 and 1899, similar weights of the Thomas' phosphate were used in place of the mineral phosphate, excepting in plot 6 in each series. In this plot the Thomas' phosphate was used in 1898 only.

After constant cropping for ten or eleven years, it was found that the soil on these plots to which no barn-yard manure had been applied was much depleted of humus, and hence its power of holding moisture had been lessened, and the conditions for plant growth, apart from the question of plant food, had on this account become less favourable. In 1899 the experiments were modified and an effort made to restore some proportion of the humus and at the same time gain further information as to the value of clover as a collector of plant food. In the spring of that year ten pounds of red clover seed per acre was sown with the grain on all the plots of wheat, barley and oats. The young clover plants made rapid growth, and by the middle of October there was a thick mat of foliage varying in height and density on the different plots, which was ploughed under. No barn-yard manure was applied on plots 1 and 2 in each series from 1898 to 1905.

In 1900 all the fertilizers on all the plots were discontinued, and from then to 1905 the same crops were grown on all these plots from year to year without fertilizers, sowing clover with the grain each season. In this way some information has been gained as to the value of clover as a collector of plant food, and also as to the unexhausted values of the different fertilizers which had been used on these plots since the experiments commenced. In 1905 and 1906 all the fertilizers were again used as in 1898.

SPECIAL TREATMENT OF PLOTS OF INDIAN CORN AND ROOTS.

As it was not practicable to sow clover with the Indian corn and root crops, the sowing of these latter crops was discontinued in the spring of 1900 and clover sown in their place in the proportion of 12 pounds per acre. The clover on these plots made strong growth, so strong as to necessitate twice cutting during the season, the cut clover being left on the ground in each case to decay and add to the fertility of the soil. The clover was left over for further growth in the spring of 1901, and ploughed under for the roots about May 10, and for corn about the middle of that month. Then roots and Indian corn were again sown. In 1902 crops of Indian corn and roots were grown on these plots. In 1903 the land was again devoted to clover and was in Indian corn and roots again in 1904 and each year since.

WHEAT PLOTS.

The seed sown on each of these plots from the beginning has been in the proportion of about $1\frac{1}{2}$ bushels per acre, excepting in 1894; and the varieties used were as follows:— In 1888 to 1891, White Russian, and in 1892-3, Campbell's White Chaff. In 1894, Rio Grande was used, and from 1895 to 1906, inclusive, Red Fife. In 1906 the Red Fife was sown May 3, and was ripe August 17.

TABLE I.
EXPERIMENTS WITH FERTILIZERS ON PLOTS OF WHEAT.

Number of Plot.	Fertilizers applied each year from 1888 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1899 and each year after to 1905 with the grain and ploughed under in the autumn. In 1905-6 fertilizers again applied as in 1898. Clover discontinued.	Average Yield for Eighteen Years.			19th Season, 1906. Variety, Red Fife.			Average Yield for Nineteen Years.		
		Yield of Grain.		Yield of Straw.	Yield of Grain.		Yield of Straw.	Yield of Grain.		Yield of Straw.
		Per acre.		Per acre	Per acre.		Per acre	Per acre.		Per acre
		Bush.	lbs	Lbs.	Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.
1	Barn-yard manure (mixed horse and cow manure), well rotted, 12 tons per acre in 1888; 15 tons per acre each year after to 1898 inclusive. No manure used from 1899 to 1905. In 1905-6 15 tons per acre again used.	22	$31\frac{17}{18}$	3928	23	50	3180	22	36	3888
2	Barn-yard manure (mixed horse and cow manure) fresh, 12 tons per acre in 1888; 15 tons per acre each year after to 1898 inclusive. No manure used from 1899 to 1905. In 1905-6 15 tons per acre again used.	22	46	3969	22	50	3200	22	$46\frac{4}{19}$	3928
3	Unmanured from the beginning.	11	$47\frac{14}{18}$	1910	13	20	2100	11	$58\frac{8}{19}$	1920
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899 a similar weight of the Thomas phosphate was used. No fertilizer used from 1900 to 1905. In 1905-6 Thomas phosphate again used as in 1899.	12	$38\frac{1}{18}$	2035	15	10	2200	12	$46\frac{1}{19}$	2044
5	Mineral phosphate, untreated, finely ground, 500 lbs., nitrate of soda, 200 lbs. per acre used each year from 1888 to 1897 inclusive. In 1898 and 1899, 500 lbs. of the Thomas phosphate were used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899.	13	$29\frac{3}{18}$	2653	18	10	2710	13	$43\frac{8}{19}$	2656
6	Barn-yard manure, partly rotted and actively fermenting, six tons per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using, applied each year from 1888 to 1897 inclusive. In 1898, 500 lbs. of Thomas phosphate were used in place of the mineral phosphate. No fertilizers used from 1899 to 1905. In 1905-6 fertilizers again used as in 1898.	19	$20\frac{8}{18}$	3280	28	20	3420	19	$48\frac{6}{19}$	3287
7	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899, 500 lbs. of the Thomas phosphate were used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899	13	$58\frac{17}{18}$	2622	21	00	3040	14	$21\frac{2}{19}$	2644

TABLE I.—EXPERIMENTS WITH FERTILIZERS ON PLOTS OF WHEAT—*Concluded.*

No. of Plot.	Fertilizers applied each year from 1888 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1899 and each year after to 1905 with the grain and ploughed under in the autumn. In 1905-6 fertilizers again applied as in 1898. Clover discontinued.	Average Yield for Eighteen Years.			19th Season, 1906. Variety, Red Fife.			Average Yield for Nineteen Years.		
		Yield of Grain.		Yield of Straw.	Yield of Grain.		Yield of Straw.	Yield of Grain.		Yield of Straw.
		Per acre.		Per acre	Per acre.		Per acre	Per acre.		Per acre
		Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.
8	Mineral phosphate, untreated, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899, 500 lbs. of the Thomas phosphate were used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899...	12	$2\frac{4}{18}$	2232	16	20	2320	12	$15\frac{15}{19}$	2237
9	Mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as in 1899........................	12	$40\frac{3}{18}$	2008	13	20	2130	12	$42\frac{5}{19}$	2014
10	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899...	13	$33\frac{12}{18}$	2930	16	30	1960	13	$42\frac{13}{19}$	2879
11	Mineral superphosphate, No. 1, 350 lbs., nitrate of soda, 200 lbs., wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899..............	14	$21\frac{7}{18}$	2858	19	41	3201	14	$38\frac{4}{19}$	2876
12	Unmanured from the beginning...........	10	$41\frac{2}{18}$	1874	13	40	1980	10	$50\frac{10}{19}$	1880
13	Bone, finely ground, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6, bone again used as at first..	12	$52\frac{7}{18}$	2106	15	00	2200	12	57	2111
14	Bone, finely ground, 500 lbs., wood ashes unleached, 1,500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as at first....	15	$32\frac{14}{18}$	2658	19	00	2560	15	$43\frac{13}{19}$	2653
15	Nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizer again used as at first....	14	$23\frac{10}{18}$	2477	14	10	2300	14	$23\frac{3}{19}$	2471
16	Muriate of potash, 150 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first	15	$32\frac{17}{18}$	2312	17	30	2190	15	$39\frac{2}{19}$	2306
17	Sulphate of ammonia, 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first.........	13	$4\frac{5}{18}$	2474	16	20	2160	13	$14\frac{11}{19}$	2457
18	Sulphate of iron, 60 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first........	12	$53\frac{11}{18}$	2024	14	4	2460	12	$57\frac{6}{19}$	2042
19	Common salt (Sodium chloride), 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first	13	$52\frac{13}{18}$	1676	16	00	2210	13	$59\frac{8}{19}$	1704
20	Land plaster or gypsum (Calcium sulphate), 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first................	12	$56\frac{16}{18}$	1958	15	30	2320	13	$4\frac{17}{19}$	1977
21	Mineral superphosphate, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first.......	13	$16\frac{16}{18}$	1954	16	10	1980	13	$25\frac{10}{19}$	1955

BARLEY PLOTS.

The quantity of seed sown per acre on the barley plots was about 2 bushels in 1889 to 1891, 1½ bushels in 1892 and 1893, and 2 bushels from 1894 to 1906 inclusive. Two-rowed barley was used for seed throughout until 1902, when Mensury, a six-rowed sort, was tried. The varieties used were as follows: 1889 to 1891, Saale; 1892, Goldthorpe; 1893, Duckbill; and in 1894 to 1901, Canadian Thorpe, a selected form of the Duckbill. Since 1902 Mensury has been sown. In 1906 it was sown May 3, and was harvested on July 30.

TABLE II.
EXPERIMENTS WITH FERTILIZERS ON PLOTS OF BARLEY.

No. of Plot.	Fertilizers applied each year from 1889 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1899 and each year after to 1905 with the grain and ploughed under in the autumn. In 1905-6 fertilizers again applied as in 1893. Clover discontinued.	Average Yield for Seventeen Years.			18th Season, 1906. Variety, Mensury.			Average Yield for Eighteen Years.		
		Yield of Grain.		Yield of Straw.	Yield of Grain.		Yield of Straw.	Yield of Grain.		Yield of Straw.
		Per acre.		Per acre	Per acre.		Per acre	Per acre.		Per acre
		Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.
1	Barn-yard manure, well rotted, 15 tons per acre each year to 1898, inclusive. No manure used from 1899 to 1905. In 1905-6 15 tons per acre again used............	37	5 5/17	3042	49	18	3930	37	38 10/18	3086
2	Barn-yard manure, fresh, 15 tons per acre each year to 1898, inclusive. No manure used from 1899 to 1905. In 1905-6 15 tons per acre again used....	37	4 4/17	3187	53	16	3900	37	47 10/18	3228
3	Unmanured from the beginning....	15	10 3/17	1545	27	24	1170	15	42 15/18	1525
4	Mineral phosphate, untreated, finely ground 500 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899 a similar weight of the Thomas phosphate was used. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as in 1899.........	16	46	1598	28	6	1820	17	27 10/18	1610
5	Mineral phosphate, untreated, finely ground 500 lbs., nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899 500 lbs. of the Thomas phosphate were used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899................	22	10	2245	38	16	2400	23	5	2253
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre, mineral phosphate, untreated, finely ground 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using, applied each year from 1888 to 1897, inclusive. In 1898 500 lbs. of the Thomas phosphate were used in place of the mineral phosphate. No fertilizers used from 1899 to 1905. In 1905-6 fertilizers again used as in 1898	30	26 10/17	2463	46	12	2900	31	2 5/18	2487
7	Mineral phosphate, untreated, finely ground 500 lbs., nitrate of soda, 200 lbs., wood ashes, unleached, 1,000 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899, 500 lbs. of the Thomas phosphate was used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899..............	28	2 1/17	2446	51	2	3190	29	15 7/18	2487

TABLE II.—EXPERIMENTS WITH FERTILIZERS ON PLOTS OF BARLEY—*Concluded.*

No. of Plot.	Fertilizers applied each year from 1889 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1899 and each year after to 1905 with the grain and ploughed under in the autumn. In 1905-6 fertilizers again applied as in 1898. Clover discontinued.	Average Yield for Seventeen Years. Yield of Grain. Per acre.		Yield of Straw. Per acre	18th Season, 1906. Variety, Mensury. Yield of Grain. Per acre.		Yield of Straw. Per acre	Average Yield for Eighteen Years. Yield of Grain. Per acre.		Yield of Straw. Per acre
		Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.
8	Mineral phosphate, untreated, finely ground, 500 lbs., wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899, 500 lbs. of the Thomas phosphate were used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899............	23	31 10/17	1901	39	8	2320	24	25 13/18	1924
9	Mineral superphosphate, No. 1, 500 lbs. per acre used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as in 1899......	22	47 4/17	1780	33	42	2110	23	28 5/18	1798
10	Mineral superphosphate, No. 1, 350 lbs., nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899..	28	41 15/17	2382	38	6	2680	29	19 2/18	2398
11	Mineral superphosphate, No. 1, 350 lbs., nitrate of soda, 200 lbs., wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899...	28	20 12/17	2504	41	42	3000	29	8 10/18	2531
12	Unmanured from the beginning..........	15	2 11/17	1278	28	16	1100	15	38 1/18	1269
13	Bone, finely ground, 500 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905-06 bone again used as at first	16	41 2/17	1436	31	42	1220	17	32 3/18	1424
14	Bone, finely ground, 500 lbs., wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as at first...	25	25 5/17	2151	32	34	2420	25	44 8/18	2166
15	Nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first....	22	16 1/17	2211	33	26	2070	22	45 17/18	2203
16	Muriate of potash, 150 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first....	23	18 11/17	1847	35	20	1260	24	2 13/18	1815
17	Sulphate of ammonia, 300 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first....	20	8 1/17	1905	32	14	1460	20	40 7/18	1880
18	Sulphate of iron, 60 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first....	19	42 12/17	1630	36	32	1020	20	39 8/18	1596
19	Common salt (Sodium chloride) 300 lbs. per acre used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first.	28	6 15/17	1869	33	36	2140	28	21 15/18	1884
20	Land plaster or gypsum (Calcium sulphate), 300 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first.................. .	21	12	1613	34	38	840	22	8 6/18	1570
21	Mineral superphosphate, 500 lbs. per acre, used each year from 1889 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first.............	22	16	1770	31	42	840	22	41 5/18	1717

OAT PLOTS.

The quantity of seed sown per acre on the oat plots was about 2 bushels in 1889 and 1890; 1½ bushels in 1891 to 1893, and 2 bushels from 1894 to 1906, inclusive. The varieties used were as follows: in 1889, Early English; in 1890 to 1893, Prize Cluster; and from 1894 to 1906, inclusive, the Banner. In 1906 Banner was sown May 3 and the plots were harvested August 19.

TABLE III.

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF OATS.

No. of Plot.	Fertilizers applied each year from 1889 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1899 and each year after to 1905 with the grain and ploughed under in the autumn. In 1905-6 fertilizers again applied as in 1898. Clover discontinued.	Average Yield for Seventeen Years.			18th Season, 1906. Variety, Banner.			Average Yield for Eighteen Years.		
		Yield of Grain.		Yield of Straw.	Yield of Grain.		Yield of Straw.	Yield of Grain.		Yield of Straw.
		Per acre.		Per acre	Per acre.		Per acre	Per acre.		Per acre
		Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.
1	Barn-yard manure, well rotted, 15 tons per acre each year to 1898, inclusive. No manure used from 1899 to 1905. In 1905-6 15 tons per acre were again used.........	52	15 4/17	3229	50	10	3590	52	11 3/18	3249
2	Barn-yard manure, fresh, 15 tons per acre each year to 1898, inclusive. No manure used from 1899 to 1905. In 1905-6 15 tons per acre were again used.	56	3 11/17	3370	53	8	3550	56	0 2/18	3380
3	Unmanured from the beginning...........	35	11 8/17	1773	35	20	1490	35	11 17/18	1757
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899 a similar weight of the Thomas phosphate was used. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as in 1899............................	36	27 5/17	1925	39	14	2530	36	31 6/18	1958
5	Mineral phosphate, untreated, finely ground, 500 lbs., nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899, 500 lbs. of the Thomas phosphate were used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899	49	12 14/17	2673	50	20	4190	49	15 2/18	2752
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre, mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using, applied each year from 1888 to 1897, inclusive. In 1898 500 lbs, of Thomas phosphate were used in place of the mineral phosphate. No fertilizers used from 1899 to 1905. In 1905-6 fertilizers again used as in 1898...	49	21 11/17	2798	42	2	2880	49	7 6/18	2802
7	Mineral phosphate, untreated, finely ground, 500 lbs., nitrate of soda, 200 lbs., wood ashes, unleached, 1,000 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899, 500 lbs. of the Thomas phosphate were used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899.........................	49	30 11/17	3132	40	10	3030	49	12 9/18	3135
8	Mineral phosphate, untreated, finely ground, 500 lbs. wood ashes, unleached, 1,500 lbs. per acre used each year from 1888 to 1897, inclusive. In 1898 and 1899, 500 lbs. of Thomas' phosphate were used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899.........	45	2 1/17	2584	36	7	2540	44	19 5/18	25[illegible]6

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF OATS—*Concluded.*

No. of Plot.	Fertilizers applied each year, from 1889 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1899 and each year after to 1905 with the grain and ploughed under in the autumn. In 1905 fertilizers again applied as in 1898. Clover discontinued.	Average Yield for Seventeen Years.			18th Season, 1906. Variety, Banner.			Average Yield for Eighteen Years.		
		Yield of Grain.		Yield of Straw.	Yield of Grain.		Yield of Straw.	Yield of Grain.		Yield of Straw.
		Per acre.		Per acre	Per acre.		Per acre.	Per acre.		Per acre
		Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.
9	Mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as in 1899	39	$19\frac{10}{17}$	2004	31	16	2410	39	$4\frac{6}{18}$	2027
10	Mineral superphosphate, No. 1, 350 lbs., nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899	48	$0\frac{16}{17}$	2576	39	24	2950	47	$19\frac{4}{18}$	2597
11	Mineral superphosphate, No. 1, 350 lbs., nitrate of soda, 200 lbs., wood ashes unleached, 1,500 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899	39	$18\frac{4}{17}$	2426	33	18	2160	39	$6\frac{16}{18}$	2411
12	Unmanured from the beginning	24	$21\frac{6}{17}$	1442	13	28	2430	24	$0\frac{17}{18}$	1497
13	Bone, finely ground, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 bone again used as at first	36	$12\frac{8}{17}$	2015	32	12	1410	36	$4\frac{11}{18}$	1982
14	Bone, finely ground, 500 lbs., wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers used again as at first	41	$28\frac{12}{17}$	2340	38	28	1910	41	$22\frac{8}{18}$	2316
15	Nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer used again as at first	47	$14\frac{16}{17}$	2746	37	22	1900	46	$30\frac{3}{18}$	2699
16	Muriate of potash, 150 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first	41	$3\frac{16}{17}$	2241	39	14	1710	41	$0\frac{13}{18}$	2211
17	Sulphate of ammonia, 300 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first	46	$24\frac{7}{17}$	2752	43	28	2850	46	$18\frac{17}{18}$	2757
18	Sulphate of iron, 60 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first	39	$31\frac{16}{17}$	2064	39	24	1910	39	$31\frac{9}{18}$	2055
19	Common salt (Sodium chloride), 300 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer used again as at first	40	$0\frac{5}{17}$	2007	42	32	2410	40	$5\frac{15}{18}$	2029
20	Land plaster or gypsum (Calcium sulphate), 300 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first	36	$20\frac{2}{17}$	2066	40	10	2230	36	$27\frac{2}{18}$	2075
21	Mineral superphosphate, 500 lbs. per acre, used each year from 1889 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first	37	$15\frac{14}{17}$	1912	43	18	2370	37	$27\frac{5}{18}$	1938

The one-tenth acre plots of wheat, barley and oats had by the end of 1903 become infested with several troublesome perennial weeds, hence it was thought best to sow only one-half of each plot with grain in 1904, devoting the other half to a hoed crop to clean the land. On this account no clover was sown on any of the cereal plots in 1904, and one-half of the wheat plots was sown with mangels, one-half of the barley plots with potatoes, and one-half of the oat plots with carrots, computing the yields of grain from a one-twentieth acre plot in each case. Similar hoed crops were sown in 1905 and 1906 changing the position of the varieties from year to year.

INDIAN CORN PLOTS.

The experiments with the plots of Indian corn have been conducted with the object of obtaining the largest weight of well matured green fodder for the silo, and to have the corn so far advanced when cut, that the ears shall be as far as is practicable in the late milk or glazed condition. Each plot has been divided from the outset into two equal parts, on one of which—known as No. 1—one of the stronger growing and somewhat later ripening sorts has been tried, and on the other, marked No. 2, one of the earlier maturing varieties. During the first four years one of the Dent varieties was testéd under No. 1. On the other half of the plot (No. 2) one of the Flint varieties was grown. For the first four years the No. 1 series was planted in drills 3 feet apart, using about 24 pounds of seed to the acre and thinning the plants, when up, to 6 or 8 inches, and the No. 2 in hills 3 feet apart each way with 4 or 5 kernels in a hill. During the past eight years both sorts have been grown in hills.

In 1900 no crop of Indian corn was grown on these plots, but clover was sown in its place on May 5, in the proportion of 12 pounds per acre. This made a strong growth, was cut twice during the season and left on the ground to decay, so that when ploughed under, the land might get the full benefit of the clover crop. The clover was allowed to remain growing until May 20, 1901. It was then ploughed under about 6 inches deep, and harrowed well before the corn was planted. Clover was sown again in 1903, and ploughed under in May, 1904. Corn was planted in 1905 and 1906. In 1906 it was planted on May 28, and cut for ensilage September 13.

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF INDIAN CORN, CUT GREEN FOR ENSILAGE.

No. of Plot.	Fertilizers applied each year from 1888 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1900 in place of the corn and ploughed under in May, 1901, before the corn was planted. In 1903 clover was again sown and ploughed under in May, 1904. In 1905-6 fertilizers again applied as in 1898. Clover discontinued.	Average Yield for Fourteen Years.				15th Season, 1906,				Average Yield for Fifteen Years.			
		Plot No. 1—½ weight of green fodder. Per acre.		Plot No. 2—½ weight of green fodder. Per acre		Plot No. 1—Selected Leaming, weight of green fodder. Per acre.		Plot No. 2—Angel of Midnight, weight of green fodder. Per acre		Plot No. 1—½ weight of green fodder. Per acre.		Plot No. 2—½ weight of green fodder. Per acre	
		Tons.	lbs.	Tons	lbs	Tons.	lbs.	Tons	lbs	Tons.	lbs.	Tons	lbs
1	Barn-yard manure (mixed horse and cow manure) well rotted, 12 tons per acre, each year from 1888 to 1898 inclusive. No manure used from 1899 to 1905. In 1905-6 manure was again used as at first.	16	1076	13	634	14	180	12	1700	16	750	13	320
2	Barn-yard manure (nixed borsee and cow manure) fresh, 12 tons per acre each year from 1888 to 1898 inclusive. No manure used from 1899 to 1905. In 1905-6 manure was again used as at first......	16	809	11	1636	13	1850	12	30	15	1145	11	1662
3	Unmanured from the beginning..........	7	258	5	1077	2	1640	2	1400	6	1684	5	689

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF INDIAN CORN.

No. of Plot.	Fertilizers applied each year from 1888 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1900 in place of the corn and ploughed under in May, 1901, before the corn was planted. In 1903 clover was again sown and ploughed under in May, 1904. In 1905-6 fertilizers again applied as in 1898. Clover discontinued.	Average Yield for Fourteen Years. Plot No. 1—weight of green fodder. Per acre.		Average Yield for Fourteen Years. Plot No. 2—weight of green fodder. Per acre.		15th Season, 1906. Plot No. 1—Selected Leaming, weight of green fodder. Per acre.		15th Season, 1906. Plot No. 2—Angel of Midnight, weight of green fodder. Per acre.		Average Yield for Fifteen Years. Plot No. 1—weight of green fodder. Per acre.		Average Yield for Fifteen Years. Plot No. 2—weight of green fodder. Per acre.	
		Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.
4	Mineral phosphate, untreated, finely ground, 800 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899 a similar weight of the Thomas phosphate was used. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as in 1899	8	770	5	1567	8	550	6	1170	8	755	5	1674
5	Mineral phosphate, untreated, finely ground, 800 lbs., nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899, 800 lbs. of the Thomas' phosphate were used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899	11	1721	9	1014	10	1010	9	790	11	1540	9	939
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre, mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using, applied each year from 1888 to 1897 inclusive. In 1898, 500 lbs. of Thomas' phosphate were used in place of the mineral phosphate. No fertilizers used from 1899 to 1905. In 1905-6 fertilizers again used as in 1898	16	334	12	421	13	960	10	1450	15	1975	12	223
7	Mineral phosphate, untreated, finely ground, 500 lbs., nitrate of soda, 200 lbs., wood ashes, unleached, 1,000 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899, 500 lbs. of the Thomas' phosphate were used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899	15	348	11	826	11	750	9	1400	14	1841	11	598
8	Mineral phosphate, untreated, finely ground, 500 lbs., wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899 500 lbs. of the Thomas' phosphate were used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899	12	892	9	1726	10	990	8	1910	12	631	9	1605
9	Mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as in 1899	11	1048	8	1876	9	1300	6	1840	11	791	8	1607
10	Mineral superphosphate, No. 1, 350 lbs., nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899	13	1116	10	1261	8	1340	7	880	13	464	10	836
11	Mineral superphosphate, No. 1, 350 lbs., nitrate of soda, 200 lbs., wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899	16	545	12	1130	12	50	10	300	15	1979	12	808

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF INDIAN CORN—*Concluded.*

No. of Plot.	Fertilizers applied each year from 1888 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1900 in place of the corn and ploughed under in May, 1901, before the corn was planted. In 1903 clover was again sown and ploughed under in May, 1904. In 1905-06 fertilizers again applied as in 1898. Clover discontinued.	Average Yield for Fourteen Years. Plot No. 1—weight of green fodder. Per acre. Tons.	lbs.	Average Yield for Fourteen Years. Plot No. 2—weight of green fodder. Per acre. Tons	lbs	15th Season, 1906. Plot No. 1—Selected Leaming, weight of green fodder. Per acre. Tons.	lbs.	15th Season, 1906. Plot No. 2—Angel of Midnight, weight of green fodder. Per acre. Tons	lbs	Average Yield for Fifteen Years. Plot No. 1—weight of green fodder. Per acre. Tons.	lbs.	Average Yield for Fifteen Years. Plot No. 2—weight of green fodder. Per acre. Tons	lbs
12	Unmanured from the beginning..........	11	86	9	466	8	1100	6	300	10	1755	9	55
13	Bone, finely ground, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 bone again used as at first........	12	722	9	1559	9	1400	6	1550	12	367	9	1158
14	Bone, finely ground, 500 lbs., wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as at first....	13	213	10	647	11	10	8	1180	12	1933	10	416
15	Nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first....	12	1075	9	1633	8	1060	6	910	12	541	9	1185
16	Sulphate of ammonia, 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first..	13	144	10	442	8	1290	7	540	12	1554	10	49
17	Mineral superphosphate, No. 1, 600 lbs., muriate of potash 200 lbs., sulphate of ammonia, 150 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first....	13	1251	10	639	11	1510	9	10	13	1002	10	464
18	Muriate of potash, 300 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first ...	10	783	7	1698	9	1810	8	270	10	718	7	1736
19	Double sulphate of potash and magnesia, 300 lbs. per acre in 1889 and 1890, (muriate of potash 200 lbs., substituted, each year since), dried blood, 300 lbs., mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as at first.............	12	1203	9	812	12	1360	10	500	12	1213	9	925
20	Wood ashes unleached, 1,900 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first.............................	11	800	8	1763	9	960	8	530	11	544	8	1681
21	Bone, finely ground, 500 lbs., sulphate of ammonia, 200 lbs., muriate of potash, 200 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as at first....................	12	1588	8	422	8	1640	7	127[illegible]	12	1058	8	345

PLOTS OF MANGELS AND TURNIPS.

In conducting these experiments, the roots only have been taken from the land, the tops have always been cut off and left on the ground to be ploughed under, so that the plant food they have taken from the soil has been returned to it. One half of each one-tenth acre plot in the series has been devoted to the growth of mangels, and the other half to turnips, and these crops have been alternated from year to year. The preparation of the land has been the same for both these roots. Until 1900 it was ploughed in the autumn after the crop was gathered, gang-ploughed deeply in the spring after the barn-yard manure had been spread on plots 1, 2 and 6, and after gang-ploughing, the other fertilizers were spread by scattering them evenly over the surface, after which it was all harrowed with the smoothing harrow, then made in ridges 2 feet apart, rolled and sown.

The variety of mangel principally grown was the Mammoth Long Red, and four pounds of seed were sown per acre each year.

The variety of turnip chiefly sown was the Prize Purple Top Swede. The land used for the turnips, which are usually sown later than the mangels, was prepared in the same manner as for the mangels. It was then allowed to stand until the day before sowing, when it was gang-ploughed shallow or cultivated to kill weeds and loosen the soil, ridged, rolled and sown. About 3 pounds of seed were sown per acre.

In 1900 and 1903, no crops of mangels or turnips were grown but clover was sown in their place in May in the proportion of 12 pounds per acre. This made a strong growth and was cut twice each year during the season, and left on the ground to decay, so that when ploughed under, the land might get the full benefit of the clover crop. The clover was allowed to remain growing until near the middle of May, the year following, by which time it had made a very heavy growth. It was then ploughed under about 6 inches deep and harrowed well, then made into ridges 2 feet apart. These were rolled with a hand roller, which flattened the ridges considerably and made a firm, even seed bed. The crops of clover and roots were alternated in this way, for the purpose of supplying humus and also of gaining information as to the fertilizing effect of green clover ploughed under on land to be used for growing roots.

In 1906, the mangels were sown on May 8, and pulled on October 29; the turnips were sown May 14, and pulled October 30. The yield per acre has been calculated in each case from the weight of roots gathered from the whole plot.

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF MANGELS AND TURNIPS.

No. of Plot.	Fertilizers applied each year from 1889 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1900 in place of the roots and ploughed under in May, 1901, before the roots were sown. In 1903 clover was again sown and ploughed under in May, 1904. In 1905 and 1906 fertilizers again applied as in 1899. Clover discontinued.	Average Yield for Fourteen Years. Mangels, Weight of Roots. Per acre. Tons.	lbs.	Average Yield for Fourteen Years. Turnips, Weight of Roots. Per acre. Tons.	lbs.	15th Season, 1906. Varieties. West Half Plot. Turnips: Purple Top, Swede. Weight of Roots. Per acre. Tons.	lbs.	15th Season, 1906. Varieties. East Half Plot. Mangels: Mammoth Long Red. Weight of Roots. Per acre. Tons.	lbs.	Average Yield for Fifteen Years. Mangels. Weight of Roots. Per acre. Tons	lbs.	Average Yield for Fifteen Years. Turnips. Weight of Roots. Per acre. Tons.	lbs.
1	Barn-yard manure (mixed horse and cow manure) well rotted, 20 tons per acre each year from 1889 to 1898 inclusive. No manure used from 1899 to 1905. In 1905-6 manure was again used as at first.	22	358	15	1397	11	640	21	1680	22	313	15	813
2	Barn-yard manure (mixed horse and cow manure) fresh, 20 tons per acre each year from 1889 to 1898 inclusive. No manure used from 1899 to 1905. In 1905-6 manure was again used as at first	21	423	15	1467	10	1500	21	1520	21	497	15	803
3	Unmanured from the beginning	8	1940	7	998	4	460	8	1560	8	1923	7	562
4	Mineral phosphate, untreated, finely ground, 1,000 lbs. per acre, used each year from 1889 to 1897, inclusive. In 1898 and 1899 a similar weight of the Thomas' phosphate was used. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as in 1899.	8	1922	8	649	6	160	7	380	8	1686	8	350

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF MANGELS AND TURNIPS—*Continued.*

No. of Plot.	Fertilizers applied each year from 1889 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1900 in place of the roots and ploughed under in May, 1901, before the roots were sown. In 1903 clover was again sown and ploughed under in May, 1904. In 1905-6 fertilizers again applied as in 1899. Clover discontinued.	Average Yield for Fourteen Years. Mangels, Weight of Roots. Per acre.		Average Yield for Fourteen Years. Turnips, Weight of Roots. Per acre.		15th Season, 1906, Varieties. West Half Plot. Turnips: Purple Top Swede Weight of Roots. Per acre.		15th Season, 1906, Varieties. East Half Plot. Mangels: Mammoth Long Red. Weight of Roots. Per acre.		Average Yield for Fifteen Years. Mangels. Weight of Roots. Per acre.		Average Yield for Fifteen Years. Turnips. Weight of Roots. Per acre.	
		Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.
5	Mineral phosphate, untreated, finely ground, 1,000 lbs., nitrate of soda, 250 lbs., wood ashes, unleached, 1,000 lbs. per acre, used each year from 1889 to 1897 inclusive. In 1898 and 1899 500 lbs. of Thomas phosphate were used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899....	14	1824	10	470	9	1420	18	40	15	238	10	400
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre, mineral phosphate, untreated, finely ground, 1,000 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using, applied each year from 1889 to 1897 inclusive. In 1898 1,000 lbs. of Thomas phosphate were used in place of the mineral phosphate. No fertilizers used from 1899 to 1905. In 1905-6 fertilizers again used as in 1898...	17	1934	12	1893	7	1120	15	1920	17	1666	12	1175
7	Mineral phosphate, untreated, finely ground, 1,000 lbs., sulphate of potash, 200 lbs. in 1889 and 1890 (substituted by muriate of potash, 250 lbs. in 1891 and subsequent years), nitrate of soda, 200 lbs. per acre, used each year from 1889 to 1897 inclusive. In 1898 and 1899 1,000 lbs. of the Thomas phosphate were used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899......	12	243	9	1191	7	1800	20	100	12	1300	9	965
8	Mineral superphosphate, No. 1, 500 lbs., sulphate of potash, 200 lbs. in 1889 and 1890 (substituted by muriate of potash, 250 lbs. in 1891 and subsequent years), nitrate of soda, 200 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as in 1899	14	242	11	1175	10	240	16	1280	14	578	11	979
9	Mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as in 1899.........................	10	313	9	901	5	1140	7	1100	9	1996	9	467
10	Nitrate of soda, 300 lbs. per acre, used each year from 1889 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer used again as in 1899....	14	738	9	892	7	980	12	80	14	427	9	631
11	Sulphate of ammonia, 300 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer used again as in 1899.......	12	743	10	1358	8	1860	11	1040	12	629	10	1125

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF MANGELS AND TURNIPS—*Concluded.*

No. of Plot.	Fertilizers applied each year from 1889 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1900 in place of the roots and ploughed under in May, 1901, before the roots were sown. In 1903 clover was again sown and ploughed under in May, 1904. In 1905-6 fertilizers again applied as in 1899. Clover discontinued.	Average Yield for Fourteen Years.				15th Season, 1906, Varieties.				Average Yield for Fifteen Years.			
		Mangels, Weight of Roots.		Turnips, Weight of Roots.		West Half Plot. Turnips: Purple Top Swede Weight of Roots.		East Half Plot. Mangels: Mammoth Long Red. Weight of Roots.		Mangels. Weight of Roots.		Turnips. Weight of Roots.	
		Per acre.		Per acre.		Per acre.		Per acre.		Per acre.		Per acre.	
		Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.
12	Unmanured from the beginning.....	7	918	7	675	4	1740	7	40	7	859	7	346
13	Bone, finely ground, 500 lbs., wood ashes, unleached, 1,000 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as at first........	12	571	8	1989	7	240	15	200	12	946	8	1739
14	Wood ashes, unleached, 2,000 lbs. per acre, used each year from 1889 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first....	11	422	8	1077	5	760	12	1980	11	659	8	656
15	Common salt (Sodium chloride), 400 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first....	10	256	8	270	2	1600	9	1020	10	174	7	1558
16	Mineral superphosphate, No. 1, 500 lbs., nitrate of soda, 200 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as at first.......	12	1983	10	1884	7	1820	9	1680	12	1563	9	1897
17	Mineral superphosphate, No. 1, 350 lbs., wood ashes, unleached, 1,500 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as at first........................	13	1163	10	1319	8	20	10	200	13	699	10	966
18	Mineral superphosphate, No. 1, 500 lbs., muriate of potash, 200 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as at first ...	13	150	11	443	7	1100	15	1460	13	504	10	1943
19	Double sulphate of potash and magnesia, 300 lbs. per acre in 1889 and 1890 (muriate of potash, 200 lbs., substituted each year since), dried blood, 250 lbs., mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as at first...........	14	800	12	299	6	1960	16	640	14	989	11	1610
20	Wood ashes, unleached, 1,500 lbs., common salt (Sodium chloride), 300 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905-6 fertilizers again used as at first	15	214	10	1810	6	1020	17	650	15	510	10	1290
21	Mineral superphosphate, No. 2, 500 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905-6 fertilizer again used as at first....	14	1977	11	382	5	1860	11	1180	14	1524	10	1680

FURTHER EXPERIMENTS IN GROWING FARM CROPS IN THE YUKON.

The experiments reported on last year have been continued with the kindly aid of the Royal Northwest Mounted Police. The seed was forwarded in cotton bags containing about 5 lbs. each. The officers and men of the police force have my warmest thanks for the kindly interest they have taken in this matter.

Through the courtesy of the Comptroller of the police force, Frederick White, C.M.G., I have been favoured with the following report:

WHITEHORSE, Y.T., November 1, 1906.

The Assistant Commissioner.
Royal North-West Mounted Police,
Dawson, Y.T.

SIR,—I have the honour to forward herewith reports showing the distribution made with the seeds received last spring from the Experimental Farm, Ottawa, together with copies of letters received from the different persons to whom they were distributed.

The season was an exceptionally bad one on account of the frequent frosts, we having had more or less heavy frost some nights in every summer month.

I have the honour to be, sir,
Your obedient servant,
A. E. SNYDER, *Supt.*,
Commanding 'H' Division.

DISTRIBUTION OF SEEDS RECEIVED FROM THE EXPERIMENTAL FARM.

To whom.	Place.	Date.	Varieties.
H. J. Biggar	Whitehorse	April 25th, 1906	1 sack Rochester Rose potatoes.
			1 " barley, Odessa.
			1 " oats, Ligowo.
			1 " wheat.
Mrs. M. G. Watson	Whitehorse	April 25th, 1906	1 sack Rochester Rose potatoes.
			3 ozs. Rye grass seed.
			3 " Timothy grass seed.
			3 " Brome grass seed.
			3 " Hungarian grass seed.
J. B. Saint	Whitehorse	April 26th, 1906	1 sack Rochester Rose.
			1 pkt. Timothy grass seed.
			1 " Brome grass seed.
			1 " Hungarian grass seed.
			1 " Western Rye grass seed.
			1 " barley.
Mrs. H. Gilchen	Whitehorse	April 26th, 1906	2 pkts. Western Rye grass.
Mrs. Harry Chapman	Whitehorse	April 26th, 1906	1 sack Brome grass seed.
			1 pkt. Timothy grass seed.
			1 " Hungarian grass seed.
			1 " Western Rye grass seed.
Mrs. J. E. Shermer	Ten Mile Point	May 4th, 1906	1 sack Improved Ligowo oats.
			1 bag Timothy seed.
			1 " Hungarian grass.
			1 " Brome grass seed.
			1 " Western Rye grass.
			1 " Preston wheat.
			1 " barley.
			1 " Rochester Rose potatoes.
R. N. W. M. P	Whitehorse	May 11th, 1906	2 sacks Rochester Rose potatoes.
J. Holliday	Kluahne	June 4th, 1906	1 bag Ladoga wheat.
			1 " oats.
			1 " Western Rye grass.
			1 " Hungarian.
			1 " Timothy.
			1 " Brome.

Copies of reports as to success met with seeds from the Experimental Farm, Ottawa, distributed by the R.N.W.M.P., in the Whitehorse district:—

KLUAHNE, Y.T., October 6, 1906.

MAJOR A. E. SNYDER,
Commanding R.N.W.M.P.,
Whitehorse, Y.T.

SIR,—In connection with the different seeds you so kindly forwarded to me in order to see whether the same could be grown and matured in my locality I beg to report that I was only sorry that they reached me too late to sow and expect them to mature. I shall retain them, or else get new seed, and next season if I am in the country it shall be my pleasure to give them a fair trial.

I have the honour to be, sir,
Your obedient servant,
(Sgd.) PHIL. HOLLIDAY,
Mining Recorder.

WHITEHORSE, Y.T., October 6, 1906.

Received of Major Snyder some field seed. They grew all right in some gardening which I did this summer.

(Sgd.) H. J. BIGGAR.

WHITEHORSE, October 10, 1906.

This is to certify that the grass seed known as the Western Rye received from Major Snyder as an experiment has given the greatest of satisfaction, and I do not wish for any better.

(Sgd.) MRS. H. GILCHEN.

WHITEHORSE, October 10, 1906.

This is to certify that the seed I received from Major Snyder came up all right but did not mature. The potatoes were small but of good flavour.

(Sgd.) MRS. W. G. WATSON.

WHITEHORSE, October 11, 1906.

MAJOR A. E. SNYDER, R.N.W.M.P.,
Whitehorse, Y.T.

DEAR SIR,—The grass seed sent out from the government experimental station at Ottawa, which you kindly furnished me early last summer produced a splendid growth. It appears to be a sufficiently hard variety for this climate.

Very respectfully,
(Sgd.) HARRY CHAPMAN.

WHITEHORSE, Y.T., October 13, 1906.

To the Officer Commanding
R.N.W.M.P., 'H' Division,
Whitehorse, Y.T.

SIR,—I have the honour to submit the following report on seed potatoes received from the experimental farm. I received from the Q.M. store two sacks of seed potatoes called the 'Rochester Rose,' which were planted by myself in good soil and under the best conditions. These potatoes were given every care to promote their growth and did very well until the exceedingly early frosts of this season destroyed the stalk growth and plants beating them to the ground and thus preventing the plants from attaining maturity. This variety appears to be a good hardy type of potato, but somewhat later than other varieties in attaining a strong stalk growth, thus being late in maturing. This is therefore owing to the extreme shortness of the Yukon season very much unsuited for growth in this territory as the early frost does not give the plants and necessary length of time to mature.

I have the honour to be, sir,
Your obedient servant,
(Sgd.) E. HOLMDEN.

Report of J. E. Shermer, Ten-mile point.

Rochester Rose potatoes. Five pounds of seed sown. Crop 60 lbs. of potatoes.

Western rye grass. No results.

Brome grass. No results.

Oats. Five pounds seed sown. Grew three feet high, did not ripen, about 200 pounds hay obtained.

Barley, six rowed, 5 pounds sown, grew two feet high, did not ripen, made 150 pounds hay.

Wheat, Preston, five pounds sown, grew three feet high, made 150 pounds hay.

Some reports from the officers commanding are also here given.

ROYAL NORTH-WEST MOUNTED POLICE,
YUKON TERRITORY.
ASSISTANT COMMISSIONER'S OFFICE,
DAWSON, Y.T., November 22, 1906.

SIR,—In accordance with the request of Dr. Saunders, Director of Experimental Farms, I directed the officers commanding at Dawson and Whitehorse to make a distribution of various seeds of grasses and grain sent in by the Department of Agriculture for experimental growing in the Yukon Territory. Notices were given to the local papers apprising the public of the fact that we had these seeds for distribution and any one applying was given samples on condition that he or she would furnish a report upon the results. These have just been received and I have the honour to forward herewith, for the information of the Department of Agriculture, copies of reports received from those who were supplied with seed.

I have the honour to be, sir,
Your obedient servant,
Z. T. WOOD,
Assistant Commissioner.

The Comptroller,
R.N.W.M. Police,
Ottawa, Ont.

DAWSON, November 19, 1906.

TO THE ASSISTANT COMMISSIONER,
R.N.W.M. Police,
Dawson, Y.T.

SIR,—I have the honour to make the following report on the seeds furnished by the Department of Agricultüre, Ottawa, for experimental purposes in the Yukon Territory.

The seeds received were as follows:—

Stanley wheat, Preston wheat, Bishop wheat—a small quantity. Improved Ligowo oats, Welcome oats. Mensury barley, Odessa barley. Vick's Extra Early potatoes, Early Rose potatoes, Rochester Rose potatoes, Vermont Gold Coin potatoes. Timothy grass, Western Rye grass, Hungarian grass, Brome grass.

Of these all the potatoes, wheat, and grass seeds were issued, a quantity of both oats and barley still remain on hand. Every application, whether by letter or in person, was filled. There was a number of people who applied for garden and vegetable seeds, but these could not be filled.

While a number of people were supplied with seeds only nineteen reports of results were returned, copies of which are attached. There was considerable dissatisfaction expressed over the condition of the potato seed as they had all sprouted, sprouts eight to ten inches long being common. This unfortunately could not be avoided as the seeds had to be kept through the winter and the only available place where they could be kept without freezing was the Q.M. store, where the temperature was naturally too high.

Taking into consideration the condition of the seed, the potatoes were a distinct success and did very well, more especially the 'Vermont Gold Coin.' Of this variety A. Blaker, of Dawson, reports he grew potatoes one pound in weight; G. A. Hatch, of Dawson, mentions potatoes of one and one-half pounds of the 'Early Rose.' A. Blaker reports that from one pound 14 ounces of seed he had a yield of 64 pounds of ripe potatoes.

The wheat seems to grow well, but only in three cases did it ripen, the season seems too short. Menard and Grenier, of Pelly River, report both samples of wheat to have grown four feet high and to have ripened, while John King, of Flat Creek, sixty miles from Dawson, reports that they headed in fifty days, grew tall and rank but did not ripen.

The barley, more especially the 'Mensury,' seems to have done very well. Thos. McCabe, of Minto, who says he has grown much barley in Lambton county, Ont., reports this barley to have the largest head he ever grew. From the different reports barley would undoubtedly be a success in this country, the only report of a failure coming from R. B. Devlin.

Of the oats, Mr. Swinehart, of Selkirk, reports the 'Welcome' variety a complete failure. R. B. Devlin reports both varieties as not doing well, all the other reports are favourable. Menard and Grenier, of Pelly, report both varieties to have grown four feet high and to have ripened; John King, of Flat creek, reports both varieties to have headed in forty-five days, grown four feet high, filled out very well, but did not quite ripen. Thos. McCabe reports both to have done well and to have ripened. The different grasses have all grown very well, no failure being reported, except from Thos. McCabe, whose seed failed to grow owing to the extremely dry season at Minto.

I have the honour to be, sir,

Your obedient servant,

T. A. WROUGHTON, *Inspector.*

Commanding 'B' Division.

YUKON TERRITORY.

SEEDS supplied by the Department of Agriculture, Ottawa, 1906.

REPORT OF A. BLAKER OF DAWSON, Y.T., 1906.

Name of Seed.	Date of Planting.	Nature of Soil.	Remarks on growth, present condition and suitability.
Odessa Barley	May 15	Light clay	Came up well and headed out early in July, but fell down; ripened fair; cut Aug. 20. Nice looking grain, plumper than the seed. Have not threshed out, but the yield will be only fair.
Mensury Barley	" 22	"	Same as above, but about 10 days later.
Preston Wheat	" 15	"	Made a good stand and headed out well, but did not ripen.
Potatoes, Vermont Gold Coin	" 27	Light loamy clay	This seed was badly sprouted; had sprouts 6 and 8 in. long. Kept in cool place until planting, but seed was in a bad condition then; planted 9 hills, yield45 lb. from 1 lb. 12 oz. seed. Lots of tubers weighed 1 lb. each. Cook dry and of fine flavour. Dug Sept. 15.
Potatoes, Early Rose	" 27	"	1 lb. 14 oz. seed; planted 21 hills, yield 64 lb. Was ripe a week before frost, otherwise as above. Dug Sept. 15.
Potatoes, Rochester Rose	" 15	"	1 lb. 8 oz. seed, in bad condition; planted 18 hills, yield 44½ lb. Fairly well ripened. Dug Sept. 15.
Potatoes, Vick's Extra Early	" 27	"	1 lb, 12 oz. seed, in very bad condition; planted 12 hills, yield 26½ lb. No good. Poor eating.

REPORT OF MENARD AND GRENIER OF PELLY, Y.T., 1906.

Hungarian Grass	May 15	Black sand	Grew from 1 to 6 inches.
Odessa Barley	" 5	"	Grew 3 ft. and ripened.
Mensury Barley	" 6	"	" "
Ligowo Oats	" 6	"	Grew 4 ft. and ripened.
Welcome Oats	" 6	"	" "
Preston Wheat			Spoiled in shipping.
Stanley Wheat	May 6	Black sand	Grew 4 ft. and ripened.
Bishop Wheat	" 6	"	" "
Rochester Rose Potatoes			Spoiled seed.
Vermont Gold Coin Potatoes	May 20	Black sand	Matured in fine shape.
Vicks Extra Early Potatoes and Early Rose			Spoiled seed.

The season has been so unusually dry that the crops have suffered for that reason in every respect.

Yukon Territory.

Seeds supplied by the Department of Agriculture, Ottawa, 1906.

REPORT OF THOS. McCABE OF MINTO, Y. T., 1906.

Name of Seed.	Date of Planting.	Nature of Soil.	Remarks on growth, present condition and suitability.
Preston Wheat	May 2	Sandy loam	Slow coming up, very dry season. Worst in 6 years; both kinds ripened and were a fair sample. Cut Aug. 15.
Stanley Wheat	" 2	" "	
Odessa Barley	" 2	" "	Slow in coming up; ripened and cut Aug. 15.
Mensury Barley	" 2	" "	Slow in coming up, but was a fair sample. Had the largest head of any barley I ever grew. I have grown much barley in Lambton County, Ont.
Welcome Oats Ligowo Oats	April 20		Both kinds came up early and did well for the dry season, ripened and was a fair sample. Cut Aug. 4th.
All grass Seeds	May 2		Did not grow. Season too dry.

REPORT OF G. A. HATCH OF DAWSON, Y. T., 1906.

Vermont Gold Coin Potatoes	May 7	Sandy	Gathered Sept. 12. 104 lbs. I think they will be a good potato for this climate.
Early Rose Potatoes	" 7	"	Gathered Sept. 12, 62 lbs.
Vick's Extra Early Potatoes	" 7	"	" " 12, 35 lbs.
Rochester Rose Potatoes.	" 7	"	" " 12, 91 lbs.
Stanley & Preston Wheat.	" 10	"	Fully headed and in full bloom Aug. 6, 38 inches high and the grains well formed. Cut Sept. 5, mostly ripened; would have ripened if left standing a few days longer.
Mensury Barley Odessa Barley	" 10	"	Fully ripened 3 weeks ahead of the wheat.

The oats also did well.

I had all the grass seeds which made a good start standing from 2 to 5 inches high on Sept. 20.

The potatoes were all planted and gathered on the same dates. The ground was well manured. In the Vermont Gold Coin yield there were 8 lbs. small potatoes, the rest running from the size of a hen's egg to 1½ lbs. each. The other varieties had more small ones. I intend to plant all I get from the 4 varieties next spring to give them a second trial.

YUKON TERRITORY.

SEEDS supplied by the Department of Agriculture, Ottawa, 1906.

REPORT OF JOHN KING OF FLAT CREEK COUNTRY, 1906.

Name of Seed.	Date of Planting.	Nature of Soil.	Remarks on growth, present condition and suitability.
Wheat	June 1	Sandy muck	Headed in 50 days and grew tall and rank but did not ripen.
Oats	" 1	" "	Headed in 45 days, grew nearly 4 ft. high, filled out very well but did not ripen on account of an unusually wet season.
Barley	" 1	" "	Headed in 45 days, grew 4 ft. high, filled out well and ripened. I think barley would be a success in this country.
Brome Grass	" 1	" "	Grew 22 inches high, very rank and heavy but only a few seeds appeared and these did not ripen.
Western Rye grass	" 1	" "	A very fine grass, grew thick and rank but no seeds formed.

I think that barley would be all right for this country as it did so well this year and could not have had a worse season. Oats would ripen nearly every year.

YUKON TERRITORY.

SEEDS supplied by the Department of Agriculture, Ottawa, 1906.

REPORT OF W. H. SWINEHART OF SELKIRK, Y. T., 1906.

Name of Seed.	Date of Planting.	Nature of Soil.	Remarks on growth, present condition and suitability.
Odessa Barley	May 4	Sandy loam	Season dry and growth slow but consider barley suitable for this climate. Cut Aug. 10.
Mensury	" 4	" "	" "
Stanley Wheat	" 4	" "	Conditions same as the barley, but don't consider it a success in this country. Cut Aug, 10.
Preston Wheat	" 4	" "	" "
Ligowo Oats	" 4	" "	Fine growth and consider them O.K. Cut Aug. 15.
Welcome "	" 4	" "	A complete failure, only a few stalks came to a head, they acted like winter wheat sown in spring. Cut nothing.
Brome Grass Western Rye grass Hungarian " Timothy "	May 5	" "	Did well and look fine at present, but will not be able to report as to suitability before next year.

Oat samples of above did not look good. I imagine grain was wet before threshing.

Barley samples did not look good and bright as they should.

YUKON TERRITORY.

SEEDS supplied by the Department of Agriculture, Ottawa, 1906.

REPORT OF R. B. DEVLIN OF BONANZA CREEK, 1906.

Name of Seed.	Date of Planting.	Nature of Soil.	Remarks on growth, present condition and suitability.
Stanley Wheat	May 22	Sandy loam	Growth fairly good but did not ripen.
Preston "	" 22	"	A total failure.
Welcome Oats	" 22	"	Very short and sparse.
Ligowo "	" 22	"	Just the same.
Odessa Barley	" 22		Did not mature at all.
Mensury "	" 22		" " "

Had also sown 10 acres of oats (sold here for feed). From the northwest portion of the field had a *very, very* heavy crop, balance of field a fair crop, oats well matured, but cut it for oat hay. Grown on same soil as samples, only not planted till two weeks later.

Have sown Timothy on 10 acres, looks well at present, and experimenting with it for next year.

REPORT OF W. HORKAN OF DAWSON, Y.T., 1906.

Potatoes.			
Vick's Extra Early	May 18	Sandy loam	Growth satisfactory.
Rochester Rose	" 18	" "	" "
Early Rose	" 18	" "	" good, early, medium size.
Vermont Gold Coin	" 18	" "	" very good, medium size.
Grasses.			
Brome	" 20	" "	Excellent results.
Hungarian	May 20 to June 10	" "	
Western Rye	May 15 to June 15	" "	" "
Timothy	May 15 to June 1	" "	Very vigorous growth.
		" "	Very satisfactory.

REPORT OF GEO. F. HENLEY OF WEST DAWSON, 1906.

Early Rose Potatoes	June 1st	Light sandy loam	Toward the middle of August some of the potatoes had grown to the size of a goose-egg, about three of such a size were dug from each hill and in addition perhaps six smaller potatoes varying in size from a pigeon's egg to that of a hen's egg. Light frosts about this time—Aug. 15—checked the growth. No manure of any kind was used unless moss be a manure. Virgin soil on the side hill about 150 ft. above the city flat was chosen. I am satisfied that properly manured soil would produce excellent potatoes.
Grass			I am sorry to have no report on the grass as it was destroyed by roaming cattle.

YUKON TERRITORY.

SEEDS supplied by the Department of Agriculture, Ottawa, 1906.

REPORT OF GEO. J. MILTON OF FIVE FINGER COAL CO., 1906.

Name of Seed.	Date of Planting.	Nature of Soil.	Remarks on growth, present condition and suitability.
Brome grass.......... Western Rye grass. ... Hungarian grass.......	June 1st....	Black loam.........	Seeds were planted a little too late, could not get land ready earlier. Grass seeds did very well and look very fine at present being about 1 ft. high, horses broke down the fence and ate up some of the grass. Hope to be in better shape to handle seeds next year. I believe all kinds of hardy grain and grass will grow in this country. I have a nice patch of Timothy and Clover growing.

REPORT OF McLAUGHLIN & GILLIN OF STEWART RIVER, Y.T., 1906.

Stanley wheat......... Preston "	May 19.	Black loamy soil....	Grew well but did not ripen.
Ligowo oats.......... Welcome "	" 19..	" "	Planted too late to ripen.
Mensury barley..... Odessa "	" 19..	" "	Headed well but did not ripen.
			Had we planted the above seeds earlier, undoubtedly they would have matured as they were very thrifty and headed well.
Grass seeds...........	....	....	Can't tell until next year.

REPORT OF W. S. LAURENCE OF FORTY MILE, Y.T., 1906.

Welcome oats.... .... Ligowo "	May 18..	Upland...........	Both kinds are quick growers, matured in 100 days, short heads and light straw.
Mensury barley.........	" 18..	"	Headed well and ripened early.
Preston wheat.......	" 18..	"	Slow growth and small heads.
Stanley "	" 18..	"	" " "
Potatoes, Vick's Extra Early and Rochester Rose................	" 18..	Island sand	Good growth and well matured.

REPORT OF C. A. LAMPHERE OF GOLD RUN, Y.T., 1906.

Vick's Extra Early potatoes............. Early Rose potatoes... Rochester Rose potatoes	May 17..	Sandy loam.........	Vick's Extra Early were a success, one seed producing as many as ten large smooth white potatoes without a blemish of any kind. Rochester Rose did not do well.
Stanley wheat......... Bishop " .... Preston " .. .... Welcome oats......... Ligowo " .... Mensury barley.. ..... Odessa "	" 20..	"	All grains except the samples of wheat grew well, Mensury barley being the best. Both samples of oats produced a good healthy crop but did not mature on account of the early frost.

YUKON TERRITORY.

SEEDS supplied by the Department of Agriculture, Ottawa, 1906.

REPORT OF T. BELL OF STEWART RIVER, 1906.

Name of Seed.	Date of Planting.	Nature of Soil.	Remarks on growth, present condition and suitability.
Brome, Western Rye and Hungarian grasses.....	May 10..	Silt................	I think pretty fair for first year, grass about 2 feet high. I did not plant the potatoes as they were all frozen.

REPORT OF C. E. KINSEY OF UPPER DOMINION CREEK, 1906.

Oats....................	....	Muck...............	Did very well considering the backwardness of the season, but doubt they would ever ripen on this end of the Creek.
Wheat and Barley ...	....	....	Not sown owing to the backwardness of the season.
Timothy grass..........	....	....	" " "

REPORT OF JESSE H. ROGERS OF DOMINION CREEK, 1906.

Timothy grass....	June 1..	Sandy loam.........	All the seed came up and grew to about 3 inches, expect a good crop of hay next year.

REPORT OF MRS. FLEISHMAN OF DAWSON, Y.T., 1906.

Grasses—			
Western Rye.........	May 22...	Heavy loam	Very good crop.
Timothy.............	" 22...	"	Good crop.
			Both these seeds were a great success, I have tried seeds before but did not do as well as with these.

REPORT OF R. McCLUSKEY OF DAWSON, Y.T., 1906.

Potatoes—			
Vermont Gold Coin...	May 28...	Black schist........	Good crop, 1 stalk produced 4 potatoes weighing 7½ lb.
Vick's Extra Early, Rochester Rose, Early Rose	" 28...	"	Average crop.
Barley................	" 28...	"	Both samples a good crop, will grow in the country.
Oats..................	" 28...	"	A good crop from both samples.
Timothy grass.........	" 28...	"	Grew very well.

REPORT OF DAVID COLLINS OF GRAND FORKS, 1906.

Oats..................	May 20...	Heavy loam on hill-side...............	Very good oat, ripened.
Barley................	" 20...	" " ..	Fully matured with good heavy grain.
Potatoes..............	" 20...	" " ..	Seed frozen when received.

TESTS OF THE VITALITY OF SEED GRAIN AND OTHER SEEDS.

The following report includes tests of grain and other seeds grown on the several experimental farms, as well as those bought with the object of growing them on the farms. The list also includes tests of the vitality of a number of specimens of grain grown in the several provinces of the Dominion from the samples distributed from the Central Experimental Farm. These tests have been made with the object of ascertaining what climatic conditions are most favourable for producing seed of high vitality and how far this desirable quality is likely to be influenced by variations in character of season. Formerly these tests included a number of doubtful samples which were believed by the parties sending them to have been injured in their vitality by exposure to unfavourable conditions. All such samples are now referred to the Seed Commissioner for report. The results reported on here are the average proportions of vitality shown by samples of grain grown in different parts of the several provinces of Canada under healthy and normal circumstances. In the following table showing the results by provinces, the total percentage of vitality is given, also the percentage of strong and weak growth.

RESULTS OF TESTS OF SEEDS FOR VITALITY, 1905-06.

Kind of Seed.	Number of Tests.	Highest Percentage.	Lowest Percentage.	Percentage of Strong Growth.	Percentage of Weak Growth.	Total Percentage of Vitality.
Wheat	552	100·0	9·0	79·5	4·7	84·2
Barley	357	100·0	36·0	82·3	8·9	91·3
Oats	400	100·0	35·0	90·7	3·8	94·6
Rye	12	95·0	60·0	72·0	5·2	77·3
Peas	201	100·0	46·0	....	....	87·0
Corn	14	100·0	66·0	....	....	93·2
Beans	6	100·0	48·0	....	....	89·3
Clover	13	94·0	10·0	....	....	74·5
Grass	3	95·0	40·0	....	....	66·0
Flax	22	96·0	52·0	....	....	73·0
Carrots	5	27·0	16·0	....	....	21·6
Tares	1	86·0	86·0	....	....	86·0
Turnips	1	100·0	100·0	....	....	100·0
Miscellaneous seed	47	84·0	2·0	....	....	32·5

Total number of samples tested, 1,634. Highest percentage of vitality observed, 100; lowest, 2.

TABLE SHOWING RESULTS OF GRAIN TESTS FOR EACH PROVINCE.

Kind of Seed.	Number of Tests.	Highest Percentage.	Lowest Percentage.	Percentage of Strong Growth.	Percentage of Weak Growth.	Total percentage of Vitality.
Ontario.						
Wheat	242	100·0	9·0	69·3	6·8	76·1
Barley	122	100·0	36·0	71·1	14·5	85·7
Oats	115	100·0	60·0	88·5	4·4	92·9
Quebec.						
Wheat	35	100·0	63·0	91·5	2·1	93·7
Barley	33	100·0	86·0	90·0	6·3	96·4
Oats	36	100·0	61·0	89·6	3·6	93·3
Manitoba.						
Wheat	69	100·0	79·0	90·4	2·8	93·3
Barley	46	100·0	87·0	84·2	9·5	93·8
Oats	61	100·0	83·0	93·4	2·9	96·3
Alberta.						
Wheat	10	100·0	65·0	83·3	4·3	87·6
Barley	6	97·0	85·0	85·5	7·8	93·3
Oats	8	93·0	35·0	76·0	6·1	82·1
Saskatchewan.						
Wheat	71	100·0	67·0	86·8	3·3	90·1
Barley	54	99·0	41·0	86·5	4·3	90·8
Oats	62	100·0	73·0	89·4	3·8	93·2
Nova Scotia.						
Wheat	44	100·0	76·0	89·5	2·7	92·2
Barley	39	100·0	74·0	89·7	5·5	95·3
Oats	44	100·0	92·0	95·0	2 6	97·7
New Brunswick.						
Wheat	19	99·0	51·0	88·7	2·8	91·5
Barley	13	99·0	78·0	86·7	6·3	93·0
Oats	15	100·0	86·0	90·7	4·1	94·8
Prince Edward Island.						
Wheat	15	99·0	67·0	89·0	2·7	91·7
Barley	6	100·0	93·0	92·3	4·8	97·1
Oats	12	100·0	90·0	92·7	3·7	96·5
British Columbia.						
Wheat	47	100·0	58·0	78·8	4·5	83·3
Barley	38	100·0	77·0	92·1	4·3	96·5
Oats	47	100·0	85·0	93·0	4·5	97·5

Signed, WILLIAM T. ELLIS.

BULLETINS ISSUED DURING 1906.

Three bulletins were issued this year, No. 53 on the 'Results Obtained in 1905 from Trial Plots of Grain, Fodder Corn, Field Roots and Potatoes.' This bulletin was prepared jointly by Dr. C. E. Saunders, Cerealist, and the Director.

In this bulletin there are given the results of experiments which were conducted at all the experimental farms during the season of 1905 with spring wheat, oats, barley, pease, Indian corn, turnips, mangels, carrots, sugar beets and potatoes. The relative earliness and productiveness of the varieties are also recorded, with the average crops obtained during the past five years, the several varieties being placed in the lists in the order of their productiveness for that period. A considerable number of cross-bred varieties produced on the experimental farms are included in these tests.

No. 54, on the 'Breeding, Feeding and General Management of Poultry.' Part 1 of this bulletin was written by Mr. A. G. Gilbert, Poultry Manager, in which is discussed the principles underlying profitable poultry raising, description of breeds, rations and manner of feeding them, the moulting of fowls and methods of shortening this period of non-production. Short chapters are also written by Mr. Gilbert on turkeys, ducks, and geese.

Part 2 was prepared by Mr. Victor Fortier, Assistant Poultry Manager, in which he treats of incubation, natural and artificial, poultry raising, the fleshing of chickens and the fattening of fowls, poultry buildings and runs and the general treatment of poultry, including diseases, injuries, &c.

Bulletin No. 55 treats of the crops obtained in 1906 from the annual trial plots on the several experimental farms. This is the twelfth of that series of bulletins and was prepared jointly by Dr. C. E Saunders, Cerealist and the Director. In this bulletin the crops of each year are given, also the average of the past five years, showing the relative productiveness of the many different sorts in the several provinces of the Dominion in which the experimental farms are located. For example, the average crop produced in 1906 by the sixteen varieties of spring wheat under trial at Ottawa was 32 bushels 38 lbs. per acre. At Nappan, N.S., it was 29 bushels 27 lbs. At Brandon, Man., 35 bushels 52 lbs.; and at Indian Head, Saskatchewan, 42 bushels 11 lbs.

Of oats there were 37 varieties under trial, these gave at Ottawa an average crop of 60 bushels 11 lbs. per acre; at Nappan, N.S., 47 bush. 18 lbs.; Brandon, 97 bush. 31 lbs.; Indian Head, 105 bush. 25 lbs., and at Agassiz, 60 bush. 7 lbs. per acre. The results obtained from these uniform trial plots show that there are marked differences in the relative productiveness of varieties even when grown side by side under similar conditions. Such facts point to the importance of farmers choosing for seed those sorts which give the heaviest crops.

JOURNEYS THROUGH THE WEST.

It has been my privilege to travel through the past year over several important districts in Western Canada, concerning which a few notes are submitted. These notes were taken mainly along the line of railway and in such cases only those parts of the country in sight of the railway are referred to.

CALGARY TO EDMONTON, SEPTEMBER 5, 1906.

From Calgary to Beddington, 11 miles, much of the land is used for ranching purposes and very little in the way of grain crops is seen, only a few small fields of oats or wheat. Beddington to Airdrie, 9 miles, land still devoted mostly to ranching, fields of grain seen in increased number.

Airdrie to Crossfield, 10 miles (31 from Calgary). The land for about the first 27 miles from Calgary is quite bare of trees or shrubs, but about 7 miles beyond

Airdrie the first shrubs appear, mostly small bunches of willows. A few fields of oats, barley and brome grass were seen in this district. Crossfield is growing rapidly. The land seems to be of good quality in this vicinity. About Crossfield and north the shrubby growth of willows is more plentiful and covers some of the fields in the neighbourhood quite thickly.

Crossfield to Carstairs, 10 miles. Fields of oats plentiful in this area, also some fields of winter wheat. In some parts quantities of hay were cut and stacked, the growth of grasses was quite heavy here. The town of Carstairs is growing very fast. The first poplar trees seen in this district were north of Carstairs. Willows were abundant there.

Carstairs to Didsbury, 8 miles. Saw crops of spring wheat nearly ripe and numerous fields of oats, many of them in stook; also, several large fields of winter wheat well up and quite green. Didsbury is a good-sized town and growing fast. Saw some large fields of wheat north of Didsbury, also some large areas in summer fallow.

Didsbury to Olds. Country well settled, saw many large fields of good spring grain, some cut, some still standing. Some fields of winter wheat; a fine stretch of country with many good farms. Haying was in progress all along the route. Country partly covered with trees and scrubby undergrowth, especially beyond Olds.

From Olds to Innisfail, 19 miles, the district is well settled. Many fields of spring wheat and oats were seen and much of the grain was ripe. Innisfail is a good dairy centre and a thriving town. One of the largest creameries in the Northwest is well sustained here.

From Innisfail to Penhold, 5 miles, is a very pretty country with an extended view, some fine farm lands lying on a nice slope near Innisfail with a pretty lake in the background.

From Penhold to Red Deer, 10 miles, some of the land along the railway is good; other sections are rather low and some apparently wet. This district yields large crops of hay. Red Deer is a thriving place and quite a business centre, with some very good country around it.

From Red Deer to Blackfalds, 12 miles, there is much good hay land most of which is probably too low for successful grain growing. There are, however, many fields of grain on the higher lands. The land in this vicinity varies much in quality, some of it being very good while other sections are light and gravelly. Some good winter wheat has been grown in this locality.

Blackfalds to Lacombe, 7 miles. Land generally good and well settled, the higher lands are devoted to grain growing while the lower portions produce excellent hay.

A NEW EXPERIMENTAL FARM AT LACOMBE.

Lacombe is a busy town which has good railway facilities. Besides being on the Calgary and Edmonton line, it has a branch line extending 51 miles east to Stettler. On examining this district a very good and suitable site was found for a branch experimental farm for Northern Alberta. This is the southeast quarter of section 24—40—27. This quarter section adjoins the town; the railway runs across the lower corner of it cutting off from 15 to 20 acres. The Hudson Bay trail to Edmonton, one of the principal roads for travel in this part of the country, also passes through this land. This leaves about 150 acres available for cultivation, a large proportion of which has already been brought under crop. The soil is a dark loam, rich and fertile, partly clay and partly sand, much of it with a clay subsoil. This quarter-section lies on a beautiful slope facing the railway, and nearly all of it can be seen from the passing trains. It is also within easy walking distance from the station, about a mile. This farm has water of excellent quality. This land has been secured and the establishment of an experimental farm for Northern Alberta on this site is now in progress.

Lacombe to Morningside, 6 miles. Beyond Lacombe the country continues much the same to Morningside. Many fields of grain were seen, although the larger part of the land was in hay. A fine open country with good views of the distant fields from the train. From Morningside to Ponoka, 7 miles farther, much the same scenery prevails.

From Ponoka to Hobbema, 12 miles, much of the land is low, a valuable hay-making district. Not many improved farms seen from the railway. There are good lumber mills at Ponoka. Spruce timber grows here to a fair size, and in considerable quantities. There is a large Indian reserve along this district on which there is practically no land broken on the railway front, but stacks of hay were put up at several points.

Hobbema to Wetaskiwin, 10 miles. As soon as the Indian reserve is past the country becomes well settled and fields of grain again appear on the landscape. Immediately about Wetaskiwin the land is rather flat, but the soil is very good over most of this district and considerable quantities of grain are grown here on both sides of the railway. There is a branch railway running southeast from Wetaskiwin to Hardisty, a distance of 95 miles.

From Wetaskiwin to Millet, 11 miles, considerable quantities of grain were seen, chiefly in stook. Land rather flat and some of it low on each side of the railway, about Leduc there are several small lakes or ponds on the east side of the town, surrounded by good natural hay-lands.

Millet to Leduc, 11 miles. A large number of grain fields about Leduc, one elevator there. From Leduc to Otoskwan, 10 miles, many more grain fields were seen; as yet, however, only a small proportion of the available land is under cultivation.

Otoskwan to Strathcona, 9 miles. Some very good land in this district and considerable quantities of grain are grown. Both Strathcona and Edmonton, on the opposite side of the Saskatchewan river, are favourably located with fertile lands all about them. As a rule the lands about the margin of the river are somewhat light in character, a sandy loam of a dark colour, while heavier clayey soils prevail a short distance from the river. Edmonton has grown wonderfully and is expanding in every direction.

EDMONTON TO HUMBOLT.

September 1, 1906.—During this journey about 400 miles of the main line of the Canadian Northern Railway were covered and a large area of fine country seen. Many settlers are moving in all along the line and every year large additional tracts of land are brought under cultivation. As a rule the remarks on what was seen in passing through apply only to the land in view from the railway. More extended information was occasionally had by stopping over and taking drives through the country and calling on some of the settlers. This was done whenever time would permit.

Edmonton to Oliver, 8 miles. Passed some fine fields of oats mostly cut, and some of wheat all cut. Oliver to Fort Saskatchewan, 9 miles. There is quite a large area under crop in this district and a quantity of new land is being brought under the plough. The cutting of crops was proceeding rapidly. The town of Fort Saskatchewan is growing very fast.

Fort Saskatchewan to Scotford, 7 miles. Saw some fair crops of wheat. There is not yet much land under cultivation in this locality and the treatment of the soil by the new-comers is not always very thorough. The fields of grain seen were more than half cut, straw rather short crop, mostly medium, in some places good.

Scotford to Bruderheim, 6 miles. Saw a good deal of crop in this district, the wheat was all cut and most of the oats. Considerable quantities of spruce suitable for timber were seen in the woods through which we passed. Bruderheim to Lamont, 7 miles. A good country, with good land and where fields were under cultivation the crops were good.

Lamont to Chipman, 8 miles. Saw many fields of grain; the country is here more open and prairie-like, not without brush, but it is small and scattered. The soil at Chipman seemed rather shallow, a greyish clay with more or less black soil intermixed, with rather a hard clay subsoil. A mile or two out from the town the soil changed again to a deep friable black loam and fields of grain again appeared.

Chipman to Mundare, 14 miles. The grain seen here was rather short in straw, but would probably give a fair crop. Galician houses, one story high, neatly thatched and more or less ornamented were frequently seen. In this part of the country there are many Galicians settled, within a radius of 50 or 60 miles there are said to be from twelve to fourteen thousand of them. They seem to till their land well and to average good crops. Mundare has made but very little growth. The almost exclusive foreign element in the population does not seem favourable to the rapid growth of a town.

Mundare to Vegreville, 14 miles. A stop was made at this thriving town which was about six months old and had a population of four to five hundred. A pleasant and interesting drive was taken through this part of the country covering about 60 miles in all, visiting Beaver Lake and many parts of the numerous Galician settlements. The progress made in the cultivation of their land seemed in many instances to be slow, due doubtless partly to the fact that at first many of the settlers are obliged to work out for other farmers or on the lines of railway to earn money with which to buy implements, stock, &c., for their farms, also food supplies for their families. Several homes were visited where the inmates had been three or four years on their farms. These had accumulated some stock and had good-sized fields of grain, and seemed contented. There is no doubt that after a time they will make good progress as they are industrious and frugal.

From Vegreville to Lloydminster, about 100 miles, the line was passed over in the night and the following day spent in driving about among the Barr colonists. These people who came over from England in a body some three or four years ago, have made good progress. Most of them have completed their homestead duties and have taken out the patents for their land and many of them now have with the increase in the value of their homesteads, property varying in value from $1,500 to $2,000 or more. They seem to have adapted themselves to their conditions, are living in a fair degree of comfort and are moving along towards comparative independence. A drive of 20 miles was taken through the district from Lloydminster to Lashburn and many of the settlers called on. The land in this district seems very good and the crops realized had been satisfactory.

Lashburn to Maidstone, 14 miles. Passed through much the same sort of country as in the drive from Lloydminster. While most of the land seen was very good, some fields were passed where the soil was lighter, and occasionally sandy or gravelly soil was noticed. From Maidstone to Paynton, 16 miles, the soil averages much lighter, much of it being sandy; the land however, improves in quality near Paynton.

Paynton to Delmas, 15 miles. Land variable in this district, part of it stony, some sandy or gravelly and some portions of better soil. Delmas to North Battleford. Leaving Delmas the land is at first of better quality then stony and gravelly alternating with better land. This is a fine open district; as the Saskatchewan river is reached, the grade takes the train gradually down and the crossing is made over a high bridge.

North Battleford was growing very rapidly and new houses were going up in every direction. The land along the bank of the Saskatchewan is for the most part a sandy loam and is variable in character. Very little grain was seen on either side of North Battleford. From that town to Denholm, 17 miles, several fields of grain were seen. The soil was quite variable, some of it good, but the larger part seen from the railway was stony and gravelly.

From Denholm to Ruddell, 9 miles, the country is fine and open and most of the land very good when one gets away from the river. At Ruddell there was some crop on a hillside which looked very promising.

Ruddell to Fielding, 17 miles. Much of the soil in this locality seems to be a rather light sandy loam. The fields of wheat seen did not promise a heavy crop and the oats were short in the straw. North of Fielding there were large crops of excellent grain. There the land was lower and probably had a heavier soil. The town of Fielding is growing fast and there is a fine stretch of country about it extending for some miles.

Fielding to Radisson, 9 miles. The town of Radisson has also made excellent progress. The land east of the town seems very good and a large acreage there is under crop. The land on the west side is rather low and wet. This district is a promising one, most of the land is very good and there is a large acreage of land newly broken.

Radisson to Langham, 15 miles. The land through this district is somewhat variable, much of it is good, but some sections are lighter and more or less sandy. Land very similar from Langham to Warman Junction, where the main line crosses that from Regina to Prince Albert. About the junction the soil is comparatively light and the crops of wheat were only medium, the stooks comparatively few and the straw shorter than the average.

Warman to Clarkboro and Aberdeen, 11 miles. Before reaching Clarkboro the Saskatchewan river is crossed on a fine iron bridge. After this the railway runs along a stony ridge where stone lies on the surface on either side in great abundance. After a few miles the land becomes free from stone but is light in quality. Passed a Doukhobor village in the distance between Clarkboro and Aberdeen. There is here a large piece of open prairie with a few occasional small clumps of willow. About Aberdeen many stacks of grain were seen. Much of the soil appears to be of good quality.

Aberdeen to Vonda, 8 miles. Land variable, some light, other sections fairly heavy; not much crop in sight, most of the land unimproved. Depth of loam variable and mostly of a dull, dark-reddish colour, sometimes of a light sandy or light coloured clayey character, and in some places gravelly. Within several miles of Vonda the character of the soil changes to a good black loam and wheat fields again appear. One very large field and several smaller ones were seen near Vonda, the crop appeared to be good. Vonda is a thriving town which has been all built within about a year. There is a Galician settlement north of this town.

From Vonda to Howell, 9 miles, is an open prairie country where a few fields of wheat were seen which looked rather light, probably due to imperfect preparation of the soil. Howell to Dana, 9 miles. Howell is a new town about three months old and growing fast. It has a good farming country about it. Between Howell and Dana there is some stony land, but as Dana is approached it becomes less stony and a considerable quantity of land has been broken. Before reaching Dana many bluffs of poplar and willow were seen and the country became more rolling. Passed several large lakes, two or three miles distant from the railway.

Dana to Bruno, 8 miles. Land open and prairie-like with more or less stones scattered over its surface, these are also quite numerous occasionally along ridges. Saw a few fields of wheat in this locality which promised a good return.

Bruno to Carmel, 8 miles. Soil light, with a gravelly subsoil, looked very dry. The surface loam was for the most part a thin layer with a pale grey subsoil of a sandy or clayey character.

Carmel to Humbolt, 8 miles. Along this part of the line there were a few pieces of breaking, but no crop worth mentioning until near Humbolt, where settlement is more dense and a number of wheat stacks were seen. The town of Humbolt is very badly situated on low land amongst several sloughs or ponds filled with stagnant water. Pieces of land near the town which lie above the sloughs have produced some good wheat. On land north of the town three or four miles where it rises gradually some very fine fields of wheat were seen in stook, which, judging from the size and number of the stooks and the character of the stubble, would give a heavy yield. In driving over the country an occasional field was met with which was quite stony. Most of the land, however, seems to be free from stone and of very good quality.

North of Humbolt for 25 miles or more to Dead Moose Lake the land is said to be very good and all homesteads taken, but north of that the country is rough and broken, mostly covered with wood and an abundance of sloughs for 20 miles or more, beyond which to Melfort, a distance of about 30 miles, the land is again good and the greater part of the homesteads taken. South of Humbolt the land is said to be nearly all good and most of the homesteads taken, and for 40 miles east to the Quill lakes the land is reported as very good and the country well settled.

REGINA TO PRINCE ALBERT, SEPTEMBER 13.

From Regina to Condie, 9 miles, was almost one continuous wheat field all now cut and in stook, the crop here seemed to be very heavy. Condie is a small place, but has three elevators. From Condie to Lumsden, 11 miles, most of the district (the Qu'Appelle valley) furnishes excellent hay and pasture. Lumsden is growing rapidly and for several miles there are considerable tracts of land in the valley under cultivation. Going up out of the valley, the great level country is reached and about Disley, 8 miles farther on, there are a few large fields of wheat in sight.

From Disley to Bethune, 9 miles, the soil is light, but there were a few grain fields in sight from the railway near Bethune. From Bethune to Findlater, 10 miles, most of the land is thickly covered with small stones mixed with occasional larger ones and this condition extends to Findlater. Practically there is no cultivation in this district on either side of the railway. From Findlater to Chamberlain, 9 miles, similar conditions continue although the land is somewhat less stony, and from Chamberlain to Aylesbury, 8 miles farther, the land continues very stony and no attempts at cultivation were seen between these points.

Aylesbury to Craik, 9 miles. At Aylesbury, where there is no town—only a siding—two elevators have been built. The land continues stony here along the track, but some two or three miles distant on either side the land becomes good and a considerable quantity of wheat is grown. From Craik to Girvin, 9 miles, there are large areas of wheat which, judging from the character of the stubble must have yielded well. Craik is growing rapidly, but at Girvin, about which there is not much land under cultivation, not so much progress is being made.

Girvin to Davidson, 6 miles. Davidson is surrounded by good land, and many large fields of grain were in sight. A large town has sprung up here where three or four years ago there was nothing but bare prairie.

Davidson to Bladsworth, 12 miles. Much grain seen at a distance from the railway, especially near Davidson. As Bladsworth is approached much of the land is of poorer quality and there is very little of it under cultivation. From Bladsworth to Kenaston, 11 miles, there is also very little crop. Much of the soil looks light with more or less alkali. Bladsworth and Kenaston are both small places and seem to be making slow growth.

Kenaston to Hanley, 14 miles. Leaving Kenaston the land for some distance is inferior in character but as Hanley is approached the land becomes good and there was a large amount of crop seen. Hanley is a good sized town and is growing rapidly.

From Hanley to Dundurn, 11 miles, the land is of excellent quality and there was a very large area of wheat in sight, either wheat in stook or summer fallowed land being visible as far as the eye could reach on either side. The quantity of wheat produced in this district is very large.

Dundurn to Saskatoon, 14 miles. After travelling a few miles from Dundurn there was no grain seen worth speaking of until near Saskatoon where many large fields were seen both north and south of that place. Much of the land on the east side of the Saskatchewan is light although there are some good farms. On the west side of the river the land is much better, most of it of very good quality with a dark clay loam of a considerable depth with a dark chocolate-coloured clay subsoil.

Saskatoon to Warman, 12 miles. Saskatoon has grown to be a large place and is extending its boundaries rapidly. For some miles out, many large fields of grain were seen, but towards Warman there is not much land broken. Warman is a young and growing town. Opportunity was afforded there of examining the land at several points; most of it was a light sandy loam not very deep with a subsoil varying in different parts from stiff clay to sandy clay and in some places a light coloured sand. There were a few stones on the surface and a good many in the subsoil.

Warman to Osler, 6 miles. About Osler the land is much lighter and some of it gravelly. From Osler to Hague, 10 miles, much of the soil is light and there was not much grain seen from the railway.

Hague to Rosthern, 12 miles. As Rosthern is approached most of the land becomes good, large quantities of wheat are in sight and the crops are fairly heavy. At Rosthern a large quantity of wheat is marketed.

Rosthern to Duck Lake, 11 miles. Beyond and about Rosthern on every side there were large quantities of wheat, most of it in stook and threshing progressing rapidly, country fairly level and well settled. Most of the land south of Duck Lake seems very good and grows excellent wheat. Nearer the lake the grass is good and affords excellent crops of hay.

Duck Lake to Roddick, 9 miles. From Duck Lake north, the country begins to be wooded and grain fields become much less plentiful. From Roddick to Macdowall, 9 miles, spruce is very abundant, associated in wet spots with tamarack, the higher points being covered with poplar.

Macdowall to Prince Albert, 20 miles. The grain crops all through this district are quite limited. Such wheat as is grown in this locality is used chiefly in a local mill belonging to the Hudson Bay Co. at Prince Albert. In some places the country is more open with a good deal of hay land and a considerable number of sloughs and small lakes with good farm land intervening. The soil all through the Prince Albert district up to the Saskatchewan seems to be rich and fertile and will bear good crops wherever the soil is high enough above the sloughs and ponds with which the country abounds, to admit of early cultivation. On the opposite side of the North Saskatchewan there is a margin of good land for a mile or two, then a swampy district thickly covered with tamarack and north of this there are many miles of sandhills covered with Jack Pine. Most of the larger trees have been cut for lumber, the smaller trees covering the ground quite thickly. In some places the pine was more or less replaced by poplar (*P. tremuloides*). North of this belt of Jack Pine there are hay-lands with sloughs which are said to extend for about 20 miles to Sturgeon Lake. Beyond this the country is said to be again fit for settlement.

There is a large lumber industry at Prince Albert. The Shell river and the Red River of the North both empty into the Saskatchewan above Prince Albert, and logs are brought down these streams to the lumber mills for 100 miles or more.

PRINCE ALBERT TO MELFORT.

A trip was taken of 56 miles over this northern section of the Canadian Northern Railway beginning August 6, 1906.

Prince Albert to Davis, 10 miles. In this district there is very little land under cultivation. There are considerable quantities of wood and a large number of small ponds and lakes. The land looks good but is much broken.

Davis to Birch Hills, 16 miles. There is not much settlement yet along this line, the country is thickly covered with bluffs of willow and poplar and there are many ponds, some of the shallower of which had dried up leaving a white alkaline deposit. Small trees cover a large part of the land, too large a part to make it attractive to the settler who is looking for wheat land, but for mixed farming and the raising of stock, this district offers many advantages.

Birch Hills to Kinistino, 20 miles. The country has much the same wooded character as that travelled over from Prince Albert here, but before reaching Kinistino the country becomes more open and better settled with larger areas under crop and much less affected by sloughs.

Kinistino to Melfort, 10 miles. The Carrot river is crossed soon after leaving Kinistino and the land here from some miles west of Kinistino to Melfort seems to be of very good quality. This part of the district is more open and is well settled and there is much more crop to be seen, especially wheat.

At Melfort a stop was made and a drive taken over the country which afforded opportunity for examining several farms. The soil for the most part was excellent—a rich sandy loam with plenty of humus in it and more or less mixed with clay. The soil was about 15 inches deep with a friable clay subsoil. The different farms examined were almost uniformly good as to soil and the whole district has an excellent reputation for productiveness.

VISITS TO THE BRANCH EXPERIMENTAL FARMS.

Visits were paid to the branch experimental farms in the west during August and September, and the farm for the maritime provinces was visited in October.

EXPERIMENTAL FARM, BRANDON, MAN.

In Manitoba the season was very favourable both for seeding and subsequent growth, germination was even and growth rapid and there was no injury from late spring frosts. There was a promise of very heavy crops when rust appeared and reduced the yield somewhat. Subsequently as the wheat was about maturing a few days of excessive heat with a south wind ripened it up rapidly and thus the expected average yield was further reduced. Harvest began about August 15; the weather was good and the grain secured in excellent condition. The harvest on the whole was fully a week earlier than usual.

The field crops of spring wheat varied from 28 to 44 bushels per acre, the experimental plots from 21 to 35 bushels. Oats varied from 70 to 116 bushels per acre; barley from 44 to 66 bushels, and pease from 38 to 58 bushels per acre.

Indian corn ranged in crop from 14 to 31 tons of green fodder as cut for the silo, this crop was good and well matured. Turnips yielded from 18 to 26 tons; mangels 24 to 38 tons, and potatoes from 256 to 495 bushels per acre. The crop of fruits of most sorts was below the average.

The general condition of the farm and stock, also that of the implements, tools, &c., was creditable to the superintendent.

EXPERIMENTAL FARM, INDIAN HEAD, SASK.

The season of 1906 was generally favourable to crops both in Saskatchewan and Alberta. Spring wheat, oats and barley all gave good returns. The spring opened early in April and continued favourable until seeding was completed. Abundant moisture caused rapid and satisfactory growth. In July hot weather checked excessive growth in straw, and a second hot period in August hastened ripening and brought on an early harvest.

The harvest weather was good and the grain was gathered promptly. Threshing started without delay on completion of the harvest and was finished early. A hail storm, the first ever experienced at Indian Head, occurred on July 24. This injured all the crops more or less, but the injury was not very severe. The fields of spring wheat varied in yield from 25 to 38 bushels per acre; the experimental plots gave from 35 to 48 bushels. Oats in field crop gave from 60 to 87 bushels; in plots the return was from 78 to 128 bushels per acre.

Barley in field crops returned from 50 to 58 bushels per acre and in experimental plots from 40 to 65 bushels. Pease also gave excellent returns, in field lots from 32 to 42 bushels per acre and in plots from 30 to 45 bushels.

Indian corn cut green for the silo gave from 12 to 16 tons per acre; turnips from 14 to 22 tons; mangels from 14 to 28 tons, and potatoes from 224 to 433 bushels per acre.

The farm throughout was in excellent condition, showing evidences of thoughtful care and attention on every hand.

EXPERIMENTAL FARM, AGASSIZ, B.C.

The past winter was a mild one, the lowest temperature during the season was on December 17, when the thermometer registered 15 degrees of frost. The summer on the whole was a good one for most farm crops. The spring opened early, clover was six inches high by the end of March; cold winds and frequent showers in April and May kept the crops from growing rapidly and frequent showers in June made it difficult to cure hay. During the dry and warm weather in July and August the grain made good progress and with favourable harvest weather was saved in good condition. The hay crop throughout the province was a good one and in most localities was well saved. The wheat crop in the interior of the province was very good, but very little wheat is grown in the coast climate. The oat crop throughout the province was above the average and was harvested in good condition. Not much barley is grown, but the yield has been very satisfactory. Field roots owing to the dry weather which prevailed during the greater part of July and the first half of August gave crops which were somewhat below the average. The yields of potatoes were good. The different varieties of oats grown have varied in yield from 43 to 73 bushels per acre; barley from 27 to 49 bushels, and pease from 26 to 50 bushels. Indian corn cut green for fodder has given from 11 to 24 tons; turnips from 11 to 23 tons; mangels from 11 to 27 tons, and the different varieties of potatoes tested have varied from 200 to 611 bushels per acre.

The cold damp weather of April and May was unfavourable for many varieties of fruit. The crop of apples was about an average one, in some orchards it was heavy. Pears and cherries were a light crop. There was a fairly heavy crop of plums of very fine quality and very free from rot.

The cattle and sheep have done well. There have been many visitors to the farm during the year who have expressed much appreciation of the work in progress.

EXPERIMENTAL FARM, NAPPAN.

The season was not a particularly good one at Nappan, a long wet period in the spring had the effect of making all spring sown crops later than usual. Hay on the whole was a better crop than the average.

The very wet spring was followed by unusually hot summer weather which hurried the grain rapidly to maturity, and the quality of the crop was not quite up to the average, the yield also for the same reason was somewhat lessened. Pastures during the early part of the season were good, but they suffered from the hot weather later on.

The different sorts of crops under trial gave results as follows: spring wheat from 26 to 34 bushels per acre; oats from 40 to 63 bushels; barley from 30 to 45 bushels, and pease from 18 to 35 bushels.

Indian corn cut green for the silo gave from 15 to 25 tons; turnips from 15 to 30 tons; mangels from 13 to 24 tons, and potatoes from 242 to 503 bushels per acre. Eighty-five acres of hay yielded 132 tons 1,745 lbs.

Successful experiments were conducted in the feeding of steers, also with swine. Interesting and useful tests were also made with many different sorts of fruits and vegetables.

NEW BRANCH EXPERIMENTAL FARMS.

Two new branch experimental farms have recently been established, one at Lethbridge to serve the purposes of Southern Alberta, the other at Lacombe for Northern Alberta. The experimental farm for Southern Alberta is situated about 2½ miles from the town of Lethbridge on the Lethbridge and Crowsnest section of the Canadian Pacific Railway. It consists of 400 acres of land, 100 acres of which can be irrigated. The other 300 acres lie too high to admit of this and will be devoted to experiments in dry farming. On the irrigated portion the effect of water in the raising of crops will be studied, the quantities which should be applied under certain conditions, the number of applications needed, &c. All such problems will be investigated and reported on and in this way information likely to be of the greatest value to those growing crops on irrigated land will be obtained. On the higher land which cannot be irrigated, the various problems connected with dry farming will be studied and experiments will be conducted along lines of general farming to find out what crops can be grown and what treatment of the land is best to reach success with a scanty rainfall. Many experiments under both these conditions will be carried on with fruits, vegetables, forest trees, &c.

The experimental farm chosen for Northern Alberta is a quarter-section of land adjoining the town of Lacombe and about a mile from the railway station. Lacombe is a busy town about 70 miles south of Edmonton and the centre of a good agricultural district on the line of the Canadian Pacific railway from Calgary to Edmonton. It has also a branch line running east to Stettler, 51 miles distant, a line which will probably soon be extended to Moosejaw. The farm site has a good soil representative of the district and lies in a commanding position overlooking the railway and the surrounding country.

Mr. W. H. Fairfield has been appointed Superintendent of the farm at Lethbridge, and Mr. G. H. Hutton, Superintendent of the farm at Lacombe. Both of these officers have had excellent training in the lines of work they will have the responsibility of conducting in this important western province.

CHANGES IN THE STAFF.

It is with regret that I have to record the loss to our service of two long tried and faithful officers, both of whom have left the experimental farms to engage in more remunerative work. Mr. S. A. Bedford, so long and favourably known as superintendent of the experimental farm for Manitoba, has resigned his position on the farm at Brandon to enter into business. Mr. Bedford was the first of the superintendents appointed on the western farms and has had charge of the experimental farm at Brandon from the outset. In his management he has been most successful. In his work he has been careful and accurate and his reports have been interesting and valuable. The suggestions and recommendations he has made from time to time have been followed with profit by many farmers in Manitoba. The experiments conducted have covered a wide range in agriculture, horticulture and arboriculture and have been of great value to the country. Mr. N. Wolverton, B.A., has been appointed as his successor. He has had considerable experience and success in farming in Manitoba. His report of the operations conducted at Brandon during the past year will be read with interest.

Mr. John Fixter joined the experimental farm staff as farm foreman at the Central Farm, Ottawa, during the first year of its existence and has filled the position ever since with much satisfaction. He was a capable and efficient officer, thoroughly reliable and painstaking in all the work which devolved on him. He resigned his position at Ottawa to accept a more remunerative one at the Macdonald College, at Ste. Anne de Bellevue, Que. Mr. D. D. Gray has been selected to fill the vacancy and is discharging the duties of the office satisfactorily.

CORRESPONDENCE.

The correspondence carried on between the farmers of Canada and the officers of the experimental farms has been very large.

CENTRAL EXPERIMENTAL FARM.

The following is a summary of the letters received and sent out at the Central Experimental Farm from April 1, 1906 to March 31, 1907:—

	Letters received.	Letters sent.
Director	63,727	21,080
Agriculturist	2,973	4,140
Horticulturist	1,652	1,627
Chemist	1,483	1,442
Entomologist and Botanist	3,294	2,872
Cerealist	368	276
Poultry Manager	5,098	3,175
Accountant	1,212	1,744
	79,807	36,356

Many of the letters received by the Director are applications for samples of grain or for the publications issued by the experimental farms, a considerable proportion of which are answered by mailing the material asked for, accompanied in some instances by circular letters. This will explain why the number of letters received by that officer so much exceeds the number sent out.

DISTRIBUTION OF REPORTS, BULLETINS AND CIRCULAR LETTERS.

Reports and bulletins mailed	250,089
Circular letters, including circulars relating to samples of seed grain	60,128
	310,217

Branch Experimental Farms.

The correspondence conducted by the superintendents of the branch experimental farms is also large, as is shown by the following figures:—

	Letters received.	Letters sent.
Experimental Farm, Nappan, N.S	2,675	2,715
" Brandon, Man	4,114	4,089
" Indian Head, Sask	8,469	8,365
" Agassiz, B.C	3,328	3,051
	18,586	18,220

Much additional information has also been sent out from the branch farms in printed circulars. By adding the correspondence conducted at the branch farms to that of the Central Farm, the total number of letters received is found to be 98,393, while those sent out number 54,576.

ACKNOWLEDGMENTS.

I beg to tender my thanks for special services rendered and donations sent me during the year, to the Director of the Arnold Arboretum, Jamaica Plains, Mass., for seeds of many sorts of rare trees and shrubs for trial as to their hardiness and value in different parts of the Dominion; to the United States Department of Agriculture, for many favours, including samples of cereals, seeds of fodder crops, &c., for test from foreign countries; to the Director of the Royal Gardens, Kew, England, and to many other correspondents for seeds of many sorts of trees, shrubs and plants; also to Prof. John Macoun and Mr. J. M. Macoun of the Geological and Natural History Survey of Canada, for seeds of rare Canadian plants.

To the officers of the Central Experimental and Branch Experimental Farms, my thanks are due for their earnest co-operation in carrying on the different divisions of the work. Special acknowledgments are due to those members of the staff who have assisted me in those branches of which I have had personal charge; to Mr. John Fixter, the farm foreman, for the careful attention he has given to the special tests made with fertilizers on farm crops; to Mr. George Fixter, for his careful supervision and assistance in the distribution of samples of seed grain; to Mr. James Taggart, for the care and good judgment he has shown as foreman in charge of the lawns and ornamental grounds, and to Mr. Wm. T. Ellis, for the careful work he has done in testing the vitality of seeds, the management of the plants in the green-house, in growing and propagating useful plants for outside decoration, and in the taking of meteorological records.

I desire also to bear testimony to the faithful services of my secretary Mr. Malcolm C. O'Hanly. The employees also of all the farms have my thanks for the interest they have taken in their work and the care with which they have discharged their respective duties.

WM. SAUNDERS,
Director of Experimental Farms.

REPORT OF THE AGRICULTURIST

J. H. GRISDALE, B. AGR.

DR. WM. SAUNDERS, C.M.G.,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith reports upon the horses, cattle, sheep, swine and farming operations under my supervision during the past year.

I have to report a fairly successful year in connection with live stock, but the crop returns in 1906 fell very considerably below the average, due largely to exceptional winter weather which destroyed all clover plants in addition to ruining the timothy catch on most new meadows. This most serious state of things was rendered still worse by a too great abundance of moisture in June, drowning about 20 per cent of the grain crop in spite of an excellent drainage system. And to still further injure crop returns July, August and September were months of exceptionally light rainfall, so permitting only light crops of corn and roots and practically allowing of no growth of grass at all. The reports of the returns from the different fields under cultivation attached hereto show clearly the disastrous effects of the various conditions which united to render the husbandman's returns unusually small in this part of Canada in 1906.

The work in my division was as usual carried on with the efficient co-operation of Mr. John Fixter, farm foreman, Mr. C. T. Brettell, herdsman, Mr. Jos. Meilleur, dairyman and Mr. Geo. O. Morisset, secretary, all of whom have lent me their energetic and interested assistance.

Mr. John Fixter having found it to his advantage to assume similar but somewhat more onerous duties at the Macdonald College, Ste. Anne de Bellevue, Quebec, has, I regret to say, left us. His long and faithful service in this division will ever be remembered and appreciated by myself as well as by the farmers of this country. His place has been taken by Mr. Daniel D. Gray, formerly of Point Fortune, Que.

During the year I attended a number of meetings in various parts of Canada and took part in various short courses for farmers and farmers' sons in addition to my regular duties on the Central Experimental Farm.

From April 1, 1906, to March 31, 1907, 2,973 letters were received, and 4,140 despatched by the Agricultural division.

I have the honour to be, sir,
Your obedient servant,
J. H. GRISDALE,
Agriculturist.

LIVE STOCK.

The live stock now (April 1, 1907) occupying the different stables and pens under my charge include horses, cattle, sheep and swine.

HORSES.

The horses are kept for labour exclusively, although some experimental feeding is usually under way to gain some information as to the most economical methods of feeding draught horses, as well as experiments to determine the comparative values of different foods as forage for the same.

The horses are usually nineteen in number, at present made up of:—
Twelve heavy draught horses of Clydesdale and Percheron blood.
Six heavy driving horses.
One light driver.

CATTLE.

There are representatives of four breeds of cattle, viz.:—

Shorthorn, Ayrshire, Guernsey and Canadian. There are besides, a number of grade cattle and steers. These cattle are kept for breeding and feeding operations, mostly of an experimental character. Pure bred breeding animals are usually on sale, however, and a considerable number are sold in the course of the year.

PURE-BRED BREEDING CATTLE.

The pure bred cattle in the barn at present are as follows:—
Eighteen Shorthorns, including three bulls and fifteen females.
Eighteen Ayrshires, including one bull and seventeen females.
Seventeen Guernseys, including four bulls and thirteen females.
Eighteen Canadians, including three bulls and fifteen females.

GRADE CATTLE.

At present the grades number 19 head, made up of 2 Shorthorn grades, 5 Ayrshire grades, 6 Guernsey grades, and 6 Canadian grades.

STEERS.

Thirty-three steers are under feed. They are of different ages and breeding, and the number is made of:—
Twenty two-year-olds.
One yearling.
Twelve calves.

SHEEP.

Sheep are not kept in large numbers, only 26 being now in the pens. Two breeds are kept, namely: Shropshires and Leicesters.

There are 16 Shropshires as follows: 3 yearling rams, 9 aged ewes, and 4 shearling ewes.

There are 10 Leicesters as follows: 6 ewes and 4 rams.

SWINE.

Two hundred and thirty of all classes are now in the pens being fed experimentally or being kept for breeding purposes. The breeds kept are Berkshire, Tamworth and Yorkshire.

The Yorkshires are 142 in number, including 2 stock boars, 39 breeding sows, 101 young pigs.

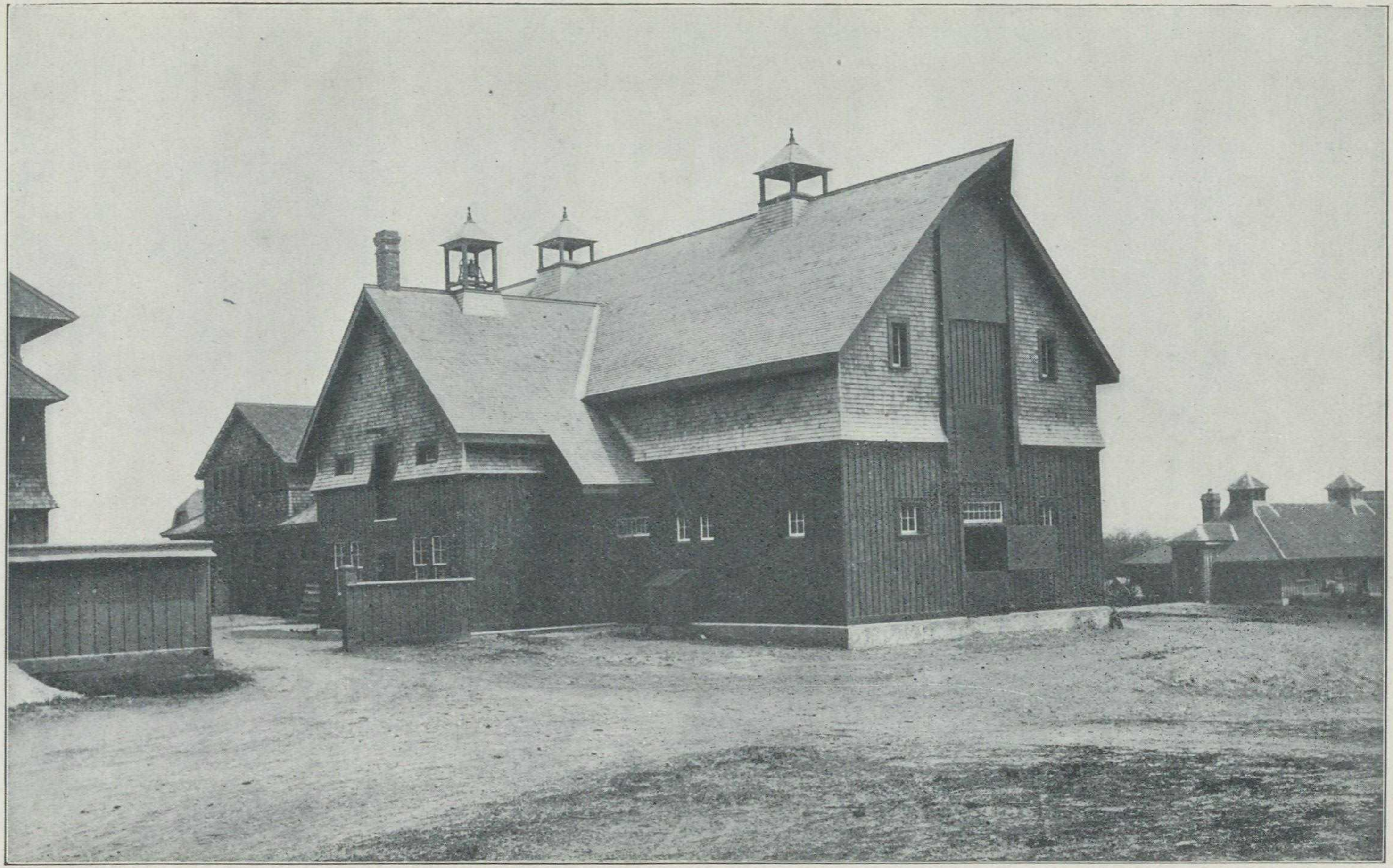
The Berkshires are 31 in number, including 2 stock boars, 9 breeding sows, 20 young pigs.

The Tamworths are 33 in number, including 1 stock boar, 8 breeding sows, 21 young pigs, 3 young boars.

Crossbreds, 14 feeders.

HORSES.

There are 19 horses in the stables. These horses are expected to do the work in the various departments during the year. The work on the '200 acre farm' is but a part of their duties. They work in addition for the horticultural and cereal departments, as well as upon the lawns and in the Arboretum. In addition a large amount of hauling in connection with the different departments, as well as road making and messenger service, takes up much of their time.



Horse Stable, Central Experimental Farm, Built 1906. (Photo by F. T. Shutt)

HORSE LABOUR.

During the year from April 1, 1906, to March 31, 1907, the work done by the 19 horses kept in the stables here was equivalent to 5901·7 days work, distributed as follows:—Live Stock, hauling feed, marketing stock, &c., 104 days; farm work (200 acre farm), 813·4 days; draining and care of roads in winter, 54·2 days; manure on 200-acre farm, 356·8 days; cleaning land, gathering stones, &c., 10 days; arboretum, 145·8 days; lawns, &c., 190·2 days; cereal division, 481·1 days; bulletins and reports to and from farm office, 78·9 days; poultry, 29·2 days; mail, including milk delivery, 174 days; omnibus service, including 3 horses for omnibus, 2 horses for general driving and 1 horse for supervision of work, 2,314 days; work about greenhouse, outbuildings, sidewalks, exhibitions, &c., 461·5 days.

In estimating the cost of farming operations further on in this report, $3 per day is charged for team and driver. To feed and care for the horses cost 32½ cents per horse per working day, and the driver receives $1.72½ per 10-hour day. It is evident therefore that the team and driver cost $2.37½ per day, leaving a margin of 62½ cents, or 31¼ cents, nearly, per horse per day for wear and tear.

EXPERIMENTS WITH HORSES.

On January 22, 1907, an experiment to gain some information as to the value of International Stock Food for draught horses was incepted. This was done at the request of a representative of the International Stock Food Co.

The experiment was carried on with five teams of heavy horses. One horse in each team received regularly the amount of Stock Food indicated in directions accompanying the barrel of Stock Food shipped us by the manufacturers. One horse received none of this stock food nor any condimental food of any description whatever. Each horse whether receiving stock food or not received 14 pounds per day of a mixture of 250 pounds of oats and 100 pounds of bran, our standard mixture for heavy horses. First there was some little difficulty in getting the horses to eat up clean the mixture of oats, bran and Stock Food, but they soon learned to take it without difficulty. The experiment might be briefly summarized as follows:—

Number of horses getting International stock food—5.

Average weight, January 22, 1907	1,569 lbs.
Average weight, March 6, 1907	1,581 "
Average gain in 42 days	12 "

Number of horses not getting International stock food—5.

Average weight, January 22, 1907	1,560 lbs.
Average weight, March 5, 1907	1,611 "
Average gain in 42 days	13 "

It would appear therefore that so far as gains in weight are concerned that the stock food was of no value whatever. So far as one could judge of condition of the horses by their appearance and by their spirit when working those not getting stock food were in no way behind their mates which were receiving stock food.

DAIRY CATTLE.

The herd of dairy cattle during the year 1906-7 consisted of 50 females all told. They were:—

Ayrshires	12
Guernseys	6
Canadians	9
Shorthorns	8

Shorthorn grades	2
Ayrshire grades	4
Canadian grades	2
Guernsey grades	7

FEEDING THE DAIRY COWS.

Summer Feeding.

In summer the area devoted to pasture is necessarily very small since 'The Farm' consists of 200 acres only and it is expected to produce sufficient hay, roots, ensilage and straw to feed from 120 to 160 head of cattle, 19 to 21 horses, 30 to 50 sheep and from 200 to 300 pigs the year around.

Of course it is not attempted to produce sufficient grain to feed this entire stock.

The area devoted to pasture so far as milkers, springers and dry cows were concerned during the summer of 1906, was 14 acres. This would have been far from sufficient to furnish enough food for the 40 head running thereon no matter how favourable the season, hence with such an unfavourable season for grass as 1906 it proved entirely inadequate. To supplement the pasture ensilage was fed in large quantities, meal in limited quantities being at the same time allowed to the cows in milk. It may hardly be said that ensilage was found to be a summer feed more satisfactory in every respect than the commonly used soiling crops, peas, oats, vetches, rye, clover, alfalfa and green corn. It had, however, some most marked advantages, (1) it was always at hand no matter what the weather, nor no matter how busy the teams and men in the field; (2) it was always in good shape to feed, that is did not vary in character to such a degree as to affect the digestive organs as not infrequently happens where soiling crops are fed; (3) it was always palatable to the cattle and eaten with apparent relish no matter how much other food was available, (4) it required a smaller area to furnish a given amount of food than would have been required had soiling crops been used. The only objection that might be raised would be that considerable loss of ensilage is probable from rot on surface of silo where the ensilage is not used regularly owing to varying grass supply.

Winter Feeding.

The roughage ration for the winter months was made up of straw, roots, ensilage and clover hay. The straw was cut, the roots were pulped and a mixture in the proportion of 400 pounds ensilage, 200 pounds roots and 30 pounds cut straw prepared every second day. This mixture being put in a solid pile fermented more or less in a few hours, and the whole mass became quite juicy and apparently very palatable to the cows by the time it was being fed. It was fed at the rate of about 40 pounds per 1,000 pounds live weight of cows fed.

The meal mixture this year was made up of bran 50 parts, ground oats 25 parts, gluten 25 parts. This mixture was fed at the same time as the roughage. Each cow received meal in proportion to the amount of milk she was producing. The amount fed varied from 2 pounds per day up to 13 pounds per day. The meal portion was thrown on top of the roughage the cow had just received and the whole mass given a slight stir so as to mix the meal with the roughage, thus ensuring the two being eaten together. After succulent roughage and meal had been consumed clover hay was fed at the rate of about 2 pounds per cow. The cows were fed in this way at 5.30 in the morning and 4 o'clock in the afternoon.

The above paragraphs refer of course to the plan or system of feeding followed most of the time or when no experiments in feeding are under way. It also describes fairly well the system of feeding we have found to give on the whole the best results.

This system is also the one followed to serve as a check system or basis of comparison where other systems or rations or foodstuffs are being tried.

BREEDING AND FEEDING THE DAIRY CALF.

The robust, healthy, vigorous and probably profitable dairy calf is the result of wise mating and judicious feeding.

THE SIRE.

The sire should have been a pure bred animal coming from heavy milking ancestry on both sides. He should have been kept in good health and in serviceable condition by careful feeding and sufficient exercise. A mature sire is likely to throw more vigorous stock than a young immature animal. Bulls may be expected to prove efficient as stock getters till 8 or 9 years of age and even later.

THE DAM.

The cow should be kept in good health and in good condition while carrying a calf. Particularly is this true the 6 or 8 weeks immediately preceding delivery. The mature cow should be dried off at least 6 weeks previous to dropping the next calf.

In the case of the heifer with her first calf she should have been fed generously and wisely during the whole period of pregnancy. Her food should have been such as would have been suitable for a cow in full flow of milk. The most suitable foods being pasture grass, clover hay, roots, ensilage, bran, oats and oil meal. She should drop her first calf when about 2 years old.

THE CALF TO RAISE.

Objection is sometimes made to raising calves from heifers. If the heifers have been properly mated and wisely fed during pregnancy the calves are likely to prove as satisfactory as stock from older cows. In the case of grade heifers, however, it may scarcely be considered wise to raise the first calf since the milking qualities being unknown the breeder might later find himself with a six or nine months calf from an unsatisfactory cow on his hands.

AT CALVING TIME.

The cow should be placed in a box stall a few days before due to calve. She should be kept on a somewhat lighter ration than usual and her food should be rather laxative in character, bran, clover, roots or ensilage.

The calf may be left with her for two or three days. She should be milked in addition to what the calf draws from her. In the case of very heavy milking cows likely to suffer from milk fever it is advisable to stop short of drawing off all the milk for three or four days. This practice has saved us all trouble from milk fever for the last five or six years.

Only a light ration should be fed for several days after calving and the cow should be brought to full feed very gradually, say in three weeks after parturition.

FEEDING THE CALF.

The calf should be removed from the cow the second or third day. It should then be taught to drink. This may be done about as follows:—Take a quart of warm new milk in a 10 quart pail. Give the calf two fingers to suck air between. Gradually lower its nose into the pail. When it finds milk instead of air entering between the fingers it is likely to relax the neck and start to take milk. Do not sink the nose so far into the milk as to cover the nostrils. If it will not drink at first, leave it for a few hours to work up an appetite. After a few days it may gradually be weaned from the fingers.

Whole milk should be fed for at least one week. During the next week the change from whole milk to skim milk should gradually be brought about. Substitute each day a regularly increasing proportion of skim milk for the same amount of whole milk withdrawn.

The skim milk should be fed warm, from 90 to 100 degrees Fahr., no more, no less. To replace the fat removed from the skim milk as well as to furnish additional protein, it is well to add some flaxseed jelly to the ration. This jelly should be added in small quantities at first and slowly increased. Begin with a desertspoonful in each portion and gradually increase until about a cupful is being fed night and morning to the three months old calf.

To prepare the jelly, boil or rather steep one pound of whole flaxseed in water almost boiling until a thick paste results. Another method of preparation is to take half a cup of ground flax in a quart of water and allow to simmer just below the boiling point until a thick jelly is formed. It should be kept cool and sweet until fed.

In addition to the flax jelly a little dry bran and whole oats should be fed. Start with very small quantities. Some clean sweet clover hay will be a valuable addition to the ration at a very early age.

Whey may be used where skim milk is not to be had. Change from milk to whey as from whole milk to skim milk (see method outlined above). The flax seed meal jelly, &c., should be used just as with skim milk.

Where skim milk or whey is not available calves may be raised on hay tea. Boil cut clover or even timothy in water until a strong decoction or tea is obtained. Wean the calf from milk to this tea precisely as described from whole milk to skim milk above. The same supplementary feeds may be used in somewhat larger quantities.

The skim milk should be fed sweet for some time at least. If it is likely, however, that it will sometimes be sour it is advisable to gradually change to sour milk and feed sour milk invariably. The same counsel applies to whey.

Calves should be kept in scrupulously clean pens. These should be dry and warm in winter and cool and dry in summer.

A strict observance of the following general directions will almost certainly ensure success:

1. Treat calves kindly and carefully.
2. Be scrupulously clean as to food, pails or troughs and pens or quarters.
3. Make all changes in character of food very gradually. This applies whether changes be as to temperature percentage of butter-fat, acidity or sweetness, quantity, times of feeding, or any other feature in connection with the food.
4. Feed only wholesome food, feed regularly, and feed in sufficient quantities but not too generously.

DAIRY COW RECORDS.

KEEPING RECORDS.

The effort to interest dairymen in the returns from their individual cows has been continued, and many farmers seem to be awakening to a knowledge of the fact that the improvement of the whole herd demands the study of the unit; that is a close acquaintance with the expenditure upon the individual cow and the returns from the same.

This can be determined in no other way than by keeping an exact record of the daily milk yield. A record of the daily food consumption would also be of great use if it could be kept.

Many farmers who have been keeping such records for some time report very strongly in favour of this kind of work.

As soon as the farmer sets to work to know what his cows are doing by keeping a record he finds himself much more closely in touch with his business. He sees at once the effect of better care and better feeding. He notes the great difference in returns between the best and the worst cows in his herd and cannot help but determine to get rid of the poor ones and replace them with good ones. Even the poor cows are improved because better feeding is almost certain to be tried, and quite certainly poor feeding is responsible for many of our unprofitable dairy cows and even for many unprofitable dairy herds.

To facilitate the keeping of such records and to help in the building up of dairying interests in Canada, forms similar to the following are supplied on application:—

DAILY MILK RECORD.

Herd belonging to.................................
Post Office..
Record for week ending..............................

(This form supplied free by Live Stock Division, Central Experimental Farm, Ottawa. Ont.)

COWS.

Day.	Time.																	Total for day.
Sunday..........	Morning.....																	
	Evening.....																	
Monday.........	Morning.....																	
	Evening.....																	
Tuesday.........	Morning.....																	
	Evening																	
Wednesday.......	Morning.....																	
	Evening ...																	
Thursday.........	Morning.....																	
	Evening.....																	
Friday..........	Morning.....																	
	Evening																	
Saturday.........	Morning.....																	
	Evening.....																	
Total.........	Week																	

(Reverse)

CENTRAL EXPERIMENTAL FARM.

Wm. Saunders, Director. J. H. Grisdale, Live Stock and Agriculture.

MILK RECORDS.

1. The profitable dairy cow must give over 5,000 pounds of milk each year. To know the value of a cow, her total annual yield of milk must be known. The only way to know this is to keep a record of her daily milk yield.

2. The form on the other side of this sheet is intended to help progressive dairy farmers by supplying them with a simple and convenient sheet for the keeping of the milk records of their individual cows. A study of such records will soon indicate

which cows should go to the butcher. We would be pleased to receive a summary of your record. If you have no summary forms, write us.

3. Such records are being kept by hundreds of successful dairymen to-day. Many of these men attribute their success to the keeping of such records. Why not give the thing a trial if you are a dairyman? It will increase your milk product. It will lighten your labour since your interest will be increased in your work, and 'interest lightens labour.' It will show you the unprofitable cow the 'boarder.' You cannot get rid of her too quickly.

4. For weighing the milk a simple spring balance may be secured for from one and a half to four dollars. If your local dealer cannot supply you, write the undersigned for particulars. A small platform scale is fairly convenient, but we find the spring balance preferable.

5. Many farmers keep records of the amount of food fed to individual cows. If you would like to do so, sample forms would be sent free on writing J. H. Grisdale, Agriculturist, Central Experimental Farm, Ottawa, Ont.

COST OF FEEDING.

In estimating the cost of feeding, the following prices were charged for feed stuffs, being the average local market rates for the same during the season of 1905, save in the case of ensilage and roots, which are charged for at the rate usually affixed in experimental feeding in all parts of Amreica.

Pasture (per month)..	$ 1 00	per cow.
Bran..	16 00	per ton.
Gluten meal..	25 00	"
Oil meal..	30 00	"
Oats and barley..	21 00	"
Clover hay..	7 00	"
Chaff..	4 00	"
Roots and ensilage..	2 00	"

In estimating the value of the product, 22 cents per pound is allowed for the butter and 15 cents per 100 pounds for the skim milk. The butter sells at from 25 to 32 cents per pound and it is considered that as feeds are dearer and wages higher and average prices for dairy products in Canada very much higher than a few years ago, the increase from 20 to 22 is necessary and justifiable to permit of comparing our results with those obtained by farmers in different parts of Canada.

The Central Experimental Farm dairy herd records as given below make only a moderate showing. No effort is being made just at present to get particularly large yields from the cattle, the aim now being to get some good breeding stock. As will be noted the pure bred cows are being milked for rather shorter periods than usual. This is on account of their being bred to come in at as short intervals as possible.

In the groups of three cows of each breed and three grades it will be noticed that the grades are being milked longer periods than the pure breds, hence make a somewhat better showing.

COW RECORDS FOR NINE MONTHS, JULY 1, 1905, TO MAR. 30, 1906.

Names of Cows.	Age.	Date of dropping last calf.	Number of days in milk.	Daily average yield of milk.	Total milk for period.	Per cent fat in milk.	Pounds butter produced in period.	Value of butter at 22 cts. per lb.	Value of skim milk at 15 cents per 100 lbs.	Total value of product.	Amount meal eaten, valued at 1c. per lb.	Amount of roots and ensilage eaten valued at $2 per ton.	Amt. hay eaten valued at $7 per ton.	Months on pasture at $1 per month.	Total cost of feed for period.	Cost to produce 100 lbs. milk.	Cost to produce 1 lb. butter, skim milk neglected.	Profit on 1 lb. of butter, skim milk neglected.	Profit on cow during period, labour neglected.
				Lbs.	Lbs.	p. c.	Lbs.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.		$ cts.	cts.	cts.	cts.	$ cts.
Countess ....(G.A.)	..	June 18, '05	254	34·4	8,748	3·7	390·	85 80	13 53	99·33	2,185	11,810	875	2	38 72	44·2	9·9	12·1	60 61
Itchen Lady........(G)	9	Mar. 10, '06	182	28·0	5,018	4·3	258·36	56 84	7 13	63·97	1,324	11,350	875	2	29 65	59·8	11·4	10·6	34 32
Jessie A...........(A)	12	Jan. 22, '06	193	31.5	6,075	3·6	264·08	58 10	8 71	66·81	1,677	11,500	875	2	33 33	54·8	12·6	9·4	33 48
Zamora ....(C.)	10	Sept. 7, '06	251	25·1	6,317	4·7	349·3	76 84	9 09	85·93	1,798	11,800	875	2	34 84	55·1	9·9	12·1	51 04
Darlington II. ......(S.)	..	Oct. 31, '05	213	24·4	5,200	4·0	247·16	54 38	7 42	61·80	1,698	11,350	785	2	33 08	63·6	13·3	8·7	28 72
Polly .... (G.C.)	11	Feb. 27, '06	184	23·5	4,336	3·9	202·91	44 64	6 19	58·45	1,344	11,500	875	2	30 00	69·2	14·3	7·7	28 45
Alma............(G.G.)	5	Jan. 17, '06	182	24·9	4,545	4·6	249·41	54 87	6 44	61·31	1,706	11,660	875	2	33 78	74·8	13·5	8·5	27 53
Marjorie...........(A.)	4	Oct. 10, '05	219	23·9	5,247	3·9	243·88	53 65	7 50	61·15	1.727	11,500	855	2	33 76	64·3	13·8	8·2	27 39
Maggie ....(A.)	10	May 25, '06	209	23·2	4,834	3·8	219·70	48 33	6 14	54·47	1,223	11,500	875	2	28 79	59·6	13·1	8·9	25 68
Deanie.............(G.)	9	Dec. 7, '05	189	23·6	4,469	4·4	232·39	51 24	6 35	57·59	1,576	11,350	875	2	32 17	71·5	13·8	8·2	25 42
Dora.............(G.G.)	..	Sept. 26, '05	182	18·0	3,283	5·4	210·13	46 23	4 51	50·74	1,267	10,300	783	....	25 71	78·0	12·2	9·8	25 03
Flavia ....(A.)	4	Dec. 6, '05	224	23·1	5,196	3·8	232·82	51 22	6 43	57·65	1,613	11,500	875	2	32 69	62·9	14·0	7·9	24 96
Queenie..........(G.G.)	8	Mar. 26, '06	214	13·3	2,849	6·1	207·35	45 62	3 96	49·58	1,071	11,200	875	2	26 97	94·6	13·0	8·9	22 61
Gurta.... ....(A.)	5	Oct. 4, '05	174	30·3	5,274	3·3	207·57	45 67	7 60	53·27	1,582	11,500	875	2	32 38	61·3	15·6	6·4	20 89
Beauty ....(G.G.)	5	Mar. 7, '05	188	23·8	4,476	4·0	214·28	47 14	6 39	53·53	1,638	11,350	875	2	32 79	73·2	15·3	6·7	20 74
Bellflower.... ....(G.G.)	8	Feb. 23, '06	220	19·5	4,300	4·1	211·70	46 57	6 13	52·70	1,565	11,660	875	2	32 37	75·2	15·3	6·7	20 33
Bloomer............(A.)	7	Jan. 15, '06	162	25·2	4,076	3·6	174·23	38 23	8 72	46·95	1,350	11,440	787	2	29 59	72·5	16·9	5·1	17 36
Fortune...........(C.)	10	Dec. 21, '05	182	27·5	5,006	4·0	186·09	40 94	7 33	48·22	1,571	11,800	785	2	32 26	64·4	17·3	4·7	15 96
Rosy.............(G.S.)	7	" 30, '05	218	21·5	4,689	3·0	193.48	42 57	6 74	49·31	1,818	11,810	875	2	35 05	74·7	18·1	3·9	14 26
Duchesse.......... (C.)	5	July 12, '05	222	17·5	3,899	3·7	172·36	37 92	5 59	43·51	1,351	11,800	875	2	30 37	77·8	17·6	4·4	13 14
Ruby ....(G.)	9	Sept. 1, '05	212	15·2	3,240	4·6	179·51	39 49	4 59	44·08	1,453	11,350	935	2	31 15	96·0	17·3	4·7	12 93
Denty Girl.........(A.)	..	Nov. 25, '05	121	23·5	2,854	3·7	125·01	27 68	4 08	31·76	1,024	7,260	633	....	19 72	69·0	15·6	6·4	12 04
Pearl...............(G.)	..	Feb. 24, '06	118	21·3	2,520	5·0	149·20	32 92	3 75	36·57	1,013	11,200	875	2	26 39	104·7	17·7	4·3	10 18
Inoquette ....(C.)	..	Dec. 16, '06	90	19·9	1,777	4·5	94·64	20 82	2 52	23·34	658	5,360	540	....	13 83	74·8	14·6	7·4	9 51
Marchioness........ (S.)	12	Mar. 4, '05	254	14·7	3,741	3·7	166·42	36 61	5 36	41·97	1,672	11,350	875	2	33 13	88·5	19·9	2·1	8 84
Dolly .... (G.A.)	..	Sept. 4, '05	186	21·2	3,945	3·2	150·82	33 18	5 69	38·87	1,368	11,500	875	2	30 24	76·6	20·0	1·9	8 63
Legacy.............(A.)	4	Mar. 1, '06	189	14·6	2,978	4·1	146·11	32 14	4 25	36·39	1,176	11,500	875	2	28 32	95·0	19·3	2·7	8 37
Dott ....(G.G.)	..	Sept. 26, '05	182	13·6	2,485	4·0	129·24	28 43	3 53	31·96	1,236	10,300	785	....	25 41	102·0	19·6	2·4	6 55
Molly II........... (S.)	..	Oct. 20, '05	146	17·4	2,533	3·8	113·36	24 94	3 63	28·57	1,204	9,060	723	....	23 63	93·2	20·8	1·2	4 94
Réjane.. ... .(C.)	..	Jan. 29, '06	59	15·3	908	4·7	50·97	11 21	1 28	12·49	416	3,540	354	....	8 94	98·4	17·5	4·5	3 55
Poupée.............(C.)	3	Feb. 18, '06	180	13·7	2,481	4·0	117·81	25 92	3 54	29·46	1,200	11,345	875	2	28 40	114·0	24·1	*1·9	1 06

* Loss.

COW RECORDS FOR NINE MONTHS JULY 1, 1905, TO MARCH 30, 1906.—*Con.*

Names of Cows.	Age.	Date of dropping last calf.	Number of days in milk.	Daily average yield of milk.	Total milk for period.	Per cent fat in milk.	Pounds butter produced in period.	Value of butter at 22 cts. per lb.	Value of skim milk at 15 cents per 100 lbs.	Total value of product.	Amount meal eaten, valued at 1c. per lb.	Amount of roots and ensilage eaten valued at $2 per ton.	Amt. hay eaten valued at $7 per ton.	Months on pasture at $1 per month.	Total cost of feed for period.	Cost to produce 100 lbs. milk.	Cost to produce 1 lb. butter, skim milk neglected.	Profit on 1 lb. of butter, skim milk neglected.	Profit on cow during period, labour neglected.
				Lbs.	Lbs.	p. c.	Lbs.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.		$ cts.	cts.	cts.	cts.	$ cts.
Eva ....(G.C.)	..	Mar. 7, '06	25	14·5	363	4·5	19·63	4 32	51	4·83	200	1,360	186	....	4 51	124·0	22·9	* ·9	32
Queen Clatina......(G.)	..	Jan. 5, '06	59	12·3	731	4·6	40·38	8 88	1 03	9·91	472	3,540	354	....	9 50	130·0	23·5	*1·5	41
Flossy's Gem ....(G.)	..	Dec. 30, '05	84	11·6	975	4·4	50·68	11 15	1 43	12·58	592	5,400	540	....	13 21	135·0	26·0	*4·0	* 63
Denty..............(A.)	7	Apl. 11, '05	133	15·0	2,002	3·9	93·95	20 67	1 85	22·52	946	11,500	875	2	26 02	129·9	27·6	*5·6	*3 50
Alice..............(G.A.)	5	....	195	13·0	2,518	3·1	94·40	20 76	3 63	24·39	1,157	11,500	875	2	28 13	112·0	29·8	*7 8	*3 74
Cora..............(G.A.)	3	Jan. 1, '06	186	10·9	1,942	3·9	89·50	19 69	1 74	21·43	1,141	9,450	689	2	25 27	130·0	27·1	*5 1	*3 84
Jessica ....(S.)	5	" 29, '06	103	12·1	1,253	3·9	57·64	12 68	2 79	15·47	827	11,350	875	2	24 68	197·0	42·9	*20·9	*9 21
Janet..............(S.)	5	Dec. 1, '05	70	19·4	1,359	4·3	69·17	15 22	2 93	18·15	1,360	11,500	785	2	29 85	219·0	43·1	*21·1	*11 70
Duchess ....(S.)	5	Mar. 23, '05	81	15·2	1,232	4·1	60·24	13 25	2 75	16·00	1,366	11,500	875	2	30 22	245·0	50·1	*27·9	*14 22

* Loss.

COW RECORDS FOR YEAR, APRIL 1, 1906 TO MARCH 31, 1907.

Name of Cows.	Age.	Date of dropping last calf.	Number of days in milk.	Daily average yield of milk.	Total milk for year.	Per cent fat in milk.	Pounds butter produced in year.	Value of butter at 22 cents per lb.	Value of skim milk at 15 cts. per 100 lb.	Total value of product.	Amount meal eaten valued at 1c. per pound.	Amount of roots and ensilage eaten, valued at $2 per ton.	Amount hay eaten valued at $7 per ton.	Months on pasture at $1 per month.	Total cost of feed for year.	Cost to produce 100 lbs. milk.	Cost to produce 1 lb. butter, skim milk neglected.	Profit on 1 lb. butter, skim milk neglected.	Profit on cow during year, labor neglected.
				lbs.	lbs.	%	lbs.	$ cts.	$ cts.	$ cts.	lbs.	lbs.	lbs.	Mos	$ cts.	cts.	cts.	cts.	$ cts.
Queenie...........(G.G.)	9	Mar. 26, '06	365	17·7	6,465	6·3	480·52	105 71	8 98	114 69	2,130	17,100	1,002	4	45 90	79·8	9·5	12·5	68 79
Itchen Lady ....(G.)	10	Jan. 13, '07	280	26·3	7,390	5·0	434·90	95 68	10 43	106 11	2,103	16,570	1,002	4	45 11	61·0	10·3	11·7	61 00
Alma.............(G.G.)	6	" 17, '06	314	22·8	7,183	4·9	415·08	91 31	10 15	101 46	2,344	17,250	1,000	4	48 19	67·0	11·6	10·4	53 27
Polly..............[illegible]	12	Feb. 27, '06	365	22·7	8,301	4·1	400·08	88 11	11 85	99 96	2,285	17,560	940	4	47 70	57·4	11·7	10·3	52 26
Deanie ....(G.)	10	Jan. 1, '06	300	21·8	6,980	4·6	385·34	84 77	9 79	94 56	2,219	16,725	1,002	4	46 43	66·0	12·4	9·6	46 43
Maggie.............(A.)	11	May 25, '06	282	27·6	7,242	4·2	366·06	80 53	10 51	90 84	2,043	17,490	912	4	45 11	66·2	12·4	9·6	45 73
Denty ....(A.)	8	Apr. 11, '06	245	30·4	7,466	4·1	363·30	79 93	10 65	90 58	2,166	17,640	912	4	46 49	64·9	12·7	9·3	44 09
Zamora ....(C.)	11	Sept. 7, '06	299	20·5	6,156	5·2	379·98	83 64	8 64	92 24	2,491	17,770	1,002	4	50 19	81·5	13·2	8·8	42 05
Pearl...............(G.)	..	Jan. 9, '07	283	20·3	5,778	5·1	349·53	77 90	8 14	85 04	2,010	16,735	1,004	4	44 35	76·7	12·7	9·3	40 69
Bellflower.........(G.G.)	..	Feb. 23, '06	365	19·3	7,076	4·2	351·94	77 43	10 09	87 52	2,314	17,045	1,002	4	47 69	67·*	13·5	8·5	39 83
Jessie A............(A.)	13	Jan. 22, '06	249	28·3	7,060	3·9	327·50	72 05	10 10	82 15	2,285	16,870	878	4	46 79	66·2	14·2	7·8	35 36
Dora..............(G.A.)	..	Nov. 20, '06	254	18·0	4,572	5·9	321·03	70 63	6 45	77 08	1,979	17,180	1,002	4	44 48	97·2	13·8	8·2	32 60
Darlington II.......(S.)	..	Oct. 31, '05	332	19·9	6,627	3·9	308·66	67 90	9 50	77 40	2,255	17,180	971	4	47 12	71·1	15·2	6·8	30 28
Flavia..............(A.)	5	Jan. 5, '07	269	24·1	6,845	3·7	302·98	66 66	9 27	75 93	2,125	17,460	912	4	45 90	67·0	15·1	6·9	30 03
Fortune.............(C.)	11	Mar. 29, '07	255	23·1	5,896	4·8	332·62	63 18	8 34	71 52	2,193	17,180	1,002	4	46 62	79·0	14·0	7·9	24 90
Poupée.............(C.)	4	Apr. 6, '06	286	19·1	5,702	3·9	266·07	58 64	8 15	66 79	1,953	16,290	1,002	4	43 33	75·9	16·2	5·8	23 46
Illuminata II.......(S.)	..	Feb. 23, '06	355	16·4	5,824	3·8	266·44	58 62	8 34	66 96	1,960	17,180	1,001	4	44 28	76·0	16·6	5·4	22 68
Legacy ....(A.)	5	Mar. 1, '06	241	20·5	4,943	3·7	218·11	47 98	7 09	55 07	1,648	10,510	549	4	32 91	66·5	15·8	6·2	22 16
Marjorie ....(A.)	5	Dec. 28, '06	246	22·6	5,580	3·9	257·80	56 72	7 98	64 70	1,880	17,490	912	4	43 48	77 9	16·8	5·2	21 22
Inoquette...........(C.)	..	Feb. 26, '07	300	16·2	4,865	4·3	248·82	54 74	6 92	61 66	2,095	16,260	1,002	4	44 72	91·9	17·9	4·1	16 94
Whitie ....(G.S.)	..	Dec. 14, '06	282	18·6	5,264	4·1	258·58	56 87	7 51	64 38	2,224	17,180	961	4	47 77	90·7	18·4	3·6	16 61
Gurta...............(A.)	6	Jan. 12, '06	241	21·9	5,285	3·9	242·77	53 41	7 53	60 94	2,022	17,460	912	4	44 87	84·9	18·4	3·6	16 07
Alice.............(A.G.)	6	Mar. 29, '07	287	17·9	5,138	3·3	201·45	44 32	7 41	51 73	1,556	13,720	732	4	35 84	69·7	17·7	4·3	15 89
Maggie III..........(A.)	..	Aug. 9, '06	108	19·6	2,118	4·5	103·80	23 94	3 02	26 96	516	4,090	273	1	11 21	52 8	10·7	11·3	15 75
Ruby................(G.)	10	Sept. 18, '06	233	17·1	3,991	4·7	223 96	49 27	5 65	54 92	1,581	16,580	1,002	4	39 90	100·0	18·2	3·8	15 02
Duçhesse II ....(C.)	..	Dec. 18, '06	101	22·3	2,256	4·1	119·07	26 19	3 20	29 39	720	6,070	363	–	14 54	64·0	12·2	9·8	14 85
Ottawa Spot.........(G.)	..	Aug. 31, '06	211	14·3	3,037	4·2	152·71	33 60	4 33	37 93	1,146	10,610	633	1	25 29	83·2	16·5	5·5	12 64
Countess.........(G.A.)	.	....	92	24·4	2,252	3·9	105·08	23 12	3 22	26 34	1,011	4,830	276	–	15 90	70·6	14·1	7·9	10 44
Illuminata III.......(S.)	..	Sept. 1, '06	187	16·1	2,023	3·7	134·14	29 51	4 33	33 84	1,092	10,760	636	1	24 90	82·6	18·5	3·5	8 94
Poupée II...........(C.)	..	Jan. 1, '07	83	21·3	2,210	3·9	81·33	17 89	2 54	20 43	481	4,810	270	–	10 57	59·6	12·9	9·1	9 86
Rosy ....(S.G.)	8	....	61	24·7	1,508	3·4	60·60	13 33	2 17	15 50	488	3,350	183	–	8 87	58·8	14·6	7·4	6 63
Queen Clatina.......(G.)	..	Jan. 3, '07	295	12·2	3,616	4·6	199·85	43 97	5 12	49 09	1,886	16,560	1,002	4	42 93	118·8	21·4	·6	6 16
Réjane..............(C.)	..	" 29, '06	243	10·3	2,527	4·9	147·64	32 48	3 57	36 05	1,525	9,420	639	4	30 90	122·2	20·2	1·8	5 15

Names of Cows.	Age.	Date of dropping last calf.	Number of days in milk.	Daily average yield of milk.	Total milk for year.	Per cent fat in milk.	Pounds butter produced in year.	Value of butter at 22 cents per lb.	Value of skim milk at 15 cts. per 100 lbs.	Total value of product.	Amount meal eaten valued at 1c. per pound.	Amount of roots and ensilage eaten, valued at $2 per ton.	Amount hay eaten valued at $7 per ton.	Months on pasture at $1 per month.	Total cost of feed for year.	Cost to produce 100 lbs. milk.	Cost to produce 1 lb. butter, skim milk neglected.	Profit on 1 lb. butter, skim milk neglected.	Profit on cow during year, labour neglected.
				lbs.	lbs.	%	lbs.	$ cts.	$ cts.	$ cts.	lbs.	lbs.	lbs.		$ cts.	cts.	cts.	cts.	$ cts.
Beauty..........(G.G.)	6	....	62	22·2	1,373	4·0	64·61	14 21	1 95	16 16	517	3,350	183	2	11 16	81·0	17·2	4·8	5 00
Fanny..........(G.A.)	..	Oct. 19, '06	161	12·4	1,982	4·2	97·89	21 54	2 83	24 37	904	8,780	546	–	19 73	99·5	21·5	·5	4 64
Dolly..........(G.G.)	..	Sept. 4, '05	270	14·3	3,883	4·0	174·90	38 48	5 90	44 38	1,581	17,190	850	4	39 98	103·0	22·8	*·8	4 40
Eva..........(G.C.)	..	Apr. 1, '07	314	10·1	3,186	4·9	183·74	40 42	4 50	44 92	1,644	16,861	950	4	40 63	127·5	22·1	*·9	4 29
Denty III..........(A.)	..	Jan. 31, '07	31	18·4	572	4·2	28·25	6 21	82	7 03	186	1,550	93	–	3 75	65·5	13·2	8·8	3 28
Duchesse..........(C.)	6	July 6, '06	247	17·2	4,252	3·6	181·18	39 85	6 15	46 00	1,890	16,590	1,002	4	43 00	101·1	23·7	*1·7	3 00
Maggie II..........(A.)	..	....	61	15·5	948	3·8	43·36	9 54	1 41	10 95	488	3,350	183	–	8 87	93·0	20·2	1·8	2 08
Flora..........(G.G.)	..	....	31	14·9	464	4·1	22·91	5 04	66	5 70	186	1,550	93	–	3 75	80·8	16·3	5·7	1 95
Ottawa Fortune..(C.)	.	Oct. 22, '06	159	10·2	1,631	4·3	83·91	18 46	2 32	20 78	844	8,480	636	–	19 15	117·4	22·8	*·8	1 63
Denty Girl..........(A.)	..	....	184	13·9	2,571	3·9	118·68	26 11	3 08	29 19	1,250	10,510	549	4	28 93	112·5	24·3	*2·3	26
Ottawa Marchioness..(S)	..	Jan. 10, '06	311	11·8	3,687	4·1	180·48	39 71	5 38	45 09	2,071	17,180	971	4	45 28	125·4	25·0	*3·0	* 19
Flecky II..........(A.)	..	Dec. 1, '06	30	9·6	288	3·6	12·51	2 55	42	2 97	186	1,550	90	–	3 66	127·4	29·2	*7·2	* 69
Dott..........(G.G.)	..	" 6, '06	217	14·3	3,106	4·2	151·69	33 37	3 42	36 79	1,759	16,920	1,002	4	42 02	135·2	27·2	*5·2	*5 23
Molly II..........(S.)	..	Oct. 20, '05	251	12·6	3,142	4·0	150·30	33 07	4 49	38 56	2,075	17,180	971	4	45 32	144·0	31 5	*10·5	*6 76
Jessica..........(S.)	6	Jan. 22, '06	261	10·5	2,741	4·2	134·93	29 68	4 20	33 88	1,673	17,180	971	4	41 30	150·0	36·0	*14·0	*7 52
Janet..........(S.)	6	Dec. 1, '05	175	14·0	2,464	4·0	117·66	25 88	3 52	29 40	1,764	17,180	971	4	42 21	171·0	35·8	*13·8	*12 81
Duchess..........(S.)	6	Nov. 23, '05	148	11·3	1,676	4·0	95·90	21 98	2 36	24 34	1,590	17,180	971	4	40 42	241·0	42·1	*20·1	*16 08

AYRSHIRES.

Names of Cows.	Age.	Date of dropping last calf.	No. of days in milk.	Daily average yield of milk.	Total milk for year.	Per cent fat in milk.	Pounds of butter produced in year.	Value of butter at 22c. per pound.	Value of skim milk at 15c. per cwt.	Total value of product for year.	Amount meal eaten at 1c. per lb.	Amt. roots and ensilage eaten valued at $2 per ton.	Amt. hay valued at $7 per ton.	Months on pasture at $1 per mo.	Total cost of feed for year.	Cost to produce 100 lbs. milk.	Cost to produce 1 lb. butter, skim milk neglected.	Profit on 1 lb. butter, sk. milk neglected.	Profit on cow during year, labour neglected.
				lbs.	lbs.	%	lbs.	$ cts.	$ cts.	$ cts.	lbs.	lbs.	lbs.	mos	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Maggie	11	May 25, '06	282	27·6	7,242	4·2	366 06	80·53	10·51	90·84	2,043	17,490	912	4	45 11	66·2	12·4	9·6	45 73
Denty	8	Apl. 11, '06	245	30·4	7,466	4·1	363·30	79·93	10·65	90·58	2,166	17,640	912	4	46 49	64·9	12·7	9·3	44 09
Jessie A.	13	Jan. 22, '06	249	28·3	7,060	3·9	327·50	72·05	10·10	82·15	2,285	16,870	878	4	46 79	66·2	14·2	7·8	35 36
			258		7256	4.1	352.28			87.85	2164				46.13	65.7	13.1		125.18

CANADIANS.

Names of Cows.	Age.	Date of dropping last calf.	No. of days in milk.	Daily average yield of milk.	Total milk for year.	Per cent fat in milk.	Pounds of butter produced in year.	Value of butter at 22c. per pound.	Value of skim milk at 15c. per cwt.	Total value of product for year.	Amount meal eaten at 1c. per lb.	Amt. roots and ensilage eaten valued at $2 per ton.	Amt. hay valued at $7 per ton.	Months on pasture at $1 per mo.	Total cost of feed for year.	Cost to produce 100 lbs. milk.	Cost to produce 1 lb. butter, skim milk neglected.	Profit on 1 lb. butter, sk. milk neglected.	Profit on cow during year, labour neglected.
Zamora	11	Sept. 7, '06	299	20·5	6,156	5·2	379·98	83·64	8·64	92·24	2,491	17,770	1,002	4	50 19	81·5	13·2	8·8	42·05
Fortune	11	Mar. 29, '07	255	23·1	5,896	4·8	332·62	63·18	8·34	71·52	2,193	17,180	1,002	4	46 62	79·4	14·	7·9	24·90
Poupée	4	Apl. 6, '06	286	19·1	5,702	3·9	266·07	58·64	8·15	66·79	1,953	16,290	1,002	4	43 33	75·9	16·2	5·8	23·46
			280	~~219~~	5918	4.6	326.22			76.85	2212				46.71	78.9	14.4		30.13

GUERNSEYS.

Names of Cows.	Age.	Date of dropping last calf.	No. of days in milk.	Daily average yield of milk.	Total milk for year.	Per cent fat in milk.	Pounds of butter produced in year.	Value of butter at 22c. per pound.	Value of skim milk at 15c. per cwt.	Total value of product for year.	Amount meal eaten at 1c. per lb.	Amt. roots and ensilage eaten valued at $2 per ton.	Amt. hay valued at $7 per ton.	Months on pasture at $1 per mo.	Total cost of feed for year.	Cost to produce 100 lbs. milk.	Cost to produce 1 lb. butter, skim milk neglected.	Profit on 1 lb. butter, sk. milk neglected.	Profit on cow during year, labour neglected.
Itchen Lady	10	Jan. 13, '07	280	26·3	7,390	5·	434·90	95·68	10·43	106·11	2,103	16,570	1,002	4	45 11	·61	10·3	11·7	61·00
Deanie	10	Jan. 1, '06	300	21·8	6,980	4·6	385·34	84·77	9·79	94·56	2,219	16,725	1,002	4	46 43	·66	12·4	9·6	46·43
Pearl	..	Jan. 9, '07	283	20·3	5,778	5·1	349·53	77·90	8·14	85·04	2,010	16,735	1,004	4	44 35	7·67	12·7	9·3	40·60
			287		6716	4.9	393.25			95.57	2110	16676			45.29	2.98	11.8		49.37

SHORTHORNS.

Names of Cows.	Age.	Date of dropping last calf.	No. of days in milk.	Daily average yield of milk.	Total milk for year.	Per cent fat in milk.	Pounds of butter produced in year.	Value of butter at 22c. per pound.	Value of skim milk at 15c. per cwt.	Total value of product for year.	Amount meal eaten at 1c. per lb.	Amt. roots and ensilage eaten valued at $2 per ton.	Amt. hay valued at $7 per ton.	Months on pasture at $1 per mo.	Total cost of feed for year.	Cost to produce 100 lbs. milk.	Cost to produce 1 lb. butter, skim milk neglected.	Profit on 1 lb. butter, sk. milk neglected.	Profit on cow during year, labour neglected.
Darlington II	..	Oct. 31, 1905	332	19·9	6,627	3·9	308·66	67·90	9·50	77·40	2,225	17,180	971	4	47 12	71·1	15·2	6·8	30·28
Illuminata II	..	Feb. 23, '06	355	16·4	5,824	3·8	266·44	58·62	8·34	66·96	1,960	17,180	1,001	4	44 28	76·	16·6	5·4	22·68
Illuminata III	..	Sept. 1, '06	187	16·1	2,023	3·7	134·14	29·51	4·33	33·84	1,092	10,760	636	1	24 90	82·6	18·5	3·5	8·94

THREE GRADES.

Names of Cows.	Age.	Date of dropping last calf.	No. of days in milk.	Daily average yield of milk.	Total milk for year.	Per cent fat in milk.	Pounds of butter produced in year.	Value of butter at 22c. per pound.	Value of skim milk at 15c. per cwt.	Total value of product for year.	Amount meal eaten at 1c. per lb.	Amt. roots and ensilage eaten valued at $2 per ton.	Amt. hay valued at $7 per ton.	Months on pasture at $1 per mo.	Total cost of feed for year.	Cost to produce 100 lbs. milk.	Cost to produce 1 lb. butter, skim milk neglected.	Profit on 1 lb. butter, sk. milk neglected.	Profit on cow during year, labour neglected.
Quennie G. g.	9	Mar. 26, '06	365	17·7	6,465	6·3	480·52	105·71	8·98	114·69	2,130	17,100	1,002	4	45 90	79·8	9·5	12·5	68·79
Alma G. g.	6	Jan. 17, '06	314	22·8	7,188	4·9	415·08	91·31	10·15	101·46	2,344	17,250	1,000	4	88 19	6·7	11·6	10·4	53·27
Polly G. g.	12	Feb. 27, '06	365	22·7	8,301	4·1	400·08	88·11	11·85	99·96	2,285	17,560	940	4	47 70	57·4	11·7	10·3	52·26

GLUTEN, OIL MEAL, COTTON SEED MEAL VS. BRAN AND OATS.

During the winter of 1906-7 an experiment was undertaken to gain some information as to the value of gluten, oil meal, and cottonseed meal as feeds in comparison with bran and oats.

The tables which follow give a full history of the experiment.

It will be seen that while these feeds, especially oil meal and gluten, checked the falling off in milk flow they at the same time raised the cost of production so that the period when bran was being fed holds first place in economy. Gluten meal period is very close behind, however, and has the advantage of having not only checked the natural decrease in milk flow but even induced a slight increase.

VALUES OF MIXTURES.

Oats and bran mixture, equal parts..	$20 00	per ton.
Oats, bran and gluten meal mixture, equal parts	21 60	"
Oats, bran and oil meal mixture, equal parts.. ..	23 40	"
Oats, bran and cottonseed meal mixture, equal parts	23 60	"

These were the prices the feeds cost us.

GROUP I.—Bran, Oats, Gluten, Oil Meal and Cotton Seed Meal Experiment.

ITEM CONSIDERED.	MEAL MIXTURE FED.				
	Preliminary Oats 100, Bran 100.	Oats 100, Bran 100.	Oats 100, Bran 100, Oil meal 100.	Oats 100, Bran 100, Gluten 100.	Oats 100, Bran 100, Cotton seed meal 100.
Period.	Feb. 21 to Mar. 6.	Mar. 7 to Mar. 20.	Mar. 21 to April 3.	April 4 to April 17.	April 18 to May 2.
Number of days on feed..............	14	14	14	14	14
Amount meal mixture consumed in period......	364 lbs.	364 lbs.	364 lbs	364 lbs.	364 lbs.
Average amount meal per cow per day .	6½ "	6½ "	6½ "	6½ "	6½ "
Amount roots and ensilage consumed by group in period..........	2660 "	2380 "	2359 "	2338 "	1820 "
Average amount roots and ensilage per cow per day..........	47·5 "	43 "	42 "	41·5 "	32½ "
Amount hay consumed by group in period..........	168 "	168 "	168 "	168 "	168 "
Total milk in average day of period....	86 "	82 "	76·5 "	82 "	86 "
Total milk produced by group in period	1210½ "	1147 "	1145 "	1148½ "	1117½ "
Total milk produced by group in first three days of period..........	258·5 "	250 "	243½ "	241 "	247 "
Total milk produced by group in last three days of period..........	255 "	244 "	241 "	242 "	241 "
Value of food consumed by group during period..........	$6 89	$6 61	$7 21	$6 86	$6 71
Value of food consumed by group in one day..........	0 49$\frac{3}{14}$	0 47$\frac{3}{14}$	0 51½	0 49	0 47$\frac{13}{14}$
Cost of 100 lbs. milk produced by group during period..........	0 57	0 57·6	0 63	0 60	0 60
Cost of 100 lbs. milk produced by group during first three days of period......	0 56·3	0 56·7	0 63	0 60	0 58·2
Cost of 100 lbs. milk produced by group during last three days of period.. .	0 57·9	0 58·1	0 64	0 60	0 59·7
Normal rate of decrease in milk flow during period..........	4 p.c.	4 p.c.	4 p.c.	4 p.c.	4 p.c.
Rate of decrease—; or increase+; during period..........	—1·3 p.c.	—2·3 p.c.	—1 p.c.	+·4 p.c.	—2·4 p.c.
Average per cent of fat in milk during period..........	4·4 p.c.	4·6 p.c.	4·6 p.c.	4·4 p.c.	4·4 p.c.

GROUP II.—Bran, Oats, Gluten, Oil Meal and Cotton Seed Meal Experiment.

Item Considered.	Meal Mixture Fed.				
	Preliminary Bran 100, Oats 100.	Oats 100, Bran 100, Oil meal 100.	Oats 100, Bran 100, Gluten 100.	Oats 100, Bran 100, Cotton seed meal 100.	Bran 100, Oats 100.
Period.	Feb. 21 to Mar. 6.	Mar. 17 to Mar. 20.	Mar. 21 to April 3.	April 4 to April 17.	April 18 to May 2.
Number of days on feed	14	14	14	14	14
Amount meal mixture consumed in period	308 lbs.	308 lbs.	308 lbs.	308 lbs.	308 lbs.
Average amount meal per cow per day	$5\frac{1}{2}$ "	$5\frac{1}{2}$ "	$5\frac{1}{2}$ "	$5\frac{1}{2}$ "	$5\frac{1}{2}$ "
Amount roots and ensilage consumed by group in period	2660 "	2520 "	2506 "	2492 "	1960 "
Average amount roots and ensilage per cow per day	47·5 "	45 "	$44\frac{3}{11}$ "	$44\frac{1}{2}$ "	35 "
Amount hay consumed by group in period	168 "	168 "	168 "	168 "	168 "
Total milk in average day of period	72 "	70 "	72 "	71 "	67·6 "
Total milk produced by group in period	1003 "	$986\frac{1}{2}$ "	$1005\frac{1}{2}$ "	$988\frac{1}{2}$ "	947·5 "
Total milk produced by group in first three days of period	215·5 "	$209\frac{1}{2}$ "	$216\frac{1}{2}$ "	214 "	211 "
Total milk produced by group in last three days of period	$210\frac{1}{2}$ "	$212\frac{1}{2}$ "	$217\frac{1}{2}$ "	$212\frac{1}{2}$ "	197 "
Value of food consumed by group during period	$6 33	$6 71	$6 43	$6 71	$5 63
Value of food consumed by group in one day	0 $45\frac{3}{14}$	0 $47\frac{13}{14}$	0 $45\frac{13}{14}$	0 $47\frac{13}{14}$	0 $40\frac{3}{14}$
Cost of 100 lbs. milk produced by group during period	0 63	0 68	0 64	0 67·8	0 59·4
Cost of 100 lbs. milk produced by group during first three days of period	0 63	0 68·2	0 64	0 67·3	0 57·2
Cost of 100 lbs. milk produced by group during last three days of period	0 64·4	0 67·3	0 64	0 67·9	0 61·2
Normal rate of decrease in milk-flow during period	4 p.c.	4 p.c.	4 p.c.	4 p.c.	4 p.c.
Rate of decrease—; or increase +; during period	—2 p.c.	+1·5 p.c.	+ ·4 p.c.	— ·7 p.c.	—6·6 p.c.
Average per cent of fat in milk during period	4·2 p.c.	4·7 p.c.	4·7 p.c.	4·7 p.c.	4·5 p.c.

GROUP III.—Bran, Oats, Gluten, Oil Meal and Cotton Feed Meal Experiment.

Item Considered.	Meal Mixture Fed.				
	Preliminary, Bran 100, Oats 100.	Oats 100, Bran 100, Gluten 100.	Oats 100, Bran 100, Cotton seed meal 100.	Oats 100, Bran 100.	Oats 100, Bran 100, Oil meal 100.
Period.	Feb. 21 to Mar. 6.	Mar. 17 to Mar. 20.	Mar. 21 to Apl. 3.	Apl. 4 to Apl. 17.	Apl. 18 to May 2.
Number of days on feed	14	14	14	14	14
Amount meal mixture consumed in period	308 lbs.	308 lbs.	308 lbs.	308 lbs.	308 lbs.
Average amount meal per cow per day	5½ "	5½ "	5½ "	5½ "	5½ "
Amount roots and ensilage consumed by group in period	2,590 "	2,380 "	2,359 "	2,338 "	1,820 "
Average amount roots and ensilage per cow per day	46¼ "	42½ "	42 "	42 "	32½ "
Amount hay consumed by group in period	168 "	168 "	168 "	168 "	168 "
Total milk in average day of period	76 "	77 "	76 "	71 "	66 "
Total milk produced by group in period	1,063½ "	1,077½ "	1,061½ "	977 "	932 "
Total milk produced by group in first three days of period	228 "	223 "	230 "	217½ "	207½ "
Total milk produced by group in last three days of period	228½ "	233 "	224½ "	206½ "	199 "
Value of food consumed by group during period	$6 26	$6 30	$6 58	$6 01	$6 01
Value of food consumed by group in one day	0 44 12/14	0 45	0 47	0 42 13/14	0 42 13/14
Cost of 100 lbs. milk produced by group during period	0 59	0 58·5	0 62	0 61·5	0 64·5
Cost of 100 lbs. milk produced by group during first three days of period	0 59	0 60·5	0 61	0 59·3	0 62 3
Cost of 100 lbs. milk produced by group during last three days of period	0 59	0 58	0 63	0 62·4	0 64·8
Normal rate of decrease in milk flow during period	4 p.c.	4 p.c.	4 p.c.	4 p.c.	4 p.c.
Rate of decrease —; or increase +; during period	—	+4·4 p.c.	—2·6 p.c.	—5 p.c.	—4 p.c.
Average per cent of fat in milk during period	4·2 p.c.	4·7 p.c.	4·9 p.c.	4·5 p.c.	4·2 p.c.

GROUP IV.—Bran, Oats, Gluten, Oil Meal and Cotton Seed Meal Experiment.

Item Considered.	Meal Mixture Fed.				
	Preliminary, Bran 100, Oats 100.	Bran 100, Oats 100, Cotton seed meal 100.	Bran 100, Oats 100.	Bran 100, Oats 100, Oil meal 100.	Bran 100, Oats 100, Gluten 100.
Period.	Feb. 21 to Mar. 6.	Mar. 17, to Mar. 20.	Mar. 21 to Apl. 3.	Apl. 4 to Apl. 17.	Apl. 18 to May 2.
Number of days on feed	14	14	14	14	14
Amount meal mixture consumed in period	392 lbs.	392 lbs	392 lbs.	392 lbs.	392 lbs.
Average amount meal per cow per day	7 "	7 "	7 "	7 "	7 "
Amount roots and ensilage consumed by group in period	2,660 "	2,660 "	2,590 "	2,52) "	2,030 "
Average amount roots and ensilage per cow per day	47½ "	47½ "	46¼ "	45 "	36¼ "
Amount hay consumed by group in period	168 "	168 "	168 "	168 "	168 "
Total milk in average day of period	87½ "	88 "	83 "	83 "	82 "
Total milk produced by group in period.	1,225½ "	1,233 "	1,166 "	1,167½ "	1,149 "
Total milk produced by group in first three days of period	266 "	257 "	259 "	246½ "	250 "
Total milk produced by group in last three days of period	264½ "	267½ "	246½ "	254 "	252 "
Value of food consumed by group during period	$7 17	$7 88	$7 10	$7 70	$6 85
Value of food consumed by group in one day	0 51 3/14	0 56 4/14	0 50 10/14	0 55	48 13/14
Cost of 100 lbs. milk produced by group during period	0 59	0 64	0 61	0 66	0 59·6
Cost of 100 lbs. milk produced by group during first three days of period	0 60	0 66	0 59	0 67	0 58·7
Cost of 100 lbs. milk produced by group during last three days of period	0 59	0 63	0 61·5	0 65	0 58·2
Normal rate of decrease in milk flow during period	4 p.c.	4 p.c.	4 p.c.	4 p.c.	4 p.c.
Rate of decrease —; or increase +; during period	—1 p.c.	+2·5 p.c.	—5 p.c.	+3·2 p.c.	+·8 p.c.
Average per cent of fat in milk during period	4·3 p.c.	4·4 p.c.	4·4 p.c.	4·8 p.c.	4·4 p.c.

SUMMARY of Bran, Oats, Gluten, Oil Meal and Cotton Seed Meal Experiment.

Item Considered.	Meal Mixture Fed.				
	Pre-liminary, Oats 100, Bran 100.	Oats 100, Bran 100.	Oats 100, Bran 100, Oil meal 100.	Oats 100, Bran 100, Gluten 100.	Oats 100, Bran 100, Cotton seed meal 100.
Period.	—	—	—	—	—
Number of days on feed	11	14	14	14	14
Amount meal mixture consumed in period	1,372 lbs.	1,372 lbs.	1,372 lbs.	1,372 lbs.	1,372 lbs.
Average amount meal per cow per day.	6·1 "	6·1 "	6·1 "	6·1 "	6·1 "
Amount roots and ensilage consumed by group in period	10,570 "	9,268 "	9,219 "	9,254 "	9,331 "
Average amount roots and ensilage per cow per day	47·2 "	41·5 "	41 "	41·1 "	41·6 "
Amount hay consumed by group in period	672 "	672 "	672 "	672 "	672 "
Total milk in average day of period	320·5 "	303·6 "	295·5 "	313 "	321 "
Total milk produced by group in period.	4,502·5 "	4,237·5 "	4,231·5 "	4,380·5 "	4,400·5 "
Total milk produced by group in first three days of period	998 "	937·5 "	907 "	940·5 "	948 "
Total milk produced by group in last three days of period	958·5 "	893 "	906·5 "	944·5 "	945·5 "
Value of food consumed by group during period	$26 65	$25 35	$27 63	$26 44	$27 88
Value of food consumed by group in one day	1 90·4	1 81·1	1 96·6	1 48·8	1 99·1
Cost of 100 lbs. milk produced by group during period	0 59·1	0 59·8	0 65·3	0 60·3	0 63·3
Normal rate of decrease in milk flow during period	4 p.c.	4 p.c.	4 p.c.	4 p.c.	4 p.c.
Rate of decrease —; or increase +; during period	—3·1 p.c.	—3·7 p.c.	—	+·4 p.c.	—·2 p.c.
Average per cent of fat in milk during period	4·3 p.c.	4·5 p.c.	4·6 p.c.	4·5 p.c.	4·6 p.c.

INTERNATIONAL STOCK FOOD FOR DAIRY COWS.

At the instance of the International Stock Food manufacturers, an experiment to get some information as to the value of Stock Food as an addition to the ration of dairy cows in milk was instituted.

The report which follows does not seem to indicate that it has much value as a food for this class of stock.

In the valuation put on the food when Stock Food was fed no account is taken of the cost of the Stock Food.

International Stock Food for Dairy Cows.

—	Method of Feeding.						—	
	1st period of 1 week.		2nd period of 3 weeks.		3rd period of 3 weeks.			
	Group A.	Group B.	Group A.	Group B.	Group A.	Group B.	Summary.	Summary.
	Preliminary.	Preliminary.	No stock food.	Fed stock food.	Fed stock food.	No stock food.	Fed stock food.	Fed no stock food.
	Number in group 3.	Number in group 3.	Number in group 3.	Number in group 3.	Number in group 3.	Number in group 3.	Number in group 3.	Number in group 3.
Meal fed group in 1 day .... Lbs.	21	17·5	22	17·5	20	18	....	....
Hay fed group in 1 day .... "	4	4	4	4	4	4	....	....
Ensilage and roots fed group in 1 day .... "	202	181	....	....	....	....	....	....
Ensilage fed group in 1 day .... "	....	....	160	190	165	150	355	310
Stock food fed group in 1 day .... Ozs.	....	....	....	3	3	....	6	....
Meal fed group in period .... Lbs.	147	122·5	435	374·5	392	371	766·6	806
Hay fed group in period .... "	28	28	84	84	84	77	168	161
Ensilage and roots fed group in period .... "	1,414	1,267	....	....	....	....	....	....
Ensilage fed group in period .... "	....	....	3,570	3,605	3,430	3,150	7,035	6,720
Stock food fed group in period .... "	....	....	....	3 9	3·9	....	7·8	....
Value of feed fed group in period .... $	2 97	2 57	8 41	7 65	7 64	7 12	15 29	15 53
Value of feed fed 1 cow in 1 day .... Cts.	14	12·2	13·3	12·1	12·1	11·3	12·1	12·3
Milk produced by group in period .... Lbs.	429	406·5	1,173·5	1,134	932	973·5	2,066	2,147
First day's milk from group .... "	63½	59·5	61·5	58	51·5	54·5	109·5	116
Second " " .... "	61	55	61	56·5	50·5	53·5	107	114·5
Average daily yield of group during 1st week .... "	61·3	58	58·2	55·2	49·2	50·6	104·4	108·8
" " 2nd " .... "	....	....	53	52·8	40·2	43·3	93	96·3
" " 3 weeks .... "	....	....	53·5	54	44·3	46·3	98·3	99·8
Next to last day's milk from group .... "	61·5	59·5	53·5	54·5	40	46	94·5	99·8
Last day's milk from group .... "	61	59	52	52·5	40	42	92·5	94
Cost to produce 100 lbs. milk during period .... Cts.	69·2	63·2	71·7	67·4	81·9	73·1	74	72·3

ROOTS VS. ENSILAGE FOR DAIRY COWS.

In January and February an experiment was undertaken with dairy cows to get some idea as to whether the addition of a certain proportion of roots to the ensilage ration fed would in any way influence the yield of milk.

The roots were mixed with the ensilage in the proportion of 100 pounds roots to 200 pounds corn ensilage. In each case the cows were given all they would eat of the succulent part of the ration.

They were at the same time fed as much meal as the milk flow warranted, that is about 1 pound meal to 3 pounds milk produced.

The results do not seem to show up very strongly in favour of roots.

No conclusions are to be drawn, however, just at present as it is proposed to try the experiment on a more comprehensive scale at a later date.

EXPERIMENT to compare Roots with Ensilage.

Item Considered.	Ration Fed.		
	Preliminary Period.	1st Period, no Roots.	2nd Period, Roots.
Period.	Dec. 25 to Jan. 1, 1907.	Jan. 2 to Jan. 22.	Jan. 23 to Feby. 13.
Number of days on feed	7	21	21
Amount meal mixture consumed in period... Lbs.	658	2,016	1,890
Average amount meal per cow per day "	5·5	5·6	5·29
Amount ensilage consumed by group in period "	....	16,800	....
Amount roots and ensilage consumed by group in period "	6,070	....	20,040
Average amount of ensilage per cow per day "	....	47·	....
Average amount of roots and ensilage per cow per day. "	51·0	....	56·1
Total milk in average day of period "	221·9	267·8	235·6
Total milk produced by group in period "	1,553·5	5,624·5	4,949
" " " in 1st 3 days of period "	655·5	752	773·5
" " " in last 3 " " "	684·5	800	680
Value of food consumed by group during period $	13 80	40 65	42 69
" " " in 1 day $	1 97	1 93·5	2 03
Cost of 100 lbs. milk produced by group during period. Cts.	88·8	70·5	86·2
" 100 " " " " 1st 3 days "	90·2	77·1	78·7
" 100 " " " " last 3 days "	86·3	72·5	89·6
Normal rate of decrease in milk-flow during period.... Lbs.	2·5%	7·5%	7·5%
Rate of decrease; or increase; during period "	....	+6·3%	-12%

BEEF PRODUCTION.

SOME REMARKS.

No line of farming affords more genuine pleasure to its devotees than does beef production. There is a feeling of satisfaction and pleasure in watching a good hearty steer make way with his food and lay on flesh that scarce any other feature in farming can approach. Nor need the farmer be satisfied with the pleasure alone, for where skill and judgment are exercised good profits are practically sure to follow.

The profits likely to accrue to him who feeds steers wisely and well are of two kinds. In the first place having bought good steers at a reasonable price he is likely to be able to sell them at such an advance on cost when fat as not only to recoup his outlay for both stockers and feed, but to leave a good margin of profit. To put it in another way, he is likely to be able to sell a steer that has cost him to start with say, $40, and that has cost for feed $20 more during the feeding period, not for $60 which would recoup him, but for $70 or possibly for even $80, leaving him a profit of from $10 to $20 on his outlay of money and feed. Such margins of profit do not always materialize, but one other advantage the farmer is certain to reap. Since a large amount of food passes through the steer in the fatting process and since the increase in live weight is relatively small and of a character to remove very little material of any fertilizing value from this food it is all available for use on the land, and in addition a large amount of humus forming material of the very best kind is at the farmer's disposal. Farms where beef has been produced for years and the manure utilized are invariably productive. In addition it must be remembered that the farmer by feeding beef makes for himself a home market for all the forage of every description that he can raise on the farm, so even did he find himself at the end of the year with scarcely more than market prices or even less for feed given his steers he might still console himself with the fact that it had practically all gone back on his land and he would be sure to reap the advantage later.

FEEDING STEERS.

The methods followed in feeding steers have a great deal to do with the success of the operations. The feeds used are of course also of very great importance.

The economical results obtained here are, we consider, due to the system followed. Briefly outlined, that system is as follows:—

For from two to four weeks steers receive no meal in addition to the roughage ration. The roughage ration fed is of a laxative character, viz.: roots, ensilage and clover hay. Roots usually constitute the major part of the succulent portion of the ration at this time, the first 3 or 4 weeks after stabling.

At the end of from two to four weeks meal is fed. The quantity given at first is very small, about 1 pound per steer per day.

This is gradually increased till, if the feeding period last say six months, the steers are usually receiving from 10 to 11 pounds per day during the last 10 days or fortnight.

The meal fed always contains a considerable proportion of bran. In 1905-6 oil meal and bran were fed. In 1906-7 gluten meal and bran made up the meal ration. The proportion was gluten 400 to bran 100.

The roughage ration was prepared as follows:—300 pounds ensilage was spread on the feed floor, over this was spread 100 pounds roots with about 40 pounds cut hay or straw. This was repeated layer after layer until enough for two days was corded up ready to feed.

The meal is scattered on the roughage in the trough after it is before the cattle. The hay is fed when the succulent portion of the feed with the meal mixed therein, has been practically all eaten.

The cattle are fed in this way night and morning, no portion being fed at noon.

SCOPE OF REPORT.

On account of the change in the date of beginning the fiscal year, it is necessary in this report to summarize the work of two seasons so far as beef production is concerned. The report on this line of work is accordingly divided into two parts, viz.:— Experiments in 1905-6, and experiments in 1906-7.

EXPERIMENTS IN 1905-6.

WINTER FEEDING.

The lines of experiment followed in the winter of 1905-6 were as follows:—

A. A study of the feeding qualities of well bred as compared with fairly well bred and poorly bred steers. This might be expressed differently, thus:—Had the farmer better feed, superior, good or inferior cattle so far as profits are concerned?

B. A study of baby beef production.
C. Cost of beef from birth to block at various ages.
D. A study of the production of stall fed beef in summer.

'A.'

In the autumn of 1905 three groups of steers differing markedly as to quality were selected in this district. Group 1, consisted of 9 steers weighing 1,263 pounds each and of excellent breeding and conformation. These cost delivered, 4 cents per pound.

Group 2, consisted of 8 steers weighing 1,111 pounds each of good breeding and very fair conformation. These cost delivered, 3½ cents per pound.

Group 3, consisted of 8 steers weighing 1,037 pounds each of mongrel breeding and poor conformation from the beef producer's standpoint. These cost delivered, 3 cents per pound.

Lot 1.

Number of steers in lot	9	
First weight, gross, Dec. 11, 1905	11,370	lbs.
First weight, average	1,263	"
Finished weight, gross, April 6, 1906	13,480	"
Finished weight, average	1,497½	"
Total gain in 116 days	2,110	"
Average gain per steer	234	"
Daily gain per steer	2·02	"
Daily gain for lot, 9 steers	18·18	"
Gross cost of feed	$ 161 25	
Cost of 100 pounds gain	7 64	
Cost of steers, 11,370 pounds at $4 per 100 pounds	454 80	
Total cost to produce beef, $454·80 + $160·25	616 05	
Sold, 13,480 at $5.25 per 100 pounds, less 4 per cent	679 39	
Profit or loss—profit	63 34	
Net profit per steer	7 04	
Average buying price per steer	50 53	
Average selling price per steer	75 49	
Average increase in value	24 96	
Average cost of feed for steer	17 92	
Amount of meal eaten by lot of 9 steers	6,670¼	lbs.
Amount of ensilage and roots	66,776	"
Amount of hay	5,022	"

Lot 2.

Number of steers in lot	8	
First weight, gross, Dec. 11, 1905	8,890	lbs.
First weight, average	1,111	"
Finished weight, gross, April 6, 1906	10,985	"
Finished weight, average	1,373	"
Total gain in 116 days	2,095	"
Average gain per steer	262	"
Daily gain per steer	226	"
Daily gain for lot, 8 steers	18·08	"
Gross cost of feed	$ 140 73	
Cost of 100 pounds gain	6 72	
Cost of steers, 8,890 pounds at $3 50 per 100 pounds	311 15	
Total cost to produce beef, $311·15 + $140·73	541 88	

Sold 10,985 lbs. at $5 25 per 100 lbs., less 4 per cent..	$ 553 66
Profit or loss—profit..	101 78
Net profit per steer..	12 72
Average buying price per steer..	38 89
Average selling price per steer..	69 21
Average increase in value..	30 32
Average cost of feed for steer..	17 60
Amount of meal eaten by lot of 8 steers..	5,936 lbs.
Amount of ensilage and roots..	57,048 "
Amount of hay..	4,408 "

Lot 3.

Number of steers in lot..	8
First weight, gross..	8,300 lbs.
First weight average..	1,037 "
Finished weight, gross..	9,990 "
Finished weight average..	1,248 "
Total gain in 116 days..	1,690 "
Average gain per steer..	211 "
Daily gain per steer..	1·82 "
Daily gain for lot, 8 steers..	14·56 "
Gross cost of feed..	$ 145 40
Cost of 100 lbs. gain..	8 60
Cost of steers, 8,300 lbs. at $3 per 100 lbs..	249 00
Total cost to produce beef, $249 + $145·40..	394 40
Sold, 9,990 lbs. at $4 50 per 100 lbs., less 4 per cent..	431 59
Profit or loss—profit..	37 12
Net profit per steer..	4 65
Average buying price per steer..	31 13
Average selling price per steer..	53 95
Average increase in value..	22 82
Average cost of feed for steer..	18 18
Amount of meal eaten by lot of 8 steers..	6,326 lbs.
Amount of ensilage and roots..	57,048 "
Amount of hay..	4,464 "

'D.'

SPRING FEEDING.

In the spring of 1906 two groups of steers were purchased to experiment with as to possibility of profitably producing beef in the stable to compete in the open market with grass fed beef.

Lot 1, consisted of 10 steers weighing 1,080 lbs. each and cost us 4 cents per lb. delivered.

Lot 2, consisted of steers weighing 883 lbs. each and cost us 3½ cents per lb. delivered.

Lot 1.

Number of steers in lot..	10
First weight, gross, April 21, 1906..	10,800 lbs.
First weight, average..	1,080 "
Finished weight, gross, July 23, 1906..	12,825 "
Finished weight average..	1,282 "
Total gain in 92 days..	2,025 "
Average gain per steer..	203 "

Daily gain per steer	2·21
Daily gain for lot, 10 steers	22·10
Gross cost of feed	$ 128 93
Cost of 100 lbs. gain	6 37
Cost of steers, 10,800 lbs. at $4 per 100 lbs	432 00
Total cost to produce beef, $432 + $128 93	560 93
Sold, 12,825 at $5 25 per 100 lbs., less 4 per cent	673 31
Profit or less—profit	112 38
Net profit per steer	11 24
Average buying price per steer	43 20
Average selling price per steer	67 33
Average increase in value	24 13
Average cost of feed for steer	12 89
Amount of meal eaten by lot of 10 steers	6,410 lbs.
Amount of ensilage and roots	43,725 "
Amount of hay	3,280 "

Lot 2.

Number of steers in lot	10
First weight, gross, April 7, 1906	8,830 lbs.
First weight, average	883 "
Finished weight, gross, August 2, 1906	11,710 "
Finished weight, average	1,171 "
Total gain in 116 days	2,880 "
Average gain per steer	288 "
Daily gain per steer	2·46 "
Daily gain for lot, 10 steers	24·60
Gross cost of feed	$ 129 19
Cost of 100 lbs. gain	4 52
Cost of steers, 8,830 lbs. at $3 50 per 100 lbs	309 05
Total cost to produce beef, $309 05 + $129 19	438 24
Sold, 11,710 at $4.50 per 100 lbs., less 4 per cent	505 87
Profit or loss—profit	67 63
Net profit per steer	6 76
Average buying price per steer	30 91
Average selling price per steer	50 59
Average increase in value	19 68
Average cost of feed for steer	12 92
Amount of meal eaten by lot of 10 steers	4,940 lbs.
Amount of ensilage and roots	58,275 "
Amount of hay	4,030 "

'B.'

BABY BEEF.

During the winter of 1905-6 the 2 lots of limited and unlimited ration steers dropped in 1905, were continued on the regular rations. In the spring of 1906, however, it was decided to vary the experiment and the lot of limited ration steers (lot 1) were put on a heavier grain ration, and fed till July 23, 1906, when they were sold for beef.

LOT 1.—LIMITED GROWING RATION, DROPPED 1905.

Number of steers in lot	5
First weight, gross	1,800 lbs.
First weight, average	360 "

Finished weight, gross, July 23, 1906	3,735	lbs.
Finished weight, average	747	"
Total gain in 234 days	1,935	"
Average gain per steer	387	"
Daily gain per steer	1·65	"
Daily gain for lot, 5 steers	8·27	"
Gross cost of feed	$ 93 94	
Cost of 100 lbs. gain	4 85	
Value of steers, Dec. 1, 1905, 1,800 lbs. at $3 50 per 100 lbs.	63 00	
Total cost to produce beef $63 + $93·94	156 94	
Sold, 3,735 lbs. at $5 per 100 lbs., less 4 per cent.	179 30	
Profit	22 36	
Net profit per steer	4 47	
Average valuation per steer, Dec. 1, 1905	12 60	
Average selling price per steer, July 23, 1906	35 86	
Average increase in value	23 26	
Average cost of feed for steer	18 79	
Amount of meal eaten by lot of 5 steers in 234 days	4,751·5	lbs.
Amount of ensilage and roots	34,875	"
Amount of hay	3,410	"

The meal consisted of 1,157½ lbs. oats, 280 lbs. corn, 115 lbs. oil meal, 580 lbs. barley, 1,831½ lbs. bran and 787½ lbs. gluten meal. The mixture of ensilage and roots was made up of 12,725 lbs. roots and 22,150 lbs. corn ensilage. Each steer consumed in the 234 days, 231½ lbs. oats, 56 lbs. corn, 23 lbs. oil meal, 116 lbs. barley, 366 lbs. bran, 157½ lbs. gluten meal, 682 lbs. hay, 2,545 lbs. roots and 4,430 lbs. ensilage.

To produce 1 lb. increase in live weight required 2·24 lbs. meal, 1·7 lbs. hay and 18 lbs. ensilage and roots.

LOT 2.—FULL FATTENING RATION, DROPPED 1905.

Number of steers in lot	5	
First weight, gross	2,345	lbs.
First weight, average	469	"
Finished weight, gross, July 2, 1906	4,585	"
Finished weight, average	917	"
Total gain in 213 days	2,240	"
Average gain per steer	448	"
Daily gain per steer	2·1	"
Daily gain for lot, 5 steers	10·5	"
Gross cost of feed	$ 92 89	
Cost of 100 lbs. gain	4 14	
Value of steers, Dec. 1, 1905, 2,345 lbs. at $3 50 per 100 lbs.	82 08	
Total cost to produce beef, $82 08 + $92 89	174 97	
Sold, 4,585 lbs. at $5 25 per 100 lbs., less 4 per cent.	231 10	
Profit on lot	56 13	
Net profit per steer	11 22	
Average valuation per steer, Dec. 1, 1905	16 42	
Average selling price per steer, July 2, 1906	46 22	
Average increase in value	29 80	
Average cost of feed for steer	18 58	
Amount of meal eaten by lot of 5 steers in 213 days	4,646	lbs.
Amount of ensilage and roots	35,425	"
Amount of hay	3,420	

The meal consumed consisted of 1,140 lbs. oats, 287 lbs. corn, 300 lbs. barley, 2,069 lbs. bran, 10 lbs. oil meal, and 840 lbs. gluten meal. The mixture of ensilage and roots was made up of 14,200 lbs. roots and 21,225 lbs. corn ensilage. Each steer consumed in the 213 days, 228 lbs. oats, 51½ lbs. corn, 60 lbs. barley, 414 lbs. bran, 2 lbs. oil meal, 168 lbs. gluten meal, 684 lbs. hay, 2,840 lbs. roots and 4,245 lbs. corn ensilage.

To produce 1 lb. increase in live weight required ·207 lbs. meal, 1·52 lbs. hay and 15·8 lbs. roots and ensilage.

'C.'

Interesting summaries follow showing the history of the two lots of calves dropped in 1905, and one lot dropped in 1904. These were all sold in 1906. Lot 2 being 14 months old, Lot 1 about 15 months old and Lot 3, 24 months old.

LOT 1.—LIMITED GROWING RATION, DROPPED 1905.

Life History.

Number of steers in lot	5	
First weight, gross, May 12, 1905	490	lbs.
First weight, average	98	"
Finished weight, gross, July 23, 1906	3,735	"
Finished weight average	747	"
Total gain in 435 days	3,245	"
Average gain per steer	649	"
Daily gain per steer	1·49	"
Daily gain for lot, 5 steers	7·46	"
Gross cost of feed	$ 140 91	
Cost of 100 lbs. gain	4 34	
Cost of steers, $5 each	25 00	
Total cost to produce beef, $140 91 + $25	165 91	
Sold, 3,735 lbs. at $5 per 100 lbs., less 4 per cent	179 30	
Profit on lot	13 39	
Net profit per steer	2 68	
Average buying price per steer	5 00	
Average selling price per steer, July 23, 1906	35 86	
Average increase in value	30 86	
Average cost of feed for steer	28 18	
Amount of meal eaten by lot of 5 steers in 435 days	6,801·5	lbs.
Amount of ensilage and roots	40,595	"
Amount of hay	4,992	"
Amount skim milk	10,825	"

The meal consumed consisted of 1,890½ lbs. oats, 2,378½ lbs. bran, 808 lbs. barley, 969½ lbs. gluten meal, 115 lbs. oil meal and 280 lbs. corn.

LOT 2.—FULL FATTENING RATION, DROPPED 1905.

Life History.

Number of steers in lot	5	
First weight, gross, May 12, 1905	795	lbs.
First weight, average	159	"
Finished weight, gross, July 2, 1906	4,585	"
Finished weight, average	917	"
Total gain in 414 days	3,790	"

Average gain per steer	758	lbs.
Daily gain per steer	1·83	"
Daily gain for lot, 5 steers	9·15	"
Gross cost of feed	$ 145 59	
Cost of 100 lbs. gain	3 84	
Cost of steers, $5 each	25 00	
Total cost to produce beef, $145 59 + $25	170 59	
Sold, 4,585 at $5 25 per 100 lbs., less 4 per cent	231 10	
Profit on lot	60 51	
Net profit per steer	12 10	
Average buying price per steer, May 12, 1905	5 00	
Average selling price per steer, July 2, 1906	46 22	
Average increase in value	41 22	
Average cost of feed for steer	29 20	
Amount of meal eaten by lot of 5 steers	6,856	lbs.
Amount of ensilage and roots	42,215	"
Amount of hay	5,475	"
Amount of skim milk	11,350	"

Meal consumed consisted of 1,980¾ lbs. oats, 3,029 lbs. bran, 475 lbs. barley, 287 lbs. corn, 10 lbs. oil meal, 840 lbs. gluten meal and 235 lbs. mixed meal.

A LIFE HISTORY.

The next lot, dropped in 1904, were fed as usual with a very light meal ration till May 18, 1905, when they were turned out to pasture and left thereon till October 28, 1905. The pasture was poor, however, and heavily stocked, so the steers did very little more than hold their own.

Below follows a life history.

LOT 3.—LIMITED RATION, CALVES DROPPED 1904.

Number of steers in lot	6	
First weight, gross, May 1, 1904	490	lbs.
First weight, average	81	"
Finished weight, gross, May 7, 1906	6,995	"
Finished weight, average	1,166	"
Total gain in 743 days	6,505	"
Average gain per steer	1,084	"
Daily gain per steer	1·46	"
Daily gain per lot, 6 steers	8·76	"
Gross cost of feed	$ 264 07	
Cost of 100 lbs. gain	4 06	
Cost of steers, $5 each, 6 steers	30 00	
Total cost to produce beef $264 07 + $30	294 07	
Sold, 6,995 lbs. at $5 25 per 100 lbs., less 5 per cent	348 86	
Profit on lot	54 79	
Net profit per steer	9 13	
Average buying price per steer	5 00	
Average selling price per steer	58 14	
Average increase in value	53 14	
Average cost of feed for steer	44 01	
Amount of meal eaten by lot of 6 steers	8,621	lbs.
Amount of ensilage and roots	78,438	"
Amount of hay	7,542	"

Amount of straw eaten..........................	1,684 lbs.
Amount of skim milk..........................	15,738 "
Amount of green feed, clover, mixed peas and oats cut green, rape, &c..........................	7,266 "
Pasture 5 months, for lot..........................	30 months.

The meal consisted of 1,247 lbs. oats, 504 lbs. oil meal, 273 lbs. barley, 3,006 lbs. bran, 1,648 lbs. gluten meal and 1,943 lbs. corn. The hay was red clover hay in every case.

The green feed, 7,266 lbs., was made up of green red clover 500 lbs., rape 1,256 lbs. and mixed crop (oats 3 bushels and peas 1 bushel seed per acre) 5,510 lbs.

The straw fed was chaffed and mixed with ensilage and roots. Oat straw was used.

BEEF PRODUCTION, 1906-07.

The work with beef cattle in the winter of 1906-07 was, on account of lack of space, rather limited. Steers in this district in the month of November were very low in flesh on account of a very dry season. The experiments were, however, highly interesting, since they ran very smoothly, the cattle being remarkably healthy and doing exceedingly well, no untoward incident of any kind happening to detract in any way from the value of the results. From a financial standpoint, the work was probably as satisfactory as any feeding operations that have ever been conducted here, considering the high prices that have maintained for stockers and foods, and later the low prices for the finished product.

The feeds used were perhaps the best that have ever been fed here. The corn ensilage was exceedingly rich in dry matter of a highly nutritious character, since the corn was well eared and well matured when cut. The ears were of a good size and glazed, before cutting. The hay fed was clean timothy, and the meal, a mixture of four parts gluten meal with one part bran, has proven with us to be one of the most satisfactory feeds for beef production.

The work has been along the following lines:—

A. Feeding superior steers in comparison with inferior steers.

B. Feeding short keep steers in comparison with long keep steers.

C. Baby beef experiments continued.

A.

In November, 1906, two groups of steers were selected in this neighbourhood. They were all low in flesh, due to scarcity of grass.

Lot 1, consisted of 7 steers weighing 1,095 lbs. each. They were Shorthorn grades being of good conformation and quality. All 2-year-olds. Cost 4 cents per lb. delivered.

Lot 2, consisted of 7 steers weighing 851 lbs. each. They were showing various faults in conformation and breeding. Ayrshire, Holstein, Jersey and Guernsey blood was in evidence here and there and in one or two cases no conclusion could be reached as to the blood lines indicated, pure scrub probably. Cost 3 cents per lb. delivered.

A study of the subjoined feed histories will prove interesting.

LOT I.—EXTRA CHOICE.

Number of steers in lot..........................	7
First weight, gross, Nov. 14, 1906..........................	7,675 lbs.
First weight, average..........................	1,095 "
Finished weight, gross, May 13, 1907..........................	10,645 "
Finished weight, average..........................	1,521 "
Total gain in 180 days..........................	2,970 "

Average gain per steer	424	lbs.
Daily gain per steer	2·36	"
Daily gain for lot, 7 steers	16·52	"
Gross cost of feed	$ 146 66	
Cost of 100 lbs. gain	4 26	
Cost of steers, 7,675 lbs. at $4 per 100 lbs.	307 00	
Total cost to produce beef, $307 + 146.66	543 66	
Sold, 10,645 lbs. at $5 75 per 100 lbs., less 5 per cent.	581 49	
Profit on lot	127 83	
Net profit per steer	18 23	
Average buying price per steer, Nov. 14, 1906	43 86	
Average selling price per steer, May 13, 1907	82 68	
Average increase in value	38 82	
Average cost of feed for steer	20 95	
Amount of meal eaten by lot of 7 steers	6,274	lbs.
Amount of ensilage and roots	63,385	"
Amount of hay	3,180	"

LOT II.—INFERIOR STEERS.

Number of steers in lot	7	
First weight, gross, Nov. 14, 1906	5,955	lbs.
First weight, average	851	"
Finished weight, gross, May 13, 1907	8,820	"
Finished weight, average	1,260	"
Total gain in 180 days	2,865	"
Average gain per steer	409	"
Daily gain per steer	2·27	"
Daily gain for lot, 7 steers	15·89	
Gross cost of feed	$ 142 34	
Cost of 100 lbs. gain	4 97	
Cost of steers, 5,955 lbs. at $3 per 100 lbs.	178 65	
Total cost to produce beef, $178 65 + $142 24	326 99	
Sold, 8,820 lbs. at $4 50 per 100 lbs., less 5 per cent.	377 05	
Profit on lot	50 06	
Net profit per steer	7 15	
Average buying price per steer	25 52	
Average selling price per steer	53 86	
Average increase in value	28 34	
Average cost of feed for steer	20 33	
Amount of meal eaten by lot of 7 steers	5,765	lbs.
Amount of ensilage and roots	64,487	"
Amount of hay	3,301	"

As will have been noted, the inferior steers made almost as rapid and almost as economical gains as did the extra choice lot. The great difference in profits made by each lot being due to the difference in selling price. The extra choice lot cost $1 per 100 lbs. live weight more than did the inferior lot, but when marketed commanded $1.25 per hundred more and made somewhat cheaper gains while on feed.

'B.'

Two lots of steers of 7 each were selected in November and started on feed Nov. 14, 1906. The aim in view was to see whether it was (1) advisable to feed for the Easter market, (2) more profitable to feed steers in good condition for a shorter time or steers in low flesh for a longer period.

Lot 1, consisted of 7 steers low in flesh, but of good conformation. They weighed going into the pen, 1,095 lbs. each. Cost 4 cents delivered.

Lot 2, consisted of 7 steers so good in flesh that they were competed for by local butchers when being bought. They were of excellent conformation as well as being in good flesh. Cost 4 cents delivered. Weight, 898 pounds each.

The subjoined tables show results.

LOT I.—LONG FEED.

Number of steers in lot	7	
First weight, gross, Nov. 14, 1906	7,675	lbs.
First weight, average	1,095	"
Finished weight, gross, May 13, 1907	10,645	"
Finished weight, average	1,521	"
Total gain in 180 days	2,970	"
Average gain per steer	424	"
Daily gain per steer	2·36	"
Daily gain for lot, 7 steers	16·52	"
Gross cost of feed	$ 146 66	
Cost of 100 lbs. gain	4·26	
Cost of steers, 7,675 lbs. at $4 per 100 lbs	307 00	
Total cost to produce beef, $307 + $146 66	453 66	
Sold, 10,645 lbs. at $5 75 per 100 lbs., less 5 per cent	581 49	
Profit on lot	127 83	
Net profit per steer	18 23	
Average buying price per steer, Nov. 14, 1906	43 86	
Average selling price per steer, May 13, 1907	82 68	
Average increase in value	38 82	
Average cost of feed for steer	20 95	
Amount of meal eaten by lot of 7 steers	6,274	lbs.
Amount of ensilage and roots	63,385	"
Amount of hay	3,180	"
Average daily meal ration for group	34·3	"
Average daily meal ration per steer	4·9	"
Average daily roughage ration per steer	52·8	"

LOT II.—SHORT KEEP.

Number of steers in lot	8	
First weight, gross	7,185	lbs.
First weight, average	898	"
Finished weight, gross	9,315	"
Finished weight, average	1,164	"
Total gain in 130 days	2,130	"
Average gain per steer	266	"
Daily gain per steer	2·08	"
Daily gain for lot, 8 steers	16·64	"
Gross cost of feed	$ 97 74	
Cost of 100 lbs. gain	4 58	
Cost of steers, 7,185 lbs. at $4 per 100 lbs	287 40	
Total cost to produce beef, $97 74 + $287 40	385 14	
Sold, 9,315 lbs. at $5 50 per 100 lbs. less 5 per cent	486 69	
Profit on lot	101 55	
Net profit per steer	12 69	
Average buying price per steer	35 92	
Average selling price per steer	60 86	
Average increase in value	24 94	

Average cost of feed for steer	$ 12 22
Amount of meal eaten by lot of 8 steers	3,024 lbs.
Amount of ensilage and roots	54,000 "
Amount of hay	2,564 "
Average daily meal ration for group	23·26 "
Average daily meal ration per steer	2·91 "
Average daily roughage ration per steer	54·4 "

It will have been noted that the short keep cost slightly more per 100 lbs gain than did the long keep, due no doubt to the half finished condition in which the short keep were when feeding started.

One feature in the feeding is worthy of note: While the long feed consumed on an average 4·9 lbs. meal per steer right through the feeding period, the short keep consumed only 2·91 lbs. per steer per day. The farmer who has lots of roughage might therefore do better to feed steers for a short period and so save the last period when meal has to be fed in large quantities to maintain gains.

'C.'

The experiments with steer calves have been continued and below will be found reports on two lots of calves dropped in 1906.

These reports are interesting as showing the comparative cost of wintering calves where very little meal is fed and where a heavy meal ration is fed. The weights indicate fairly accurately the conditions of the two lots so far as flesh is concerned. Lot 2 the Full Fattening Ration bunch, making probably a better appearance than the weights indicate.

BABY BEEF.

Lot 1.—Limited Growing Ration, Dropped 1906.

Number of steers in lot	6
First weight, gross, May 4, 1906	485 lbs.
First weight, average	80 "
Finished weight, gross, April 1, 1907	2,965 "
Finished weight, average	545 "
Total gain in 327 days	2,785 "
Average gain per steer	464 "
Daily gain per steer	1·42 "
Daily gain for lot, 6 steers	8·52 "
Gross cost of feed	$ 87 31
Cost of 100 lbs. gain	3 13
Cost of steers, $5 each	30 00
Total cost to produce beef, $30 + $87 31	117 31
On hand April 1, 1907, 2,965 lbs. at $3 50 per 100 lbs.	103 78
Profit or loss—loss	3 53
Net loss per steer	0 59
Average buying price per steer	5 00
Average value per steer, April 1, 1907	17 30
Average increase in value	12 30
Average cost of feed for steer	14 55
Amount of meal eaten by lot of 6 steers	2,110½ lbs.
Amount of ensilage and roots	27,510 "
Amount of hay	1,956 "
Amount of skim milk	10,146 "

The meal consumed consisted of 735 lbs. oats, 126 lbs. corn, 829½ lbs. bran, 273 lbs. barley, and 147 lbs. mixed meal. The mixture of roots and ensilage was made up of 27,510 lbs. corn ensilage and 11,508 lbs. roots. Each steer ate during the 327 days on feed, 122½ lbs. oats, 21 lbs. corn, 138 lbs. bran, 45½ lbs. barley, 24½ lbs. mixed meal, 4,585 lbs. corn ensilage, 1,918 lbs. roots, 326 lbs. hay and 1,691 lbs. skim milk.

Lot 2.—Full Fattening Ration.

Number of steers in lot	6
First weight, gross, May 4, 1906	680 lbs.
First weight, average	113½ "
Finished weight, gross, April 1, 1907	3,615 "
Finished weight, average	602½ "
Total gain in 327 days	2,935 "
Average gain per steer	489 "
Daily gain per steer	1·49 "
Daily gain for lot, 6 steers	8·94
Gross cost of feed	$ 93 24
Cost of 100 lbs. gain	3 18
Cost of steers, $5 each	30 00
Total cost to produce beef, $93 24 + $30	123·24
On hand, 3,615 lbs. at $4 50 per 100 lbs	162 68
Profit or loss—profit	39 44
Net profit per steer	6 57
Average buying price per steer	5 00
Average value per steer, April 1, 1906	27 11
Average increase in value	22 11
Average cost of feed for steer	15 54
Amount of meal eaten by lot of 6 steers	4,557 lbs.
Amount of ensilage and roots	29,568 "
Amount of hay	1,956 "
Amount of skim milk	10,314 "

The meal consumed consisted of 1,554 lbs. oats, 2,268 lbs. bran, 735 lbs. barley. The mixture of ensilage and roots was made up of 12,390 lbs. roots and 17,178 lbs. corn ensilage. Each steer ate during the 327 days on feed, 259 lbs. oats, 378 lbs. bran, 122½ lbs. barley, 2,065 lbs. roots, 2,863 lbs. corn ensilage, 326 lbs. hay and 1,719 lbs. skim milk.

SWINE FEEDING.

I have to report a fairly successful year with swine. Most of the work has been along the line of supplying breeding stock to farmers' clubs and individual farmers desirous of improving their herds. A very considerable number have been so supplied during the past year and this has in some measure prevented the carrying on of satisfactory feeding experiments.

A number of good subjects are now available for work however, and some feeding experiments are being incepted.

During the winter months a small experiment comparing the feeding value of mangels and sugar beets was carried on.

Placing the mangels at $2 per ton it was found that pork cost $6.20 per 100 lbs.

Placing the sugar beets at $3 per ton it was found that pork cost $5 05 per 100 lbs.

When meal alone was used 100 lbs. increase live weight cost $7 03.

When along with the meal Herbageum was used in the quantities indicated by manufacturers, 100 lbs. increase live weight cost $5 23.

Lot B.—Fed on Meal and Mangels.

Meal mixture, barley 500 lbs., oats 200 lbs., shorts 500 lbs., gluten 200 lbs. Mixture cost $1 per 100 lbs. Mangels $2 per ton.

Number of pigs in lot	4
Weight to enter, Jan. 1	342 lbs.
Average weight	85½ "
Weight, March 26	532 "
Average weight	133 "
Days on feed	85 days.
Gain made by lot in 85 days	190 lbs.
Gain made per pig in 85 days	47½ "
Daily rate of gain per pig	0·55 "
Meal consumed by lot in 85 days	994½ "
Mangels consumed by lot in 85 days	1,848 "
Value of food consumed	$ 11 79½ "
Cost to produce 100 lbs. live weight	6 20

Lot C.—Fed on Meal and Sugar Beets.

Meal mixture, barley 500 lbs., oats 200 lbs., shorts 500 lbs., gluten 200 lbs. Mixture cost $1 per 100 lbs. Beets cost $3 per ton.

Number of pigs in lot	4
Weight to enter, Jan. 1	335 lbs.
Average weight	83¾ "
Weight, March 26	575 "
Average weight, March 26	143¾ "
Days on feed	85 days.
Gain made by lot in 85 days	240 lbs.
Gain made per pig in 85 days	60 "
Daily rate of gain per pig	0·70 "
Meal consumed by lot in 85 days	1,096 "
Beets consumed by lot in 85 days	1,560 "
Value of food consumed	$ 13 30
Cost to produce 100 lbs. live weight	5 05

Lot D.—Fed on Meal and Herbageum.

Meal mixture, barley 500 lbs., oats 200 lbs., shorts 500 lbs., gluten 200 lbs. Mixture cost $1 per 100 lbs. Herbageum 15 cents per lb.

Number of pigs in lot	4
Weight to enter, Jan. 1	291 lbs.
Average weight	72¾ "
Weight, March 26	570 "
Average weight, March 26	142½ "
Days on feed	85 days.
Gain made by lot in 85 days	279 lbs.
Gain made per pig in 85 days	69¾ "
Daily rate of gain per pig	0·71 "
Meal consumed by lot in 85 days	1,055½ "
Herbageum consumed by lot in 85 days	434 ozs.
Value of food consumed	$ 14 60
Cost to produce 100 lbs. live weight	5 23

Lot E.—Fed on Meal.

Meal mixture, barley 500 lbs., oats 200 lbs., shorts 500 lbs., gluten 200 lbs. Mixture cost $1 per 100 lbs.

Number of pigs in lot		4
Weight to enter, Jan. 1		270 lbs.
Average weight		67½ "
Weight, March 26		431 "
Average weight, March 26		107¾ "
Days on feed		85 days.
Gain made by lot in 85 days		161 lbs.
Gain made per pig in 85 days		42¼ "
Daily rate of gain per pig		0·50 "
Meal consumed by lot in 85 days		1,133 "
Value of food consumed	$	11 33
Cost to produce 100 lbs. live weight		7 03

INVENTORIES.

The changing of the dates of the beginning and ending of the fiscal year necessitated the changing of the year dates in all live stock record and feeding work, it is not therefore possible to give the inventories for the date 12 months previous to the date of inventories this year, April 1, 1907.

Inventories of live stock and feed on hand April 1, 1907, follow:—

LIVE STOCK.

—	April 1, 1907.	
	Number on hand.	Value.
		$
Horses	19	3,985 00
Cattle—		
Shorthorns:—		
Males, 3; females, 15	18	4,095 00
Guernseys:—		
Males, 4; females, 13	17	2,100 00
Ayrshires:—		
Males, 1; females, 17	18	2,105 00
Canadians:—		
Males, 3; females, 15	18	1,540 00
Grades:—		
females, 19	19	720 00
Steers	33	1,502 40
Sheep—		
Shropshires:—		
Males, 3; females, 13	16	300 00
Leicesters:—		
Males, 3; females, 6	10	190 00
Swine—		
Yorkshires:—		
Males, 4; females, 37; young stock, 101	142	1,568 00
Berkshires:—		
Males, 2; females, 9; young stock, 20	31	420 00
Tamworths:—		
Males, 4; females, 8; young stock, 21	33	393 00
Grades:—		
Feeding stock	14	56 00
Total	388	18,974 40

INTERIOR OF HORSE STABLE, CENTRAL EXPERIMENTAL FARM, BUILT 1906. (Photo F. T. Shutt)

FEED ON HAND.

April 1, 1907.

Estimated—		
Hay	66,500	lbs.
Straw	37,500	"
Ensilage and roots	652,000	"
Weighed—		
Potatoes	175	"
Oats	50,772	"
Seeds, small oats, &c.	3,529	"
Barley	3,184	"
Mixed meal, ground	2,650	"
Oil meal	3,850	"
Peas	1,031	"
Wheat	2,508	"
Imperial	3,100	"
Nestor	200	"
Mill feed, ground seeds and barley	720	"
Cotton seed meal	1,750	"
Gluten meal	23,960	"
Corn	3,234	"
Shorts	2,000	"
Flax seed, ground	1,500	"

COMPARATIVE Statement of Crops on '200 Acre Farm,' from 1899 to 1906, inclusive. (200 Acre Farm includes 7 Acres of Roads.)

Year.	Grain.		Hay.		Roots and Corn.		Pasture.		Soiling Crop.		Pig Pasture.		Remarks.
	Area in Acres.	Yield in Pounds.	Area in Acres.	Yield in Tons.	Area in Acres.	Yield in Tons.	Area in Acres.	Number of Cattle.	Area in Acres.	Disposition of Crops.	Area in Acres.	Crops Grown for Pasture.	
1899........	73	118,466	39	93	40	326½	40	36	1	Fed to dairy cows	....	....	Generally considered a good year for all crops.
1900........	80	126,621	53	138	40	743	20 and aftermath.	49	....	....	....	....	Season very favourable for most crops.
1901........	79	114,472	58	210	40	702	16 and aftermath.	52	....	....	....	....	" " "
1902........	74	144,914	60	216	39	665	20 and aftermath.	62	....	....	5	Clover, rape and aftermath.	Season favourable for hay, bad for corn.
1903........	69	126,619	62	154	34	473	16 and aftermath.	96	5	Dairy cows, bulls and calves.	6	Clover and rape.	Season very unfavourable for most crops, particularly adverse to corn and roots. No second crop hay.
1904........	67	112,009	60	192	46¾	674	13·75	98	3	" " ..	3	" " ..	Season unfavourable for grain and corn, good for hay and roots.
1905........	66	111,932	59	258	47	971½	14 and aftermath.	100	5	All cattle ensilage fed.	4	Clover, rape, mixed crop, pease, roots.	Season favourable for hay, corn and roots, too wet for grain on mucky land.
1906........	69	125,516	62	140	48	774½	14	105	5	" " ..	3	" " ..	Very bad season. Meadows winter killed. Summer too dry.

Of the area indicated as having been used as pasture for swine in 1895, 3 acres yielded a crop of green feed for soiling cattle before being given over to swine. Cattle were pastured on roads where possible. A small rough field not included in the '200 Acre Farm' is used as partial pasture and a run for about 20 head of young stock. These cattle receive ensilage or other succulent food every day, and meal at the rate of about 1½ lbs. each per day part of the time.

The variety of crops grown and the varying areas under each crop each year make it quite difficult to make a comparison of the returns of the different years, so to simplify matters I would suggest that a fixed valuation be put upon the products, and the returns of each year valued accordingly.

Fixing prices as follows: Grain, $1 per hundred lbs.; roots and ensilage $2 per ton; hay $7 per ton; summering cattle, $8 per season; and an area used as pasture for pigs, $15 per acre; the returns from the '200-acre farm' for the years mentioned may be said to have been worth $2,776.66 in 1899; $4,110.21 in 1900; $4,434.72 in 1901; $4,787.14 in 1902; $4,148.19 in 1903; $4,741.09 in 1904; $5,714.32 in 1905; and $4,669.16 in 1906.

ROTATION EXPERIMENT.

The experiment to determine the effects of different rotations is being followed up and over the detailed report of the labour on each plot, and in the returns therefrom will be found some brief notes on each field and on the rotation as a whole.

The rotations are as follows:—

Rotation A.—Five years, clover hay, timothy hay, grain, corn, grain.

Rotation B.—Five years, clover hay, grain, clover hay, corn, grain.

Rotation E.—Three years, pasture, corn, grain.

Rotation Z.—Three years, clover hay, corn, grain.

Rotation S.—Four years, shallow ploughing, clover hay, timothy hay, roots, grain.

Rotation D.—Four years, deep ploughing, clover hay, timothy hay, roots, grain.

Rotation H.—Three years, hog pasture, roots, grain or soiling crop.

Rotation T.—Four years, sheep pasture, roots and soiling crop, grain, clover hay.

Rotation M.—Six years, grain, grain, clover hay, timothy hay for three years.

Rotation N.—Six years, grain, grain, timothy hay for four years.

Rotation O.—Three years, grain, timothy hay, timothy hay.

Rotation P.—Three years, grain, clover hay, timothy hay.

In the descriptions of the rotations and fields that follow, an effort is made to give as concisely as possible the location of each field, its size, the character of its soil, its drainage and its general crop history.

In the tables will be found all items of expenditure. The manure is applied in the same ratio to each field in each rotation. To illustrate: if to the corn land in rotation 'Z,' 15 tons of manure per acre is applied; this is equivalent to 5 tons per acre per annum, as Z, is a three-year rotation. Then in applying manure to M, 30 tons per acre would be applied, as M is a six-year rotation. Since the manure must vary slightly in quantity each year, $3 per annum per acre is charged in each rotation.

COMPARATIVE VALUES OF ROTATION ON STOCK FARMS.

Supposing the average animal of the bovine species to consume 2,000 lbs. hay, 1,500 lbs. meal, 16,000 lbs. roots and ensilage and 2,000 lbs. of straw per annum, which valued at prices given above would amount to $37, a rough idea of the relative value of the different rotations for stockmen may be arrived at.

ROTATION

Lot.	Location.	Description of Soil. Sand.	Sandy loam.	Clayey loam.	Clay.	Black muck.	Gravel.	Hardpan.	Area in Acres.	Crop.	Crop.	Rent and Manure.	Seed, Twine and use of Machinery.
		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	Ac.	1905.	1906.	$ cts.	$ cts.
A 1	W. S. 3	30	45	....	....	25	....	....	9·96	Grain	Corn	59 76	16 68
A 2	L. S. 1	30	65	5	....	....	....	....	8·90	Alfalfa Hay.	Grain	53 40	13 85
A 3	A. S. 14	10	15	20	20	15	....	20	10·20	Corn	Grain	61 20	16 32
A 4	W.P.G.S. 1. F. S. 1	70	20	10	....	....	....	....	9·15	Hay	Hay	54 90	13 66
A 5	F. S. 3	....	35	30	10	15	10	....	9·63	Oats	Hay	28 89	43 33
Aggregate									47·84			258 15	103 84
Average per acre in 1906									1·00			5 39	2 17

ROTATION

Lot.	Location.	Sand.	Sandy loam.	Clayey loam.	Clay.	Black muck.	Gravel.	Hardpan.	Area in Acres.	Crop 1905.	Crop 1906.	Rent and Manure.	Seed, Twine and use of Machinery.
B 1	W.S. 4	5	35	5	50	5	....	....	10·00	Grain	Hay	60 00	13 00
B 2	L.S. 2	20	70	....	5	5	....	....	8·82	Oats	Hay	52 92	11 46
B 3	A. S. 15	20	60	5	....	15	....	....	10·20	Clo. Hay	Corn	61 20	17 92
B 4	W.P.G.S. 2	20	60	15	....	5	....	....	9·15	Clo. Hay	Oats	54 90	14 63
B 5	F. S. 2	....	30	30	40	....	....	....	9·93	Corn	Oats	59 58	15 89
Aggregate									48·10			288 60	72 90
Average per acre in 1906									1.00			6 00	1 51

ROTATION 'A.'

This rotation of 5 years duration includes grain, hay (2 years), grain and corn or roots in the order named. The grain crop mentioned first comes after corn. With the first crop of grain is sown 10 lbs. red clover, 1 lb. alsike and 10 lbs. timothy per acre. The field is left in hay for 2 years, then in August of the second year it is ploughed and cultivated at intervals till October, when it is ridged up and left till the next spring. Oats are sown on this field, and with them red clover seed at the rate of 10 lbs. per acre. This clover is allowed to grow for something over a year or until corn seeding time the fololwing spring, when it is turned under with a shallow furrow along with the manure that will have been applied during the winter. After the corn has been harvested the land is ploughed shallow and left till the next spring.

The crops on this rotation this year have not been as satisfactory as usual, due to adverse weather conditions. On A, a fair crop of corn was harvested. On A2, oats were grown and gave fair returns. A3, also was in grain and gave a fair crop. A4, gave only a light crop of hay since no clover survived the winter and part of the timothy was destroyed. A5, gave only a light crop of hay as all clover was killed out.

'A.'

Items of Expense in raising Crop in 1906.								Particulars of Crop in 1906.						
Manual Labour.		Horse Labour.												
No. of Hours.	Cost of Manual Labour.	Hours with Single Horse.	Hours with Team.	Value of Horse Labour.	Threshing.	Total Cost.	Cost for 1 Acre.	Grain	Straw.	Hay.	Roots and Ensilage.	Total Value.	Value of Crop per Acre.	Profit per Acre in 1906.
Hrs.	$ cts.	Hrs	Hrs	$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
926	138 90	....	427	128 10	...	237 35	23 83	......	......	....	297,135	297 13	29 83	6 00
70	10 50	...	245	73 50	13 23	164 48	18 48	18,005	15,445	....	....	210 94	23 70	5 22
60	9 00	....	150	45 00	12 76	142 28	14 14	17,592	33,638	....	....	243 19	23 84	9 70
80	12 00	16	35	13 70	......	94 26	10 30	....	......	45,320	....	181 28	19 81	9 51
123	18 45	7½	44½	14 85	....	105 52	10 85	.....	......	50,010	....	200 04	20 77	9 92
1,259	188 85	23½	901½	275 15	25 99	743 89	77 60	35,597	49,083	95,330	297,135	1,132 58	117 95	40 35
26	3 94	·04	19	5 75	0 54	15 54	15 54	744	1,025	1,992	6,211	23 67	23 67	8 13

'B.'

60	9 00	15	147	47 10	......	129 10	12 91	......	......	41,362	....	165 44	16 54	3 63
81	12 15	16	24	10 40	... .	86 93	9 85	......	.....	33,870	....	135 48	15 34	5 49
498	74 70	20	303	94 90	......	247 72	24 28	...	......	....	308,720	308 72	30 26	5 98
80	12 00	4	127	38 90	12 30	132 73	14 61	16,959	22,180	....	....	213 95	23 38	8 77
69	10 35	5	110½	34 15	10 15	130 12	13 10	14,000	27,900	....	....	195 80	19 71	6 61
788	118 20	60	711½	225 45	22 45	726 60	15 10	30,959	50,080	75,232	308,720	1,019 39	21 19	30 48
16	2 45	1·2	15	4 68	0 46	15 10	15 10	643	1,411	1,564	6,418	21 19	21 19	6 09

ROTATION 'B.'

This rotation of 5 years duration includes grain, hay, corn or roots in the order named, the first crop of grain following a crop of corn or roots. Red clover 10 lbs., alsike 1 lb. and timothy 5 lbs. is sown with the grain each time grain is sown. When grain follows hay the land is ploughed in the early fall. When corn follows hay the land is ploughed in the spring, the spring growth of grass and clover being ploughed in along with the manure which will have been applied during the preceding winter.

The crops on this rotation fell short of the average. The crop of hay on B1 was made up of sorghum, millet and Hungarian grass since not a sign of what had been a splendid catch of clover and timothy remained. The hay crop on B2 was short; no clover. On B4, oats were grown giving only a light crop on account of adverse weather conditions. On B5 also the grain crop was light.

ROTATION

Lot.	Location.	Description of Soil. Sand.	Sandy loam.	Clayey loam.	Clay.	Black muck.	Gravel.	Hardpan.	Area in acres.	Crop.	Crop.	Rent and Manure.	Seed, Twine and use of Machinery.
		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	Ac.	1905.	1906.	$ cts.	$ cts.
D 1........	E.G.P.S. 2.	20	80	....	....	....	....	....	2	Hay.......	Hay........	12 00	1 60
D 2........	E.G.P.S. 4.	20	80	....	....	....	....	....	2	Hay.......	Roots.......	12 00	1 60
D 3........	E.G.P.S. 6.	30	70	....	....	....	....	....	2	Roots	Grain	12 00	3 20
D 4........	E.G.P.S. 8.	60	40	....	....	....	....	....	2	Oats..	Oat-Hay....	12 00	2 60
	Aggregate....								8	....	....	48 00	9 00
	Average per acre in 1906.......								1	....	....	6 00	1 12

ROTATION

S 1........	E.G.P.S. 1.	20	80	....	....	....	....	....	2	Clover Hay.	Tim. Hay..	12 00	1 60
S 2........	E.G.P.S. 3.	20	80	....	....	....	....	....	2	Clover Hay.	Roots	12 00	1 60
S 3........	E.G.P.S. 5.	30	70	....	....	....	....	....	2	Roots	Grain	12 00	3 20
S 4........	E.G.P.S. 7.	60	40	....	....	....	....	....	2	Oats.. .. .	Oat-Hay....	12 00	2 60
	Aggregate.....								8	....	....	48 00	9 00
	Average per acre in 1906.....								1	....	....	6 00	1 12

ROTATION 'D.'

Deep Ploughing.

This rotation is of 4 years duration and includes grain, 2 years hay and roots.

The grain crop follows roots, the root land being ploughed to a depth of about 7 inches after the roots are harvested in the fall. With the grain is sown 10 lbs. red clover, 1 lb. alsike and 10 lbs. timothy seed per acre. The clover hay is cut twice in the season and the second aftermath left on the field, that is it is not pastured off as is usually done. In the second hay year two crops are cut if possible, and the land ploughed in August with a deep 7-inch furrow.

D1.—This plot was under hay and gave a very good crop considering the season.

D2.—This plot was in roots. They made a splendid start and offered to be a very heavy crop until about the middle of July, when the dry weather began to affect them.

D3.—This field was in grain (oats) and gave only poor returns.

D4.—This field should have been in clover hay but when spring came no sign of clover or grass was in evidence and so all the field had to be ploughed up and put under oat and pea hay.

'D.'

Items of Expense in raising Crop of 1906.								Particulars of Crop of 1906.							
Manual Labour.		Horse Labour.													
No. of Hours.	Cost of Manual Labour.	Single Horse.	Hours with Team.	Value of Horse Labour.	Threshing.	Total cost.	Cost for 1 Acre.	Grain.	Straw.	Hay.	Roots and Ensilage.	Total Value.	Value of Crop per Acre.	Profit per Acre in 1906.
Hrs.	$ cts.	Hrs	Hrs	$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
25½	3 82	....	10	4 10	......	21 52	10 76	......	......	8,900	....	35 60	17 80	7 04
295	44 25	....	45½	18 25	......	76 10	38 05	......	......	....	80,500	80 50	40 25	2 20
15	3 00	....	30	10 80	1 90	30 90	15 45	2,630	6,030	....	....	38 36	19 18	3 73
17	2 55	....	29	9 50	......	26 65	13 32	......	......	11,240	....	44 96	22 48	9 16
352½	53 62	....	114½	42 65	1 90	155 17	77 58	2,630	6,030	20,140	80,500	199 42	99 71	22 13
44	6 70	...	14	5 33	0 24	19 39	9 69	329	754	2,517	10,062	24 93	24 93	5 54

'S.'

25½	3 82½	5	9	3 70	......	21 12½	10 56	......	......	9,165	....	36 66	18 33	7 77
295	44 25	23	45½	18 25	......	76 10	38 05	.....	......	....	81,285	81 28	40 64	2 59
20	3 00	....	26	10 80	1 90	30 90	15 45	2,630	5,820	....	....	37 94	18 97	3 52
17	2 55	4	29	9 50	.....	26 65	13 32	.....	......	11,150	....	44 60	22 30	8 92
357½	53 62½	32	109½	42 25	1 90	154 77½	77 38	2,630	5,820	20,315	81,285	200 48	100 24	22 80
45	6 70	4	14	5 28	0 24	19 35	9 67	329	727	2,539	101,606	25 06	25 06	5 91

ROTATION 'S.'

Shallow Ploughing.

This rotation is of 4 years duration and includes grain, 2 years hay and roots.

The grain crop follows roots, the root land being ploughed (or cultivated) to a depth of about 4 inches after the roots are harvested in the fall. With the grain is sown 10 lbs. red clover, 1 lb. alsike and 10 lbs. timothy seed per acre. The clover hay is cut twice in the season and the second aftermath left on the field, that is, it is not pastured off as is usually done. In the second hay year two crops are cut if possible and the land ploughed in August with a shallow 4-inch furrow. If manure is applied before ploughing a sub-soiler is attached to the plough to loosen up the subsoil to a depth of 8 or 9 inches. If manure is not applied this end is attained by means of a strong deep-cutting cultivator after the sod has rotted in the fall, or next spring.

S1.—This plot was under hay and gave a very good crop considering the season.

S2.—This plot was in roots. They made a splendid start.

S3.—This plot was in grain (oats) and gave only poor returns.

S4.—This plot was in hay. (See D4.)

ROTATION

Lot.	Location.	Description of Soil. Sand.	Sandy Loam.	Clayey Loam.	Clay.	Black Muck.	Gravel.	Hardpan.	Area in Acres.	Crop.	Crop.	Rent and Manure.	Seed Twine and use of Machinery.
		p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	Ac.	1905.	1906.	$ cts.	$ cts.
E 1	W.S. 1	40	40	....	....	15	5	....	14·00	Oats	Pasture	84 00	84 00
E 2	L.S. 4	10	60	10	....	20	....	....	13·75	Corn	Grain	82 50	22 40
E 3	Morn.	30	60	5	....	5	....	....	14·00	Pasture	Corn	84 00	23 40
	Aggregate								41·75	....	....	250 50	129 80
	Average per acre in 1906								1·00	....	....	6 00	3 11

ROTATION

Z 1	W.S. 2	40	40	....	....	15	5	....	6·00	Oats	Hay	36 00	16 20
Z 2	L.S. 3	10	60	10	....	20	....	....	5·81	Corn	Grain	34 86	9 46
Z 3	Obs. S.	10	60	20	10	....	....	....	4·2	Hay	Corn	25 20	5 00
	Aggregate								16·01	....	....	96 06	30 66
	Average per acre in 1906								1·00	....	....	6 00	1 91

ROTATION 'E.'

This rotation of three years' duration includes grain, pasture and corn.

The grain comes after the corn, the stubble of which is treated as described under rotation 'A.' With the grain in the spring is sown 10 lbs. red clover, 1 lb. alsike clover, 5 lbs. alfalfa and 5 lbs. timothy seed per acre. If weather permits the field is pastured slightly in the fall.

After the grain crop the land is pastured, the grass seeding having been done with this object in view. In estimating the value of the returns from this field, pasture is charged at $1 per month per cow. At this rate the returns fall very far short of what would have been the returns if a hay crop had been harvested, if we may judge by the returns from 'Z 2.' This rotation and rotation Z were introduced into the list in order to gain some idea as to the difference in returns probable from land pastured and land from which all the crops are harvested. Of course the corn crop after the pasture has in a measure made up for the difference in favour of the no pasture rotation 'Z,' but the returns are on the whole still considerably short of those from 'Z.'

Corn follows the pasture. Manure applied during the fall and winter and turned under with the growth of clover and grass in the spring.

'E.'

Items of Expense in Raising Crop in 1906.								Particulars of Crop in 1906.						
Manual Labour.		Horse Labour.												
No. of Hours.	Cost of Manual Labour.	No. of Hours with Single Horse.	No. of Hours with Team.	Value of Horse Labour.	Threshing.	Total Cost.	Cost for 1 Acre.	Grain.	Straw.	Hay.	Roots and Ensilage.	Total Value.	Value of Crop per Acre.	Profit per Acre in 1906.
Hrs.	$ cts.	Hrs	Hrs	$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
......	......	....	....	......	......	168 00	12 00	......	......	....	....	*143 00	10 21	†1 79
173	25 95	....	238	71 40	14 33	216 58	15 75	19,778	38,252	....	....	274 28	19 94	4 19
715	107 25	20	363	112 90	.....	327 56	23 39	....	......	....	387,745	387 74	28 27	4 88
888	133 20	20	601	184 30	14 33	712 13	51 14	19,778	38,252	....	387,745	805 02	58 42	7 23
21·2	3 19	·48	14·4	4 41	0 34	17 05	17 05	473	916	....	928	19 28	19 28	2 42

'Z.'

42	6 30	6	22	7 80	....	66 30	11 05	......	......	26,980	....	107 92	17 97	6 92
52	7 80	....	30½	24 15	......	82 02	14 11	7,825	15,435	....	....	109 10	18 79	4 63
110	16 50	81	22	38 20	......	84 90	20 21	......	.....	....	129,637	129 64	30 87	10 66
204	30 60	141	74½	70 15	......	233 22	45 37	7,825	15,435	26,980	129,637	346 66	67 63	22 26
12·7	1 91	·08	10·9	4 38	....	14 56	14 56	489	964	1,685	8,097	21 65	21 65	7 09

* 143 months' pasture (cows).
† Loss.

ROTATION 'Z.'

This rotation of three years' duration includes corn, grain and clover hay, in the order named.

Corn comes after the clover hay. The manure is applied in the fall or during the winter and spring, and the clover allowed to grow up through it, so facilitating the turning under of the whole mass of manure and spring growth and late fall growth of clover a few days before the corn is to be sown. The furrow turned is quite shallow, about 5 inches deep, and the land is then thoroughly disc-harrowed and the corn sown in rows 42 inches apart. It receives later the usual cultivation and care.

Grain follows corn, the land having been ploughed in the fall. With the grain there is sown 10 lbs. red clover, 1 lb. alsike and 5 lbs. timothy seed. The hay is cut twice and the last aftermath allowed to grow up, to be turned under the next spring for corn. Such a rotation would be particularly valuable to a farmer having sufficient rough land for pasture or for one desirous of keeping as many cattle as possible on the land at his disposal, supposing him willing to grow roots and corn.

ROTATION

Lot.	Location.	Description of Soil. Sand.	Sandy loam.	Clayey loam.	Clay.	Black muck.	Gravel.	Hardpan.	Area in Acres.	Crop.	Crop.	Rent and Manure.	Seed, Twine and use of Machinery.
		p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	Ac.	1905.	1906.	$ cts.	$ cts.
H 1........	H.S. 1.....	30	40	20	10	....	....	....	3 35	Roots	Oat Hay....	20 10	4 35
H 2........	H.S. 2.....	25	45	20	10	....	....	....	3 15	Grain	Pasture.....	18 90	4 72
H 3........	H.S. 3.....	10	20	50	20	....	....	....	2 85	Hay, Grain, Pasture...	Roots	17 10	3 72
	Aggregate........................								9 35	....	....	56 10	12 79
	Average per acre in 1906............								1 00	....	....	6 00	1 36

ROTATION

T 1........	S.S. 1.....	10	90	....	....	....	....	....	1 51	Hay........	Pasture.....	9 06	2 45
T 2	S.S. 2.....	15	85	....	....	....	....	....	2 44	Roots	Hay..	14 64	2 73
T 3........	S.S. 3.....	....	100	....	....	....	....	....	3 27	Pasture.....	Pasture.....	19 62	1 56
T 4........	S.S. 4	15	85	....	....	....	....	....	3 50	Pastnre.....	Roots	21 00	4 55
	Aggregate.....................								10 72	....	....	64 32	11 23
	Average per acre in 1906.								1 00	....	....	6 00	1 04

ROTATION 'H.'

Hog Farm.

This rotation is of three years' duration and includes roots, soiling crop and pasture in the order named. The land is ploughed late in the fall after it has been manured. It is disked the next spring and the roots sown on ridges. The roots receive the usual cultivation and are of a varied character, including mangels, sugar mangels, sugar beets and turnips devoted to pork production for the most part, the surplus being sold to cattle and the returns invested in meal for pig feeding.

The soiling crop field is sown with various crops suitable for feeding to pigs. What is over and above the amount possible of consumption by pigs is sold to cattle at $2 per ton and the returns used to purchase meal for pork production.

The pasture area is divided into several parts, the seed being sown as far as possible at the same time as the soiling crops the previous year, and not allowed to be eaten too close the first fall, although any good growth is not wasted.

H1.—This field was this year under oats and peas mixture to cut for green feed. The crop was good and was fed to cattle and swine.

H2.—This field was pastured off, but did not prove very satisfactory as all the clover had been killed.

H3.—On this field were grown mangels, sugar mangels and sugar beets with fairly satisfactory results.

'H.'

Items of Expense in raising Crops, 1906.								Particulars of Crop of 1906.						
Manual Labour.		Horse Labour.												
Hours.	Cost of Manual Labour.	Hours, (Single Horse.)	Hours, (Team Horses.)	Value of Horse Labour.	Threshing.	Total Cost.	Cost for 1 Acre.	Grain.	Straw.	Hay.	Roots and Ensilage.	Total Value.	Value of Crop per Acre.	Profit per Acre in 1906.
Hrs.	$ cts.	Hrs	Hrs	$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
40	6 00	16	65	22 70	......	53 15	15 86	......	.....	21,085	....	84 34	22 19	6 33
......	.....	....	....	......	.....	24 62	7 50	....	......	....	....	*47 25	15 00	7 50
481	72 60	24	60	22 80	......	116 22	40 77	.....	......	....	106,300	131 83	46 22	5 45
524	78 60	40	125	45 50	.....	193 99	64 13	.....	......	21,085	106,300	263 42	83 41	19 28
56·	8 40	4·2	13·3	4 86	.....	20 74	6 85	.....	......	2255	11,369	28·17	8 92	2 06

* Pasture valued at $15 per Acre.

'T.'

......	......	....	....	......	......	11 51	7 74	......	......	....	....	*16 00	10 60	2 86
28	4 20	8	42	13 20	.....	35 77	14 66	. .	.....	11,260	....	45 04	18 45	3 79
......	.....	....	....	......	......	21 00	6 45	......	......	....	....	†34 76	10 63	3 18
571	85 65	56	114½	45 55	....	156 75	44 78	......	......	....	157,703	157 70	45 05	0 27
599	89 85	64	156½	58 75	.....	225 03	73 63	......	.....	12,260	157,703	253 50	84 73	10 10
55·	8 38	5·9	14·5	5 48	....	20 99	6 86	.....	.....	1050	14,711	23 64	7 90	0 94

* 1,600 days pasture at 1 cent per day.
† Pasture 1 sheep, 1 cent per day.

ROTATION 'T.'

Sheep Farm.

This rotation of four years duration includes roots, grain, hay and pasture.

The area devoted to sheep farming is rather limited, about 10·72 acres. This area is not included in the '200-acre farm.' The whole field had been for several years devoted to pasturing sheep, but it has been divided into four rather unequal fields susceptible of further subdivision and devoted to a rotation considered suitable for sheep.

The root field is devoted to white turnips, Swedes, cabbage, Kohl Rabi, thousand headed kale, rape, &c. It comes after the pasture, the land being manured and ploughed in the fall.

Grain follows the root land, and with the grain various clovers and grass seeds are sown to prepare for the ensuing two years. The grain may be harvested or used as soiling crop for sheep. The hay field is expected to give one crop of hay and then be devoted to pasture for lambs as soon as they are weaned.

The pasture field is the field that has been hay the previous year. Alfalfa, red clover, alsike clover, *Bromus inermis* and timothy are the clovers and grasses used.

The crops on this rotation were fairly satisfactory this year.

ROTATION

Lot.	Location.	Description of Soil. Sand.	Sandy loam.	Clayey loam.	Clay.	Black muck.	Gravel.	Hardpan.	Area in Acres.	Crop. 1905.	1906.	Rent and Manure.	Seed, Twine and use of Machinery.
		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	Ac.			$ cts.	$ cts.
M 1...	A.S. 2......	....	30	15	....	45	....	10	1	Oats..........	Hay......	6 00	1 30
M 2........	A.S. 4......	....	30	15	....	45	....	10	1	Clover Hay...	Oat Hay.	6 00	1 30
M 3...... ..	A.S. 6......	....	30	15	....	45	....	10	1	" ...	Grain	6 00	1 55
Aggregate......									3	....	....	18 00	4 15
Average per acre in 1906........									1	....	... ...	6 00	1 38

ROTATION

N 1........	A.S. 3......	....	30	15	....	45	....	10	1	Oats..........	Hay......	6 00	1 30
N 2.........	A.S. 5......	....	30	15	....	45	...	10	1	Timothy Hay.	Oat Hay..	6 00	1 30
N 3...	A.S. 7......	....	30	15	....	45	....	10	1	" .	Grain	6 00	1 55
Aggreate....................									3	....	....	18 00	4 15
Average per acre in 1906.................									1	....	....	6 00	1 38

ROTATION 'M.'

This rotation of six years duration includes in its crops grain, grain, clover hay and then timothy hay or mixed hay for three years. First year grain is sown on sod ploughed late in the fall. In the spring the land is disked, harrowed and sown with 10-pounds of red clover seed per acre at the same time as the grain is sown. After the grain is harvested the clover is allowed to grow as late as possible and the land ploughed the last thing in the fall. The next spring 8 pounds of red clover and 10 pounds timothy seed is sown with the grain and the land put in as good shape as possible.

Clover hay follows the second year grain. It is cut twice in the year and the last aftermath not pastured.

Timothy hay or mixed hay then occupies the land for three consecutive years. Manure is applied in the fall of the second year that the field is under hay.

M1.—This field had been seeded down to hay, but catch was killed in winter, so had to be put in oat, pea and vetch hay. The crop was satisfactory.

M2.—This field shared the fate of 'M1' in the winter and, like it, had to be seeded to oat, pea and vetch hay in the spring of 1906.

M3.—This field was in grain. On account of part of the field being mucky in character it was weedy this year and had to be cut green.

'M.'

Items of Expense in raising Crop in 1905.								Particulars of Crop of 1906.						
Manual Labour.		Horse Labour.												
Hours.	Cost of Manual Labour.	Single Horse.	Team.	Cost of Horse Labour.	Threshing.	Total Cost.	Cost for 1 Acre.	Grain.	Straw.	Hay.	Roots and Ensilage.	Total Value.	Value of Crop per Acre.	Profit per Acre in 1906.
	$ cts.	Hrs	Hrs	$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
5	0 75	2	20	6 40	......	14 45	14 45	....	.....	4,360	......	17 44	17 44	2 99
5	0 75	2	20	6 40	......	14 45	14 45	......	.....	5,173	....	20 69	20 69	6 24
9	1 35	....	19	5 70	1 10	15 70	15 70	1,527	4,233	......	....	23 74	23 74	8 04
19	2 85	4	59	18 50	1 10	44 60	44 60	1,527	4,233	9,533	....	61 87	61 87	17 27
6	0 95	1·3	19	6 17	0 37	14 87	14 87	509	1,411	3,178	....	20 62	20 62	5 76

'N.'

5	0 75	2	20	6 40	.....	14 45	14 45	......	......	3,640	....	14 52	14 52	0·07
5	0 75	2	20	6 40	......	14 45	14 45	......	....	4,746	....	18 98	18 98	4 53
9	1 35	...	19	5 70	0 83	15 43	15 43	1,153	3,127	....	....	17 77	17 77	2 34
19	2 85	4	59	18 50	0 83	44 33	44 33	1,153	3,127	8,386	....	51 27	51 27	6 94
6	0 95	1	19	6 17	0 28	14 78	14 78	384	1,042	2,795	....	17 09	17 09	2 31

ROTATION 'N.'

This rotation of six years' duration includes in its crop grain, grain and timothy hay for four years.

The first year's grain is sown on land that had been ploughed six inches deep the fall previous. No grass or clover seed of any kind is sown with it. The stubble is ploughed in the fall and with the grain of the second year timothy seed is sown at the rate of 12 pounds per acre. Every care is taken to insure a good catch and the land put in as good shape as possible to remain in meadow four years.

Timothy hay is then the crop for four years, manure being applied in the fall of the second year of hay.

N1.—This field should have been in hay but was frozen out and so had to be sown to oat, pea and vetch hay.

N2.—This field should have been in hay but was frozen out so was sown to oat, pea and vetch hay.

N3.—This field was in grain. It includes a considerable area of black muck, which part was infested with weeds and had to be cut and fed green.

ROTATION

Lot.	Location.	Description of Soil.							Area in Acres.	Crop.	Crop.	Rent and Manure.	Seed, Twine and use of Machinery.
		Sand.	Sandy loam.	Clayey loam.	Clay.	Black muck.	Gravel.	Hardpan.					
		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	Ac.	1905.	1906.	$ cts.	$ cts.
O 1........	A.S. 8......	....	30	15	....	45	....	10	1	Tim. Hay...	Tim. Hay..	6 00	1 30
O 2........	A.S. 10.....	....	30	15	....	45	....	10	1	Oats.......	Grain . ..	6 00	1 55
O 3........	A.S. 12....	....	30	15	....	45	....	10	1	Tim. Hay..	Oat Hay....	6 00	1 30
Aggregate..........................									3			18 00	4 15
Average per acre in 1906..............									1			6 00	1 38

ROTATION

P 1......	A.S. 9......	....	30	15	....	45	...	10	1	Clover Hay.	Hay......	6 00	1 30
P 2......	A.S. 11.....	....	30	15	...	45	....	10	1	Oats.......	Grain.....	6 00	1 55
P 3........	A.S. 13.....	....	30	15	....	45	...	10	1	Clover Hay.	Oats........	6 00	1 30
Aggregate..............									3			18 00	4 15
Average per acre in 1906................									1			6 00	1 38

ROTATION 'O.'

This rotation is of three years' duration and includes grain, timothy hay, timothy hay.

The field intended for grain is ploughed early in the fall and cultivated at intervals to insure the sod rotting. It is ploughed again late in the fall and with the grain, the next spring, timothy seed is sown at the rate of 12 lbs. to the acre.

Timothy hay is cut for two years and the land again ploughed early in the fall. Manure is applied in the fall of the first year under hay.

O1.—This field was again under timothy hay.

O2.—This field was oats. It includes a very considerable portion of black mucky soil. This part of the field was on account of the adverse season, infested with weeds and the crop on that part had to be cut and fed green. This was allowed for in giving returns above.

O3.—This field was under oat hay. It should have been in timothy hay, but was frozen out in the winter 1905-6.

'O.'

Items of Expense in raising Crop in 1906.								Particulars of Crop of 1906.						
Manual Labour.		Horse Labour.												
No. of Hours.	Cost of Manual Labour.	Hours with Single Horse.	Hours with Team.	Value of Horse Labour.	Threshing.	Total Cost.	Cost for 1 Acre.	Grain.	Straw.	Hay.	Roots and Ensilage.	Total Value.	Value of Crop per Acre.	Profit per Acre in 1906.
Hrs.	$ cts.	Hrs	Hrs	$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.
6	0 90	2½	15¾	5 22½	......	13 42½	13 42½	....	.....	2,280	....	8 38	8 38	*4 54
9	1 35	....	19¼	5 77½	0 76	15 43	15 43	1,051	2,275	....	....	15 06	15 06	*0 37
6	0 90	2	18½	5 95	......	14 15	14 15	......	......	4,460	....	17 84	17 84	3 69
21	3 15	4½	53½	16 95	0 76	43 00½	43 00½	1,051	2,275	6,740	....	41 28	41 28	0 41
7	1 05	1½	18	5 65	0 25	14 33	14 33	350	758	2,247	....	13 76	13 76	0 41

'P.'

6	0 90	2½	15¾	5 22½	......	13 42½	13 42½	......	......	2,780	....	11 02	11 02	*2 40
9	1 35	...	19¼	5 77½	0 92	15 59	15 59	1,280	3,485	....	....	19 77	19 77	4 18
6	0 90	2	18½	5 95	0 90	14 15	14 15	......	.....	3,350	....	13 40	13 40	*0 75
21	3 15	4½	53½	16 95	1 82	43 16½	14 39	1,280	3,485	6,130	....	44 19	14 74	0 34
7	1 05	1½	18	5 65	0 61	14 39	14 39	427	1,163	2,043	....	14 73	14 73	0 34

* Loss.

ROTATION 'P.'

This rotation is of three year's duration and includes grain, clover hay, and timothy hay or mixed hay.

The field intended for grain is ploughed early the previous fall and cultivated at intervals to insure the sod rotting. It is again ploughed late in the fall and left till seed time next spring. With the grain is sown ten pounds clover and ten pounds timothy.

Manure is applied in the fall of the first year of hay.

P1.—This field was supposed to be under hay, but was frozen out in the winter and had to be seeded down again. It gave a crop of oat, pea and vetch hay this year.

P2.—This field was in grain (oats); the crop suffered from the fact of a part of the field being of a peaty nature. Allowance was made in making calculations.

P3.—The field was frozen out in the winter and this year gave a crop of oat, pea and vetch hay.

REPORT OF THE HORTICULTURIST.

(W. T. MACOUN.)

MARCH 31, 1907.

DR. WM. SAUNDERS, C.M.G.,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith the twentieth Annual Report of this division, in which will be found the results of some of the more important experiments conducted during the year and information regarding other work of the Horticultural Division.

I have the honour to be, sir,
Your obedient servant,
W. T. MACOUN,
Horticulturist.

CHARACTER OF SEASON AND EFFECT OF WINTER OF 1905-6 ON VEGETATION.

Since the year 1898 a record has been kept of the character of each season from a horticultural standpoint, and some facts regarding the weather have been published in the Annual Report of the Horticulturist since that time. Owing to the Interim Report being published last summer, which was somewhat different from the regular annual report, no account of the previous winter was published, hence in order to make the record complete it is necessary to go back to December, 1905. December of that year was a mild month. There was no sleighing of any account until the first week of the month. At no time during December could there have been more than a foot of snow on the ground. The lowest temperature in December was on the 16th, when it was 13·1° F. below zero. January was a mild month with changeable weather and very little snow on the ground, there being only about six inches on the 15th. On February 14th, a month later, there were still only about six inches of snow on the ground, and the fields were bare in some places. There were also frozen pools of water here and there which threatened injury to trees, shrubs, and herbaceous plants. By the 22nd of the month the sleighing was practically gone. February was a colder month than January, but mild for the time of the year. The lowest temperature of the winter was 21·8° F. below zero on February 2.

On March 1 the following record was made: 'It has been quite cold again this week, the temperature falling to eight degrees below zero. Great injury is likely to occur to strawberry plantations and to herbaceous plants generally as the ground is for the most part bare of snow and where it is not bare it is covered with ice. There is a great deal of ice on the lawns and in the orchard. The lower part of the strawberry plantation is nearly covered with ice. The soaking of the few inches of soil which had thawed out by the rain on February 25, followed by the severe frost must have been very hard on the roots of plants.' Thawing and freezing continued and on March 12 there were still large patches of ice in the orchard and part of the strawberry plantation was still covered with ice. While the weather was very changeable with several thaws, March was a cold month on the whole.

The effect of the unusual winter of 1905-6 was very marked on vegetation, especially on herbaceous plants. Practically all strawberry plants in the vicinity of Ottawa and at the Experimental Farm were destroyed, even where well mulched with straw. Where snow lay heavily along the fences they were better protected and came through the winter in fair condition. Other herbaceous perennials suffered badly although at the Experimental Farm, where the snow lies heavily on the border they were comparatively little injured. In some gardens in Ottawa the growers lost practically all the perennials they had. The plants which suffered most were, as a rule, those with fleshy roots. In a border containing over 2,000 species and varieties at the Experimental Farm, 277 were killed. Deciduous trees and shrubs, including fruit trees and bushes, suffered considerably more than usual, but not as much as might have been expected.

Evergreens suffered most, the different varieties of the American Arbor Vitæ being badly affected. Some were killed outright, while others had branches destroyed. The varieties which suffered least were *Thuya occidentalis wareana* and *Thuya occidentalis globosa,* the former not being injured in the least. In exposed places the native American Arbor Vitæ were badly injured. By April 16, the frost was out of the ground in most places and the first ploughing was done in the orchard on that day and also the first digging with the spade. Even by April 21 there was still some frost in the ground and up to that time there had been little growth. The highest temperature in April was on the 19th, when the temperature was 71·6° F. above zero. The lowest was 17° F. on the 7th. May was rather cool on the whole with changeable weather although there were a few warm days. The highest temperature was 89·8° F. on the 18th, and the lowest 28·8° F. on the 11th. The last spring frost recorded by the thermometer was on May 21, when the temperature was 29·8° F. June was a warm month, although no very high temperatures were recorded, the highest being 89° F. on the 15th and 21st. The temperature was over 80° F. thirteen times in June. There were a number of showers during the month which with the heat caused vegetation to recover remarkably from the injurious effects of the winter. July was a very warm, dry month, the temperature being 80° F. and above no less than twenty-two times during the month. The highest temperatures were 93° F. on the 15th, and 93·6° F. on the 22nd.

From July 12 to August 12 the temperature was 80° F. and above every day except one. The highest temperature in August and the hottest days of summer were on August 18 and 19, when the temperature rose to 96° F. and 96·6° F., respectively.

On September 11 and 12 the following notes were made: 'Rain is very badly needed, the grass is brown except in spots and trees and shrubs have a parched look and are showing the want of moisture very much. Many leaves of elms have turned yellow and are falling. Fruit trees have not suffered much except young plum trees, which are suffering. The soil is very dry.' There were some very high temperatures in September, the two highest being on the 9th and 12th, when the thermometer re corded 91° F. and 92° F., respectively. There was a good rain on September 29, and again on October 6. The weather in October was fine and warm for the season of the year. The highest temperature was 75·8° F. on the 4th. The first autumn frost recorded was on October 1, when the temperature was 30° F.

The first severe frost of the season was on October 12, when the grape leaves were killed, the lowest previous temperature having been on October 8, when 29·1° F. were recorded.

There was a fall of snow on November 9, but this disappeared again the next day. On the 14th the ground froze hard, the temperature dropping to 7° F. above zero on the 15th, but thawed out again. Winter set in on November 26 with a heavy snowfall and the ground unfrozen. The lowest temperature in November was 7·4° F. on the 15th. December, January, and February were all cold months, although the temperatures were not as low as in some winters. There was a thaw during the first week of January. The amount of cloudy weather was very marked during the winter, but the snowfall was not heavy, there never being more than about two feet on the level during the winter. The lowest temperature during the winter was on December 8, 1906, when the thermometer registered 25·2° F. below zero. The temperature rose above the freezing point on March 12, at which time there were about two feet of snow on the level. The snow went away gradually as frosty weather with snowfalls occurred at intervals.

During the winter the temperature fell below zero fifty-two times.

FRUIT AND VEGETABLE CROPS.

The crop of apples in the provinces of Ontario and Quebec was a light to medium one on the whole in 1906. The yield of summer and autumn kinds was a medium one in some places, but below medium in others. Of winter apples there were very few in Eastern Ontario and the province of Quebec, but in Central anl Western Ontario the crop ran light to medium. The Apple Spot was not so injurious as usual, but codling moths were very numerous and there was a large proportion of wormy fruit. The Sooty Fungus disfigured the apples considerably. The great heat and dry weather in Eastern Ontario and Quebec and in some sections further west caused the apples to mature earlier than usual and drop badly.

The crop of pears was only a medium one and the fruit rather undersized. Peaches were a good crop and while they ripened rapidly and required to be handled quickly the prices obtained were very satisfactory. The plum crop was a light one on the whole. There was a good crop of cherries in Western Ontario and good prices were obtained for the fruit. There were practically no cherries in Eastern Ontario and Quebec. The grape crop was a medium one in the grape districts but the fruit suffered considerably from dry weather in September.

The crop of strawberries and bush fruits was only a medium one in Western Ontario, although there were some good crops. In Northern and Eastern Ontario and the province of Quebec, strawberries suffered badly from winter killing and the crop on the whole was very light. Raspberries were considerably injured by winter also, but there was a partial crop.

At the Experimental Farm the crop of summer and fall apples was a medium one, but there was very little winter fruit. The European plum crop was a failure, but the crop of American plums while not as good as usual was a fair one, although the drought caused the fruit to be rather small. There were practically no cherries. A few varieties of Russian pears had a light to medium crop. The strawberry crop was a total failure due to winter killing of the plants. The raspberry crop was below medium, but a fair amount of fruit was obtained. Blackberries were not as much injured by winter as usual and in the early part of the summer promised a good crop, but the extremely dry weather prevented the fruit developing and the crop was light. The crop of black, red and white currants was good. Gooseberries were medium to light.

Vegetables suffered much from the dry, hot weather and were below the average in Ontario and Quebec. The yield of tomatoes was below the average.

At the Experimental Farm the crop suffered considerably also, but the vegetables were not injured so much in the sandy loam soil which was kept loose, as in the clay ground of some commercial growers.

MEETINGS ATTENDED AND PLACES VISITED.

Following are the meetings attended and places visited during the year, with titles of addresses, where given:—

Canadian Seed Growers' Association, Ottawa, June 27 and 28, 1906. Address: 'Improvement of the Potato.'

Summer meeting of the Quebec Pomological Society, Chateauguay Basin, Que., August 29; Como. August 30, 1906. Address: 'Conclusions on Hardiness of Fruits After Nineteen Years' Experience at Ottawa.'

Annual meeting of the Ontario Fruit Growers' Association, Toronto, November 7 and 8, 1906. Address: 'Protecting Trees from Mice and Rabbits.'

Annual meeting of the Nova Scotia Fruit Growers' Association, Wolfville, N.S., December 12, 13, 14, 1906. Address: 'Orchard Management.'

Annual meeting of the Quebec Pomological Society, Knowlton, Que., December 20 and 21, 1906. Address: 'Growing Grapes for Home Use.'

Annual meeting of the Canadian Forestry Association, Ottawa, March 14 and 15, 1907. Address: 'Some Questions Relating to the Establishment, Maintenance, and Improvement of Farm Forestry.'

The Canadian National Exhibition was attended at Toronto during the second week of September, 1906, for the purpose of studying the horticultural exhibits there. During the same week a trip was made through the fruit district between Hamilton and St. Catharines. Several fruit farms were visited and notes taken of the condition of the orchards and fruit in order to learn in what way we could best help the fruit growers. While at St. Catharines, I took the opportunity of learning as much as possible regarding the methods adopted there of shipping fruit to the Northwest as many carloads were shipped from that point last summer.

At the Dominion Exhibition held at Halifax, N.S., from September 22 to October 5, 1906, I had charge of the exhibit from the Dominion experimental farms and believe that we had a very creditable display. While in Nova Scotia I drove from Middleton to Wolfville, a distance of about forty-two miles, through the Annapolis valley, visiting on the way a number of orchards and learning what I could regarding methods of culture and packing and shipping of the fruit. The cranberry bogs at Auburn were also examined and useful information obtained.

ACKNOWLEDGMENTS.

It gives me much pleasure to acknowledge again the services of those who share with me the responsibility of the Horticultural Division. Mr. J. F. Watson continues to help me in the office work, which he does with much care and accuracy. In the field Mr. H. Holz, foreman of the division, has as in the past done his work well. He is assisted by Mr. F. Horn, foreman in the Arboretum and Botanic Garden and Mr. Horace Reid who records the experiments in progress and takes many of the field notes, both of whom have shown much interest and care in their work.

The fruit growers in Canada and the United States continue to assist me in obtaining information and in other ways, which has been a great help to me in my work. I again take this annual opportunity of expressing my appreciation of their sympathy and aid.

DONATIONS.

Interest in the work of the Horticultural Division is shown each year by many who send plants, scions or seeds for test at the Experimental Farm. A public acknowledgment of those which were received since the report for 1905 was published up to December 31, 1906, is made here.

Donations.	Sender.
Wm. Sangster, Upper Falmouth, N.S.	Scions of seedling apple.
Henry Wilmot, Oromocto, N.B.	Scions of Belmont seedling apple.
Charles B. Camp, Cheney, Neb., U.S.	Grape vines, eight varieties.
Heber Rawlings, Forest, Ont.	Seedling potatoes.
W. H. Dempsey, Trenton, Ont.	Scions of Coo's River Beauty apple.
Wm. Wilson, Port Arthur, Ont.	King Edward potato.
Stanislas Lachance, D'Artagnon, Que.	'Soleil Levant' potato.
S. Short, Ottawa.	Plants of Cuthbert raspberry.
Geo. F. Bonewell, North Augusta, Ont.	Wortley potato.
Fred Foyston, Minesing, Ont.	Early Harvester potato.
J. F. Morrow, Calumet, Que.	Scions of Tom seedling apple.
C. Scott, Melville Cross, Ont.	Magyar potato.
Lieut.-Col. Wm. White, Ottawa.	Scions unknown apple.
Dr. Coughlan, Hastings, Ont.	Scions of seedling apple.
A. A. Evans, Kingsey, Que.	Scions of late keeping Fameuse seedling.
A. Mosely, London, Eng.	Scions of Fearn's Pippin apple.
Jules Lagace, Fraserville, Que.	Scions Grand St. Jean apple.
J. C. Gilman, Fredericton, N.B.	Scions of unknown apple.
Wm. Pratt, Penetanguishene, Ont.	Scions of No. 1 and No. 2 seedling apples.
Robert Hamilton, Grenville, Que.	Apple scions and seed of Volga pear.
R. A. Marrison, Cataraqui, Ont.	Scions of Phenomenal crab.
John C. Hodgson, Westmount, Que.	Seeds of Italian pine.
M. Pettit, Winona, Ont.	Cuttings of Early Dawn and Black Delaware grapes.
G. S. Hoyt, Lequille, N.S.	Seeds of Improved Swede turnip.
M. G. Clark, Nanaimo, B.C.	Tubers of Apex potato.
A. Lalonde, Isle Perrot, Que.	Scions of La Salle and Highly Coloured Pewaukee apples.
F. W. Wilson, Port Hope, Ont.	Scions of Choate apple.
O. F. Brand & Son, Faribault, Minn., U.S.	Scions of Estelline apple.
E. Loranger, Ste. Anne de la Perade, Que.	Cherry scions.
Wm. Tucker, Halifax, N.S.	Geraniums.
Iowa Experiment Station, Ames, Ia., U.S.	Scions of Bestovall and Atkins plums.
Sutton & Sons, Reading, England.	Twenty lots of potatoes.
A. H. Stead, Tapley's Mills, N.B.	Scions of seedling pear.
A. H. McRae, Pownal, P.E.I.	Scions of Dodd apple.
Ontario Agricultural College, Guelph, Ont.	Plants of eighteen varieties of strawberries.
L. A. Clemons, Storm Lake, Ia., U.S.	Scions of Clemons apple.
Miss Maggie McLaurin, Dalkeith, Ont.	Scions of Craignaivie apple.
Malcolm Macleod, Big Intervale, N.S.	Tubers of Shoat potato.
W. H. Brand, Jordan Station, Ont.	Two cans Target Brand Scale Destroyer.
J. G. Webster, Hedley, B.C.	Potatoes.
J. A. Wright, Melboro, Que.	Scions of seedling apple.
S. B. Chute, Berwick, N.S.	Scions of Crimson Beauty apple.
G. M. Bonmarvel, Sintaluta, Sask.	Tubers of Sausisse potato.
John C. Walker, Holland, Man.	Maple Leaf potato.
D. W. Buchanan, St. Charles, Man.	Plants of Dr. Reider raspberry.
C. H. Snow, Cummings Bridge, Ont.	Twenty-five plants Daisy strawberry.
H. N. Antisdel, Milford, Ia., U.S.	Two trees Okoboji apple.
Messrs. Smith Bros., Beachville, Ont.	1 lb. 9 ozs. Eldorado potato.
E. Chegrion, St. Laurent, Manitoba.	Uruguay potato.
R. Gammón, Lachine Locks, Que.	Sutton's Prolific potato.
Wallace Machinery Co., Champaign, Ill., U.S.	New and Improved parts for Wallace Power Sprayer.
Spencer Seedless Apple Co., Toronto, Ont.	Two trees of Spencer seedless apple.
James P. Wood, Stratford, Ont.	Seeds of Columbine.
W. Atlee Burpee Co., Philadelphia.	Vegetable seeds.
Wm. Rennie Co., Toronto, Ont.	Vegetable seeds.
B. G. Thoralson, Pine Valley, Man.	Unknown potato.
Geo. Boulet, Normandin, Que.	Tubers of unnamed potato.
Wesley Barkley, Chesterfield, Ont.	Seedling potato.
J. P. Helm, Tignish, N.S.	Blue Prolific potato.
John Hicks, Belleville, Ont.	Hicks' Jubilee potato.
A. Smith, Ladners, B.C.	Sutton's Reliance potato.
W. J. Dickson, Springhill, N.S.	Immigrant potato.
Jas. W. Stairs, Halifax, N.S.	Seedling potato.
W. L. Scott, Ottawa, Ont.	Scions of unknown apple.
R. B. Whyte, Ottawa, Ont.	Scions of Wolf River apple.
T. Harris, Bayview, Ont.	Scions of unknown apple.

SEEDLING FRUITS RECEIVED FOR EXAMINATION—1906.

A considerable number of seedling fruits was received for examination in 1906, as in previous years, and it was with much interest and pleasure that these fruits were tested and described. A large proportion of them, it is true, were not as good as named varieties on the market, but a few of them give promise of being useful. Full descriptions are given of those which are thought to be the most promising, while briefer notes are published of those which were not considered of special merit. The full descriptions follow the table.

It is hoped that fruit growers will continue to send specimens of promising fruits to the horticulturist, whether they are seedlings or merely unknown varieties. There are many desirable seedlings fruiting in different parts of Canada of which nearly 100 of apples alone have been collected from various sources and are growing at the Central Experimental Farm, Ottawa, where they are compared with other named sorts and a fair estimate obtained of their relative merits.

Record Number.	Province.	Name and Address of Grower or Sender.	Description of Fruit.
346	Nova Scotia	Wm. Sangster, Falmouth	See full description.
347	" ..	C. E. Starr, Perraux....	Medium size, oblong, yellow, well splashed and washed with crimson. Season evidently early winter or late fall. Not promising.
348	" ..	W. H. Woodworth, South Berwick.	Appears to be identical with Yellow Bellflower.
349	New Brunswick.	A. H. Stead, Tapley's Mills.	Supposed seedling of Duchess. Below medium size, roundish, pale yellow, splashed and washed with bright red mostly on sunny side; briskly subacid; medium quality. Season probably November. Not promising.
350	" ..	" ..	See full description (pear).
351	" ..	C. N. Vroom, St. Stephen.	Above medium size, roundish to oblate; pale yellow with a pink blush; subacid; good quality; season October. Being the same season as Wealthy it is not desirable.
352	Quebec.....	A. E. Evans, Kingsey...	See full description.
353	"	R. Hamilton, Grenville.	Pitcairn seedling. Above medium to large, oblate conic; pale greenish yellow well washed and splashed with deep crimson; briskly subacid, astringent; quality medium to above medium; season early to midwinter. Not sufficiently promising.
354	"	" ..	'Holdfast.' See full description.
355	"	" ..	'A. McMillan's Seedling.' Medium size, oblate; pale green, splashed and washed with deep, rather dull crimson; acid; medium quality; season evidently mid to late winter. Not promising.
356	"	" ..	Seedling 'Like La Salle.' Above medium in size, oblong, conical; pale greenish yellow, splashed lightly with crimson on sunny side; acid; medium to above medium in quality; season evidently midwinter. Not promising either in appearance or quality.
357	"	" ..	'St. Hilaire Seedling.' Above medium in size, oblate, angular. flattened; greenish yellow well washed with deep red; sub-acid; quality medium; season evidently early to mid winter or perhaps later. Not promising.
358	"	" ..	'R. Beauchamp's Seedling.' Medium in size, roundish; pale green washed with dark red on sunny side; briskly subacid, of pleasant flavour and above medium in quality. Season midwinter or later. Not sufficiently promising.
359	"	" ..	Above medium in size, oblate, flattened; yellow washed with dull purplish red on sunny side; briskly subacid; medium quality; season evidently midwinter or later. Not sufficiently promising.
360	"	" ..	'From near Pig Pen.' Medium to above medium in size, roundish, yellow with a pink blush; subacid with a pleasant flavour; quality good; season early winter. Past best condition.

Record Number.	Province.	Name and Address of Grower or Sender.	Description of Fruit.
361	Quebec.....	R. Hamilton, Grenville..	'Knoll Seedling.' Above medium in size, roundish; pale yellow; mildly subacid and of pleasant flavour; quality good; season evidently early to midwinter. Would be promising if of a more attractive colour.
362	"	" ..	'St. Jane.' Medium in size, roundish; pale yellow well washed with crimson; subacid; quality probably good; season early winter. Too much past best condition to judge fairly of merits.
363	"	" ..	'Welden's Red Seedling.' Northwest Angle. Medium in size, oblate, conic; greenish yellow well washed with deep red; subacid; quality medium; season probably mid to late winter.
364	"	" ..	'X Calf Pasture—French Crab Stock.' See full description.
365	"	" ..	'Entrance.' Medium in size, oblate; rich yellow with an orange blush; acid; astringent; quality below medium; season October. Of no value unless as a cider apple. From French crab stock.
366	"	" ..	'Entrance'—French Crab Stock:—Medium in size, oblate, conic; pale greenish yellow splashed with bright purplish red on sunny side; subacid, little flavour; medium in quality, season probably early to midwinter. Not promising.
367	"	" ..	'Knoll from French Crab Stock.'—Medium in size, roundish, conical, yellow well washed and splashed with deep red; briskly subacid, little flavour; quality medium; season probably early to midwinter. Not promising.
368	"	J. F. Morrow, Calumet .	Medium in size, roundish, slightly angular; yellow washed on sunny side with deep, dull red with purplish red splashes; mildly subacid, pleasant flavour and above medium in quality. Season mid to late winter. Not quite good enough in quality.
369	"	J. F. Prudhomme, St. Philomêne.	Below medium in size, roundish, slightly angular; greenish yellow well washed and splashed with dull red; quality above medium; season probably early to midwinter. Not sufficiently promising.
370	"	" ..	Medium in size, oblate, conic; yellow splashed and washed with crimson mostly on sunny side; subacid; quality above medium; season evidently early to midwinter. Not sufficiently promising.
371	"	Peter Reid, Chateauguay Basin.	'Sport of Duchess' now called 'Reid.' See full description.
372	"	James Wright, Melboro.	See full description.
373	Ontario....	A. R. Surtees, Wendover	'Seedling No. 3.'—Medium in size, oblate, pale yellow with a pink blush; subacid; medium in quality; season probably December. Not sufficiently promising.
374	" ...	" ..	'Seedling No. 9.'—Too far gone to describe.
375	" ...	" ..	'Seedling No. 12.'—Medium in size, roundish to oblate, pale greenish yellow splashed with dull purplish red; briskly subacid: quality medium; season October. Not promising.
376	"	" ..	'Seedling No. 16.'—See full description.
377	" ...	" ..	'Seedling No. 20.'—Below medium in size, roundish; pale yellow with a pink blush; subacid with a pleasant flavour; quality above medium; season October, Not sufficiently promising.
378	"	" ..	'Seedling No. 23.'—Above medium in size, roundish, conical; pale green splashed and washed mostly on sunny side with dull red; subacid; quality above medium; season October. Not nearly as good as Wealthy.
379	"	" ..	'Seedling No. 31.'—Medium in size, roundish; yellow with a pink blush; subacid with a pleasant flavour; quality above medium; season October. Not promising.
380	"	" ..	'Seedling No. 32.'—Medium in size, oblate; yellow splashed and washed with purplish red; briskly subacid; quality medium; season October and later.
381	" ...	" ..	'Seedling No. 33.'—Above medium in size, oblate; pale green splashed and washed with dull red; snbacid; quality medium; season probably October. Not promising.

Record Number.	Province.	Name and Address of Grower or Sender.	Description of Fruit.
382	Ontario....	J. Hawkins, Ojibwa ...	See full description.
383	"	J. McMullen, Cummings' Bridge.	Medium in size, conical; pale yellow; subacid with no decided flavour; quality medium; season evidently late September. Not promising.
384	" ...	Thos. Paddon, Toronto..	Medium in size, roundish, angular; green with a bronze or pinkish blush; subacid, pleasant; quality almost good; season probably October. Not sufficiently promising.
385	"	J. S. Reeson, Carterton.	Medium in size, roundish, conical; yellow with a red blush on sunny side: mildly subacid, pleasant flavour; quality almost good; season late winter. May be useful in the North.
386	"	Richard Shillington, City View.	Above medium in size, oblate; pale green splashed with dull red, mostly on sunny side; sweet with a pleasant flavour; quality above medium; season evidently mid to late winter. A good keeping sweet apple.
387	" ...	C. L. Stephens, Orillia ..	'No. 1.'—Medium in size, oblate; greenish yellow with a pink blush on sunny side; briskly subacid with a pleasant but not high flavour; quality above medium to good; season evidently late winter. Not sufficiently attractive in appearance.
388	"	"	'No, 2.'—Medium in size, roundish; greenish yellow with a bronzy pink blush; subacid, sprightly with a pleasant but not high flavour; season evidently late winter. Not sufficiently attractive in appearance.
389	"	"	Above medium in size, oblate; yellow, well splashed and washed with deep crimson; briskly subacid; medium in quality. Said to be a little earlier in season than Duchess. Not good enough in quality. Resembles Duchess in outward appearance.
390	" ...	"	Crab Apple Seedling. See full description.
391	" ...	Geo. Wilkinson, Parry Sound.	Medium in size, roundish; yellowish green; splashed and washed with dull orange red; mildly subacid, pleasant; quality above medium to good. Season probably early winter. Not attractive in appearance; not sufficiently good in quality.
39[illegible]	"	F. W. Wilson, Port Hope.	'Choate.'—See full description.

APPLES.

No. 346. Falmouth Seedling, from Wm. Sangster, Falmouth, N.S.—Medium in size, oblate to roundish, flattened at ends; cavity deep, open, russeted; stem short, moderately stout; basin deep, open, slightly wrinkled; stem short, moderately stout; calyx partly open; colour yellow, well washed with bright and deep crimson; dots moderately numerous, yellow, distinct; skin moderately thick, tender; flesh yellowish tinged with red, crisp, moderately juicy; core medium; subacid, pleasant flavour; good quality; season evidently early to mid winter.

Suggestive of King. Rather promising.

No. 352. Evans, A. E. Kingsey, Que.—Late Keeping Fameuse like Seedling.—Below medium in size, oblate conic; cavity medium depth and width; stem medium length, slender; basin narrow, shallow, almost smooth; calyx closed; yellow well washed with crimson with darker splashes; dots few, yellow, distinct; skin moderately thick, tough; flesh white, tinged with yellow, juicy; core medium; subacid, pleasant but not of high flavour; good quality; season early to late winter.

Said to keep until spring. Not as good as Fameuse in quality, but if hardy may be desirable.

No. 354. Holdfast.—Medium size, roundish; cavity deep, medium width; stem short, slender; basin deep, medium width, smooth; calyx closed; pale yellow splashed and washed with bright crimson; dots few, yellow, indistinct; skin moderately thick, tough; flesh dull white, tender, juicy; core medium; subacid, pleasant flavour; quality good; season mid to late winter.

May prove useful. Apples hang well on tree.

No. 364. Hamilton, R.,—Seedling from 'X Calf Pasture—French Crab Stock.'—Above medium in size, oblong, conical; cavity narrow, medium depth; stem medium length, slender; basin medium depth and width, wrinkled; calyx open; pale yellow, splashed and washed with red; dots fairly numerous, white, distinct; skin thick, moderately tender; flesh white, firm, juicy; core medium; sweet, pleasant flavour; quality good for a sweet apple; season mid October, probably through November.

May be a useful sweet apple.

No. 371. Reid—from Peter Reid, Chateauguay Basin, Que.—Fruit large, oblate, angular, flattened at each end; cavity deep, open; stem short, stout; basin very deep, open, almost smooth; calyx open; colour pale greenish yellow, well washed on about ¾ of skin with deep red, somewhat orange red, with darker splashes; dots moderately numerous, small, white, distinct; skin thick, tough; flesh dull white, rather coarse, juicy, tender; crisp; core small; briskly subacid, pleasant flavour; quality above medium to good; season midwinter.

Much like Milwaukee. Said to be a sport on a Duchess tree, two branches of which were budded with McIntosh Red four years ago.

No. 372. Wright, Jas., Melboro, Que.—Seedling from.—Fruit above medium size, oblate, angular; cavity deep, medium width, russeted; stem (gone); basin medium depth and width, almost smooth; calyx open; colour greenish yellow; dots numerous, grey, distinct; skin moderately thick, moderately tender; flesh yellow, crisp, juicy, tender, breaking; core small; subacid, pleasant flavour; quality good to very good; season early to mid winter, evidently.

Somewhat like Grimes Golden in appearance and quality, but evidently not that variety.

No. 376. Wilson, A. E., Clarence, Ont.—Seedling No. 16 from; grown by A. R. Surtees, Wendover, Ont.—Above medium to large; roundish; cavity medium depth and width; stem short, stout; basin medium depth and width, almost smooth; calyx open; pale yellow, well splashed and washed with deep purplish red; dots obscure; skin moderately thick, tender; flesh white, tinged with red to near core; core medium; subacid, pleasant flavour; quality good; season October.

The most promising of Surtees' seedlings. A nice dessert apple.

No. 382. Hawkins, J., Ojibwa (Windsor), Ont.—Seedling from.—Above medium in size, roundish angular, flattened somewhat at both ends; cavity deep, open; stem short, slender; basin deep, open, smooth; calyx probably open; pale yellow, well washed and splashed with bright red; dots few, grey, indistinct; skin thick, moderately tender; flesh white, crisp, has some Fameuse characters, somewhat coarse, juicy; core medium; subacid, pleasant but not high flavoured; above medium to good in quality; season evidently October and later.

Seed brought from Quebec by a Frenchman.—Tree bears every year. Is about 15 years old. A very handsome apple. If better in quality would be quite promising.

No. 390. Stephens, C. L., Orillia, Ont.—Seedling from.—One and seven-eighths inches in diameter, about the size of Martha, but flatter; oblate, flattened; cavity open, medium depth; stem long, slender; basin open, medium depth; calyx closed; colour pale yellow washed with bright red on sunny side; dots purplish red on red side, indistinct on yellow side; skin thin, tender; flesh white, tender, breaking, juicy; core medium; subacid, pleasant flavour; quality good; season early September.

A good crab. About the same season as Martha, and compares favourably with that variety in quality.

No. 392. Wilson, F. W., Port Hope, Ont.—Seedling from, called 'Cheate.'—Medium to above in size, oblate; cavity deep, open; stem short, moderately stout to slender; basin medium depth and width, slightly wrinkled; calyx closed; pale yellowish green, well washed with deep red and splashed with darker shades; dots obscure; skin thick, tough; flesh white, tender, breaking, juicy; core small; subacid, pleasant flavour; quality very good; season evidently early to late winter.

Said to be a seedling. Very similar to Shiawassee Beauty.

PEAR.

No. 393. Stead, A. H., Tapley's Mills, N.B.—Seedling from.—Below medium in size, oblong, obovate, pyriform; cavity shallow; stem long, stout; basin deep, medium width, russeted; calyx partly open; yellow with an orange red blush on sunny side; dots numerous, orange red, distinct; skin thin, tender; flesh yellowish, tender, buttery but gritty about core, juicy; core small; sweet, good flavour, quality good; season evidently mid October.

Said to be a seedling of Bartlett and perfectly hardy and free from blight. Desirable in northern districts if hardier than Bartlett. Much like Bartlett in flavour, but not so good in quality. Has a trace of astringency about flesh.

APPLES ORIGINATED IN THE HORTICULTURAL DEPARTMENT, CENTRAL EXPERIMENTAL FARM, OTTAWA.

Since the year 1897 seedling apples have been fruiting at the Central Experimental Farm from seed sown there. The first seedlings which fruited were of Russian origin, the seed having been imported from North of Riga in Russia. The seedlings which were grown at Ottawa were planted out in 1890 to the number of 3,000. These began to fruit in 1897. Most of the trees proved very hardy, but while the fruit of a large proportion of the trees was as good as many of the named Russian apples which were introduced into Canada, very few of them were considered superior. The 3,000 trees were gradually reduced to 75. These seventy-five varieties were retained so that most of them might be tested in the prairie provinces on account of their apparent hardiness and good size, and 59 of them have been considered sufficiently promising to name. Only four of these compare favourably with the best named varieties of their season here. There are a few others which may be found of sufficient value for the east after a few more years test.

In 1898 seed was saved of some of the best varieties of apples which fruited at Ottawa that year, including St. Lawrence, Wealthy, McIntosh, Shiawassee, Fameuse, Swayzie, Scott's Winter, Winter St. Lawrence, Northern Spy, American Golden Russet, and several others. The seedlings of these and others which were sown later have been planted out at different times since 1901, until now, there are about 2,000 trees. The first tree to fruit was a Wealthy seedling now called Crusoe, which fruited in 1903, two years after planting and five years from seed. This variety fruited again in 1904, and it was not until 1905 that any other of the seedlings began to fruit. Owing to its many good points as an early apple the Crusoe was named and described.

In 1906 there were 105 seedlings fruited, of this lot of seedlings consisting of 47 Wealthy, 22 Swayzie, 6 Winter St. Lawrence, 6 Scott's Winter, 4 Salome, 4 McIntosh, 2 Fameuse, 7 Lawver, 4 Gano, 2 Shiawassee, 1 Langford Beauty. Out of this number, no less than 29 were considered sufficiently promising to propagate with a view of having a supply of trees should the future behaviour of these trees confirm the first fruiting. The large proportion of promising seedlings is significant when compared with the small number from the Russian seedlings, but in the latter case hardiness was the principal characteristic sought for, while in the seedlings raised from seed of apples fruited at Ottawa, hardiness, season, appearance, and quality were all taken into consideration. While the male parents of these seedlings are not known positively, as they were pollenized naturally in the orchard, certain characteristics of a number of varieties which grew near the trees from which the seed was obtained are quite apparent in the seedlings. This is very marked in the Swayzie seedlings. A Baxter tree grew near the Swayzie in the orchard and this tree is, we believe, mainly responsible for the large size, high colour, with large dots, of quite a number of the Swayzie seedlings. It may be remarked here that a few of the Wealthy and Swayzie seedlings were very similar to the female parent, but there were more among the former than the latter.

It is believed that some of the varieties which fruited in 1906 have distinct advantages over some of the named sorts of the same season and if the proportion of good seedlings continues each year as it did in 1906, by the time the 2,000 seedlings have fruited there should be a large number from which to select that hardy winter apple of handsome appearance and good dessert quality which has long been sought for in the colder parts of Ontario, and Quebec.

The following seedlings and cross-bred apples are among the best which have fruited at the Central Experimental Farm. These were not named for the purpose of introducing them at present, but to make it easier to heep a record of their future behaviour. Among these varieties are four which were produced by Mr. John Craig, when horticulturist here, by crossing the McMahan with the Scott's Winter.

Adonis (Wealthy Seedling).—Medium in size, roundish regular; cavity deep, open; stem short, stout; basin deep, medium width to open, almost smooth; calyx open; pale greenish yellow well washed with bright crimson on sunny side; dots moderately numerous, white, distinct; skin thick, tough; flesh dull white, rather coarse, moderately juicy; core small; subacid, pleasant but not high flavoured; quality almost good to good; season late October, probably through November.

A handsome, symmetrical apple and probably a better keeper than Wealthy. Resembles Wealthy much in outward appearance and in character of flesh.

Claire (Russian Seedling).—Above medium to large, roundish to oblong, angular; cavity medium depth and width; stem medium length, stout; basin deep, medium width, slightly wrinkled; calyx open; pale yellow, splashed, streaked and washed with bright crimson; dots obscure; skin moderately thick, fairly tender; flesh white, crisp, juicy; core above medium; subacid, pleasant, agreeable flavour; quality good; season late September and perhaps later.

May be useful for coming in just before Wealthy. A handsome apple of good quality.

Congo (Lawver Seedling).—Above medium to large, oblate to roundish; cavity narrow, medium depth; stem medium length, moderately stout; basin deep, open, almost smooth; calyx open; pale green washed with crimson; dots moderately numerous, white, distinct; skin moderately thick, tender; flesh yellowish, crisp, tender, juicy; core medium; subacid, sprightly, pleasant flavour; quality good; season probably mid to late winter.

Quite promising. Resembles Lawver considerably in outward appearance. Seeds also are large and broad like Lawver.

Crusoe (Wealthy Seedling).—Medium size, roundish, slightly angular; cavity deep, moderately open; stem medium to long, moderately stout; basin medium depth and width, wrinkled; calyx closed; colour pale yellow well splashed and washed on sunny side with bright red; dots obscure; bloom slight; skin thick, moderately tough; flesh yellowish, sometimes with red near skin, tender, juicy; core medium; subacid, pleasant flavour; quality good; season almost same as Duchess.

A very early bearer. Promising on account of handsome appearance, early bearing and good quality.

Dorval (McMahan White, female, x Scott's Winter, male).—Above medium in size, roundish, obtusely conical, prominently angular: cavity deep. medium width, russeted; stem short, stout; basin deep, medium width, wrinkled; calyx open; colour yellow with a few splashes of pink about cavity; dots obscure; skin moderately thick, rather tough; flesh yellowish, tender, breaking, juicy; core medium; acid, pleasant but not high flavoured; quality above medium; season probably early to mid or late winter.

This is much like Scott's Winter in character of flesh and flavour. Should make an excellent cooking apple.

Galetta (Wealthy Seedling).—Above medium in size, roundish, flattened at both ends; cavity deep, open, slightly russeted; stem short, stout; basin deep, open, wrinkled; calyx closed or partly open; colour pale yellow, washed and splashed with red, with a suggestion of pink, mostly on sunny side; dots obscure; skin thick, moderately tough; flesh white, crisp, tender, juicy; core medium; subacid, pleasant flavour; quality good; season late August to early September. Promising. Of good quality. A good eating apple. Resembles Wealthy somewhat in outward appearance.

Mendel (Wealthy Seedling).—Medium to above medium in size, roundish, regular; cavity medium depth and width; stem short, slender; basin deep, medium width, slightly wrinkled; calyx closed or partly open; colour pale greenish yellow well washed with an attractive shade of crimson, sometimes with a line down the side as on Tolman; dots numerous, yellow, distinct; skin thick, moderately tough; flesh dull white, juicy; core medium; briskly subacid, pleasant flavour, sprightly; quality good; season evidently early to mid winter or later. Promising. Resembles Wealthy very much in outward appearance and in flavour.

Navan (Swayzie Seedling).—Medium in size, roundish, somewhat oblique; cavity deep, medium width; stem short, moderately stout; basin open, medium depth, wrinkled at base; calyx closed; colour yellow, well washed with bright crimson; dots obscure; skin moderately thick, tender; flesh dull white, firm, crisp, juicy; core medium; subacid, pleasant, raspberry-like flavour; quality good; season November and probably later.

May be a useful winter apple. Not like Swayzie in any marked degree.

Neville (Russian Seedling).—Large to above medium in size, roundish conical; cavity deep, medium width, russeted; stem short to medium, stout; basin medium depth and wrinkled slightly; calyx partly open; pale yellow, splashed and streaked mostly on sunny side with bright purplish red; dots obscure; skin moderately thick, fairly tender: flesh white, crisp, tender, juicy; core medium; subacid, pleasant flavour; quality good; season second to third week of August, between Yellow Transparent and Duchess. A promising early apple.

Noel (Wealthy Seedling).—Large, almost very large, oblate, conic; cavity deep, medium width, russeted; stem short, stout; basin deep, narrow, almost smooth; calyx closed; colour pale greenish yellow, well washed and splashed with crimson; dots obscure; skin thick, moderately tough; flesh white, sometimes tinged with red near skin, rather coarse, moderately juicy; core small; briskly subacid, sprightly; quality above medium; season probably October and November and through December.

Resembles Wealthy somewhat in appearance and quality, but not as good. A much better keeper than Wealthy.

Ottawa (Swayzie Seedling).—Fruit medium to above medium in size, oblong, conical, somewhat flattened at ends, slightly angular; cavity deep, rather open; stem medium length, slender; basin deep, open, wrinkled; calyx open; pale greenish yellow well washed and splashed with rich crimson; dots moderately numerous, white, distinct; skin moderately thick, tough; flesh dull white or yellowish, crisp, juicy; core medium; subacid, sprightly, spicy, high flavour; quality very good to best; season mid to late winter.

This is one of the best, if not the best, seedlings obtained so far. The flavour is somewhat between a King and an Esopus Spitzenburg.

Percival (Russian Seedling).—Large to very large, roundish conic; cavity deep, open, russeted; stem short, stout; basin deep, open, wrinkled; calyx open; colour pale greenish yellow, splashed and washed with light crimson on sunny side; dots few, yellow, distinct; skin thick, tough; flesh yellowish, crisp, tender, breaking; core medium; briskly subacid, good, high flavour; core medium; quality good to very good; season early September.

Quite promising. Should be a splendid cooking apple and a nice dessert apple though very large.

Petrel (Wealthy Seedling).—Medium in size, oblate to roundish, regular, symmetrical; cavity medium depth and width; stem short, stout; basin medium depth and width, slightly wrinkled or plaited; calyx closed or partly open; pale greenish yellow, well splashed and washed with crimson; dots moderately numerous, pale, distinct; skin thick, tough; flesh white, firm, crisp, juicy, inclined to watercore; core small; briskly subacid, pleasant but not highly flavoured; quality above medium to good; season late August to early September.

An attractive looking apple, much like Wealthy in outward appearance. Should ship well. Promises to be very productive.

Roberval (McMahan White, female, x Scott's Winter, male).—Fruit medium in size, oblate; cavity medium depth and width, russeted; stem short, stout; basin deep, medium width, wrinkled; calyx open or partly open; yellow, well washed with deep red and splashed with dark red; dots obscure; skin moderately thick, tender; flesh yellowish sometimes tinged with red near skin, tender, melting; core small; flavour briskly subacid, pleasant; quality above medium, almost good. Should keep to mid winter.

Resembles Scott's Winter outwardly very much, but is larger. Quality is better than Scott's Winter.

Rupert (Russian Seedling).—Above medium in size, oblate; cavity medium depth and width, russeted; stem short, stout; basin medium depth and width, wrinkled; calyx closed; pale greenish yellow, sometimes with a faint pink blush; dots numerous, green, indistinct; skin thick, tough; flesh white, juicy, tender; core medium; pleasant flavour, briskly subacid almost acid; quality above medium to good; season early August. As early or earlier than Tetofsky and much better in quality. Better in quality than Yellow Transparent. Inclined to water core.

Valois (McMahan White, female x Scott's Winter, male).—Above medium in size, oblate, conic, angular; cavity deep, narrow, russeted; stem short, stout; basin deep, medium width, wrinkled; calyx closed; pale yellow well washed with deep red; dots obscure; skin moderately thick, tender; flesh white, tinged with red, tender, juicy; core medium; briskly subacid, pleasant flavour; quality above medium. Season probably early to mid winter.

Considerably larger than Scott's Winter. May be useful. Resembles Scott's Winter considerably in outward appearance and in character of flesh.

Walton (McMahan White, female x Scott's Winter, male).—Fruit large, roundish, conical, slightly angular; calyx deep, narrow, russeted; stem short to medium, moderately stout; basin deep, medium width, wrinkled; calyx partly open; yellow, well washed and splashed with bright red. Whole surface has a somewhat mottled effect, attractive; dots obscure; skin moderately thick, rather tough; flesh white, with a yellow tinge, firm, moderately juicy; core small; briskly subacid, not high flavoured, quality medium to above medium; season probably November and December.

A handsome apple. Has indications of Scott's Winter blood in shape and colouring and mottled appearance of skin. Little indication of McMahan blood except in size and perhaps firmness of flesh.

The following names have been given to fifty-nine of the Russian seedlings originated at the Central Experimental Farm:—Arcola, Birtle, Bowie, Bolton, Beaver, Bomba, Bison, Carlyle, Claire, Carman, Cicero, Cecil, Carnie, Crescent, Cottage, Dauphin, Dewar, Earliana, Grenfell, Galena, Hanley, Hamlet, Harbinger, Jarvis, Jasper, Jacko, Lang, Leroy, Mentor, Melfort, Morden, Murillo, Morley, Neville, Nepigon, Osler, Otter, Percival, Pingree, Ponoka, Parma, Polaris, Rupert, Roslin, Ramona, Rawdon, Selkirk, Snelling, Solina, Sorley, Sanford, Souris, Selwyn, Vesta, Virgil, Varna, Virden, Woburn, Wesley. Most of these are no better than, nor as good as, the best named varieties fruiting at Ottawa, but it is hoped that some of them will prove very hardy and be suitable for the colder districts of Canada. Four of these are described above, namely, the Claire, Neville, Rupert and Percival. The descriptions of the others have not yet been published.

CONCLUSIONS REACHED AFTER NINETEEN YEARS' EXPERIENCE AND SEARCH FOR A HARDY WINTER APPLE OF GOOD APPEARANCE AND BEST QUALITY.

The search for a hardy, productive winter apple of good colour and the best dessert quality is becoming an old story in the Northwestern States, in the north, central and eastern portions of the province of Ontario, throughout the province of Quebec, and over a large part of the province of New Brunswick. Over this immense territory the cry for many years has been for a long keeping apple which will compare favourably in all particulars with the best long keeping apples grown in the more favoured parts of the American continent. Why does this search still go on? Will the desired apple ever be found? Finally the attempts made to find it are the points which after nineteen years' experience in this work may be discussed at this time when the probabilities of soon obtaining such an apple seem bright.

From experience with over 3,000 species and varieties of trees and shrubs, exclusive of cultivated fruits, from many countries and climates, which are under our care and observation at the Central Experimental Farm, Ottawa, we have drawn the following conclusions, regarding hardiness of trees.

A tree or shrub which will withstand a test winter at Ottawa must be one which ripens its wood early.

Trees or shrubs which are native to places having a longer or much longer growing season than at Ottawa, grow longer than the native species or those from a somewhat similar climate to the native species, and when a test winter comes their wood is not sufficiently ripened, or winter resistant, and they are more or less injured or perish.

After seventeen years' observations of this large collection which has increased to over 3,000 species and varieties, it may be said that with scarcely an exception, and those doubtful ones, no apparent increase in hardiness has taken place in individual specimens. Plants which killed to the ground seventeen years ago, kill to the ground still. Those which killed to the snow line, kill to the snow line still. Those which are killed back one-half or merely a few inches at the tip do so still. Sometimes a tree will remain hardy for several years and then kill back to near the ground. It is possible that they are getting hardier very gradually, but if so this increasing hardiness is scarcely imperceptible so far.

Another observation regarding tender trees has been that after a season when the growth has been strong more injury is likely to occur than in a season when the growth is short.

Individual specimens of certain species have been found hardier than others. This has been particularly noticeable in the case of the Hardy Catalpa (*Catalpa bignonioides*) which, as a rule, kills back badly at Ottawa, but some individual trees have proven much hardier and bloom freely at Ottawa. The raising of seedlings from these tender species has not been carried on long enough to state positively from our own experience that hardier types will be produced in this way, but the history of such work makes us hopeful. Some favourable results have, however, already been obtained.

Let us now turn to the hardiness of apple trees, and we might include all other large fruits that have been tested at Ottawa. About 700 named varieties of apples have been tested.

It has been found that a far larger proportion of those which originated in the Eastern and Southwestern States are tenderer than those which originated in the Northeastern and Northwestern States and in Canada. The same may be said of Europe. The hardy varieties from Great Britain, France, and Germany are few compared with those from the colder parts of Russia. It may be safely stated that the hardiest apples are those which have originated in Russia. They are the hardiest survivors of the hundreds and thousands of varieties which have originated in Russia during the past centuries and have shown their ability to withstand the winters there as far North as latitude 55°, or further, in a continental climate. In America, and especially in the colder parts of the country, the origination of varieties has been more recent and we believe that it will be some time before such hardy large apples as Hibernal, Charlamoff, and Duchess will be obtained on this continent, although some quite hardy varieties have already been originated.

By again analysing the list of varieties tested, we find that the season of all the hardiest varieties is summer or autumn. The winter of 1903-4 was a very severe one in the province of Ontario, and in the orchards at the Central Experimental Farm 164 varieties were winter killed. An analysis of these varieties, a list of which was published in the annual report for 1904, shows that 130 of these were early winter and winter varieties, and 34 summer and autumn. We believe that this is sufficient evidence to prove that summer and autumn varieties are hardier than later keeping sorts.

Let us now consider the difference between a summer and a winter apple.

A summer apple is one which is ready for use in the summer; a winter apple is one which is not ready for use until winter. The season of the first is much shorter than the second, mainly, we believe, because it reaches maturity in a hotter time of the year than the others. Duchess and Wealthy apples will keep much longer on Prince Edward Island, where the climate is cooler and development slower, than they will at Ottawa. Winter apples will also keep better there than they will in those parts of Ontario where they succeed.

It has been frequently observed that apples which mature early and are in condition for eating in summer and autumn are grown on trees which ripen their wood early, and on the other hand an apple which is not ready for use until winter is usually grown on a tree which does not ripen its wood early. A fact which many have observed and which we believe is perfectly natural. The fruit of most varieties of winter apples has to be kept on the trees at Ottawa until there is danger of severe frost, in order to get the apples sufficiently mature that the flavour will develop and that there will be a fair colour. The wood of such trees is also equally slow in arriving at that stage of ripeness which will enable it to withstand the winter, as has been proven by the figures given above.

Some winter apples are hardier than others, but from our experience with a large number of varieties we are forced to conclude that unless the fruit of a variety reaches a certain stage of development or maturity every season a certain time before it has to be picked, owing to danger from severe frost, that variety is not a safe one to plant. What that stage of maturity is we cannot at present definitely say.

In brief, then, we believe that it is a physiological impossibility for the majority of winter apples which have yet been produced to prove hardy in the colder apple districts of Canada because the trees having originated where the season is longer, grow too late for our short season. Must we then conclude that the origination of a hardy winter apple for the north, of good colour, and the best dessert quality, is an impossibility? We believe not. Apples which will keep nearly all winter when grown in some districts are autumn apples elsewhere. Some of the hardy varieties of Russian apples which have been introduced are found to be much earlier in season in America than they are in Russia. We believe that the growing and ripening season in two countries, or districts, while about the same length of time, may vary sufficiently to cause a marked difference in the season of a variety. As an example, take again Prince Edward Island, where there is a late spring, but where severe frost does not come until late, as compared with the colder parts of Ontario, where the spring is early, but where fall frosts are early also. In order, then, to get an apple most suited to a district or climate and to get it of the season required, it must be originated in that climate. The work of originating apples has been comparatively recent in the colder parts of Eastern Canada and in the Northwestern States, and by far the largest majority of seedling apples of merit which have been produced are summer or autumn kinds. This we think is due to two principal causes. In the first place, because most of the seedlings have been raised from summer or autumn varieties, these being the hardiest, and we should naturally expect that most of such seedlings would be of the same season as their parents. In the second place, and on the other hand, seedlings have been raised from the best late keeping verieties, but which are not hardy enough to stand a test winter, and the seedlings from such trees have not, as a rule, proven hardy. We do not believe that because seedlings are raised in a climate with a short season that the largest proportion of them will prove early apples regardless of their ancestry. We believe that in most cases in the past the ancestry of the seedling varieties originated in the North has not been favourable to the production of hardy winter varieties. The importance of ancestry in the origination of a hardy winter apple is well illustrated, we think, in a number of cross-bred apples which have fruited at the Central Experimental Farm. Of a cross between Scott's Winter male and McMahan female made by Prof. John Craig, when horticulturist, 23 trees have fruited. None of these are earlier in season than McMahan and 14 of them are later keeping apples. Practically all of them have some visible resemblance to the parents and some are very similar to both parents. All withstood the test winter of 1903-4.

It is believed that the basis for the production of the desired winter apple for the north should be a variety or varieties which have withstood test winters in the north and are also the latest keepers of such varieties.

It has been already said that late keeping varieties mean late ripening of wood, hence tender trees, but such late keeping hardy varieties as have already been originated in the north are of a different class. They are varieties which, although they mature or are fit for use early in the winter, yet keep all winter with good care. The fact that they are fit for use early means that the wood has ripened comparatively early, and hence is able to withstand the cold. Pomologists are well aware that certain varieties of fruits which are ready for use at the same time as other varieties will keep much longer. It is to this class that the desired winter apple for the north will belong.

The following winter varieties originated in the north stood the test winter of 1903-4 at Ottawa and are just such apples as have been described.

Canada Baldwin, originated in the province of Quebec.

Winter Rose, originated in Dundas County, Ont.

Calumet, originated on Calumet Island, in the Ottawa river.

Baxter, originated near Brockville, Ont.

La Victoire, originated in the province of Quebec.

Stone, originated in Vermont.

Scott's Winter, originated in Vermont.

Milwaukee, originated in Wisconsin.

Other promising unnamed late keeping seedlings obtained from the colder parts of Canada and the United States are growing at Ottawa. None of the varieties above mentioned have all the desired points, but we consider the outlook very bright for the origination of a hardy, productive, long keeping variety of good colour and best dessert quality for the north.

EXPERIMENTAL SHIPMENT OF APPLES.

One shipment of 90 boxes of apples was made in 1906. It was consigned to Thos. Russell, Glasgow, Scotland, and went via ss. *Athenia,* Donaldson Line, sailing from

Montreal on August 30. There were 44 boxes of Duchess apples in this consignment and 46 boxes of Charlamoff apples. The apples were picked when well coloured but still firm. Two pickings were made so as to have them all in as good condition as possible, the first picked being kept in a cool place until the rest were picked. The apples were carefully packed in rows and tiers in the boxes. No packing material was used except a sheet of cardboard at the top and bottom of the boxes between the fruit and the wood.

In addition to learning how the summer apples would arrive and the price they would bring when carefully packed, it was designed to test the strength of thinner boards than are usually used in the east for the tops and bottoms of the boxes, $\frac{3}{16}$ inch white pine being used instead of $\frac{3}{8}$ inch. The thinner material has long been used in the Western States and in British Columbia, but the wood used there is much tougher. The advantage of using thin material is that the apples can be packed much tighter, as the thin board will bend without bruising the fruit much. In this consignment 23 boxes had thin, or $\frac{3}{16}$ inch tops and bottoms, and 43 had thin tops only, the rest had tops and bottoms of the usual thickness, $\frac{3}{8}$ inch. The tops and bottoms were fastened on with cleats, which are very necessary where thin boards are used.

The apples all sold at six shillings per box. Following is the account of sales:—

'GLASGOW, September 11, 1906.

Account sales of 90 boxes apples ex. steamer '*Athenia.*'

Sold by Thomas Russell, by order and for account of: Mr. W. T. Macoun, Ottawa.

Mark.	QUANTITY.	£	s.	d.	£	s.	d.
No. 1...	45 boxes Duchess at 6s.	13	10	0			
	45 boxes Charlamoff at 6s.	13	10	0			
					27	0	
	CHARGES.						
	Freight on goods (including cold storage)	7	0	8			
	River and Harbour dues, Master Porterage, landing, selecting, coopering, catalogues, advertising, cartage to warehouse, receiving and delivering	2	5	0			
	Commission and guarantee	1	7	0			
					10	12	8
	Net proceeds				16	7	4

The following letter was received from Mr. J. A. Findlay, Canadian Agent, Glasgow, Scotland, who was asked to report on the condition in which the fruit arrived:—

'GLASGOW, September 11, 1906.

W. T. MACOUN, Esq.,
Horticulturist,
Central Experimental Farm,
Ottawa.

DEAR SIR,—Yours of the 28th ultimo to hand on the 8th inst.

The boxes of apples you refer to were discharged yesterday from the *Athenia* and I watched them as they were being handled, and found all the boxes in excellent order, with no breakages in either of the styles of boxes, the fruit also appeared in satisfactory condition.

The fruit, in the boxes of $\frac{3}{16}$ of an inch tops and bottoms, and $\frac{3}{16}$ of an inch tops and $\frac{3}{8}$ of an inch bottoms was certainly more tightly packed than in the ordinary box.

A box of this weight with $\frac{3}{8}$ of an inch bottom and $\frac{3}{16}$ of an inch top would seem to be most serviceable as it permits of the fruit being more tightly packed and because of the heavier bottom would stand rougher handling in discharging than these received, there is meantime no great pressure here, and all fruit from cold storage in being discharged is loaded in wooden tubs or iron tubs raised by crane to the dock and thereby no pressure is brought to bear on fragile boxes. It sometimes happens, however, boxes of fruit are raised by crane in slings formed of chains or ropes and thereby more or less pressure is put on the boxes according to the number in the sling, and I fear had such a method of discharging been adopted in this case from the manner in which a few of the boxes with thin bottoms bulged, a knock or pressure would have resulted in breakage.

Trusting this information is satisfactory.

Yours faithfully,
(Sgd.) JAS. A. FINDLAY.'

From this one shipment it would appear that apples may be safely shipped in boxes with $\frac{3}{16}$ inch top and bottom made of such material as can be obtained in the east, but further experience is necessary before recommending the general use of such material. By using thin tops only and bottoms of the usual thickness, apples may be packed tight and less risk be run.

THE SEEDLESS APPLE IN CANADA.

During the past three years considerable interest has been aroused in Canada in regard to seedless apples, and during 1906 a company was formed in Toronto to push the sale of one variety, the 'Spencer Seedless.' In view of this fact it seems desirable to publish in this Annual Report what we know in regard to seedless apples in Canada, and the 'Spencer Seedless' in particular.

The seedless apple is not a new thing, having been recorded by writers several hundred years ago. There are in Canada at the present time several varieties of seedless apples which originated in this country. A seedless apple was exhibited at the annual meeting of the Ontario Fruit Growers' Association, held at Brantford, Ont., on December 19, 1900. The following reference is made to it in the report of the Fruit Exhibit Committee, of which the writer was chairman:—

'A curiosity in the form of a seedless apple was shown by Mr. A. W. Whitney, Iroquois, Ont. The apple was quite normal in outward appearance and of good size. Mr. Whitney says that none of the apples contain seeds.'

This tree was reported by the owner, Mr. L. Cameron, Iroquois, Ont., to be both seedless and bloomless. Through Mr. A. D. Harkness, Irena, Ont., I obtained specimens of the flowers and on May 26, 1904, several clusters were received from him and the following description was made of them:—

'Apetalous apple blossoms, received from Mr. A. D. Harkness, Irena, Ont., from tree grown by Mr. L. Cameron, Iroquois, Ont. About one dozen flowers received May 26. Flowers in clusters averaging three flowers in each, calyx apparently very similar (these were not compared with the calyx of perfect flowers at the time) to that of ordinary flowers. Petals abortive, very small and hidden by the sepals. Flowers evidently all pistillate. Appear to be fifteen stigmas to each flower.' We visited Iroquois in August, 1904, and went to see the seedless apple tree which is in the garden or small orchard of Mr. Cameron. The tree was found in a very thrifty condition but with not a fruit on it. This lack of fruit was explained to my satisfaction by the fact that there were practically no apples in the orchard that year, hence the pistillate flowers could not be pollinated. Mr. Cameron informed me that it was a seedling tree about 10 years old and probably fruited for the first time in 1900, when the fruit was shown in Brantford. Mr. Cameron has this seedless apple top grafted on another variety in addition to the original tree. Buds were obtained from Mr. Cameron and trees of this variety are now growing at the Central Experimental Farm.

Efforts have been made to obtain fruit of the apple since that time, but without success.

In April, 1904, the following item appeared in the Prince Edward Island *Farmer*: 'In a recent issue of the *Farmer* we published the result of an experiment in apple growing by which a noted Colorado orchardist, after seven years of experimenting, had succeeded in producing a seedless apple (The Spencer Seedless). It was noted that the tree bearing this scientific wonder bears no blossoms and that the fruit resembles a navel orange. Last Saturday, to our surprise and pleasure, we received a box of seedless apples grown last year in the orchard of Mr. Hugh Ramsay, Port Hill, P.E.I., with the explanation that similar apples had been grown yearly on the same tree during the past thirty years. Examination shows that the apple is entirely solid, there are no seed chambers, nor any semblance of seed; it is well formed, richly flavoured, and a good winter keeper, the samples received being firm and fresh although stored in ordinary barrels. The tree bearing this peculiar variety was full grown and bearing heavily when Mr. Ramsay came into possession of his farm thirty years ago.'

After this article appeared we wrote to the Editor, and also to the owner of the fruit, asking for specimens, but unfortunately the best were gone, the specimen received being small and the quality, judging by the fruit tested, not more than medium. The core was small and was situated nearer the calyx than in ordinary varieties, the cartilagenous parts of the core, or carpels, were not as thick as in the varieties with seeds. There were no seeds in the specimen examined. I have tried to obtain fruit of this apple since, but without success.

When attending the annual meeting of the Prince Edward Island Fruit Growers' Association on December 20, and 21, 1904, a specimen was shown me of a seedless apple grown by Jesse A. Wright, North Bedeque, P.E.I. This apple was past best condition, but was seedless with a small core confined to the calyx end of the apple.

At the Flower, Fruit and Honey Show held in Toronto on November 6-10, 1906, a number of the Spencer Seedless apples were exhibited and agents were in attendance taking orders for trees of this fruit. The Spencer Seedless apple is said to have originated with Mr. J. F. Spencer, Grand Junction, Col., U.S.A., but it is believed by good authorities to have originated in Virginia as a chance seedling.

As trees of the Spencer Seedless apple were being offered at $2·50 per tree those attending the Ontario Fruit Growers' Association thought it would be in the interests of Canadian fruit growers to have an unbiased judgment on the merits of this fruit, hence a committee was appointed consisting of H. H. Groff, Simcoe, Chairman; D. Johnston, Forest; E. Morris, Fonthill; W. H. Dempsey, Trenton; and W. T. Macoun, Ottawa. This Committee reported as follows:—

'We secured specimens from the exhibit at Massey Hall, which showed the following objectionable characteristics in apparent contradiction to the printed description. Although the core is smaller and less distinct than in the average apple, there is still sufficient to make the process of coring a necessity. The practical absence of the calyx tube leaves an abnormally large and deep opening reaching to the core, thereby involving loss of flesh nearly equal to a normal core, as well as affording a harbour for injurious insect pests. The specimens examined by us showed this space to contain an objectionable mold-like accumulation. They also gave well developed seeds, though fewer than the normal apple. As to size, the specimens seen by us were about equal to our Fameuse, or Snow, and those tested for quality and flavour were about equal to Ben Davis. We believe that our inspection warrants the advice that trees of this apple should only be purchased as a curiosity.'

Having procured some specimens of the Spencer Seedless apple, I took a full description of the fruit on my return from Toronto.

The following is the description made:—

'Spencer Seedless Apple.—Medium in size; oblate to roundish, flattened at ends, somewhat angular; cavity deep, medium width, russeted; stem short, slender; basin very open, medium depth, slightly wrinkled with five fleshy, rounded masses where sepals or petals were; calyx absent, a wide opening extends to the core; colour greenish-yellow, well washed with orange red and splashed with purplish red, though not prominently; dots numerous, yellow, conspicuous; skin moderately thick, tender; flesh yellowish, firm, inclined to woody, moderately juicy; core small, closed. There are really two cores, one above the other; mildly subacid, little flavour; quality medium, about like Ben Davis; season probably mid to late winter.

Seeds are not always absent, from one to two being sometimes found. While the core is smaller than that of the average apple there is still enough to necessitate coring, and the open cavity having an unattractive mould-like accumulation necessitates cutting this part out, which would offset any saving in the size of the core.'

The Spencer Seedless Apple Company have sent two trees of this variety to be tested at the Central Experimental Farm.

Unless a seedless apple is as good or better than a McIntosh, Northern Spy, King, or Esopus Spitzenburg, it is of little practical value in my judgment, unless for evaporating or canning, and as so many culls and windfalls of well known varieties can be obtained for this purpose we do not believe that seedless apples unless of great merit will become popular or useful. It is possible that by crossing seedless apples with varieties of the best quality that something will be produced that will be of real commercial value.

PEARS.

The only pears that fruited in 1906 were three Russian varieties. None of these are, however, good enough to grow where fruit of the better kinds can be obtained at reasonable prices.

The Flemish Beauty is the hardiest good pear which has been tested and it is hoped that in the seedlings of this variety which have not yet fruited there will be some still hardier. There was practically no pear blight in 1906, and little winter killing.

PLUMS.

The crop of Americana and Nigra plums was below medium on the whole, and while some varieties fruited heavily the crops of others were quite light. The European plum crop was practically a failure. The unfavourable winter, dry weather in summer, Aphis, Shot-hole fungus, and Ripe Rot combined to reduce the crop.

Notwithstanding thorough spraying with kerosene emulsion twice, the aphis could not be completely controlled as the curling of the leaves prevented reaching them all. The Ripe Rot has been somewhat troublesome during the past few seasons causing considerable injury to Americana plums. All varieties are not equally affected, those with the tenderest skins suffering the most as a rule. The early varieties were but little, if any, affected. The trees were sprayed four times with Bordeaux mixture for the purpose of helping to keep this disease under control, but notwithstanding this thorough spraying some injury was done. Although the plum trees have been very thoroughly sprayed with Bordeaux mixture year after year, the Shot-hole fungus has not been entirely controlled by it. Some varieties are almost immune, while others are usually badly affected.

Two varieties of Americana plums highly spoken of elsewhere fruited this year, namely: U.S. and Brackett. These are fine large plums, but do not appear better than some already described. Following are descriptions made of them, also of two seedlings originated at the Central Experimental Farm and named during the past season, Lester and Troy:—

U.S.—Form roundish; large; cavity shallow, medium width; suture a distinct line; apex rounded; yellow almost entirely covered with deep purplish red; dots numerous, yellow, distinct; bloom moderate, bluish; skin thick, tough; flesh yellow, juicy; stone medium size, oval, cling; sweet, good flavour; quality good.

Of the same type as Oren and Bouncer, but not as good as either.

Brackett.—Form roundish, flattened at ends; large to very large; cavity medium width, shallow; stem ½ inch, slender; suture a distinct line, no depression; apex flattened, indented; colour yellow almost entirely overspread with deep purplish red; dots numerous, yellow, distinct; bloom moderate, bluish; skin thick, tough; flesh deep yellow, meaty, juicy; stone above medium, roundish, flattened, cling; sweet, rich, good flavour; quality good.

Of the same character as Oren and Bouncer. Does not appear better than either of them.

Lester—(De Soto Seedling).—Roundish, one side a little longer than other; medium to above medium in size; cavity narrow, shallow; suture a distinct line only; apex rounded; yellow more or less covered with bright red; dots moderately numerous, small, yellow, rather indistinct; bloom moderate, bluish; skin moderately thick, rather tough; flesh deep yellow, juicy; stone below medium size, semi-cling, roundish, considerably flattened; sweet, good flavour; quality good. Season mid September. Worth keeping on account of quality and productiveness. A promising plum.

Troy—(Cheney Seedling).—Roundish, large; cavity narrow, shallow; suture a fairly distinct line very slightly depressed; apex rounded; yellowish well washed with deep red; dots numerous, small, yellow, distinct; bloom moderate, bluish; skin rather thick, moderately tender; flesh deep yellow, juicy; stone above medium, oval, flattened; sweet, good flavour; quality good to very good. Season mid September.

A promising seedling, better in quality than Cheney.

CHERRIES.

The cherry crop was practically a total failure this year; the fruit buds, as is usually the case, being destroyed by winter. Each year's experience makes it more certain that until some hardier varieties are found the only method of producing cherries in this district is by protecting the trees or by growing dwarf trees which will be protected by the snow. Bushy trees of the Koslov Morello type are what are needed, but unfortunately these trees are extremly slow in growing when grafted and if stones are planted the fruit varies so much that one is uncertain what he will get when the trees begin to bear, which from the seed takes a long time also. The Orel 25 and Vladimir are two of the hardiest varieties which have been tested.

The black aphis and leaf spot were troublesome on the cherry trees this year.

GRAPES.

Although there was very little snow in the winter of 1905-6 and what there was disappeared early, the grape vines with the slight protection afforded them from cold by the few inches of soil thrown over them in the autumn came through the winter in good condition, showing clearly that the value of covering lay not so much in the protection from cold as from the sudden changes of temperature. The vines were not uncovered until May 18 and 19, it being learned by experience that it is very important to keep them covered as long as possible without danger of heating so that spring frosts will be avoided.

The season of 1906 was a very favourable one for grapes in the Ottawa valley, the hot, dry weather causing them to grow rapidly and ripen up their fruit well.

There were 100 named varieties ripened thoroughly. The twenty-five varieties which ripened first were: Florence, September 8; Janesville, Hartford, September 11; Jewel, Early Ohio, Early Daisy, Champion, September 12; Manito, Pattison, Bonne Madame, Moore's Early, Early Victor, Presley, September 15; Golden Drop, Moyer, Brant, Jessica, September 18; Campbell's Early, Potter, Lutie, Cottage, Rogers 17, September 20; Merrimac, Winchell, Canada, September 24.

Some very promising seedlings fruited this year.

During the past few years robins have been troublesome in the vineyard and are very destructive to the early varieties of grapes if left unprotected, hence it has become necessary to protect them. This is done by means of paper bags which are pinned over the bunches very rapidly and at comparatively little cost when the grapes are beginning to colour. The fruit does not ripen quite so early when covered as when left unprotected.

The vines were kept thoroughly sprayed in 1906 with Bordeaux mixture and there was little injury from disease.

BLACKBERRIES.

The blackberries wintered better than usual this year, which was somewhat unexpected considering the lack of snow last winter, but the wood was evidently better ripened than usual in the autumn of 1905. Early in the season the crop promised to be a good one, but the hot, dry weather prevented the development of the fruit and the crop was a light one. The Agawam is the most satisfactory blackberry tested here, Snyder coming next. The Eldorado is promising.

RASPBERRIES.

Notwithstanding the lack of snow in the winter of 1905-6, the raspberries came through the winter in fair condition, although there was some injury to the more tender varieties. The hot, dry weather was unfavourable to the production of much fruit, hence the crop was not a large one. A new plantation was made in the spring of 1906.

CURRANTS.

The red and white currants wintered well on the whole and there was a good crop of them. The Cherry, Versaillaise, Fay, Moore's Ruby, and Wilder, are distinctly more tender in fruit bud than most of the other sorts, and the crop of these was light this year.

The crop of black currants was good in some cases, but a number of the varieties were injured by winter, both in wood and fruit buds. The crop, on the whole, was not more than a medium one.

GOOSEBERRIES.

The gooseberry crop was a light one, the flowers having been apparently injured by spring frosts.

STRAWBERRIES.

The strawberry crop at the Experimental Farm, as throughout this district, was practically a total failure in 1906. The thawing and freezing of the ground during the winter of 1905-6 and the coating of ice which covered the strawberry plantation as it did the ground nearly everywhere on the Experimental Farm caused the death of nearly all the strawberry plants in a plantation containing over 200 named varieties, and 34 unnamed seedlings of great promise, which had been selected from a large number originated at the Experimental Farm. The strawberry plantation had been well mulched with marsh grass the previous autumn. It was impossible to obtain many of the varieties which were in the plantation from growers of strawberry plants as they are not now offered for sale. These varieties had been retained as they were found superior to many of the new kinds put on the market each year.

A new plantation was made in May, 1906. As some varieties stood the hardships of the winter of 1905-6 better than others, a list of those which appeared the hardiest is given as these should be among the most useful where the climate is severe.

LIST OF STRAWBERRIES WHICH CAME THROUGH THE WINTER OF 1905-6 IN THE BEST CONDITION.

Hardiest.—Beder Wood, Lovett, Senator Dunlap, Pocomoke, Crescent.

Probably almost or quite as hardy—conditions a little more favourable.—Bismark, Steven's Late Champion, Hawaii, Abington, Howard, Luxury, Hero, Sunshine, New Globe, Jucunda Improved, Giant, Armstrong, Uncle Jim, Giant Ruby, and Carleton.

In 1903, spring frosts did much damage in the strawberry plantation by injuring the flower buds and the yields that year were very small. Of the varieties which proved hardiest after the winter of 1905-6, the Jucunda Improved, Lovett, Crescent, and Beder Wood, appear in the list of the twenty-five which yielded best in 1903, showing that these are both hardy in flower and plant.

A NORTHERN EXPERIMENTAL ORCHARD.

In the annual reports of the Horticulturist for 1895 and 1899, there were published the results of experiments in fruit culture by Mr. J. C. Chapais, St. Denis, Kamouraska county, P.Q. It seems desirable to again publish an account of the orchard which will bring the results of the experiments up to date. These results were summed up by Mr. Chapais in the following paper which he presented before the Quebec Pomological Society recently.

'ORCHARD EXPERIMENTS IN EASTERN QUEBEC.

ANALYSIS OF A LECTURE DELIVERED BEFORE THE WINTER CONVENTION OF THE QUEBEC POMOLOGICAL SOCIETY, HELD AT KNOWLTON, BROME COUNTY, P.Q., ON DECEMBER 19 AND 20, 1906.

Twenty years ago, we undertook, in the province of Quebec, at St. Denis, Kamouraska county, P.Q., a locality situated 90 miles below the city of Quebec, on the St. Lawrence river, by 47° 30′ of latitude north, some experiments in small and large fruit growing. We give here a few particulars on the climate of that region and on the ground of our orchard.

Lowest temperature experienced in 43 years—34° F. below zero.

Highest temperature experienced in 43 years—96° F.

Average rainfall experienced in 43 years—28½ inches, including the winter snowfall, which gives an average of three feet deep in the open country.

Predominant winds are northeastern, saturated with salt emanations from Gulf of St. Lawrence.

The soil of the orchard, which is gently sloping to the north, is composed of sandy clay, naturally damp, but well drained. A wind-break of white-spruce shelters the orchard on the northeastern side.

At the time we began our experiments, we were growing a few seedling apple trees, the Blue Damson and Montmorency plums and the common or French cherry, but, practically, no grafted fruit trees of any kind. We have been trying, since, 51 varieties of apples, 9 of pears, 33 of plums, 13 of cherries, 12 of gooseberries, 10 of currants, 8 of raspberries and blackcaps and 7 of strawberries.

As to apples, we have picked out as good for cultivation in our district and having a real value, 22 varieties classified here after the results obtained with them:—

Summer apples.—Hare Pipka, Red Astrachan, Summer or Early Strawberry and Yellow Transparent.

Early fall apples.—Grandmother, Peach of Montreal, Transcendent and Whitney.

Late fall apples.—Alexander, Duchess of Oldenburg, Hyslop, Montreal Beauty, Wolf River, St. Lawrence and Titovka.

Early winter apples.—Fameuse, McIntosh Red, Wealthy and Winter St. Lawrence.

Late winter apples.—Ben Davis, English Golden Russet, Longfield.

Out of those 22 varieties of apples giving good crops of well matured fruit and being very hardy with us, we have made a selected list of the very best varieties, as being quite commendable. They are:—

Summer.—Hare Pipka, Summer or Early Strawberry.

Early fall.—Grandmother, Whitney.

Late fall.—Duchess of Oldenburg, Titovka.

Early winter.—Fameuse, Wealthy.

Late winter.—English Golden Russet, Longfield.

In pear culture, we have, since three years, after having discarded Russian varieties that have proved to give very poor fruit, had good success with the Flemish beauty and the Vermont Beauty. We entertain great hopes from four varieties bought in Belgium, coming from the Ardennes mountains, having wintered well since three years, including the very severe one of 1904, and having bloomed last spring.

Our experiments with plums have proved very interesting. Out of 33 varieties tested since twenty years we have still under cultivation 31 varieties, out of which the nineteen following are bearing and give us good crops of fine fruit. They are:—

Blue Damson,	Lombard,	St. Cloud,
Canada Orleans,	Mirabelle,	St. Denis Seedling,
Coe's Golden Drop,	Pond's Seedling,	Saunders,
Early Yellow,	Purple Gage,	Smith Orleans,
Grand Duke,	Reine Claude de Bavay,	Unknown Seedling,
Gueii,	Reine Claude de Montmorency,	Yellow Damson.
John Trotter,		

From these we pick the following selected list of the very best ten varieties for us:—

Blue Damson,	Lombard,	Saunders,
Coe's Golden Drop,	Purple Gage,	Smith Orleans,
Early Yellow,	Reine Claude de Montmorency,	St. Denis Seedling.
Gueii,		

The ten varieties of plums just indicated give plums fit to eat from August 25 to November 10. We sold them, this year, 30 cents a gallon, taken by the buyer on the tree, without package.

We have made experiments with thirteen varieties of cherries; seven of them have proved to be very valuable. They are:—

French cherry, maturing from July 5 to 25.

Ostheim, Russian, maturing from July 10 to 25.

Empress Eugenie, maturing from July 15 to 31.

Montmorency, maturing from July 20 to August 5.

Bessarabian, Russian, maturing from the last days of July to the first days of August.

Lutovka, Russian, maturing from August 1 to 15.

Fouché Morello, maturing from August 10 to 31.

With those seven varieties, we can send cherries on the market from the second week of July to the last week of August.

Now, coming to the small fruits, we make our selected lists as follows:—

Gooseberries.—Out of twelve varieties we consider as the best: Columbus, Downing, Houghton, Pearl, Smith improved.

Currants.—Out of ten varieties, we have selected as the best: Champion, black; Fay's Prolific, red; Versaillaise, red; White Dutch.

Raspberries.—Out of eight varieties we have kept as very valuable: Antwerp red; Golden Queen, yellow; Marlboro, red; White raspberry, yellow.

No success to speak of with Black Cap raspberries and Blackberries.

Strawberries.—We intend to grow, of the seven varieties tested, the Lovett, Red Alpine, Red Bush Alpine, Sharpless, White Alpine, White Bush Alpine. We have discarded only the William Belt because it is infested with leaf rust.

We plant our apple trees 25 feet apart in the rows and 30 feet between the rows. This is contrary to all instructions generally given by orchardists. The reason, however, that has made us resort to that system, is that, under our severe climate, the trees must be planted close together, in order to offer protection the one to the other against the heavy damp winds prevailing in our region. We have found that, though in Essex county, Ontario, apple trees planted 40 feet apart, 20 years ago, intermingle their branches, in our district our apple trees planted 20 years ago, 25 feet apart only, don't yet intermingle their branches. This shows that there is a great difference in the growth caused by the difference of climate and that the reasons which are invoked necessitating a distance of 40 feet between apple trees, viz.: that when planted closer they soon intermingle their branches, prevent the fruit from getting enough air and light and are an obstacle to the cultivation and spraying of the orchard, don't exist in Eastern Quebec.

J. C. CHAPAIS.

FUNGOUS DISEASES AND SPRAYING.

Fungous diseases did considerable injury to fruit in 1906. The Apple Spot was not nearly so bad, however, as usual, doubtless owing to the dry season. The Sooty Fungus of the apple, a disease which has been more or less troublesome during the past five years, was somewhat worse than usual in 1906. This disease was not before noticed by the writer east of Toronto, but this year it was seen on a specimen grown at Lachine Locks, Que. The Dry Rot on summer apples was worse than usual. It has been observed that this disease or injury to the fruit is more pronounced in dry seasons. In the pear districts, particularly in the Niagara Peninsula, the Pear Blight did great harm, ruining many trees. No practical preventive or remedy has yet been discovered for this disease except cutting out the diseased branches. Peaches and plums did not suffer much from rot in 1906 in Western Ontario. At Ottawa there was considerable injury to Americana plums from Ripe Rot, notwithstanding thorough spraying. The Shot-hole Fungus affected some of the varieties of Americana plums and although the trees were sprayed constantly and thoroughly with Bordeaux mixture it was impossible to control it.

Grapes did not suffer much from mildew and rot in Western Ontario, although in individual cases the Black Rot did considerable injury. Where well sprayed with Bordeaux mixture, little injury was experienced. At Ottawa there was practically no disease on the grapes.

Among vegetables, the Tomato Rot did probably more harm than any other disease except the potato blight. In the Ottawa district tomatoes were badly affected but at the Experimental Farm thorough spraying with Bordeaux mixture prevented the spread of this disease and little harm was done by it. The Potato Blight was present as usual, but owing to the extremely dry season there was little rot.

PEAR BLIGHT. FIRE BLIGHT (*Bacillus amylovorus*).

The Pear Blight was more than usually destructive in the pear districts of Ontario in 1906, whole orchards being practically destroyed and many trees so badly affected that they are much disfigured by the disease and it will take some time before they have regained a symmetrical shape. The Pear Blight is a bacterial disease and is one of the most difficult to control. The only sure way of controlling it is to remove every diseased tree or branch from the orchard, and if the trunk is affected to remove all diseased parts. It will be readily seen that unless the work is done in a very thorough and systematic manner it is practically impossible to cope with the disease. As a general rule trees which are growing rapidly are worse affected, the sappy wood being very susceptible to the disease; hence any system of culture that will cause a healthy but not strong growth is to be preferred. It is rather difficult to grow good pears in sod in the pear districts, otherwise the orchards might be let grow in grass, which would check the growth and render the tree more immune. A better plan might be to loosen the ground in the spring by harrowing or cultivating and then seed it down to some cover crop, as by this plan sufficient growth might be made to ensure good sized fruit and the growth of the tree would be checked by the exhaustion of moisture by the growing cover crop. This disease has been known to injure fruit trees for more than one hundred years and it is likely to continue to do so, hence some method of growing the trees should be adopted which will as far as possible lessen the injury in addition to the method just pointed out. By training pear trees so that the top will be made up of several large branches in what is known as the vase form the chances of serious injury is lessened as one branch may be affected and not the others and if the diseased branch is removed the tree may be saved. If, however, the tree is of pyramidal shape and infection takes place in the leader the disease may run down the main trunk and the tree be destroyed. In addition to having a tree with a vase shaped or branching top it is important to keep suckers or water sprouts removed as these may carry infection to the main trunk and the tree be destroyed. Fruit spurs should not be left near the junction of the branches with the main trunk as if these are affected the disease may get to the main trunk.

Some varieties of pears are less subject to blight than others, among these are Anjou, Kieffer, Seckel, Duchess, Winter Nelis, and Tyson, while the Bartlett and Clapp are two of those which are most subject to it. It may then be desirable to plant the varieties which are least subject to this disease. Another plan would be to top graft the more susceptible varieties on the more resistant kinds as the chances of the whole tree being destroyed would be considerably lessened. The Fire Blight which affects apple trees, is the same as this disease.

Spraying with Bordeaux mixture has no apparent effect upon it, but it is believed that the lime and sulphur wash forming a coating over the bark prevents to some extent the entrance of the blight germ.

The bacillus or germ of the Pear or Fire Blight finds its way into the tree at the tenderest and least protected points and it is believed by those who have made a careful study of it that practically all the infection is done by insects or birds and that the disease is not carried to any extent by wind. Insects carrying infection travel to the tips of succulent shoots and the germs find entrance through the buds at the axils of leaves, and at any point where the bark is broken. The chief sources of infection of bearing trees are through the flowers to which come insects bearing the germs.

The blight is usually first noticed in the spring on bearing trees when flowers and flower clusters which have been blighted wither and do not set fruit. Soon the fruit spurs are noticeably affected and also the new wood. The disease starting at the tip of the shoots usually runs down, although it will run in every direction, sometimes passing on to the main branches and to the trunk of the tree. The disease varies in the way it spreads. Sometimes only the flowers are affected or the fruit spurs or smaller twigs, or patches about a place on the branches or trunk that have some physiological injury. The germs are found in a gummy substance or exudation and this is carried by the insects from one flower or tree to another. These bacteria increase very rapidly by division and once the tree is infected the disease may soon spread over a large area. As has been stated, the best method known of controlling this blight is by cutting out the diseased parts. To do this thoroughly it is necessary to begin in the winter, going over the orchard several times to be sure that all the diseased wood has been observed. This should be followed up in spring and summer and everything showing a sign of the blight should be cut out not less than six inches below the affected part or into healthy wood. Where possible it is wise to cut as much as one foot below where there is evidence of the disease. It has been proved by experiment that infection is carried on the knife or saw, especially in summer, hence after each branch is cut the knife should be disinfected. The disinfectant recommended by Prof. M. B. Waite, who has given this disease very careful study and who is confident that it can be controlled by taking proper care in pruning and doing the work systematically and thoroughly, is 'A solution of corrosive sublimate in water, one part to one thousand. Tablets may be obtained from the drug store which are of convenient size for making the solution.' A sponge is carried with which to apply the disinfectant. Corrosive sublimate is a deadly poison, hence should be labelled 'Poison.' It should not be carried in a metal receptacle. The objection to a carbolic acid solution in water is that it must be made very strong to be effective.

A systematic effort is now being made in California to stamp out this disease which has recently gained a foothold there. The method adopted is to cut out affected branches and burn them. When the body of the tree is affected it is rooted out and burned.

Fruit growers in the pear districts of Canada should combine in an endeavour to control the blight. Individual efforts are of little avail if neighbouring orchards are neglected.

SOOTY OR FLY-SPECK FUNGUS.

(*Leptothyrium pomi.*)

This disease was much more troublesome than usual this year, and disfigured much fruit. It generally occurs in low-lying orchards, where the air is moister and is usually worst in damp seasons. This disease has been more or less troublesome in the New England States, it being particularly bad in 1896. In 1902 it caused considerable injury in Ontario, and in the annual report of the Central Experimental Farm for that year the writer gives a description of it and recommendations are made for its treatment. The disease is a low form of fungus, and is apparent as sooty or black, roundish patches on the apple, not unlike splashes of ink or soot. These patches often run together and affect a large area of the surface and make the fruit very unsightly. On these patches are frequently seen small black spots resembling fly specks, which are another form of the disease. As the Sooty Fungus grows over the surface of the skin, it is easily controlled if spraying is done at the right time. The disease develops in summer after the first three sprayings for the apple spot have been given, and it will require at least a fourth spraying to control this disease. An experiment was conducted at the New Hampshire experiment station a few years ago to control it on pears, the last spraying with Bordeaux mixture being given on July 26. Of the sprayed fruit 98·9 per cent was clean, and of the unsprayed only 1·3 per cent. Spraying the apples once when they are about the size of Transcendent crabs or larger should control this disease, and if apple trees are given a fourth spraying for the Apple Spot as is recommended, there should be no trouble with it. Unfortunately, the Sooty Fungus spreads in storage, and fruit that is little affected when it goes into storage may be considerably injured before the fruit is sold. Fruit affected with this disease is known as 'Clouded Fruit' in the trade. This disease is usually confined to the southwestern parts of Ontario, but this year the writer was shown an affected specimen from near Lachine Locks, Que.

The varieties usually most affected are the Greening and Northern Spy, but it also injures the Baldwin and other varieties.

BLACK ROT OF THE TOMATO.

This disease did much damage to tomatoes in the vicinity of Ottawa in 1906, a large percentage of the fruit being rendered useless in some plantations. When the disease begins to spread on the fruit, small roundish spots may be seen usually toward the blossom end. These rapidly increase in size and the tomato becomes discoloured and rotten at the parts affected. The spores are given off from dark mould-like masses on the surface of the fruit, and these being scattered re-infect the fruit. The disease also attacks the leaves. The Tomato Rot can be controlled by spraying with Bordeaux mixture, beginning in the hot-bed and keeping the plants covered until the fruit is nearly ripe.

ONION BLIGHT OR MILDEW.

(*Peronospora Schleideniana.*)

In the Ottawa district onions have suffered during the past few years from the attacks of the Onion Blight, which in some cases has caused serious loss to vegetable growers. As this disease can be prevented by thorough spraying with Bordeaux mixture, all vegetable growers should be aware of the fact. The Onion Blight is a parasitic fungus which spreads by means of spores in summer and is carried over winter by what are known as oospores. These oospores are formed within the leaves and when these are removed in the field or fall off they remain over winter there and re-infect the young plants in the spring or early summer. It will be readily seen that it is important where the disease is troublesome to remove all foliage from the field in the autumn and destroy it. Where possible, the onion should not be grown two years in succession in the same field, and if possible two years should elapse as these oospores retain life for two years. When the disease infects the onion plants by means of the oospores in early summer the mycelium grows through the plants, feeding on the juices, and the first outward indication of the disease is a violet discoloration of the foliage. In a short time the leaves turn yellowish and fall over and give the plant the appearance of being scalded. When the disease is quite apparent, but before the leaves dry up, the latter have a downy look on the surface in places. It is at these points that the spores are being given off from the tiny stalks which have protruded from the mycelium within the leaf. These spores spread rapidly and if conditions are favourable will germinate in half an hour and re-infect other leaves or plants. The spores are so numerous that it does not take long for a large area to become affected. It has been found that the disease spreads most rapidly in damp, warm, close weather, the spores germinating very rapidly under such conditions. In low-lying ground the air is moister than over elevated land and the disease is usually worst there.

Sometimes the disease will be checked before it has done much damage owing to a change in weather conditions, but it may break out again later on. Every leaf which is destroyed weakens the plant and lessens the size of the onions, hence it is very important to check it at the very start or use preventive measures.

Once the spore has germinated and the disease entered the leaf it is not possible to reach the mycelium by spraying, hence it is necessary to spray early enough to kill the spores before they germinate. Spraying should be begun towards the end of June and the plants kept covered with Bordeaux mixture until the end of the season. If the disease appears before spraying has been done, spray as soon as possible. As the leaves of the onion are smooth it is necessary to put the mixture on in as fine a spray as possible so that it will adhere well.

EXPERIMENTS IN DESTROYING APHIS WITH KEROSENE EMULSION MADE WITH FLOUR.

It having been discovered and demonstrated at the Central Experimental Farm that kerosene emulsion could be made with flour instead of soap for holding the kerosene in suspension, this form of emulsion was used successfully in a practical way in 1905 and 1906. As the emulsion made in this way is much easier to make than with soap it was desirable to learn what percentage of oil was necessary to kill the aphis, as soap in addition to its value in holding the kerosene in emulsion is an insecticide itself and without it more kerosene might be required. The following percentages of kerosene were, therefore, used on July 16, 1906, in spraying apple trees badly infested with aphis. Percentages used, approximately: 6 per cent, 7½ per cent, 9 per cent, 11 per cent.

The following notes were made:—

Kerosene Emulsion with—

6 per cent kerosene—Aphis not affected.
7½ per cent kerosene—Aphis not affected.
9 per cent kerosene—Not so effective as 11 per cent but most of the aphis destroyed.
11 per cent kerosene—Practically all aphis destroyed.

In the kerosene emulsion made with soap scarcely 7 per cent kerosene is recommended.

There was no injury to the foliage of the trees in any case. Apple trees in nursery were sprayed on July 12, with very good results, the insects being nearly all killed.

Plum trees were sprayed July 5 and July 13 with 11 per cent kerosene emulsion. Many aphis were killed without apparent injury to the trees.

The Norway Spruce hedges were found to be badly attacked with a species of aphis and on July 26, 27 and Aug. 1, there were about 400 gallons of kerosene emulsion (11 per cent kerosene) used in spraying the hedges with the result that the aphis were destroyed. It was necessary to saturate the trees with the emulsion, holding the nozzle close in so that the spray would envelop the branches as many of the aphis were hidden. The emulsion did not injure the spruce to any extent where the foliage had not been already weakened by the aphis.

Experiments with Different Methods of Preparing the Flour Emulsion.

Experiments had been conducted in the chemical laboratory in conjunction with Mr. Frank T. Shutt, Chemist, who discovered the value of flour in making kerosene emulsion, to determine the weight of flour necessary to hold in suspension certain quantities of kerosene. Experiments had also been tried in different methods of preparing the emulsion and the amount of churning necessary. This work being done with small quantities it remained to determine the best method when made by the barrel.

A dasher was made by nailing two cross-pieces to one end of a pole, the other end being used as a handle. A piece of sacking with a hole in the centre for the pole to go through held in place on the barrel by a hoop prevented the emulsion from splashing out of the barrel.

To make an emulsion having approximately 11 per cent of kerosene (or to be exact, 11⅑ per cent) it was necessary to have 4½ gallons oil to 36 gallons of water.

In making the emulsions the kerosene was put in the barrel first, the flour then poured in and usually mixed well with the kerosene by stirring for a short time with a stick. Twenty gallons of water were then added and then the whole mass churned violently with the dasher in an up and down motion for the required length of time. When the churning was done the rest of the water was added until the barrel was filled.

Following are the emulsions made, one barrel of each:—

July 11.—10 lbs. flour, 4½ gallons kerosene, 36 gallons water, churned for 6 minutes Practically no separation of oil after standing 14 hours.

July 11.—Ditto, churned for 5 minutes. Practically no separation after 14 hours.

July 11.—Ditto, churned 4 minutes. Practically no separation after 14 hours.

July 12.—5 lbs. flour, 4½ gallons kerosene, 36 gallons water, churned for 5 minutes. Only a very slight separation after 3 hours. Emulsion was used after stirring.

July 12.—10 lbs. flour, 4½ gallons kerosene, 36 gallons water. In this case the flour was added to the kerosene without stirring and then 20 gallons water added without stirring, then churned for five minutes and the rest of the water added. After standing for 17 hours there was practically no separation of oil.

July 12.—5 lbs. flour, 4½ gallons kerosene, 36 gallons water. In this case the flour was emptied into the coal oil, then 10 gallons of water added and churned for 4 minutes, after which the barrel was filled with water.

After standing 2 hours there was no separation of kerosene, but after standing over night more than half the oil had separated. The oil and part of the emulsion were then dipped out into another barrel, 5 lbs. of flour were added to it and then churned for 3 minutes, when the emulsion was found quite satisfactory.

From these experiments it was clearly demonstrated that a satisfactory emulsion containing approximately 11 per cent of kerosene could be made by using only 5 pounds of flour to the barrel, in other words only 5 lbs. of flour are necessary, when an emulsion is formed, to hold in suspension 4½ gallons of kerosene for two hours. A poor grade of flour answers the purpose well.

The cost of one barrel of emulsion would thus be:—

	Cents.
5 lbs. flour at $1.75 per 100 lbs.	9
4½ gallons kerosene at 16 cents	72
Total	81

When the emulsion is not to be used at once or within two hours, twice the quantity of flour should be used, with which quantity the oil will not separate in twelve hours and more.

Formula.

Formula recommended for kerosene emulsion made with flour for destroying aphis on apple and plum trees.

5 pounds flour (or 10 lbs. if emulsion is not used within 2 hours).

4½ gallons kerosene.

36 gallons water.

Pour the kerosene into the barrel, put in the flour and stir thoroughly, then pour in 20 gallons of water and churn violently for from 4 to 5 minutes, now add remainder of water and the emulsion is ready for use.

There were about 700 gallons of kerosene emulsion made with flour used at the Central Experimental Farm in 1906. The chief advantage of using flour is that the emulsion can be made easily and quickly.

VEGETABLES.

FARMERS' LIST OF BEST VEGETABLES.

The results of variety tests of vegetables for the past eighteen years are summarized in the following table, where a list is given of the varieties of each kind of vegetable which are considered the best to plant.

Asparagus.—Conover's Colossal is the best all round variety, but this is more subject to rust than Palmetto or Argenteuil.

Beans.—Keeney's Rustless Golden Wax or Wardwell's Kidney Wax, for early crop; Early Refugee for medium; and Refugee or 1,000 to 1, for late crop, are the most satisfactory dwarf varieties. Asparagus, Lazy Wife and Old Homestead are three of the best pole varieties.

Beets.—Egyptian Turnip, Meteor and Eclipse are three of the best.

Borecole or Kale.—Dwarf Green Curled Scotch is the best.

Broccoli.—White Cape.

Brussels Sprouts.—Improved Dwarf is the most satisfactory.

Cabbage.—Early Jersey Wakefield (early), Succession (medium), Late Flat Dutch, Houser, Drumhead Savoy (late), Red Dutch (red), is a select list of the best varieties of cabbage. For extra early use, Paris Market is desirable, being a week earlier than Early Jersey Wakefield.

Cauliflowers.—Early Dwarf Erfurt and Early Snowball.

Carrots.—Chantenay is one of the best, but if a good extra early sort is required the Early Scarlet Horn can be planted with advantage. It is a small variety.

Celery.—Golden Self-Blanching (Paris Golden Yellow), Improved White Plume (early), Perfection Heartwell, Triumph, Winter Queen, French's Success, London Red (late) are among the best.

Corn.—Early Fordhook, Early Cory (early), Crosby's Early, Golden Bantam, Henderson's Metropolitan (second early), Perry's Hybrid, Stabler's Early, Early Evergreen, and Black Mexican (medium), Stowell's Evergreen, Country Gentleman (late). In planting, the Country Gentleman should not be omitted, as it lengthens the season very considerably and is of fine quality.

Cucumbers.—Peerless White Spine or White Spine, Cool and Crisp, and Giant Pera are three of the most satisfactory slicing varieties. Boston Pickling is a good pickling sort.

Egg Plant.—New York Improved and Long Purple succeed best.

Lettuce.—Black Seeded Simpson, The Morse, (early curled); New York, Giant Crystal Head, Crisp as Ice, and Improved Hanson (curled cabbage); Improved Salamander, Tennis Ball (cabbage); Trianon and Paris (Cos lettuce).

Melons, Musk.—Long Island Beauty, Hackensack and Montreal Market, of the Nutmeg type; Surprise, Christiana and Emerald Gem, of the yellow fleshed types, are all good.

Melons, Water.—Cole's Early, Salzer's Earliest, Ice Cream, Phinney's Early are good early water melons.

Onions.—Yellow Globe Danvers and Large Red Wethersfield are two of the best onions in cultivation.

Parsnips.—Hollow Crown and Dobbie's Selected are both good sorts.

Parsley.—Doubled Curled is as good as any.

Peppers.—Cayenne, Chili and Cardinal, are three of the best.

Pease.—Gregory's Surprise, Thos. Laxton, Gradus, American Wonder, Premium Gem (early); McLean's Advancer, Nott's New Perfection, Heroine (medium). None of these are tall growing varieties. Stratagem, Juno (dwarf), Telephone (late). Excelsior (Sutton's) is a promising second early sort.

Potatoes.—Extra early: Rochester Rose, Early Ohio, Early Andes (pink), Bovee (pink and white), Burpee's Extra Early, Eureka Extra Early, (white); *early:* Early White Prize, Irish Cobbler (white), Vick's Extra Early (pink and white); *Main crop:* Carman No. 1 (white), Money Maker (white), Burnaby Mammoth (pink and white), Late Puritan (white), Dreer's Standard (white).

Radishes.—Early: Scarlet White-tipped Turnip, Rosy Gem, French Breakfast, Red Rocket (red); Icicle (white); *late:* White Strasburg, Long White Vienna; *winter:* Long Black Spanish, Chinese Rose-coloured.

Rhubarb.—Linnaeus, Victoria.

Salsify.—Long White, Sandwich Island.

Spinach.—Victoria, Thickleaved.

Squash.—*Early:* White Bush Scalloped, Summer Crook Neck; *late:* Hubbard.

Tomatoes.—*Early:* Sparks' Earliana, Chalk's Early Jewel, Dominion Day; *Main crop:* Brinton's Best, Trophy, Matchless (scarlet), Burpee's Climax, Autocrat, Livingston's Globe (purplish pink).

There are many varieties of tomatoes which are almost equal in excellence and productiveness.

Turnips.—Early; Extra Early Milan, Red Top Strap Leaf.

Swedes.—Champion Purple Top, Skirving's Improved.

POTATOES.

The year 1906 was one of the most unfavourable seasons for potatoes which has been experienced at the Central Experimental Farm. During the early part of the summer there was sufficient rain to keep the plants growing nicely, but just after the last cultivation was given, dry, hot weather set in and continued all summer, with the result that the plants were stunted, the foliage dried up prematurely and there was a poor crop of tubers. Moreover, during the month of July there was a veritable plague of aphis which attacked the foliage of the potatoes and doubtless did their share in lessening the crop.

The potatoes were planted in good sandy loam soil on May 22. This soil had been well manured for strawberries the previous year but these had been killed by the winter of 1905-6. The soil was well prepared by ploughing and harrowing twice with the disc and once with the smoothing harrow. The drills were made 30 inches apart with the double mould board plough, and about four inches deep. The sets, which had at least three good eyes, were dropped one foot apart in the drills. Sixty-six sets of each kind were planted and then covered with the hoe. The land was harrowed before the potatoes appeared above ground that weeds might be destroyed. Cultivation was then practised and continued as long as possible. Practically level cultivation was adopted as usual, a little soil only being drawn towards the plants. The vines were sprayed with Bordeaux mixture and Paris green four times.

The potatoes were dug on October 1, and while the yield and tubers were small there was practically no rot. This year, however, there was much less advantage than usual in using the Bordeaux mixture owing to the premature drying up of the foliage from drought.

There seems to be an increased interest in potatoes of late which may be partly due to the 'boom' in new varieties in England, and to the fact that blight is causing the farmers more anxiety than it used to do. The result of this increase has been the offering of more varieties for sale. It has been the aim at the Central Experimental Farm to test as many of the new kinds as possible and this year the number of varieties grown in uniform plots was 115, while 42 were grown on smaller plots. The names of the thirty varieties which have yielded best are all that are published this year.

Vegetable Experimental Grounds, Central Experimental Farm, Ottawa, Ont.

TWELVE MOST PRODUCTIVE VARIETIES OF POTATOES: AVERAGE OF FIVE YEARS, 1902-06.

Number.	Name of Variety.	Number of Years under Test.	Season.	Colour.	Quality.	Average Yield per Acre, 1902-1906. Bush.	Lbs.
1	Carman No. 1	12	Medium late	White	Good	387	38
2	Rural Blush	18	Late	Pink and reddish	"	377	5
3	Late Puritan	13	"	White	"	375	19
4	Pearce	7	Medium	Pink and white	"	364	19
5	Money Maker	12	"	White	"	362	7
6	Dreer's Standard	13	Late	"	"	357	17
*7	Burnaby Mammoth	14	Medium	Pink and white	"	350	41
8	Sabean's Elephant	12	Late	White	"	349	22
9	Canadian Beauty	9	Medium	Pink and white	"	348	55
10	I. X. L	14	"	"	"	346	43
11	Dooley	6	"	White	"	344	58
12	Holborn Abundance	18	Late	"	"	333	31

* This variety was first grown under the name of Burnaby Seedling, and then procured under the name of Burnaby Mammoth. The average yield given is from the new strain for three years, and the old one for two years.

The Dr. Maerker and Clay Rose would appear in this list if yield only were taken into consideration, but as these two varieties are inferior in quality they are not included.

POTATOES—TEST OF VARIETIES.

THIRTY MOST PRODUCTIVE VARIETIES IN UNIFORM PLOTS, 1906.

Number.	Name of Variety.	Season.	Quality.	Total Yield per Acre. Bush.	Lbs.	Yield per Acre, Marketable. Bush.	Lbs.	Yield per Acre, Unmarketable. Bush.	Lbs.	Colour.
1	Hard to Beat			224	24	158	24	66	..	Yellowish.
2	Wee MacGregor	Medium	Good	215	36	140	48	74	48	White.
3	Dalmeny Beauty	"	"	213	24	162	48	50	36	"
4	Burpee's Extra Early	Early	"	211	12	149	36	61	36	"
5	Early Bird	"		202	24	154	..	48	24	"
6	From L. A. Sovereign, Round Plains, Man			198	..	145	12	52	48	Pale pink.
7	John Bull			182	36	149	36	33	..	Pink with red eyes.
8	American Wonder, O.A.C	Medium	Good	180	24	145	12	35	12	White.
9	Star of the East			176	..	110	..	66	..	Pale pink.
10	Holborn Abundance	Late.	Medium	171	36	132	..	39	36	White.
11	Country Gentleman	Early	Good	165	..	125	24	39	36	Pink and white.
12	Merrill			160	36	90	12	70	24	White.
13	Crine's Lightning	Early	Good	158	24	112	12	46	12	Pink with red eyes.
14	Norcross	Medium	"	158	24	107	48	50	36	White.
15	Sir John Llewellyn			158	24	96	48	61	36	"
16	Early White Prize	Early	Good	156	12	114	24	41	48	"
17	White Mammoth			156	12	110	..	46	12	"
18	Charles Fidler	Medium	Good	154	..	112	12	41	48	"
19	Standard			154	..	101	12	52	48	"
20	Snowdrop			154	..	88	..	66	..	White & pale pink.
21	Snider Best Early	Early		154	..	63	48	90	12	Red.
22	Ashleaf Kidney	Medium	Good	151	48	114	24	37	24	White.
23	Dewey			151	48	103	24	48	24	"
24	Sharpe's Victor			151	48	96	48	55	..	"
25	Early Rose	Early	Good	149	36	114	24	35	12	Pink.
26	Dooley	Medium	"	149	36	103	24	46	12	White.
27	Rochester Rose	Early	"	149	36	99	..	50	36	Pink.
28	White Albino	Medium	"	147	24	101	12	46	12	White.
29	Early Hero			145	12	110	..	35	12	Red.
30	Pearce	Medium	Good	143	..	96	48	46	12	Pink and white.

SMALLER PLOTS OF POTATOES.

The following varieties of potatoes were grown in different sized plots, the number of sets planted varying from eight to thirty-three. A large proportion of these was sent in gratis for testing by the persons whose names appear after the varieties; others were bought in small quantities, as owing to their being novelties the price was high.

POTATOES; YIELDS FROM SMALLER PLOTS.

Number.	Name of Variety.	Number of Sets Planted.	Total Yield per Acre.		Yield per Acre, Marketable.		Yield per Acre, Unmarketable.		Colour.
			Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
1	The Factor	33	312	24	149	36	162	48	White.
2	King Edward, from Wm. Wilson, Port Arthur, Ont	16	290	24	149	36	140	48	"
3	Early Harvester, from Fred Foyston, Minesing, Ont.	16	281	36	193	36	88	..	"
4	Magyar King, from C. Scott, Melville Cross, Ont	33	277	12	140	48	136	24	"
5	Duchess of Cornwall, from the Family Herald, Montreal	33	259	36	162	48	96	48	"
6	Unknown, from B. G. Thoralson, Pine Valley, Man	8	246	24	140	48	105	36	"
7	Early Mortgage Lifter, from Arden, Man	33	242	..	158	24	83	36	"
8	From Geo. Boulet, Normandin, Que	16	237	36	220	..	17	36	
9	Wilson's First Choice	12	237	36	118	48	118	48	"
10	Early Astonisher	12	237	36	118	48	118	48	"
11	Shoat, from Malcolm Macleod, Big Intervale, N. S	33	228	48	132	..	96	48	Pink.
12	Seedling, from Wesley Barkley, Chesterville, Ont	8	211	12	88	..	123	12	"
13	Longfellow	12	211	12	145	12	66	..	White.
14	Seedling, from Heber Rawlings, Forest, Ont	33	206	48	66	..	140	48	Pink.
15	Unknown, from J. G. Webster, Hedley, B.C	33	198	..	88	..	110	..	White.
16	Soleil Levant, from S. Laclance, D'Artagnon, Que	33	176	..	48	24	127	36	Pink.
17	Blue Prolific, from J. P. Helm, Tignish, N.S	33	176	..	132	..	44	..	Blue.
18	Maple Leaf, from J. C. Walker, Holland, Man	33	176	..	74	48	101	12	White,
19	Hick's Jubilee, from John Hick, Belleville, Ont	33	176	..	70	24	105	36	"
20	Rust Proof	16	176	..	123	12	52	48	Pale pink.
21	Midlothian Early	16	158	24	114	24	44	..	White.
22	Sutton's Reliance, from A. Smith, Ladners, B.C	16	158	24	44	..	114	24	Pale pink.
23	Grafted Potato, from Chas. Filteau, St. Nicolas, Que	33	154	..	114	24	39	36	Pink, with red eyes.
24	Wortley, from G. F. Bonewell, North Augusta, Ont	33	149	36	66	..	83	36	Pink.
25	June	16	114	..	61	36	52	48	Pale pink.
26	Dalmeny Early	16	96	48	44	..	52	48	White.
27	Eldorado (Dobbie)	33	92	24	..	..	92	24	"
28	King Edward VII (Dobbie)	33	83	36	..	..	83	36	White, splashed with red.
29	Solanum Commersonii Violet	16	79	12	44	..	35	12	Purplish blue.
30	Sausisse, from G. M. Bonmarvel, Sintaluta, Sask	33	17	36	..	..	17	36	

Other varieties which came in too late to be compared with the above were: Seedling, from Jas. W. Stairs, Halifax, N.S.; Uruguay, from E. Chegrion, Manitoba; Eldorado, from Smith Bros., Beachville, Ont.; Immigrant, from W. J. Dickson, Springfield, N.S.; Sutton's Prolific, from R. Gammon, Lachine Locks, P.Q. The crop from these were saved and these varieties will be compared with others in 1907.

SPRAYING POTATOES TO PREVENT BLIGHT AND ROT.

In 1906 the potatoes were sprayed as usual with Bordeaux mixture and other fungicides to prevent and control the blight and rot. Owing to the extremely hot and dry weather which caused the foliage to scald and dry up, and to the presence of aphis in large numbers the foliage was so injured that Bordeaux mixture could have little effect, and as the results would be very misleading it has been thought best not to publish them. It may be worth repeating here, however, that for an average of four years previous to 1906 potatoes sprayed with Bordeaux mixture gave an average yield of 310 bushels 20 lbs. per acre, while those not sprayed with Bordeaux mixture only yielded at the rate of 217 bushels 49 lbs. per acre, a difference of 92 bushels 31 lbs. per acre. At 45c. per bushel this means an average increase in value for four years of $41.62. Enough in one year to buy a good spray pump and pay for the seed that would be used for the next crop.

POTATOES—TEST OF RESISTANCE TO BLIGHT AND ROT.

It has been known for a long time that Bordeaux mixture will control the blight and rot disease of the potato if spraying is thoroughly done, and the foliage kept covered with the mixture from about the middle of July to the end of the season. Unfortunately, it is difficult to get farmers to spray and as a result the loss from blight and rot is very great in some parts of Canada.

It is important, therefore, to know which varieties will withstand the blight best so that if farmers will not spray they will at least plant the varieties that will give them the best yields without spraying. For a number of years notes have been taken at the Central Experimental Farm of the varieties of potatoes which remained green longest, thus indicating their relative resistance to blight. A list of ten of the varieties found most resistant was published by the writer in Bulletin No. 49 on Potato Culture. As none of the varieties there mentioned are absolutely blight proof it seemed important to find out if their resistance to blight can be increased by selection and with this object in view thirty-two varieties were planted in 1905.

The tubers from the most productive hills of fourteen of the most blight resistant varieties for that year were kept separate, each hill being dug individually at first and then the tubers from these best hills were mixed and stored together. Of seven of these varieties enough seed was saved from the hills that were left to plant this year for comparison with the potatoes from selected hills. The results, which are striking, are given in the table below.

These potatoes were not sprayed with Bordeaux mixture or any other fungicide, but were sprayed with Paris green to preserve the foliage from the potato beetles.

In addition to the seven varieties tested for comparison with those from unselected seed twenty-four other sorts were tested, seven of which were from selected hills in 1905. The best hills of most of the varieties in this test were again kept separate this year.

It is interesting to note that the varieties which stayed green longest were not in all cases the best croppers.

The potatoes for this test were planted on May 23, and dug on October 10. They received thorough cultivation, but owing to the extremely dry summer the yields are much less than they otherwise would be.

Potatoes—Test of Resistance to Blight.

Name of Variety.	Total Yield per Acre.		Yield per Acre Marketable.		Yield per Acre Unmarketable	
	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.
Clay Rose (selected, 1905)	242	..	158	24	83	36
" (unselected, 1905)	189	12	92	24	96	48
Rural Blush (selected, 1905)	237	36	140	48	96	48
" (unselected, 1905)	176	..	96	48	79	12
Vermont Gold Coin (selected, 1905)	211	12	123	12	88	..
" " (unselected, 1905)	184	48	105	36	79	12
Morgan Seedling (selected, 1905)	211	12	123	12	88	..
" (unselected, 1905)	176	..	123	12	52	48
Carman No. 1 (selected, 1905)	193	36	105	36	88	..
" (unselected, 1905)	206	48	149	36	57	12
State of Maine (selected, 1905)	189	12	145	12	44	..
" (unselected, 1905)	149	36	88	..	61	36
Carman No. 3 (selected, 1905)	149	36	96	48	52	48
" (unselected, 1905)	149	36	105	36	44	..
Average yield selected (7 varieties)	204	55	127	36	77	19
" unselected (7 varieties),	176	..	108	45	67	15
Wee MacGregor	264	..	176	..	88	..
Manistee	259	36	193	36	66	..
Nott's Peachblow (selected, 1905)	255	12	140	48	114	24
Empress Queen	250	48	189	12	61	36
Holborn Abundance (selected, 1905)	250	48	162	48	88	..
Dalmeny Beauty	237	36	176	..	61	36
American Giant (selected, 1905)	202	24	158	24	44	..
Dr. Maerker (selected, 1905)	202	24	140	48	61	36
Swiss Snowflake	198	..	136	24	61	36
Rose No. 9 (selected, 1905)	193	36	123	12	70	24
Charles Fidler	167	12	140	48	26	24
Jubilee (selected, 1905)	158	24	114	24	44	..
Norcross	158	24	114	24	44	..
Dreer's Standard	158	24	105	36	52	48
June	140	48	88	..	52	48
Northern Star	127	36	88	..	39	36
Late Puritan	127	36	88	..	39	36
Uncle Sam	123	12	96	48	26	24
Woltman	123	12	52	48	70	24
Rust Proof	114	24	88	..	26	24
Hibernia	66	..	26	24	39	36
Peachblow	52	48	26	24	26	24
Sutton's Discovery (selected, 1905)	26	24	17	36	8	48
Money Maker	44	..	..	..	44	..

SCOTCH VERSUS ENGLISH SEED POTATOES.

When in England in 1905, the writer visited the trial grounds of Messrs. Sutton & Sons, Reading, England, and was struck with the difference in growth of potatoes grown from Scotch seed and from English seed of the same variety. Potatoes from English seed were beginning to ripen while those from Scotch seed were still quite green, and it was evident that the yields from Scotch seed would be much greater than those from English, which proved to be the case.

Messrs. Sutton & Sons were good enough to furnish the Central Experimental Farm with 3 lbs. each of ten varieties of potatoes of Scotch and English seed. Thirty-three sets were made from each lot and planted on May 22. These potatoes were then treated like the uniform test plots. The results are given below. Owing to the extremely dry season the potatoes were very small, only a small proportion being marketable.

Potatoes—Scotch versus English Seed.

Number.	Name of Varieties.	Total Yield per Acre.				Yield per Acre Marketable.				Yield per Acre Unmarketable.			
		Scotch.		English.		Scotch.		English.		Scotch		English.	
		Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.
1	Sutton's Windsor Castle	167	12	83	36	35	12	17	36	132	..	66	..
2	Sutton's Ideal	136	24	101	12	44	..	48	24	92	24	52	48
3	The Sutton Flourball	127	36	48	24	22	..	22	..	105	36	26	24
4	Sutton's Supreme	101	12	61	36	39	36	17	36	61	36	44	..
5	Sutton's Reliance	92	24	61	36	13	12	.....	.....	79	12	61	36
6	Sutton's Harbinger	88	..	52	48	30	48	22	..	57	12	30	48
7	Sutton's Epicure	61	36	92	24	13	12	22	..	48	24	70	24
8	Sutton's Discovery	35	12	44	..	.....	.....	.....	.....	35	12	44	..
9	Sutton's May Queen	22	..	96	48	.....	.....	39	36	22	..	57	12
10	Sutton's Ninetyfold	13	12	101	12	.....	.....	44	..	13	12	57	12
	Average	84	29	74	22	19	48	23	19	64	41	51	3

It will be seen that the varieties from Scotch seed averaged at the rate of 10 bushels per acre higher than those from English seed. This is not a large amount in itself, but considering that the average yield of the ten varieties was only at the rate of 84 bushels 29 lbs per acre, the increase is considerable. If the year had been an average one the difference would probably have been nearer forty bushels as the yield might easily be four times as great as in 1906.

The reason why potatoes from Scotch seed give better results than those from English seed is that in Scotland, and in Ireland also, the climate is more equable than it is in England during the growing season and the tubers are developed more slowly and are not so liable to be checked by dry hot weather. It has been shown that immature seed will give greater crops than mature seed, one reason probably being that immature seed keeps in better condition until planting time than that which is mature, which will sprout earlier. Thus the Scotch and Irish seed potatoes which are not so mature as the English produce better crops. At the Central Experimental Farm it was found that immature seed gave better results than mature seed of the same variety, both grown at the experimental farm, but one not planted the previous year until July and hence not maturing. Whether potatoes would eventually increase or decrease in yield by planting immature seed every year has not yet been proved.

TOMATOES.

TEST OF VARIETIES.

The number of varieties of tomatoes tested at the Central Experimental Farm has been gradually reduced each year and in 1906 there were 38 kinds under test compared with 93 five years ago. Those tested last year included the best of the older varieties and the novelties. The number tested seems large when one considers that in half a dozen varieties or less would be included all the very best, but it is often not possible for a farmer to get the very best and by his knowing a few others which are almost as good he can get them instead.

The best strains of the Sparks' Earliana and Bruce's Dominion Day for early, and the Chalk's Early Jewel for early and main crop are three of the best scarlet tomatoes to plant. Where an early pink or purplish pink variety is desired the June Pink, a novelty of 1906, gives promise of being one of the best.

Where larger tomatoes are desired for main crop the Matchless, Trophy, and Brinton's Best of the scarlet varieties, and Burpee's Climax, Autocrat, Acme, and Democrat of the purplish pink are among the best. The Livingston's Globe, a new variety is very promising. Of later kinds, Marvel and Stone are handsome scarlet sorts. The kind of tomatoes produced will depend very much on the selection made in previous years, hence poor strains of the above varieties might not be so good as good strains of some other sorts.

The greatest interest in tomatoes is centred in the early varieties and seedsmen vie with one another in claiming that theirs is the earliest tomato in existence. A large proportion of the varieties tested at the Central Experimental Farm are these early sorts as it is important for the growers to know which are the earliest and best, as they are the ones which are most profitable. When the Sparks' Earliana was introduced in 1900 it was tested at the experimental farm and reported as a promising new variety that year. It is now the leading early sort. The Chalk's Early Jewel is almost as early as the Sparks' Earliana, is of much better shape, and owing to its more vigorous habit of growth it stands the heat better and is much more productive than the Earliana. The Bruce's Dominion Day is a Canadian variety which compares very favourably with the Earliana in earliness. The variety as it is now sold is smoother than it used to be .

A new variety introduced in 1906 called the June Pink, is promising. While in the following table it is shown to only yield as much as Chalk's Early Jewel up to August 8, it had yielded a little more than that variety up to August 2.

Steele's Earliest of All, which had ripened less fruit up to August 8 than some other varieties not included in the table of earliest varieties for 1906, ripened more fruit up to July 25 than these varieties, which entitled it to a place among the earliest.

Marked results have been obtained during the past three seasons from seed saved from the earliest tomatoes ripened at the Central Experimental Farm. These strains have proved earlier every season than plants from seed obtained elsewhere. In 1906, for instance, five plants of the Chalk's Early Jewel (C.E.F. seed) ripened 11 lbs. of fruit up to August 8, and 5 lbs. up to August 2. The same number of plants from seed from the introducers only gave 4 lbs. 8 ozs. of ripe fruit up to August 8, and 1 lb. 8 ozs. up to August 2. This means that when the price was still high on August 2, our own strain produced at the rate of 2,722 lbs. 8 ozs. ripe fruit per acre and the introducers strain only 816 lbs. 12 ozs. per acre. In the case of the Sparks' Earliana, the C.E.F. strain gave 9 lbs. 8 ozs. ripe fruit up to August 10, and the introducer's strain gave 9 lbs. 13 ozs., a little more, but up to July 25, when the price of tomatoes was much higher, the C.E.F. strain had ripened 2 lbs. of fruit and the introducers best strain only 1 lb. 13 ozs., and the introducers ordinary strain 1 lb. Even 3 ozs. difference in the yield from five plants means a difference per acre of over 105 lbs., while a difference of 1 lb. means over 544 lbs. per acre.

Among the newer main crop varieties the Livingston's Globe is the most promising. This variety as tested here in 1906 was medium to above medium in size, thick, regular, smooth, firm, purplish pink, and one of the most attractive of that colour.

The season of 1906, while favourable to the early ripening of tomatoes was so dry that the crop was comparatively small. Throughout this district many tomatoes were affected with the rot disease. Very few tomatoes were injured by this disease at the experimental farm as the plants were well sprayed with Bordeaux mixture.

The seed was sown in the hotbed on April 2, the plants pricked out into strawberry boxes on April 26 and kept in a cold frame until June 4, when five plants of each were planted in the field, four feet apart each way. The soil was a light sandy loam. The soil was well cultivated until the plants covered the ground. The plants were not pruned or trained in any way in this test.

TOMATOES—TWELVE BEST YIELDING VARIETIES, 1906.

Name of Variety.	Date of First Ripe Fruit.		Yield of Ripe Fruit to Aug. 8, 1906, five plants.		Yield of Ripe Fruit per acre to Aug. 8, 1906.		Total Yield of Ripe Fruit per plant, 1906.		Total Yield of Ripe Fruit—All Pickings, 5 plants, 1906.		Remarks.
			Lbs.	Ozs.	Lbs.	Ozs.	Lbs.	Ozs.	Lbs.	Ozs.	
1 Freedom	July	24	7	8	4,083	12	13	3	66	..	Medium to below medium in size, firm, regular, smooth or slightly ribbed, scarlet.
2 Acme	"	30	3	8	1,905	12	13	1	65	4	Medium size, regular, smooth, purplish red. One of the most attractive of this colour.
3 Dreer's Earliest Cluster.	"	23	8	[illegible]	4,492	2	12	12	63	12	Medium to above medium in size, flattened, slightly wrinkled, irregular, scarlet. Not attractive.
4 Democrat	"	29	9	4	5,036	10	12	10	63	..	Above medium size, smooth, regular, purplish pink. One of the best.
5 Frogmore Selected	Aug.	4	2	8	1,361	4	12	4	61	4	Medium to below medium in size, roundish, smooth, regular, scarlet, attractive.
6 Bright and Early	July	20	5	12	3,130	14	12	2	60	12	Below medium to small, roundish, regular, smooth, scarlet. Attractive. Too small.
7 King Humbert	"	30	3	4	1,769	10	11	7	57	4	Small, oval or heart shaped, smooth, regular, scarlet.
8 Tenderloin	Aug.	4	2	..	1,089	..	11	2	55	12	Above medium to large, flattened, fairly smooth, some wrinkled. Not specially promising.
9 Matchless	"	5	2	4	1,225	2	10	14	54	8	Medium to above medium in size, regular, smooth, scarlet. One of the most attractive.
10 Chalk's Early Jewel (Robertson.)	July	28	6	4	3,403	2	10	13	54	..	Medium size, roundish, smooth, regular, scarlet, attractive.
10a Chalk's Early Jewel (C.E.F.)	"	24	11	..	5,989	8	10	13	54	..	" "
10b Chalk's Early Jewel (Burpee.)	"	24	4	8	2,450	4	9	14	49	8	" "
11 Trucker's Favorite	Aug.	1	2	8	1,361	4	9	11	48	8	Above medium to large, purplish pink, smooth, fairly regular firm, rather late.
12 Turner's Hybrid	July	30	7	4	3,947	10	9	9	47	12	Above medium size, flattened, purplish pink, fairly smooth and regular.

TOMATOES—SIX EARLIEST VARIETIES, 1906.

1 June Pink	July	24	11	0	5,989	8	6	14	29	4	Medium to above medium in size, rather irregular in shape, most smooth, but some wrinkled, purplish pink.
2 Chalk's Early Jewel (C.E.F.)	"	24	11	0	5,989	8	10	13	54	0	Medium size, roundish, smooth, regular, scarlet, attractive.
3 Dominion Day	"	20	9	12	5,308	14	6	14	34	8	Medium size, smooth, but rather uneven in shape, scarlet.
4 Spark's Earliana (J. & S. Improved Strain).	"	20	9	13	5,342	14	6	10	33	1	Medium to below medium in size, smooth, fairly regular, scarlet.
4a Spark's Earliana (C.E.F.)	"	19	9	8	5,172	12	5	0	25	0	Medium to below medium in size, smooth, fairly regular, scarlet.
4b Spark's Earliana (G. A. Robertson)	"	20	8	5	4,526	2	5	4	26	5	Medium to below medium in size, smooth, fairly regular, scarlet.
5 Maule's Earliest	"	20	7	12	4,219	14	6	8	32	8	Medium size, flattened, wrinkled, scarlet.
6 Steele's Earliest of All.	"	22	5	4	2,858	10	5	14	29	4	Medium size, flattened, wrinkled, scarlet.

TOMATOES—EXPERIMENTS IN PRUNING.

The experiment with a certain method of pruning tomatoes begun in 1904 was continued again in 1906. The plan adopted is the following: As soon as the plants in the hot-bed have six strong leaves the tops are nipped off and the plants given more room, being placed 5½ inches apart. The object of pinching off the tops is to cause new shoots to develop at the axils of the leaves in order to have six branches bearing tomatoes instead of having only the one cluster usually found at the top of the plants, thus getting a larger crop early in the season. In one part of the experiment no other pruning is done than merely the nipping off the top as described. For comparison, all laterals except the six first ones which develop from the axils of the six leaves are removed as they appear, necessitating going over the plants twice. In 1906 the seed was sown on March 13, the young plants pricked out on April 5 and transplanted again into strawberry boxes on April 27. The plants were set out in the open field on June 5, the tops having been nipped back previously as described. When set out, the plants had six laterals all showing flower clusters. On July 7 and 21 what other laterals had developed were pinched out of 20 of the plants. Twenty plants had merely their tops pinched off at six leaves in the hot bed and no further pruning in the field, and twenty plants were left unpruned. Two varieties were used, viz.: Sparks' Earliana and Chalk's Early Jewel, the latter having been used for only two years. In the following table most of the figures given are average results for three or two years.

Name of Variety.	Date of First Ripe Fruit 1906.	Average Date of First Ripe Fruit 1904-6.	Ripe Fruit First Three Pickings, Average 1904-6.		Estimated Yield per Acre, Ripe Fruit First Three Pickings, Average 1904-6.		Yield of Ripe Fruit Fourth Picking Aug. 8th, 1906.		Total Yield of Ripe Fruit 1906.		Total Yield of Ripe Fruit Average 1904-6.		Estimated Total Yield per Acre Ripe Fruit 1904-6.	
			Lbs.	oz.	Lbs.	oz.	Lbs.	oz.	Lbs.	oz.	Lbs.	oz.	Tons.	lbs.
Sparks' Earliana:														
Unpruned....	July 19...	July 22...	11	7	1556	15	18	..	230	13	165	11	11	554
Top pinched off at six leaves.......	July 28...	Aug. 1...	13	3	1795	2	90	8	388	4	245	15	16	1478
Top pinched off at six leaves and all laterals except first six removed in field........	July 28...	Aug. 1...	24	13	3377	10	77	..	282	..	183	2	12	928
Chalk's Early Jewel:		1905-6.	1905-6.		1905-6.						1905-6.		1905-6.	
Unpruned....	July 19...	July 18...	9	2	1242	2	13	8	226	8	233	9	15	1794
Top pinched off at six leaves.......	Aug. 1...	July 31...	..	12	102	1	41	8	318	12	287	6	19	1119
Top pinched off at six leaves and all laterals except first six removed in field........	Aug. 3...	Aug. 1...	1	6	187	3	42	..	255	4	214	8	14	1199

It will be noticed in the above table that the early fruit from the pruned plants in comparison with the unpruned is greater in the case of the Sparks' Earliana than the Chalk's Early Jewel. In fact the unpruned plants average considerably more than from the pruned. Note, however, the marked increase in yield from the pruned plants at the fourth picking which was August 8, 1906, still an early date with the prices good. In the case of the Spark's Earliana there were only 18 lbs. from the unpruned and 90 lbs. 8 ozs. and 77 lbs. from the pruned. The proportion in the case of the Chalk's Early Jewel is almost as great. In conclusion, it may be stated that by this method of pruning the first ripe fruit is several days later than the few scattered specimens from the unpruned. The crop of fruit which is produced in the early part of the season is much greater than that from the unpruned. An important point to remember is to have the plants well advanced when they are put out, for it can easily be seen that if the plants are started early enough there is no reason why the six stems bearing the flower clusters should not produce six times as much fruit at the first picking as from the single cluster on ordinary plants. At Ottawa the plants have not yet been quite far enough advanced when planted out to be equal in earliness with those not pruned. It will be necessary to start them still earlier.

THE FOREST BELTS.

The trees in the Forest Belts at the Central Experimental Farm continue to make satisfactory growth on the whole, and every additional year's growth of the trees adds to the value of the experiment begun in 1887 of planting these forest trees. The objects for which the belts were planted have been dealt with in recent reports and need not be repeated here.

During the summer of 1906 the lower branches which were dead were sawn off the evergreens in the belts in order to clear the trunks and to make the danger of destruction from fire less. Measurements were taken of average trees in the belts as usual. In the annual report for 1904 a table showing the height and diameter of some of the species up to that time was given. Following will be found a table showing the height and diameter in the autumn of 1906:—

GROWTH of Trees in the Forest Belts at the Central Experimental Farm.

Name of Species.	Character of Soil.	When Planted.	Distance apart.	Age or Height when Planted.	Average Height, 1902.		Average Height, 1903.		Average Height, 1904.		Average Height, 1905.		Average Height, 1906.		Average Diameter 4 ft. 6 in. from ground, 1906.
			Feet.	Years.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	in.
Black Walnut—Juglans nigra	Low sandy loam	1888	5× 5	1	12	9	13	..	13	6	13	8	14	..	2¼
" "	"	1888	10×10	1	8	5	8	11	9	3	9	10	10	4	2
" "	Sandy loam with small stones	1889	5× 5	2	18	8	19	6	20	1	20	6	20	11	3½
" "	" "	1889	10×10	2	14	2	14	7	15	2	15	4	15	7	3¼
" "	Clay loam	1888	10× 5	1	16	2	16	10	17	8	19	7	20	10	3⅜
Butternut—Juglans cinerea	Low sandy loam	1889	5× 5	1	12	..	12	..	12	2	12	4	12	4	2
" "	"	1888	10×10	1	10	6	10	8	10	10	11	1	11	2	2
Silver-leaved Maple—Acer dasycarpum	Light sandy loam	1889	5× 5	3	28	5	28	7	28	10	29	4	29	9	3
" "	"	1889	10×10	3	25	8	25	5	25	8	25	11	26	2	4½
European White Birch—Betula alba	"	1889	5× 5	3	Dead.		..	..	..	..	..	..	..	..	..
" "	"	1889	10×10	3	39	5	Dead.		..	..	..	..	..	..	..
Canoe Birch—Betula papyrifera	"	1889	5× 5	3	33	1	33	5	34	3	35	..	35	4	4⅛
" "	"	1889	10×10	3	34	1	34	9	35	1	36	9	37	8	5⅞
Yellow Birch—Betula lutea	"	1889	5× 5	3	23	9	24	1	24	2	24	6	25	7	3
" "	"	1889	10×10	3	24	3	24	9	25	6	27	..	28	2	4½
White Elm—Ulmus americana	Sandy loam	1889	5× 5	3	18	11	19	9	20	2	20	8	21	6	2⅔
" "	"	1889	10×10	3	20	9	21	4	22	4	24	2	25	..	4½
Black Ash—Fraxinus sambucifolia	Black muck	1889	5× 5	2	19	4	19	9	20	5	21	9	23	8	2⅝
" "	Low sandy loam	1889	10×10	2	N'rly dead		..	..	..	..	..	..	..	..	..
Green Ash—Fraxinus viridis	Black muck	1889	5× 5	3	24	..	25	1	26	10	27	9	28	11	3½
" "	Low sandy loam	1889	10×10	3	19	8	21	..	21	6	21	8	22	5	4
Red Ash—Fraxinus pubescens	Black muck	1889	5× 5	2	26	..	26	11	28	8	30	1	31	10	3⅔
" "	Light sandy loam	1889	10×10	2	20	3	21	4	22	11	23	10	24	10	3⅔
White Ash—Fraxinus americana	Black muck	1889	5× 5	3	25	7	26	1	26	7	28	2	29	3	2¾
" "	Light sandy loam	1889	10×10	3	26	9	27	7	28	..	29	7	30	7	4
Black Cherry—Prunus serotina	Light sandy loam and gravel	1889	5× 5	3	21	2	22	1	23	2	24	..	24	9	3
" "	" "	1889	10×10	3	29	..	30	3	32	1	33	4	35	2	5
Box Elder—Acer Negundo	Light sandy loam	1889	5× 5	2	25	8	26	1	26	6	26	6	26	8	3¼
				in.											
Scotch Pine—Pinus sylvestris	Sandy loam with gravel	1888	5× 5	18	26	9	28	..	28	3	28	10	29	11	4¼
" "	" "	1888	10×10	18	22	9	24	2	24	4	24	11	25	9	5½
" "	Low sandy loam with gravel	1888	5× 5	18	25	8	26	10	27	9	28	4	29	5	3½
" "	Low sandy loam	1888	10×10	18	24	3	25	5	26	6	27	4	28	3	5⅔
" "	Light sandy loam	1888	10× 5	18	27	2	28	7	29	4	30	11	32	2	8⅝
" "	Clay loam	1888	10× 5	18	22	10	23	7	24	8	25	8	26	7	6⅜
" "	Light sandy loam and gravel	1888	10× 5	18	25	7	26	11	27	9	30	11	32	2	8⅝
" "	" "	1887	3× 3	9	27	..	28	4	29	4	28	7	29	5	7

Austrian Pine—Pinus austriaca	*Light sandy loam*	*1889*	*5× 5*	*18*	21	9	23	4	24	10	26	1	27	6	5
" "	"	*1889*	*10×10*	*18*	20	10	22	4	23	6	24	8	26	1	$6\frac{3}{4}$
" "	"	*1888*	*10× 5*	*15*	21	1	22	2	23	3	24	3	25	10	$6\frac{1}{8}$
" "	Clay loam	1888	10× 5	15	20	10	22	4	23	7	23	11	25	3	6
" "	Light sandy loam and gravel	1888	10× 5	15	23	1	24	5	25	7	26	9	28	2	$6\frac{1}{2}$
" "	" "	1887	3× 3	15	20	11	22	5	23	7	25	1	26	5	$3\frac{3}{4}$
White Spruce—Picea alba	Light sandy loam	1889	5× 5	15	15	1	15	7	16	5	16	9	17	4	$2\frac{5}{8}$
" "	"	1889	10×10	15	15	6	16	6	17	8	18	5	19	4	4
Norway Spruce—Picea excelsa	"	1889	5× 5	18	18	7	19	1	20	1	21	5	23	1	$3\frac{1}{4}$
" "	"	1889	10×10	18	23	3	24	9	25	5	26	4	27	11	5
" "	"	1888	10× 5	15	27	4	29	3	30	4	31	8	33	..	$5\frac{2}{3}$
" "	Clay loam	1888	10× 5	15	27	7	29	11	30	11	33	3	35	8	$6\frac{3}{4}$
American Arbor-vitæ—Thuya occidentalis	Low sandy loam and black muck	1889	5× 5	18	17	2	18	2	18	11	20	..	20	7	$3\frac{1}{2}$
" "	Low sandy loam	1889	10×10	18	15	6	16	1	17	3	18	3	19	1	$3\frac{1}{3}$
				feet.											
European Larch—Larix europæa	"	1888	5× 5	2	23	11	30	4	31	10	33	5	33	11	$4\frac{1}{8}$
" "	"	1888	10×10	2	28	9	29	7	31	2	32	4	33	..	$5\frac{1}{2}$
White Pine—Pinus Strobus	Light sandy loam with gravel	1889	5× 5	8 to 10 in.	26	1	26	10	28	11	30	1	31	8	$4\frac{1}{2}$
" "	" "	1889	10×10	8 to 10 in.	24	5	26	..	27	9	29	1	30	9	$6\frac{5}{8}$

NOTE:—The low sandy soil in which the Black Walnut and Butternut are growing appears quite unsuitable and the trees are almost at a standstill. The light sandy soil in which some of the White Spruce are is not very suitable nor is the sandy loam where the White Elm are growing. These trees have all made much better growth in other soils.

At Ottawa the experience has been with trees 10 x 10 feet apart, 10 x 5 feet apart, 5 x 5 feet apart, 3 x 3 feet apart, and 2½ feet apart. In some cases the trees are in clumps of single species, and in others they are mixed. Ten by ten feet has been found much too far apart to plant trees where cultivation is given as it would be under almost any circumstances. In some parts of the belt it was necessary to cultivate the ground between the trees for ten years before the trees interlaced sufficiently to shade the ground well. At 10 x 5 feet cultivation was necessary in some soils between thin foliaged trees such as ash and walnut for eight years after planting. In mixed plantations with trees 5 x 5 feet apart cultivation was necessary for from four to five years. It is evident that this distance is too great for a farmer to plant trees with the idea of cultivating them, as few farmers would cultivate a plantation that long. This distance is also too great from the standpoint of timber production.

In 1889 nearly 5,000 trees and shrubs were planted out in rows 2½ feet apart each way, mixed so that a large proportion of them were shrubs planted merely for the purpose of saving cultivation. The shrubs used for this purpose were Ninebark or Spiraea (*Neillia opulifolia*), Alder Buckthorn (*Rhamnus Frangula*), Rosemary Willow (*Salix rosmarinifolia*), and the Sand Cherry (*Prunus pumila*). The trees planted in this way have done well. The ground was cultivated for only two seasons. It has been found, however, that this distance is a little too close, as it was necessary to lop off some of the branches of the shrubs to prevent the trees being smothered, the shade being very dense. It is apparent from our experiments that trees planted about 3 feet apart each way, 3 x 4 feet apart, or 4 x 4 feet apart, depending on the kinds of trees and how they are mixed, would be the most satisfactory distance for the farmer from the standpoint of economy in cultivation and getting the ground shaded.

In order to gain information from our own experience regarding the relative ability of the slower growing trees to live and thrive under the shade of faster growing species, the following notes were made in the mixed forest belt in the autumn of 1904 and confirmed recently. The following notes were taken in a belt of mixed trees planted in the autumn of 1894, so that just ten years had elapsed since the time of planting. The trees consisted mainly of Austrian pine, Scotch pine, white pine, Douglas fir, Norway spruce, Rocky Mountain blue spruce, American arbor-vitæ, tamarac, box elder, American elm, green ash, red ash, white ash, rock elm, and canoe birch. The soil where these trees were growing was mostly black muck.

Austrian Pine.—Does not stand shade well. In some instances has been killed outright.

Scotch Pine.—Suffers badly in shade. In some instances has been killed outright. Where not killed, leader is destroyed and tree is very weak.

White Pine.—Stands shade a little better than Scotch pine, retaining its leader when the Scotch does not.

Douglas Fir.—Is much weakened by shade, but retains leader.

Norway Spruce.—Stands shade better than any of the pines.

Rocky Mountain Blue Spruce.—Stands shade about as well as Norway spruce, but does not stand as much chance of development as the Norway as it grows so slowly.

American Arbor-Vitæ.—Stands shade well, but makes little growth in it.

Tamarac.—Tamarac which was transplanted from swamp in 1894 has pushed up rapidly and is holding its own, but as foliage is comparatively thin it does not injure other trees. This tree has done better in the moist, gravelly soil than in the black muck, and in the gravelly soil is as tall as the American elm.

American Elm.—Has reached the greatest height and is towering above most other trees. It has made a good straight trunk. This and the box elder should do well together. The dense shade of the box elder should force an upward growth of the elm, and the elm be able to hold its own on account of its rapid growth.

Red and White Ash and Box Elder.—Are almost as tall as the American elm and are all holding their own. The dense shade of the box elder is what has done most to injure the pines.

Black Ash.—Is little more than half the height of the white.

In addition to the foregoing, the following notes were taken in a mixed belt of trees planted in the spring of 1888, the trees having had seventeen years' growth. The soil in this belt was gravelly and well drained. The trees were planted 5 x 10 feet apart:—

European White Birch.—Are the tallest trees.

Green ash, box elder, and Scotch pine are about equal in height. American pine is from four to five feet shorter.

Norway spruce, where it has had a chance is considerably taller than Scotch pine, and European larch is about the same height as Norway spruce.

There were no American elms for comparison in this part of the belt.

In another part of the belt where the trees were planted 5 x 5 feet apart in the spring of 1893, the soil being sandy loam, well drained, with more or less limestone rock in it, the following notes were taken:—

Austrian Pine.—Have nearly all been killed by the shade.

Scotch Pine.—Where much shaded are very weak or dead.

White Pine.—Has stood shade better in this belt than Scotch pine, but have not grown as fast where not influenced by shade.

Norway Spruce.—In this soil on account of its rapid growth has outstripped most heavy foliaged trees and is among the leading ones.

The American Elm.—Is not among the leading trees here and is barely holding its own, and in some cases has been nearly or quite killed. The soil is evidently not moist enough.

Red Ash.—In this soil has not made rapid growth and many trees are dead.

White Ash.—Is one of the leading trees.

European White Birch.—Is the tallest tree, but they are now beginning to die. By 1906 most of the white birch were dead.

White Oaks.—Have been killed by shade, but they appear to stand it very well as trees are alive which are much shaded, although they are making little growth.

The black walnut trees have shot up tall and straight and are among the leading trees, but many were overshadowed before they got ahead and have been killed or are barely alive.

Red Oak.—Has shot up well and is one of the leading trees.

Rock Elm.—Has done well.

Norway Maple.—Has shot up well and is one of the leading trees.

Hard Maple.—Though slender is shooting up.

Red Maple.—Side by side with Norway Maple is affected about the same by shade and is about equal in height. Norway is, if anything, slightly leading and is the more vigorous tree.

White Spruce.—Though standing shade well, got behind in the race and is not a leading tree.

American Mountain Ash.—Stands shade well.

After nineteen years' experience with many species of trees planted at different distances apart, both in plantations of single species and where mixed, some conclusions have been drawn as to the best trees for the farmer to plant where the conditions are somewhat like those at Ottawa.

In our judgment, the average farmer of to-day should plant the trees which will be most likely to look after themselves the soonest, but which will not destroy one another until those which have to be removed first are large enough to supply a fair amount of fuel. At the same time and keeping this in view, he should choose as far as possible those trees which will give him the best fuel and the best wood for other purposes.

The simplest method of planting would be to use white pine, Scotch pine, and Norway spruce, either in blocks by themselves or mixed together. These three trees all grow rapidly, shade the ground quickly, will not destroy one another for a long time and are all useful for timber. Although making considerable fuel in a short time, they are relatively poor for this purpose, hence some other kinds should be grown with them.

In our experience the canoe birch, European white birch, American elm, and European larch make a large amount of wood during the first twenty years, and are among the most useful for fuel at this stage. They shoot up very rapidly and getting a fair supply of light make a good trunk development. Being thin-foliaged, these trees do not destroy other kinds that have not grown so rapidly. The European white birch begins to fail and dies at Ottawa at from sixteen to twenty years of age, hence will be removed naturally if not needed for fuel. Individual specimens of Black locust which have done well have probably made as much wood as birch or elm, but they are so subject to borers and sucker so badly that from our experience we should not recommend them for the farmer's plantation.

Basswood is a rapid grower, but was not planted in such a way that we can judge of its usefulness in the farm wood lot.

The trees just mentioned as giving a large amount of fuel early in the history of the forest plantation may be mixed with the white pine, Norway spruce, and Scotch pine, the latter with their denser foliage shading the ground well and killing the side branches of the trees planted for fuel.

To the species already described it is now necessary to add others which will supply good fuel later on and will furnish wood for other purposes.

For fuel we should suggest the hard maple and red oak. The former does not grow as rapidly as any of the trees already mentioned and for the first twenty years will have to endure considerable shade, which it is capable of doing. The red oak has grown rapidly at Ottawa and has held its own with all the species mentioned. While the wood is not considered very valuable for working, it stands fairly high in fuel value.

To the foregoing trees must now be added other species, the wood of which is both high in fuel value and otherwise generally useful for many purposes. The white ash is a rapid growing tree and is very valuable for fuel and for many other purposes and is especially useful to the farmer, as parts of many tools, implements, &c., are made from it. Twenty years after planting it will be large enough to use in various ways, and as it grows older is increasingly valuable.

A few trees of white or bur oak should be in the farmer's plantation, these trees endure shade fairly well and if the planting is planned so that they will get a chance to develop after a few years they will eventually be among the most valuable trees in the plantation.

Black walnut is a good tree where there is thick planting as it shoots up rapidly and as it is a light-needing tree, the side branches which do not get it will die, thus ensuring a clean trunk. Only a few trees are necessary in the plantation as it will be a long time before they will be very useful.

By judiciously mixing the trees which have been mentioned the farmer may have a supply of fuel and wood for lumber and other purposes with little labour in the production of it.

In planting trees we should, from our experience, plant those which are to remain a long time, such as the pines, hard maple, oak, and walnut, at least ten feet apart with others between them.

In the Prairie Provinces the box elder or Manitoba maple is used largely in tree plantations. Our experience has been that being a very rapid grower during the first twenty years and making a very dense top, it is too destructive to other species unless kept down with much labour. Mixed with birch, ash, and American elm which could hold their own it would be useful in shading the ground and killing side branches.

ARBORETUM AND BOTANIC GARDEN.

The winter of 1905-6, owing to the lack of snow was a hard one on trees, shrubs and herbaceous plants and more of these were killed outright than usual. Of trees, 376 species and varieties comprising 403 specimens were killed, and of herbaceous perennials 264 species and varieties. In the spring of 1906, 122 species and varieties of trees and shrubs were added, and 120 of herbaceous perennials. The total number of species and varieties of trees and shrubs alive in the autumn of 1906 were 3,133 represented by 5,701 specimens. There were 1,906 species and varieties of herbaceous perennials alive.

Notwithstanding the winter and the drought during the summer, the Arboretum looked well in 1906.

During the past ten years a number of useful lists have been published of trees, shrubs and herbaceous plants growing in the Botanic Garden.

In 1897 lists were published of *One Hundred of the Most Ornamental Hardy Trees and Shrubs,* and also *One Hundred of the Best Herbaceous Perennials.* In 1898 an *Additional List of Good Perennials was given.* In 1899 a list was published of *Some Good Low Growing Flowering Shrubs,* and also an *Additional List of Good Perennials.* In 1900 there was given a list of the *Best Hardy Woody and Annual Climbers.* In 1901, *A List of the Best Lilacs.* In 1902, *A List of Best Spring Flowering Perennials.* In 1903, *A List of Deciduous Trees, Shrubs and Climbers with Attractive Foliage, Bark and Fruit.* In 1904, *A List of the Genera of Trees and Shrubs in the Arboretum with the Number of Species of Each.* And in 1899 there was published *A Catalogue of the Trees and Shrubs* which had been tested up to that date, with notes regarding hardiness. To these lists is now added *A List of Thirty of the Best Hardy Flowering Shrubs,* most of which have appeared in former lists.

LIST OF BEST THIRTY HARDY ORNAMENTAL FLOWERING SHRUBS.

In selecting a list of thirty of the best hardy ornamental flowering shrubs from the large number which have been tested, several points have been taken into consideration, such as the time of blooming, length of blooming season and the kind of fruit, in addition to the mere attractiveness of the flowers themselves. It was also desirable to not have in the list any species which required winter protection in order to ensure bloom practically every year. In this list are a few shrubby trees. Climbing shrubs are not included.

Berberis Thunbergii.—Thunberg's barberry (Japan). Height, 2 to 4 feet. The best barberry for ornamental purposes. It is a dwarf, compact shrub, with bright, green leaves in summer, changing in autumn to deep red. The flowers while not very striking are attractive. The scarlet fruit is borne very profusely and makes this barberry quite ornamental throughout the winter.

Berberis vulgaris purpurea.—Purple-leaved barberry (Europe). Height, 4 to 6 feet. In bloom, fourth week of May. The yellowish flowers in pendulous clusters make a fine contrast with the leaves which are bright purple, when young, becoming duller later in the autumn.

Caragana arborescens.—Siberian pea-tree (Siberia). Height, 10 to 15 feet. In bloom, third week of May. Flowers, bright yellow and pea shaped. The delicate green leaves of this shrub open very early and are quite attractive throughout the summer. This is one of the hardiest shrubs grown.

Caragana grandiflora.—Large flowered Caragana. (Caucasus.) Height, 4 feet. In bloom third week of May. Flowers large, bright yellow, pea-shaped. Very pretty when in full bloom. This somewhat resembles *C. frutescens,* but has larger flowers. The bush is somewhat pendulous which makes it rather graceful.

Daphne Cneorum.—Garland flower. (Eastern Europe.) Height, 1 to 1½ feet. In bloom second week of May. Flowers bright pink, and sweet scented. A very pretty little evergreen, quite suitable for flower borders. It blooms a second time in autumn.

Diervilla rosea.—Pink-flowered Weigelia, (China). Height 4 to 5 feet. Begins to bloom during the first week of June. Flowers pink. The Weigelias are very well known and are much admired. There are a number of fine varieties, but most of them are too tender and the species is almost too tender to appear in this list, but as a rule it blooms well although somewhat injured by winter. The two hardiest varieties are Eva Rathke, with dark attractive flowers of claret colour, and Sieboldii variegata, with pink and white flowers and leaves handsomely variegated with white and pale green.

Genista tinctoria.—Dyer's Greenweed. (Europe.) Height, 1 to 2 feet. Begins to bloom in fourth week of June. Flowers bright yellow, pea-shaped. A very pretty little shrub, continuing in bloom for some time. There is a double-flowered variety which is also good.

Hydrangea paniculata grandiflora.—Large flowered hydrangea (Japan). Height, 6 to 10 feet. Blooms remain attractive from August until October. Flowers white gradually becoming pink and borne in very large panicles. This is one of the finest hardy shrubs. To get best results the bushes should be pruned back severely every spring and given an abundant supply of water during the growing season.

Hypericum kalmianum.—Kalm's St. John's Wort. (Ontario.) Height, 2 to 4 fee.t Begins to bloom second week of July. Flowers large, bright yellow. A very ornamental shrub, continuing in flower until late in the summer.

Lespedeza bicolor.—(North China and Japan). Height, 4 to 6 feet. This shrub is useful on account of its late blooming. It flowers from late August until it is injured by frost. The flowers are produced in panicles, are pea-shaped and reddish-purple in colour. It is not as graceful a shrub as *Lespedeza Sieboldii,* but is well worth planting. The shrub is usually injured some by winter, but it always blooms profusely.

Lespedeza Sieboldii. (Desmodium penduliflorum). Japan. Height 4 feet. Blooms in September. Although this shrub is killed to the ground every winter, there is usually a profusion of bright purplish-red, pea-shaped blossoms, which are borne in large panicles. This is a very fine autumn flowering shrub.

Lonicera tatarica.—Tartarican honeysuckle, bush honeysuckle (Siberia, Tartary). Height 5 to 10 feet. In bloom third week in May. Flowers bright pink. This is an old favourite and one of the hardiest shrubs grown. There are many varieties of this fine shrub and a large number of hybrids. These vary in colour of flowers from white to rose. Some of them have yellow coloured fruit. Among the best are:— *L. tatarica pulcherrima* with rosy petals, having pink margins; *L. tatarica gracilis,* flowers rosy in bud, pink and rose when open; *L. tatarica speciosa,* flowers large, pink and rose; *L. tatarica splendens,* flowers pink in bud, pink and white when open; *L. tatarica grandiflora rubra,* flowers rosy in bud, rosy with pink margin when open; *L. tatarica elegans,* flowers pure white; *L. tatarica alba grandiflora,* flowers white.

Philadelphus coronarius.—Mock orange or Syringa (South Europe). Height, 5 to 10 feet. In bloom second week of June. Flowers, white, with a strong, sweet odour. A well known, popular shrub. There are several varieties, two of the most ornamental being the golden leaved and double flowered forms.

Philadelphus grandiflorus speciosissimus.—This is a great improvement on *Philadelphus grandiflorus,* with larger, whiter, and more abundant flowers. It blooms in the third week of June. It is a smaller shrub than *P. grandiflorus.*

Pyrus baccata.—Siberian crab (Siberia). Height, 15 to 20 feet. In bloom, third week of May. Flowers, white, tinged with bright pink. This compact little tree bears such a profusion of flowers in spring that it is one of the most ornamental at that time, and later in the summer, when the highly-coloured fruit hangs thickly among the leaves, it is again very handsome. This is one of the hardiest trees grown here.

Pyrus coronaria fl. pl. (Betchel's Flowering Crab).—This is a charming, double flowered variety of the native crab apple which blooms during the fourth week of May. The flowers are large, semi-double and of a delicate shade of flesh pink. They have a very delightful fragrance much resembling that of violets. This tree will probably not grow more than fifteen or twenty feet in height.

Pyrus (Cydonia) Maulei.—Maule's Japanese quince. (Japan.) Height, 1 to 3 feet. In bloom 2nd week of May. Flowers bright red. The flowers of this little shrub are very ornamental, and in the autumn, when the golden coloured, highly perfumed quinces are ripe, it makes a very interesting object. It is much hardier than *P. japonica,* of which some authorities call it a variety.

Ribes aureum.—Missouri currant (United States). Height, 6 to 8 feet. In bloom, fourth week of May. Flowers, yellow and very sweet scented. This currant is quite ornamental, especially when in bloom, and again in summer the fruit, which is quite palatable, makes it attractive at that time.

Rosa ferruginea (rubrifolia)—Red-leaved rose (Europe). Height, 6 feet. In bloom, second week of June. The bright pink flowers of this species are rather small, but the purplish red leaves are very ornamental. This rose does not sucker. Another rose which might be mentioned is *Rosa lucida,* which has glossy attractive green foliage.

Rosa rugosa.—Japanese rose (Japan). Height, 4 to 5 feet. In bloom, second week of June. Flowers, very large and deep pink. This is a beautiful rose with fine flowers and very ornamental leaves which are large, thick and shiny. There is a white-flowered variety which is also good, also a number of hybrids between rugosa and varieties of hybrid perpetual and tea roses, most of which are quite hardy.

Spiræa arguta.—Europe. Height, 3 to 4 feet. In bloom 3rd week of May. Flowers pure white, produced very profusely in compact clusters. This is the earliest flowering spiræa grown here, and is one of the best hardy shrubs of recent introduction. It is a graceful little spiræa with pendulous branches, but its chief beauty lies in the abundance of its pure-white flowers.

Spiræa Japonica alba (S. callosa alba).—White-flowered Japanese Spiræa. Japan. Height 1 foot. Begins to bloom 2nd week of July. Flowers white in flat heads. This is a neat little shrub, and although not altogether hardy, blooms profusely every year and continues in bloom for a long time.

Spiraea sorbifolia. Sorbus-leaved Spiraea (Himalaya to Japan).—Height 4 to 5 feet. In bloom fourth week in June. Flowers, white, borne in very large panicles. This is a strong growing species, but suckers considerably.

Spiraea Van Houttei.—Van Houtte's spiraea (Europe). Height 3 to 5 feet. In bloom first week of June. Flowers pure white, borne very profusely in small, compact clusters on pendulous branches. This graceful shrub is very beautiful when in full bloom. Even when out of bloom its pendulous habit and foliage make it attractive.

Syringa Japonica.—Japanese lilac (Japan). Height, 15 to 20 feet. In bloom fourth week of June and first week of July. Flowers creamy white without much perfume, borne in very large panicles. This is the latest blooming lilac tested here, being more than one month later than the common species. It is a very handsome lilac and being tall and of tree-like habit it is very noticeable.

Syringa Josikaea.—Josika's lilac (Hungary). Height, 5 to 10 feet. In bloom last week of May to first week of June. It blooms immediately after the varieties of the common lilac and continues during the first week of June. It is a strong growing species reaching a height of ten feet or more. The foliage is deep green and the leaves large, thick and very glossy, making it quite attractive irrespective of the flowers, which are bluish purple and have no perfume. This is a desirable species on account of its giving a succession of bloom and because of its fine foliage. It also makes a good hedge plant, forming a stiff row and being very attractive on account of its glossy foliage.

Syringa villosa.—Chinese lilac (North China). This is also a strong growing lilac and is growing taller than at first expected, some specimens being now from 6 to 8 feet high. The leaves are rough and rather coarse-looking, but this tends to make the shrub more striking. It flowers during the second week of June, closely following S. Josikaea. It is a free bloomer and the flowers, which are not highly perfumed, are bluish pink and produced in good sized panicles. This is a very desirable species.

Syringa vulgaris.—Common lilac (Eastern Europe). The common lilac and its varieties bloom during the last half of May, being usually at their best from the 20th to the 27th. If we were confined to recommending one variety which is all that this short list really permits of, the variety Charles X. would be the one chosen. This is an old sort but one of the best, most reliable and cheapest. It is a very free bloomer, the colour of the flowers being of a deep attractive purplish red, borne in large panicles.

There are, however, many fine varieties of the common lilac and from the large collection of 134 varieties at the Central Experimental Farm the following additional kinds are given here as there are many persons who would like an assortment of this popular shrub.

The most satisfactory single white is Alba Grandiflora, a very free bloomer with a large loose truss and pure white flowers. Of almost equal merit three of the best double whites are Madame Casimir Perier, Madame Abel Chatenay, and Obelisque. Of single varieties in the various shades the following are very fine. Congo is about the best of those of the darkest violet or purplish red varieties, the panicles being of good size and the flowers very large. Prof. Sargent and Souvenir de la Ludwig Spaeth are very much like Congo. Other dark coloured single varieties of great merit are Aline Mocqueris and Charles X. Furst Liechtenstein and Jacques Calot are two of the best singles with rosy lilac flowers, and Lavaniensis is almost a pure pink. Dr. Maillot is a fine late variety. Two of the deepest coloured and best double varieties are Charles Joli and La Tour d'Auvergne, both being dark reddish purple or violet purple. A great deal of the charm of many of these newer varieties is in the contrast of the colour of the flowers still in bud with those fully open on the same panicle. The varieties that are particularly attractive in bud, the buds having a rosy appearance are, Charles Baltet, Michael Buchner, de Jussieu and Prince de Beauveau, all very fine sorts. The last named variety has a bluish tint when open, making the contrast between bud and open flower very striking. Two varieties that are of particularly fine shades of lilac are Leon Simon and Comté Horace de Choiseul. Three other excellent varieties that are bluish when open are: Abel Carriere, Condorcet and Boussingault. Linne is a very fine variety with twisted petals.

Some of the best double varieties of more or less pink or rosy colour in bud or flower are Emile Lamoine and Jean Bart, of which, although mentioned last, at least one should not be omitted from the general collection. Taking into consideration the range of colour we should select as the twelve best: Alba Grandiflora, Madame Casimir Perier, Congo, Prof. Sargent, Furst Liechtenstein, Lavaniensis, Charles Joli, Charles Baltet, Leon Simon, Abel Carrier, Charles X. and Emile Lemoine.

Viburnum Lantana.—Way-faring tree (Europe). Height, 8 to 12 feet. In bloom third week of May. Flowers white in compact flat heads. The fruit is very ornamental, being scarlet, turning to dark purple when ripe.

Viburnum Opulus.—Guelder rose, high bush cranberry (Canada). Height, 6 to 8 feet. In bloom second week of June. Flowers, white, in large clusters. This is, at all seasons of the year, an ornamental shrub, as the abundant bright scarlet fruit remains on the bush all winter.

Viburnum Opulus sterile.—Snowball. Height 8 to 10 feet. In bloom second week of June. The almost round clusters of pure white flowers of this shrub are well known. This is one of the most ornamental hardy flowering shrubs, but during the past few years it has been badly attacked by aphis. To destroy these it is necessary to spray the bushes just as the buds are breaking in the spring. This is very important as at this time the eggs are hatching. A second spraying should be given in a few days, and while the leaves are still only partly expanded. Once the insects cause the leaves to curl it is almost impossible to get at them. Kerosene emulsion or whale oil soap may be used for spraying.

REPORT OF THE CHEMIST.

FRANK T. SHUTT, M.A., F.I.C., F.C.S., F.R.S.C.

OTTAWA, April 1, 1907.

DR. WM. SAUNDERS, C.M.G.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith the twentieth annual report of the Chemical Division of the Experimental Farms.

It contains an account of the larger number of the more important researches undertaken during the past sixteen months, the last annual report being dated December 1, 1905. A perusal of its pages will show that our field of work has been a wide one and that practically every branch of Canadian agriculture has received some assistance of a chemical nature.

There is on all sides strong evidence that the work of the experimental farms is being more and more appreciated and valued as it becomes better known, and in this connection we feel gratified to note the wider recognition of the value of chemical investigations accorded by the intelligent, practical farmer. The increased correspondence and the larger number of samples submitted to us for examination may, I think, be accepted as indications of the correctness of this conclusion.

The number and nature of the samples received for analysis from the various provinces are given in the following table:—

SAMPLES Received for Examination and Report November 30, 1905, to April 1, 1907.

Sample.	British Columbia.	Alberta.	Saskatchewan.	Manitoba.	Ontario.	Quebec.	New Brunswick.	Nova Scotia.	Prince Edward Island.	Total.	Number still awaiting examination.
Soils	85	46	62	32	69	49	3	80	2	428	88
Muds, mucks and marls	4	...	......	1	2	7	6	11	8	39	11
Manures and fertilizers	5	.....	1	3	20	14	5	28	1	77	1
Forage plants and fodders	18	6	13	16	466	22	13	22	......	576	45
Well waters	15	14	28	26	121	42	24	6	5	281	......
Miscellaneous, including dairy products, fungicides and insecticides	16	13	13	30	134	58	11	14	9	298	14
Totals	143	79	117	108	812	192	62	161	25	1699	159

During the past year several important investigations relating to dairying have been carried on and the results published in bulletin form. They appear as bulletins No. 13, 'A Critical Study of the Sweet Cream Butter-Making Process,' and No. 14, 'Apparatus for the Determination of Fat and Water in Butter,' Dairy Division, New Series.

We have reserved for future publication data obtained in connection with certain researches now in progress, in order that the results may be presented in a more completed form than is now possible. Among these investigations the following may be mentioned as some of the more important: The cause of the deterioration of wheat when grown on freshly cleared scrub land in the Northwest; the chemistry of wheat as related to its baking strength; the composition of Canadian barleys; the etxent to which land is affected by a system which comprises grain growing and occasional fallowings; the amount and availability of plant food in the soils of the semi-arid belt of British Columbia; the reclamation of muck soils; the examination of *Senecio jacobaea* (ragwort), the alleged cause of the Pictou cattle disease, for a poisonous principle; the chemistry of the potato; the fertilizing elements in rain and snow.

It is again with much pleasure that I record my thanks to Mr. A. T. Charron, M.A., and Mr. H. W. Charlton, B.A.Sc., assistant chemists, for much valuable help in connection with the work of the division. To them is due the credit for the larger amount of the analytical data contained in this report. In addition to laboratory work, Mr. Charron, as for some years past, has lectured in French at a considerable number of farmer's institute meetings and conventions on agricultural matters in Quebec and the Maritime Provinces. These addresses have been acknowledged of great educational value.

To Mr. J. F. Watson also, I would extend my thanks for the very efficient help he has given in connection with the clerical work of the division.

I have the honour to be, Sir,

Your obedient servant,

FRANK T. SHUTT,

Chemist, Dominion Experimental Farms.

THE CONTROL OF MOISTURE IN ORCHARD SOILS.

The continuance of this investigation on the Central Farm during the season of 1906 comprised observations from two series of plots, estimations of the soil moisture being made from July 18 to September 27. July was marked by an exceedingly scanty precipitation—a comparative drought. When this had continued into the third week, it was determined to ascertain the effect of this extreme dryness on the soil under various conditions, for experience has shown that it is under such circumstances, that the beneficial effect of cultivation and mulching and the exhaustive effect of sod and weeds, are more especially pronounced. The data obtained are strongly confirmatory of many we have obtained in previous seasons and serve to emphasize more particularly the value of mulching as a means of conserving soil moisture. The further fact is also brought prominently before us, that allowing weeds to grow and obtain possession of the land dries out the soil practically to the same extent as does sod.

The exceptional drought obtaining during July, at Ottawa in 1906, and to which we have referred, is well shown in the data of the following table, in which we have given the precipitation at Ottawa for the three summer months from 1896 to 1906, inclusive.

RAINFALL AT OTTAWA.

	1896.	1897.	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	1906.	Aeragve.
June	3·43	3 01	2·06	2·97	3·83	2 84	4·19	7·3	2·80	4·63	4·85	3·81
July	3·03	5·19	2·87	9·85	6·45	2 25	4·03	4·0	3·31	4·76	1·58	4·30
August	3·91	3·40	3·22	·38	2·84	6 16	1·82	4·31	2·80	4·07	2·43	3·21
Totals	10·37	11.60	8·15	13·20	13·12	11 25	10 04	15·61	8·91	13·46	8·86	11·32

From these figures we find that last season, though June had one inch more rain than the average, July was 2·72 inches and August ·78 inches below the average for these months, so that the total precipitation for the three months was 2·46 inches less than the average. July had the lowest record in eleven years.

Series I. Comprised 3 plots side by side in the plum orchard. The first plot or strip was in what might be termed permanent sod, that is, it had been established for a number of years. The second strip was cultivated three times during the early part of the summer. The third plot carried mulching material, put on to kill bindweed, to a depth of from 6 to 8 inches. This material was corn stalks, asparagus tops, old hay, &c. The soil of this part of the orchard is light and sandy.

Plot 1.—At the time of the first collection of samples there had been a period of almost three weeks of extreme dryness and many crops were showing signs of suffering. The soil under the sod (Plot 1) was almost like powder; there was practically no cohesiveness between its particles. The grass had formed a thick tough sod and the growth of grass made in the spring had been cut on June 9. This mowing was not at all severe, that is close, and the cut grass (a light crop) was not raked off. This of course soon dried into hay, but as it had not been spread evenly over the cut area—and further was too light to act as an efficient mulch, it is not a matter of surprise to find that it had had no effect in checking evaporation. The data show but 3·65 per cent water—an amount frequently exceeded in laboratory air-dried soils, and certainly very much lower than the minimum requisite for satisfactory crop growth —or indeed in many instances for the maintenance of plant vitality. The heavy loss of moisture that had taken place was not entirely caused by the transpiration of the grass, but was no doubt largely due to surface evaporation, which had been increased by the establishment of capillarity. In undisturbed soil, bearing a crop, as for instance that in sod or upon which grain is growing, the loss of moisture from this cause is usually much greater than that by a transpiration of the crop—and especially is this true of loams containing much coarse sand.

Two weeks later, August 1, the moisture content was 5·03 per cent. As on the day previous to the collection of the sample there had been a rainfall of ·6 inch, the increase over that present in the soil on the 18th is readily understood.

On August 15, the date of the third collection, this soil contained 3·79 per cent water—an amount practically identical with that of six weeks earlier. The losses by evaporation and transpiration we may therefore suppose had been supplied by water drawn from lower depths than 14 inches and by rainfall—and thus in a large measure an equilibrium maintained. That evaporation from the surface of the soil rather than transpiration through the foliage was the chief cause of loss of moisture is, I think, made clear from the fact that the grass was not functionally active—that is, was not making any appreciable growth—practically during the whole period of this investigation.

SERIES I.—Conservation of Soil Moisture, C. E. F., Ottawa, Ont., 1906.
(Samples collected to a depth of 14 inches.)

Date of Collection.	Rainfall.	Plot 1.—In Sod.		Plot 2.—Cultivated.		Plot 3.—Mulched.	
		Water.		Water.		Water.	
		Per cent.	Per acre	Per cent.	Per acre.	Per cent.	Per acre.
	Inches.		Tons. lbs.		Tons. lbs.		Tons. lbs.
July 18	0·43*	3·65	77 1473	7·74	172 304	11·51	266 1821
August 1	1·15	5·03	103 1052	11·04	254 1318	11·62	269 1593
" 15	0·93	3·79	80 1671	10·77	247 1358	10·80	248 905

* Precipitation from July 1 to July 18.

Plot 2.—Previous to the date of the first collection this plot had received, after the discing at the opening of the season, only one cultivation, namely: about the middle of June. The soil therefore had been undisturbed for several weeks during a very hot and dry period when the samples were taken for analysis on July 18. The percentage of moisture found (7·74) was decidedly low, though twice as large, as that in plot 1, in sod. No doubt a large loss through evaporation had occurred during the first part of July, an amount which might have been materially reduced by constantly stirring the soil.

From this time on till the close of the experiment the moisture content of the soil was practically maintained at 11 per cent by cultivation. There naturally had been surface evaporation, but this had been kept in check, so that the loss from this cause had been made up by water drawn by capillary attraction from lower depths aided by the scanty rain that had fallen in this period.

Comparing plots 1 and 2, we learn that in the latter (the cultivated land) there was approximately 100 tons more water per acre in the first 14 inches of soil than in the former (plot in sod), in the middle of July. Subsequent to this date the difference in water content of these two plots was even greater—due to more frequent cultivation of plot 2 and the ever increasing tendency of plot 1 to lose water. These differences were approximately, per acre, as follows: August 1, 150 tons; August 15, 167 tons.

Plot 3.—In order to kill out bindweed, that had taken possession of the soil, this plot had been heavily mulched in 1905 with refuse consisting of corn stalks, asparagus tops, old hay, &c., the depth of material being about six inches.

The data show that a mulch of this character is fully as effective as one of earth (by cultivation) for conserving moisture. This conclusion is in accord with that we reached some years ago, using straw as a mulch. The question of relative expense is one that must be settled by each fruit grower for himself—the price of labour and the cost of mulching material are the two largest factors to be taken into consideration. No doubt in many localities mulching would be cheaper than cultivating. One objection to the mulching system in certain districts would be that in order to induce ripening of the wood towards the latter part of the season it would be necessary to dry out the soil somewhat and to do this the mulch would have to be taken off, entailing expense. Another possible objection, but one upon which I can advance no evidence, would be that mulching tends to keep the roots of the trees near the surface and thus render them liable to injury during the winter.

Series II.—This consisted of three plots among a number in an orchard set out in the spring of 1906 by the horticulturist and so arranged as to illustrate the effect of various plans of soil management upon the growth and development of the young apple tree. The soil though of a sandy character was much better than that of Series 1, being richer in humus.

SERIES II.—Conservation of Soil Moisture, C. E. F., Ottawa, Ont., 1906.

(Samples collected to a depth of 14 inches.)

Date of Collection.	Rainfall	PLOT A.-UNDISTURBED.			PLOT B.—CULTIVATED TILL JULY 30, THEN SEEDED TO RAPE.			PLOT H.-CULTIVATED.		
		Water.			Water.			Water.		
		Per cent.	Per acre.		Per cent.	Per acre.		Per cent.	Per acre.	
	Inches.		Tons.	lbs.		Tons.	lbs.		Tons.	lbs.
July 18	0·43	7·53	157	1055	14·27	323	208	....		
August 1	1·15	8·42	178	937	14·67	333	1553	....		
" 15	0·93	6·70	139	788	14·37	325	1496	....		
" 29	1·50	10·20	220	965	12·71	282	1277	14·34	324	1908
September 9	0·26	6·07	125	879	6·70	139	788	13·52	303	934
" 27	0·69	7·36	154	432	7·16	149	1426	13·41	300	1232

Plot A was left undisturbed and the soil was soon fully occupied by weeds. These were cut, but not closely, on August 24 to prevent seeding. The first moisture determination (July 18) showed that the growth of the weeds had very markedly dried out the soil, though not to the same extent as the sod in Plot 1, Series I. Compared with Plot B, adjoining and which was kept cultivated, it contained at this date 166 tons less water per acre, calculated to a depth of 14 inches.

Two weeks later (August 1) the moisture content was somewhat higher—about nine-tenths of a per cent, but this increase was undoubtedly due to the rainfall (approximately ·7 in.) two days previous to the collection of the sample. On August 15 the percentage of water had fallen to a point lower than at any previous date, viz. 6·70 per cent. The soil taken on August 29 showed 10·20 per cent water. This increase is explained by the fact that the weeds were now functionally inactive, practically dead, and that during the preceding nine days rain had fallen to a depth of 1½ inches.

The dryness of the soil on September 9 and 27 is significant (6·07 per cent and 7·36 per cent respectively). The weeds were not now making any great demand on the soil's moisture, but nevertheless a loss of water was taking place. This was a result of the undisturbed capillarity and surface evaporation—which, as we have before remarked, may be as potent a factor in the loss of water as a growing crop.

Plot B affords some interesting and instructive results. It was kept cultivated till July 30, when it was seeded to rape. Its moisture content remained constant (approximately 14 per cent) so long as it was cultivated, but as soon as the rape attained a fair growth it began to exhaust notably the soil's store of water. This and surface evaporation reduced the moisture content to amounts practically identical with those of Plot A, as determined on the two last dates of the investigation. This furnishes evidence as to the value of rape as a cover crop when it is desired to dry out the soil and then hasten the ripening of the wood of the trees before winter sets in.

Plot H.—This was cultivated until August 1, but unlike Plot B, bore no crop subsequently. The first sample was taken for analysis on August 29 as the data compared with those of Plot B would show what loss in the latter had ensued from sowing the rape. Although the rainfall from this date till the close of the investigation was light, this plot held its own, or practically so, the percentage of water being between 13 and 14. The deduction from these results is that if it is desired to dry out the soil to any considerable degree it is necessary to sow a cover crop. It will be noticed that it contained 150 tons more water per acre than Plot B. But yet both plots had received exactly the same amount of cultivation and on the same dates. The difference therefore must have been owing to Plot B carrying the crop of rape while Plot H had been free of vegetation.

PRELIMINARY REPORT ON SURFACE SOILS FROM THE ABITIBI REGION.*

This series of soils, comprising thirteen samples, was forwarded to the laboratories of the Experimental Farms, Ottawa, during the first half of the year 1905. The dates of their reception and the localities from which they were collected are given in the subjoined table, which also presents the analytical data obtained. The soils are arranged in the order in which they were received.

A brief description of the soils from a preliminary examination, chiefly physical and microscopical, may be given as follows:—

1. Yellowish white clay, with very little sand, and practically destitute of organic matter. Reaction: very slightly acid. Traces of lime.

2. Greyish-white clay, with fair amount of coarse sand and some pebbles. A little root fibre. Reaction: slightly acid. Traces only of lime.

* Collected and forwarded by Mr. Frank Moberly, C.E., of the engineering staff of the Transcontinental Railway.

3. Greyish clay loam, with very little sand. Some few fragments of root fibres. Reaction: slightly acid. Traces only of lime.

4. Dark clay loam. Apparently rich in organic matter and showing plenty of root fibre. Very little sand. Reaction: slightly acid. Traces only of lime.

5. Reddish clay, containing some sand. Apparently has been burnt over (?). No visible signs of organic matter. Reaction: acid. Traces only of lime.

6. Dark-grey clay loam, apparently rich in organic matter. Showing plenty of root fibre. Very little sand present. Reaction: acid. Lime in traces only.

7. Greyish-white clay, showing only traces of organic matter. Very little sand. Reaction: neutral. Lime in traces only.

8. Dark-grey clay loam, with fair amount of organic matter. Very little sand. Reaction: neutral. Traces only of lime.

9. Dark-grey clay loam, showing some root fibre. Small quantity of sand. Reaction: neutral. Traces only of lime.

10. Greyish-brown clay loam, containing some root fibre and a little sand. Reaction: acid. Traces only of lime.

11. A grey clay apparently rather poor in organic matter, but with fair quantity of root fibre. Reaction: neutral. Lime in traces or small amount.

12. Greyish-white clay. Very little root fibre and apparently traces only of organic matter. Reaction: slightly alkaline. Should judge it to be rich in lime.

13. Greyish-white clay loam. Showing some root fibre. Very little sand. Reaction: very slightly acid. Lime in traces only.

Considered as a class, these soils are to be regarded as clay loams. Many are 'heavy' or 'strong' clays. With the exception of Nos. 2 and 5 the amounts of sand are almost negligible, though in most of them there is a fair amount of undecomposed feldspar particles, which to a certain degree may serve the same physical purpose as sand.

ANALYSIS OF THE SOILS.

In the preparation for analysis, the soils were first dried by exposure to the air. They were then gently crushed and any root fibre, pebbles, &c., separated by sieves. The analysis was made on the fine earth.

ANALYSIS OF SOILS (air-dried) from Abitibi Region.

Number.	Date of Reception.	Designation.	Moisture.	Organic Volatile Matter.	Nitrogen.
1	17-2-05	Obadagwashing Lake	1·02	3·35	·024
2	27-3-05	North shore of Abitibi Lake	0·35	1·60	·041
3	27-3-05	South shore Abitibi Lake, near H. B. Post	1·14	5·40	·121
4	27-3-05	Agotawekami Lake, 12 m. S. of Abitibi	5·07	16·85	·459
5	22-4-05	10 m. N. Abitibi, S. of Sta. 2061½ m	6·58	11·26	·167
6	22-4-05	10 m. N. Abitibi Lake	6·11	21·51	·435
7	2-6-05	Makamik Lake, N. of Abitibi	3·62	4·68	058
8	2-6-05	Whitefish River, N. of Abitibi	4·41	12·82	·212
9	3-6-05	Upper Okikodasik River, 10 m. N. Lake Abitibi, about boundary between Ontario and Quebec	3·62	9·72	·226
10	3-6-05	N. of Lower Abitibi Lake, Ontario	3·47	7·35	·156
11	13-6-05	From field cultivated by H. B. Co. for many years, H.B. Post, Abitibi	2·07	9·39	·245
12	21-6-05	From Island, Abitibi Lake	3·56	9·06	·058
13	26-6-05	Whitefish River, 3rd Rapid, Abitibi	4·03	7·09	·118

We are probably quite safe in assuming that the nitrogen content of these soils is a fair measure of their crop-producing powers. On this basis, Nos. 4 and 6 are to be placed at the head of the list. They should prove excellent soils and very fertile if properly cultivated.

Following these come Nos. 8, 9 and 11, with a nitrogen content of between 0·2 per cent and 0·3 per cent. These are very probably soils capable of producing remunerative crops, for as far as our data go they compare very favourably with many Canadian virgin soils that have shown themselves good farming lands.

The third division comprises those soils containing between 0·1 per cent and 0·2 per cent nitrogen. These are Nos. 3, 5, 10 and 13. Though somewhat deficient in organic matter (humus) and nitrogen, they are still fairly good soils and no doubt would improve under a good system of farming.

The remainder, Nos. 1, 2, 7 and 12, must be considered as below the average and would require enrichment before they could be expected to give their maximum returns.

As a class, these soils are all 'retentive' and 'lasting,' and the majority of them under skilful treatment suitable for most of our farm crops. In their cultivation it would be highly desirable to adopt a rotation that kept up, and indeed increased, their humus and nitrogen content. This can best be done by the growing of clover or some other legume in the rotation and by the keeping of stock. They are all soils that will repay thorough drainage and, with the exception of No. 12, an occasional application of lime. Owing to the large proportion of clay they contain, much will depend upon the manner of cultivation. To prevent 'puddling,' they should never be worked while wet.

In conclusion, it must be stated that as yet the analyses are incomplete; consequently this report should only be regarded as tentative in character. From the writer's long experience, however, in the examination of Canadian soils he feels justified in making the deductions here given regarding the character and probable productiveness of these soils.

PEASE AS A FERTILIZER IN THE NORTHWEST.

The enrishment of soils through the turning under of the legumes is a subject that has been studied in the fields and laboratories of the Experimental Farm for a number of years past, and our results, published in the annual reports and special bulletin, show the value and economy of this method for the maintenance of soil fertility. The crops hitherto investigated as useful for this purpose of furnishing humus and nitrogen comprise the clovers—common red, mammoth red and crimson; vetches, hairy and black; alfalfa; horse beans and Soja beans. Of these, the clovers and alfalfa are pre-eminently the legumes most serviceable as soil enrichers.

In tilling the soil a certain dissipation of the nitrogen is unavoidable. Plowing, harrowing and indeed all mechanical operations that tend to open up the soil, must result in the oxidation and, consequently, the loss of a portion of the humus (semi-decayed vegetable matter) and its concomitant, nitrogen. Especially is this true of fallowing, by which undoubtedly more nitrogen can be lost than is removed by the following crop. This fact was well established two years ago from the analyses of a series of soils—virgin and cultivated—collected in the Northwest Territories. Fallowing is most useful in keeping the land comparatively free from weeds; it liberates plant food and undoubtedly performs an important function in storing moisture for the succeeding crop, but there is no gainsaying the fact that it is a wasteful practice as regards soil fertility. Data to substantiate this statement were given in the report of this division for 1905, where it was pointed out that if the present productiveness of the soils of the northwestern provinces was to be maintained attention must be given, and this before the soils become markedly exhausted, to the return of humus-forming material rich in nitrogen. This of course does not refer to all soils in the Canadian Northwest, many of which are at the outset over-rich in organic matter and nitrogen, leading rather to rankness of straw than to development of grain. But it is applicable to many areas which have now been growing cereals for the past 20 or 25 years, without any manure and without a single season of sod to return vegetable matter, and which moreover have every third year or so been put in fallow. Such soils, in spite of their great initial, inherited richness, are showing signs of decline, and unless some remedial steps are taken, will continue to do so. All this may serve to emphasize the desirability of abandoning, where practicable, the system of continuous grain growing and substituting therefor a rotation in which at least one member shall add to the soil's store of humus and, if possible, nitrogen.

The value of Brome grass in this connection has been well brought out by experiments conducted on the Experimental Farms at Indian Head, Saskatchewan, and Brandon, Manitoba, a crop which not only adds humus, but which (though disliked by many owing to difficulty in eradication) undoubtedly is of great service in supplying a fibre that binds and holds the soil, thus preventing to a large degree the drifting and loss of the surface soil under high winds. Inquiry shows that loss of soil from this cause is common in many districts, the drifting being quite pronounced even on heavy clay loam after the latter has been worked for a number of years, and drifting is largely a result of fallowing.

The last three or four years there has been an intelligent and persistent attempt on the part of some farmers in Manitoba to grow clover, and these efforts have in many instances proved successful. A general impression prevailed that owing to insufficiency of moisture or the severity of winters or other untoward conditions, clover could not be grown in the Northwest, but the evidence is now ample that clover and alfalfa can be grown in many parts of the northwestern provinces. On the Experimental Farms at Brandon, Manitoba, and Indian Head, Saskatchewan, both of these crops have been raised successfully for a number of years past, and this frequently in spite of comparatively light snowfalls to protect the crop during the first winter. Mr. Bedford, late superintendent, Experimental Farm, Brandon, wrote in 1904: 'As usual a number of the hardiest clovers have wintered here and given a fair return of fodder. The plan usually followed in the eastern provinces of sowing clover seed with a nurse crop has always proved a failure on this farm, our heavy crops of grain so completely shade the ground that the clover plant has no opportunity of developing and is too small and weak to withstand the severe winter. The system adopted here is to plough grain stubble land in May or early in June, harrow once, sow the clover seed broadcast, then harrow a second time and roll. When the weed and volunteer crop are up about one foot high, a mower is run over the land and the cuttings left on the ground as a mulch. By autumn the clover plants are, by this plan, commonly about two feet high, well rooted, and they usually pass the winter without loss.'

PEASE AS A SUBSTITUTE FOR CLOVER.

Notwithstanding the possibility of clover growing the inquiry is frequently made by farmers in the Northwest, is there not some other legume that can be used for keeping up the soil in the place of clover, one that will make its growth in the season of seeding so that winter killing would not enter into the calculation, one that by plowing under at the end of the season would furnish the soil with large quantities of humus-forming material and nitrogen? May not pease fulfil these requirements? It is a fairly quick growing annual, a nitrogen gatherer, and one that will give a good yield if climatic conditions are at all favourable. In districts where the storing up of soil moisture for the succeeding crop is not necessary, the pease might be sown in the spring and the growth be found to make sufficient cover to keep down the weeds. Possibly a modification of this procedure that might be desirable in some districts would be to fallow the land for one month, say till the middle of June, and then sow the pease. Though undoubtedly the pease would make a considerable draft on the soil moisture, this loss would be reduced as soon as the pease had made sufficient growth to cover the land. The dense mat of foliage forms a very effective shade and protection from the sun and drying winds. With eight weeks' growth the writer is of the opinion that on the larger number of the soils of the Northwest and under the climatic influences that are there wont to prevail, there would be a very good crop to turn under. At present we have no data obtained in the Northwest to record, but an experiment was conducted in the orchards of the Central Farm, Ottawa, last season, which has yielded most promising results. Advantage was taken of the fact that the Horticulturist had sown pease for a 'cover' crop, to collect, weigh and analyse the foliage and roots (taken to a depth of 9 inches) on a certain area and to compute therefrom the amounts of vegetable matter and the various fertilizer constituents contained in the pease per acre.

PEASE FROM C. E. F. ORCHARD.

Sown, May 27. Collected, July 26.	Foliage per Acre.		Roots per Acre.	
	Tons.	lbs.	Tons.	lbs.
Yield per acre	12	1,013	1	1,132
Dry matter		3,376		472
Organic and volatile matter		3,010		412
Ash		366		60
Insoluble ash		119		37
Phosphoric acid		32		3
Potash		149		6
Nitrogen		119		10

It will be remarked that the collection was made exactly two months from the date of sowing, at which time the crop was just past the height of its flowering—probably the best period at which to turn under. The crop went 12½ tons to the acre, showing that a good growth had been made.

Though the root system is by no means extensive, which it is to be admitted is a feature that renders this crop less valuable for this purpose than alfalfa and some of the clovers, there is a very large amount of vegetable matter and of the chief elements of plant food to be returned for the improvement of the soil when the whole crop is turned under. With respect to the nitrogen—approximately 130 lbs. per acre—we are unable to say exactly what proportion has been obtained from the atmosphere, but as pease like all the legumes draw very largely from this source through the agency of bacteria upon their roots, we may conclude that as in the case of the other members of that soil-enriching family, the greater part of it has been so derived. The significant fact is that this amount—130 lbs. per acre—is practically identical with that which we have found contained in alfalfa, vetches and many of the clovers, so that in this particular it should have an equal fertilizing value to those crops, and considerably greater than that of horse beans, soja beans and some other of the legumes we have examined from this point of view.

We likewise find that the organic matter is practically equivalent to the quantity in a good clover crop, though somewhat less than that in one of alfalfa. Thus in humus forming material pease would occupy a high place among crops grown to replenish this valuable constituent.

The mineral elements—phosphoric acid and potash—have, of course, been obtained from the soil, but in the subsequent decay of the pease these are set free in more or less easily assimilable forms for succeeding crops, and this in a measure may be considered as increasing the store of fertility in the soil. The large amount of potash contained in the pease is to be noted.

FERTILIZING MATERIALS.

DOG-FISH SCRAP AS A FERTILIZER.

At intervals during the past year we have undertaken to examine and report upon samples of dog-fish scrap and dried fish offal for the Department of Marine and Fisheries. These were forwarded from the dog-fish reduction works at Canso, N.S., and Shippigan, N.B., at which places there is now a considerable accumulation of this fertilizer, chiefly obtained from the rendering or so-called reduction of dog-fish. This fish, a species of shark, by reason of its voraciousness and the fact that it is present in Atlantic waters in large numbers, has become a serious menace to fisheries on the east coast. To protect the fisheries the Federal Government accordingly offered a bounty for the capture of this pest and, to utilize to the best advantage the fish thus brought in, established the above mentioned works. In this way large quantities both of oil and of a rich nitrogenous fertilizer have been prepared. It is this latter by-product that has been submitted to us to determine its agricultural value.

The first samples of fish scrap were received on October 3, 1905, from the Dog-fish Reduction Works, Canso, N.S., marked as follows: No. 1. Fish Offal, September 10; No. 2. Dog-fish Scrap (wood dried), September 26; No. 3. Dog-fish Scrap (coal dried), September 22.

No. 1. Fish Offal.—This, I presume, is not from the dog-fish, but is the dried refuse obtained in the cleaning of fish—cod, haddock, &c., for drying or salting.

It contained a large quantity of coarse bone, many fragments being from 1 inch to 1½ inches in length, and is, therefore, not suitable for direct application to the soil. A mechanical separation showed 71 per cent granular material and 29 per cent coarse bone. This scrap would, I think, require grinding before it could be put on the market either for farmers' use or for the manufacture of commercial fertilizers. From the agricultural standpoint much importance must be placed upon the fineness of the material, as in a very large measure this factor determines the relative availability of the plant food constituents in the scrap. The finer the material, other things being equal, the more ready the decay of the scrap in the soil, and consequently the more quickly are the fertilizing elements offered in suitable forms for crop use.

Analysis.

Moisture	11·07
Nitrogen	8·43
Phosphoric acid	9·01
Total mineral matter	24·15
Mineral matter insoluble in acid (sand, &c.)	·93
Oil	5·47

These data indicate a scrap of excellent quality, both as regards percentage of nitrogen and phosphoric acid and comparatively low oil content.

In the United States large quantities of Menhaden (a coarse sort of herring) are used in the manfacture of scrap, and this, with a moisture content of, say, 10 per cent, will contain, as a rule, from 6 to 8 per cent nitrogen, and 6 to 7 per cent phosphoric acid. It is evident, therefore, that this Canadian product compares well in composition with the raw material so largely used by the fertilizer manufacturers as a source of nitrogen and phosphoric acid.

No. 2 and No. 3. Dog-fish Scrap.—These are very similar in appearance, being considerably finer than No. 1, though containing some coarse bone and meat fragments. Both are decidedly oily to the touch and sight. For the fertilizer manufacturer they would be classified as 'coarse,' and would receive a lower valuation for nitrogen and phosphoric acid than if finer. For direct application, as by farmers, grinding would not, perhaps, be necessary.

Analysis.

	No. 2. Dog-fish (wood dried).	No. 3. Dog-fish (coal dried).
Moisture	14·90	12·18
Nitrogen	7·59	7·63
Phosphoric acid	2·94	2·90
Total mineral matter	7·05	7·29
Mineral matter insoluble in acid (sand)	·16	·43
Oil	31·47	32·75

The percentage of nitrogen in these scraps is very satisfactory. The very low percentage of phosphoric acid is due to the fact that the dog-fish has not a 'bony' skeleton but belongs to a group of fishes (the Selachians) in which cartilage very largely replaces phosphates of lime.

Both these scraps possess very high percentages of oil. Oil is not plant food and its presence in excessive amounts prevents the decay of the scrap in the oil, and hence retards the liberation of its plant food constituents in available forms. Further, the continued and excessive application of a fertilizer so rich in oil might work serious injury to the proper physical condition of the soil. Possibly some modification in the process of manufacture may be devised whereby a larger portion of the oil may be removed. Whether a further extraction of oil from the scrap by naphtha (gasoline) could be made, without entailing undue expense, I am at present unable to say, but my opinion is that from the agricultural standpoint it is highly desirable that a scrap poorer in oil be prepared.

The analysis of the fourth sample of dog-fish scrap, forwarded November 11, 1905, furnished the following data:—

Moisture	20·28
Nitrogen	7·95
Phosphoric acid	2·36
Total mineral matter	6·71
Mineral matter insoluble in acid (sand, &c.)	·35
Oil	28·49

This sample is not so dry as those received on October 3. In nitrogen it is a little richer, but in phosphoric acid it is somewhat lower, pointing to a slightly larger proportion of flesh, cartilage, &c., and concomitantly less bone than in the former samples. Presumably it is entriely the refuse from dog-fish.

Although it was stated that the livers were excluded when making this scrap, the amount of oil present does not fall far below that in the scraps previously examined.

Fish-scrap Liquor.

In the preparation of the scrap a considerable amount of liquor is expressed from the cooked dog-fish which after yielding the greater part of its oil is allowed to run to waste. To learn what fertilizer value this liquor might possess a sample forwarded in January, 1906, was submitted to analysis and the following results obtained:

Dry matter	11·19
Water	88·81
	100·00
Ash	1·03
Nitrogen	1·69
Oil	4·33

Leaving out of consideration the value of the phosphates in the ash and that of the oil present, the liquor should be worth saving for its nitrogen, which amounts to approximately 34 lbs. per ton.

Fish-scrap from Shippigan, N.B.

Three samples of fish-scrap were received on December 12, 1906, from the Dog-fish Reduction Works, Shippigan, N.B., marked as follows:—

No. 1. Dry, mixed dog-fish and offal.
No. 2. Pure dog-fish scrap.
No. 3. Oily, mixed dog-fish and offal.

Analysis.

	No. 1.	No. 2.	No. 3.
Moisture	3·12	4·81	4·27
Nitrogen	8·13	9·41	8·13
Phosphoric acid	6·49	3·77	3·97
Total mineral matter	17·38	10·29	10·51
Mineral matter insoluble in acid (sand, &c.)	·51	·67	·30
Oil	25·38	22·81	31·77

These have all been well dried, the percentage of water being decidedly lower than in the samples previously examined. This, naturally, would tend to increase the percentages of the other constituents, including those of fertilizing value, nitrogen and phosphoric acid.

The nitrogen-content of Nos. 1 and 3 is the same, and slightly higher than that of the dog-fish scrap from Canso reported on in December, 1905. The proportion of nitrogen in No. 2 exceeds that of No. 1 and No. 3 by about 1¼ per cent and must be considered as extremely satisfactory.

The phosphoric acid, it will be noted, in Nos. 2 and 3 lies between 3¾ and 4 per cent. This is almost 1 per cent higher than found in the former samples of dog-fish scrap. No. 1 contains practically 6½ per cent phosphoric acid, decidedly more than the other samples. This, I presume, is due to the presence of bones from other fish in this sample—a conjecture which received confirmation from the much larger percentage of mineral matter (chiefly bone) it contains.

All are notably free from sand and other inert matter of similar character.

The data indicate a large amount of oil in this dog-fish scrap, though in this respect Nos. 1 and 2 show a distinct improvement on similar scraps from Canso, analysed in December, 1905, the reduction of this constituent being from 6 per cent to 10 per cent. No. 3 contains practically the same percentage of oil as the samples of 1905.

The Use of Fish-scrap on the Farm.

The following formulae are offered to meet inquiries respecting the use of this dog-fish scrap. Necessarily they cannot be regarded as giving the best proportions for all classes of land, but they will be helpful to those who have had no experience in the home-mixing of fertilizers.* They would result in a complete fertilizer, *i.e.*, one furnishing all three of the essential elements of fertility, and such a fertilizer has been found in a large number of instances the most profitable to use.

* Farmers intending to use this fertilizer are invited to correspond with this Division, stating the nature of their soil and its history as regards recent manuring and cropping. Advice will then be given as to mixtures that will probably prove useful.

For Cereals, Grass:

Dog-fish scrap..	300 lbs.
Nitrate of soda..	100 "
Superphosphate..	300 "
Muriate of potash..	50 "

Application—300 to 800 lbs. per acre.

For Potatoes, Roots generally, and Clover:

Dog-fish scrap..	300 lbs.
Nitrate of soda..	50 "
Superphosphate..	400 "
Muriate of potash..	150 "

Application—300 to 800 lbs. per acre.

Dry sand or fine loam may be added to the mixed fertilizer to facilitate distribution.

Probably the best plan of application is to broadcast the fertilizer on the thoroughly prepared land in the spring, previous to seeding, incorporating with the soil by one or more harrowings. It has been found that fish refuse gives the best returns on moderately light, warm, moist soils.

What is the value of the nitrogen and phosphoric acid in this scrap? This question has been frequently submitted to us during the past few months, and it seems desirable that an answer should be given here in conjunction with the foregoing information respecting the nature of this new fertilizing material.

In the last bulletin on 'Commercial Fertilizers as Sold in Canada,' issued by the Inland Revenue Department, the following valuation is given:—

Organic nitrogen in ground bone, fish, blood or tankage 16c. per lb.
Phosphoric acid, according to solubility, from . . . 1½ to 6c. "

Until data obtained from actual trials in the field are available, we perhaps should not be justified in affirming that this fish scrap should be placed in the same category with the above-mentioned fertilizers; we might suppose, however, that both its nitrogen and phosphoric acid, in the absence of deterrent influences, will be found equally available with those of these fertilizers. The question therefore is, are there any factors of an unfavourable character in connection with this material? First, as regards the degree of fineness. As pointed out, this is an important matter and several of the samples give evidence that there is room for improvement in this respect. The finer the material the more readily will the fertilizing elements be set free in the soil. If the material contains much coarse bone, that is, pieces 1 inch to 1½ inches in length, it cannot be considered as being in the best condition for direct application to the soil.

Secondly, as fully explained in the text of this report, the presence of a large quantity of oil is most undesirable, especially where large applications are made year after year. In the greater number of the dog-fish refuse samples examined, the percentage of oil was undoubtedly too high. Very probably this will be materially decreased as methods of manufacture are improved—a matter which is now receiving attention at the reduction works.

After a very careful consideration of all these matters, the writer is inclined to the opinion that the nitrogen in the pure dog-fish scrap, as represented by samples examined, is not quite equal in value, agriculturally, to that in the better class of organic fertilizers, and for this reason its price should be somewhat less. Provisionally, we should place this reduction at two to three cents per lb., that is, a value of about 13c. per lb. The phosphoric acid should be worth in the neighbourhood of 5c. per pound.

This dog-fish refuse should prove a very valuable source of nitrogen for the farmer in the Maritime Provinces, and especially so when freed to a greater degree of its oil. When unmixed with other fish offal, it is not rich in phosphoric acid and naturally it does not contain any potash. But these elements can be supplied by the admixture of various materials (superphosphate, muriate of potash, &c.), as indicated by the formulae given on the preceding page and thus a complete and effective fertilizer prepared.

TOBACCO REFUSE.

In 1903 we reported on certain samples of tobacco stems and tobacco dust, showing that these waste products had a high fertilizing value by reason of the nitrogen and phosphoric acid they contain. Two samples forwarded by Wm. Ewing & Co., Montreal, have received our attention during the past year. The results are as follows:—

—	Tobacco Stems.	Tobacco Dust.
Moisture	10·22	7·89
Organic matter	67·04	62·11
Ash or mineral matter soluble in acid	21·42	16·97
Ash or mineral matter insoluble in acid	·42	13·03
	100·00	100·00
Nitrogen	2·22	2·95
Phosphoric acid	·53	·49
Potash	7·52	2·73

Both materials evidently possess fertilizing qualities of considerable value. In nitrogen and phosphoric acid the differences are not large, but it will be noticed that in potash the 'stems' are much richer than the 'dust.' Calculated to pounds per ton we obtain the following figures:—

	Tobacco stems. Per ton.	Tobacco dust. Per ton.
Nitrogen	44·4 lbs.	59·0 lbs.
Phosphoric acid	10·6 "	9·8 "
Potash	150·4 "	54·6 "

Tobacco waste is frequently used for insecticidal purposes, either dry, in the form of a decoction, or for fumigation, and the value of any particular sample for such use will depend almost entirely on the proportions of nicotine it contains. The samples under discussion yielded data as follows:—

Tobacco stems	·67	per cent nicotine.
Tobacco dust	1·03	" "

TOBACCO ASHES.

This fertilizer was forwarded for analysis and report from the McDonald College, Ste. Anne de Bellevue, Que. It was stated to be ashes from a furnace in which tobacco waste was burnt. Its comparative purity and very high value for furnishing potash are obvious from the analytical data:

Potash	30·69	per cent.
Phosphoric acid	4·59	"

Valuing the potash at 5c. per lb. and the phosphoric acid at, say, 4c. per lb., we obtain a value per ton of $35.28.

WOOD ASHES.

When this fertilizer is sold at rates of $10 or higher per ton, it naturally falls under the official inspection made anually by the Inland Revenue Department. If, however, it is sold for less than $10 per ton it is exempt under the Fertilizer Act from analysis by that department, and there is nothing to prevent the sale of partially leached or otherwise adulterated ashes. That fraud in this matter is practiced will be evident from the following analysis, which was made on a sample forwarded from Wolfville, N.S. These ashes, it was stated, had been imported by the carload from Ontario and were being largely bought by fruit growers in the Annapolis valley:—

	Per cent.
Moisture	28·17
Insoluble residue	7·83
Phosphoric acid	1·41
Potash	4·28

These ashes are decidedly below the average in potash and show an altogether too high moisture content. Good, unleached wood ashes do not as a rule fall below 5·5 per cent potash, and their percentage of moisture would be in the neighbourhood of 10 per cent.

This examination cannot perhaps be considered as legitimately coming within the scope of our work; the analysis, however, was made with the object of warning farmers and orchardists against the risk of purchasing such materials without a guarantee from the vendor.

LIME KILN ASHES.

A sample sent from Lennox Ferry, N.S., and said to be purchasable there at $4.25 per ton, was submitted to analysis, with the following results:—

	Per cent.
Potash	4·77
Phosphoric acid	1·93
Carbonate of lime	57·16

For lime kiln ashes this sample shows an unusually high percentage of potash, though in respect to this important constituent it is not the equal of good wood ashes. It should prove an excellent fertilizer for soils in need of potash and lime and if the sample is thoroughly representative the price asked is quite reasonable.

A further sample forwarded by a correspondent from near Montreal gave results indicating a value far below that of the preceding:—

	Per cent.
Potash	1·25
Phosphoric acid	·43
Carbonate of lime	62·09

Such ashes, valuing the fertilizing constituents at market prices, would be worth about $2 per ton.

ASHES FROM MUCK.

It frequently happens in the clearing of muck lands by fire that the muck to a considerable depth is burnt, leaving a more or less heavy coating of ashes. This occurs more especially when the clearing is done during a dry season and may result in the loss of a large area of valuable soil. If the deposit of muck is of considerable depth the ashes formed by the burning of the surface 2 or 3 inches will be beneficial, and this method may be employed to advantage, but care should be taken that the fire does not burn too deeply, or more harm than good will result.

A correspondent at Pont Rouge, Que., having a large quantity of such muck ashes, forwarded a sample with the inquiry as to their fertilizing value for other parts of his farm. These ashes were submitted to analysis with the following results:—

	Per cent.
Potash	·60
Phosphoric acid	1·68
Lime	21·75

Although these ashes are not as rich as wood ashes, they certainly possess a very considerable fertilizing value, especially for soils containing an abundance of vegetable organic matter. For all soils in need of lime and mineral fertilizers an application of these ashes conjointly with farmyard manure would be advantageous, as also for root crops, clover and fruit trees.

SPENT BONE CHAR.

This material, from the Edwardsburg Starch Co., Cardinal, Ont., is bone char after use in sugar purification and contains a high percentage of phosphoric acid. It is not, however, used now-a-days directly as a fertilizer, for the reason that its phosphoric acid is not readily converted into soluble forms in the soil, but it is largely employed in the manufacture of superphosphate.

Analysis.

	Per cent.
Phosphoric acid (equivalent to 68·2 bone phosphate)	31·25
Nitrogen	1·25

These data indicate a quality somewhat above the average; the superphosphate resulting from its treatment would possess a notable amount of nitrogen.

FODDERS AND FEEDING STUFFS.

COMMERCIAL FEEDING STUFFS.

Every year a number of samples of commercial feeding stuffs are submitted to us for analysis and report as to their nutritive value. These are for the most part representative of the by-products from breakfast food factories, starch factories, beet-sugar factories, elevators, &c., &c.—of which there are many now upon the market. They necessarily vary in feeding qualities according to their source. Some are excellent, being rich in protein and fat, while others are comparatively worthless, being characterized by a low protein content and high fibre. Unfortunately many of the latter, in which oat hulls are frequently a predominating constituent, are finely ground and thus the farmer is unable from inspection to judge of their value. For such analysis and microscopic examination are the only means of ascertaining their nature and worth.

Until such time as there is a systematic, annual examination of all such materials—the desirability of which the writer has repeatedly emphasized—it has been thought well to continue this work, and thus furnish information that will afford the farmer the means to exercise his judgment in purchasing feeding stuffs and to protect himself against worthless brands. The feeds thus analysed do not represent all such materials upon the Canadian market; the time at our disposal has only permitted the examination of those regarding which inquiries have been received and which have not in recent years been analysed by us.

ANALYSIS of Feeds, 1906.

No.	Name of Feed.	Particulars.	Moisture.	Protein.	Fat or Oil.	Carbro-hydrates.	Fibre.	Ash.
1	Oat Middlings	Flavelle Milling Co., Lindsay, Ont.	6·30	11·12	5·71	52·88	18·85	5·14
2	Oat Dust	London Oatmeal Mills, Ont.	5·06	9·93	4·40	50·79	23·81	6·01
3	Oat Feed	" " " "	4·71	11·75	5·02	59·63	15·18	3·71
4	Feed Oatmeal..........	Tilsonburg Mills, Tilsonburg, Ont..	.....	16·69	8·52	....	2·31	......
5	Oat Feed	Ogilvie Milling Co., Montreal.....	4·12	6·56	3·17	54·69	25·72	5·74
6	Corn Bran.............	Distillery, Wiser & Son, Prescott, Ont	....	6·81	3·83	.....	15·95	......
7	Gluten Feed	Brantford Starch Works, Brantford, Ont......................	6.30	10·56	9·04	68·41	5·04	·65
8	"	" " " "	......	12·56	8·85	......	......	......
9	Glucose Feed	Edwardsburg Starch Co., Cardinal, Ont....................	56·25	11·10	11·95	19·44	.....	1·26
10	Rice Meal	Brackman Ker, Victoria, B.C.....	.....	14·37	16·93	......	...	9·02
11	Cotton Seed Meal......	J. B. Schaffner, Halifax, Importer.	.....	34·56	8·87	......	......	......
12	Malt Sprouts	La Cie de Brasserie de Beauport, Que	6·37	27·43	1·69	47·47	11·12	5·92
13	Molac Molasses Dairy Feed	American Cereal Co., Peterboro, Ont	...	14·62	3·18	......	13·32	5·87
14	Beet Root Feed......	Wallaceburg Sugar Co., Wallaceburg, Ont.....................	4·89	9·47	1·39	78·15	2·59	3·51
15	Screenings, Crushed....	Elevator, Imported into Quebec from Northwest...	... ..	12·56	5·60	.....	11·36	......
16	Buckwheat and Oat Feed	McAllister Milling Co., Peterboro, Ont..........	6·67	11·00	2·30	58·18	16·76	3·99
17	Buckwheat, Corn and Oats	" " " "	6·06	11·00	2·82	64·76	12·36	3·00
18	Mixed Chop	" " " "	5·16	5·34	1·42	59·58	24·58	3·92
19	Ground Middlings.	" " " "	6·62	11·31	3·64	69·19	7·00	2·24
20	Wild Buckwheat... ...	J. G. King & Co., Port Arthur, Ont.	7·48	10.16	2·89	70·00	7·29	2·18
21	Small Seeds cleaned from Flax.......	" " " "	4·41	18·78	24·48	33·27	9·51	9·55
22	Small Seeds cleaned from Wheat	" " " "	7·62	15·50	9·64	54·86	17·21	5·17
23	Seeds, Broken Wheat, Small Oats, &c., ready for grinding.........	" " " "	8·54	14·12	7·75	56·40	8·36	4·83
24	Ground Seeds obtained by grinding No. 23 ...	" " " "	9·14	17·31	9·74	51·76	6·58	5.49
25	Ground Feed Mixture, 25 p.c. No. 23 and 75 p.c. Barley..........	" " " "	9·75	13·19	5·27	60·54	7·60	3·68
26	Ground Feed Mixture, 25 p.c. No. 23 and 75 p.c. Barley...	" " " "	9·19	13·00	5·38	62·19	6·34	3·90
27	Ground Feed Mixture, 50 p.c. No. 23 and 50 p.c. Barley.............	" " " "	9·90	12·94	5·14	60·63	7·49	3·90
28	Flax Chaff...........	" " " "	7·68	6·06	4·15	62·55	13·88	5·68
29	Buckwheat Chaff.......	" " " "	10·00	7·87	2·55	63·72	13·22	2·64
30	Fine Broken Stock.....	" " " "	10·43	11·68	3·62	55·64	14·28	4·35
31	Wheat Chaff..........	" " " "	6·25	5·31	2·49	45·80	27·50	12·65

OAT PRODUCTS.

No. 1. Oat Middlings.—Manufactured by the Flavelle Milling Co., Lindsay, Ont., and retailed at Shediac, N.B., from where the sample was forwarded, at $20 per ton. This feed contains about three-fourths the protein and twice the fibre of bran. Though the analysis shows it to be decidedly inferior to bran, it is by no means a poor or worthless feed. It contains fair percentages of protein and fat and might be used to advantage if the price asked is not too high, compared with others on the same market.

No. 2. Oat Dust; No. 3. Oat Feed.—Manufactured by the London Oatmeal Mills. No. 2 retailed at $7; No. 3 at $10 per ton. Oat dust is an exceedingly poor feed, consisting largely of the hulls, hairs, dust from cleaning the grain, &c. The present analysis gives results very similar to those previously obtained on the same product from other mills, and I judge therefrom that the profitable use of such feeds is a matter open to much question. Of course, what may be a high price in one part of Canada may be a low one in another part; freight rates, the quantities bought, &c., must all be considered. The only way for the farmer to intelligently arrive at a decision is to compare prices, having a knowledge of the nutritive value of the feeds and of his special requirements. If there is an abundant supply on the farm of low-protein, coarse fodders, there could be no economy, no object, in purchasing oat dust at any price. The Oat Feed (No. 3) is a decidedly more valuable product. Though containing a large proportion of hull, it also possesses a fair amount of fine meal and broken grain. In composition it is seen to be very similar to No. 1.

No. 4. Feed Oatmeal.—Manufactured by the Tilsonburg Mills, Ont. Stated to cost in car lots in New Brunswick about $37 per ton. Advocated for poultry use and stated to be practically free from hull and foreign matter. The percentages of protein and fat are such as to give the product a high feeding value; the low fibre content is also in its favour, especially for poultry feeding. The large percentage of fat would, however, call for its limited use in the case of laying stock.

No. 5. Oat Feed.—Manufactured by the Ogilvie Milling Co. Consists largely of oat hulls and contains very little fine meal. An extremely poor feed, being very low in protein and exceedingly high in fibre.

CORN PRODUCTS.

No. 6. Corn Bran.—From the distillery of Wiser & Son, Prescott, Ont. It consists entirely of the husk or skin of the corn grain and is of very low feeding value. Among those analysed during the past year, it stands lowest in protein. Though a 'clean' feed—that is free from foreign matter—its nutritive qualities are such that it must be bought cheaply if it is to be used profitably. This would preclude freighting for any distance. Our correspondent quotes it at $13 per ton—a price much above its real worth.*

No. 7 & 8. Gluten Feed.—Manufactured by the Brantford Starch Works, Brantford, Ont. Attention must be drawn to the composition of this product, for the reason that there are 'gluten feeds' upon the market containing practically twice the amount of protein possessed by this brand. Good quality gluten feed, it has been shown, will contain in the neighbourhood of 22 per cent protein. It is much to be regretted that feeds of such great differences in value should be offered for sale under the same name —and especially in such a case as this, where the name implies similar origin.

No. 9. Glucose Feed.—Edwardsburg Starch Co. A pasty substance of which there is a small quantity formed in the manufacture of glucose. It is sold in barrels, locally, and has been used both in pig and cattle feeding. In spite of its high water-content, the analysis gives it a very fair feeding value—being especially rich in oil. It is doubtful, however, if it could be extensively used as it is to a certain degree unpalatable. A correspondent writes that he has fed it, 'after mixing into a very thin slop with other feeds, to pigs, and got good results, but animals don't take to it at first and won't take much of it anytime.'

RICE MEAL.

No. 10. Rice Meal.—From the Brackman-Kerr Milling Co. This feeding stuff, used more particularly for milch cows in British Columbia, is somewhat variable in composition. The present sample is of excellent quality. Certain 'rice feeds' have come

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* A distinction must be made between corn bran from the distillery and corn bran from the starch works. We have invariably found the latter the better feed, containing between 9 and 10 per cent protein.

under our notice that contained ground rice hulls, and consequently of much lower value.

COTTON SEED MEAL.

No. 11. Cotton Seed Meal.—This sample was forwarded by Mr. R. Chisholm, Antigonish, N.S., and stated to be imported by Messrs. Schaffner of Halifax. There are many qualities of this highly concentrated feed stuff upon the Canadian market. Genuine cotton seed meal of the first grade will contain about 42 per cent protein and 13 per cent fat; inferior brands examined in the Farm Laboratory have analysed as low as 23 per cent protein and 5 per cent oil. Purchasers of cotton seed meal should ask for the percentages of protein and fat guaranteed to be present. This ought to be obtainable, as the wholesale importers buy, or may do so if they wish, on such a basis. Though it is impossible to say from inspection what the proportion of the chief nutritive constituents may be, a judgment may be formed from the appearance of the meal; inferior brands are dark in colour and show coarse fragments of hulls, whereas high grade meals are bright yellow and free from hull. It is more particularly in the Maritime Provinces where cotton seed meal is used, it coming direct by ocean freight to Halifax or St. John from shipping ports in the Southern States.

MALT SPROUTS.

No. 12. Malt Sprouts.—From La Cie de Brasserie de Beauport, Que. As the name indicates, this feed is composed of the sprouts from barley germinated in the preparation of malt. After drying the germinated grain, the sprouts are readily detached and separated by sieving. It is a highly concentrated feed stuff as regards protein, containing from 23 per cent to 27 per cent, but is very poor in fat. A very large proportion of its protein is digestible—a fact which enhances its value for bringing up the proportion of the nitrogenous nutriments in the ration of milch cows. It does not appear to be a very palatable feed, and consequently can only be fed in comparatively small quantities—say about 2 lbs. per day. Malt sprouts have a high absorptive capacity and should be soaked several hours before feeding.

BEET ROOT PRODUCTS.

No. 13. Molac Molasses Dairy Feed.—Manufactured by the American Cereal Co., Peterboro, who in their advertising circular state that this feed 'is a perfect blending of grain products—the high protein portions of oats, corn and wheat scientifically treated, with the correct proportion of best cane molasses.' At the time of our analysis, it was quoted at $22.90 per ton at Montreal. In addition to 14 per cent of protein it was found to contain in the neighbourhood of 13 per cent sugar; it should, therefore, prove both a nourishing and palatable feeding stuff. It differs chiefly from the 'Improved Molasses Cattle Food,' analysed and reported on in 1903, in containing a much higher percentage of protein.

No. 14. Beet Root Feed.—Wallaceburg Sugar Co. This is the dried, exhausted, beet pulp. Though in all probability, a readily digested and palatable food, its composition, as indicated by the analytical data, clearly shows it to be distinctly inferior in nutritive qualities to bran or shorts. It would be of little value where a feed is desired to bring up the protein content of the ration, as for instance in the supplementing of the home grown coarse fodders.

MISCELLANEOUS ELEVATOR AND MILLING PRODUCTS.

No. 15. Screenings.—Regarding this feeding stuff, a correspondent in Warden, Quebec, writes: 'Please advise as to comparative feeding value of this food, a car load of which has been received from an elevator at Fort William. It was sold at $13 per ton. Are there any dangerous weed seeds in it and will grinding, as per sample, prevent their germination?'

On examination, it was found to contain small and broken wheat, barley, oats, flax, weed seeds, broken straw and hulls. The sample was submitted to Dr. Fletcher, the Botanist, who determined the nature of the weed seeds, as follows: Wild Buckwheat, Lamb's Quarters, Wild Sunflower, Bearded Wheat-grass, Wild Oats, Blue-bat, Wild Mustard, Sun Spurge, False Flax, Hare's-ear Mustard, Stinkweed, Great Rag-Weed, Dragonhead, Canada Thistle, Green Foxtail, Barnyard grass, Wild Rose. The weeds are named in order as to quantity, approximately, in sample.

A considerable quantity of the ground or crushed sample was sown in the test boxes, to ascertain the number of vital seeds present; only two plants appeared.

From the chemical data, it is evident that this feed has a fair nutritive value; compared with bran it contains about 2 per cent less protein, a slightly higher percentage of fat and about one-third more fibre. The experience of several farmers with whom I have corresponded on the subject, is that ground screenings are more or less unpalatable, that some animals refuse them and that in any case they can only be used as a portion of the meal ration. This if confirmed is a serious objection. The distastefulness is caused chiefly, we presume, by the presence of sulphur oils, found in many seeds of the cruciferae (mustards) and which no doubt would impart an unpleasant pungency to the feed.

Nos. 16, 17, 18 and 19.—These constitute a series of by-products from the McAllister Milling Co., Peterboro. No. 16 consists chiefly of the hulls of oats and buckwheat, with very little fine meal. No. 17 is largely composed of the hulls of oats and buckwheat, but with more fine meal than No. 16. There is a certain proportion of corn present. No. 18, apparently, consists entirely of fine oat hulls and corn bran, with practically no fine meal. No. 19 is largely corn meal and corn bran, with very little, if any, oat hulls present.

Feeds Nos. 16 and 17 are equal as regards protein; the lower percentage of fibre in No. 17, however, makes this sample the better of the two. They must both be considered low grade feeding stuffs.

No. 18 is an extremely poor feed, being very low in protein and exceedingly high in fibre. In feeding value it would rank with straws and other coarse fodders of that class.

No. 19. The best of the series; a fairly good but not a high grade feed, considered from the standpoint of protein content.

Nos. 20 to 31, inclusive, were received direct from Joseph G. King & Co., Lessees of the C.P.R. Elevator at Port Arthur, the analyses being undertaken to learn the nutritive value of the various weed seeds, &c., as obtained from the cleaning of wheat flax and other cereals at the elevator. A very large amount of such refuse or screenings must be obtained annually, the greater proportion of which apparently is at present wasted. If finely ground there could be no danger of disseminating noxious weeds, and there seems no reason, save perhaps on the ground of unpalatableness, why certain classes of such refuse could not be used to advantage, especially if mixed with a fair proportion of ground barley or other grain. As remarked when discussing No. 15, cattle and pigs do not eat such feed with relish—indeed at first they may entirely refuse it, possibly owing to a certain pungency. This flavour, however, would depend upon the proportion of certain weed seeds and might in a large measure be overcome by mixing with various meals.

No. 20. Wild Buckwheat.—This sample contained no foreign matter or admixture; the analysis, therefore, represents the composition of the seed of wild buckwheat. While not a highly nitrogenous or oily seed it is of fair feeding value, being quite low in fibre.

No. 21. Small seeds cleaned from Flax.—The bulk of this sample consists of broken flax seeds which form probably 98 per cent of the whole. The other 2 per cent is made up of seeds of Lamb's-quarters, Wild Mustard, False Flax and Hare's-ear Mustard, the abundance being in the order of the names given. It is a feed very rich in protein and exceedingly high in fat or oil and accordingly must be considered a valuable feeding stuff.

No. 22. Small Seeds cleaned from Wheat.—Consists probably to the extent of 95 per cent of the whole of the seeds of Lamb's-quarters; the other 5 per cent, of Hare's ear Mustard, Stink-weed, False Flax and Sticky Cockle. In spite of the high fibre, due to the presence of broken straw and chaff, this feed possesses a proportion of protein equal to that in the best qualities of bran; the percentage of fat is also very satisfactory.

No 23. Seeds, Broken Wheat, Small Oats, &c., mixed for grinding.—Dr. Fletcher reports regarding this sample as follows: Broken wheat and wild buckwheat constitute 95 per cent of the whole; the other 5 per cent consists of Wild Oats, Ball Mustard, Lamb's-quarters, Wild Mustard and Cow Cockle. The analysis shows the mixture to be a little lower in protein and fat than No. 22, but still a fairly good feed. Provided it is not distasteful it should prove very satisfactory, though, of course, not equal to those feeds containing from 20 per cent to 30 per cent protein, as gluten meal, oil cake and other seed meal.

No. 24.—This sample purported to be obtained by grinding No. 23; the analytical data, however, makes it very clear that the proportion of seeds rich in protein and fat must have been considerably greater in No. 24. From the feeding standpoint No. 24 should be much more valuable than No. 23.

It is quite probable that uniformity in composition, and hence in feeding value, may be in a measure difficult to obtain in a meal so produced, for there is a large variety of weed seeds entering into the make-up of the screenings, and these seeds differ widely in their percentages of protein and fat. Since all these weeds are not equally distributed, *i.e.*, equally prevalent in all wheat districts, it follows that the screenings from any consignment of wheat will vary more or less from the screenings obtained by cleaning other consignments, and this variation may have, as we have seen, a marked influence on the food value of the product. If such refuse materials therefore, are to be used in the preparation of foods it seems highly desirable that the output should be controlled by analysis.

Nos. 25 and 26. 'Ground Feed' No. 25, was made by the manufacturer by mixing 25 parts of No. 23 (ground) with 75 parts of ground barley, the chief object in adding the barley being to lighten the colour and thus make it more marketable. No. 26 consists of No. 23 and barley, in the same proportion as in No. 25, but ground together. As would be expected, the data of these two samples are in close accord. They indicate a feed that should prove practically equivalent to shorts.

No. 27 is stated to be made by grinding equal weights of No. 23 and barley. The differences between this and the two preceding samples (containing a larger proportion of barley) in the percentages of protein and fat are very slight, and I conclude that the feeding value is practically the same for all three samples, Nos. 25, 26 and 27.

No. 28. 'Flax Chaff,' obtained in the cleaning of flax, being light and separated by wind, consists chiefly of the broken seed pods of the flax. A very poor feed as regards protein, and though the flax seeds that are present furnish a fair percentage of fat, the material must be considered as distinctly low-grade.

No. 29. 'Buckwheat Chaff.'—Very largely composed of the hulls of wild buckwheat. This is also a material of extremely low feeding value.

No. 30. 'Fine Broken Stock.'—Broken wheat, buckwheat, and seeds, hulls, hairs, &c., containing a certain amount of fine meal. It is too high in fibre to be classed with the more valuable feeding stuffs, but its percentage of protein (11.68) makes it decidedly superior to oat dust and feeds of that character.

No. 31. 'Wheat Chaff.'—From inspection one would judge this to be fairly free from foreign matter. The data, however, indicate a slightly superior value to pure wheat chaff, no doubt due to the presence of a small quantity of broken wheat. It is scarcely necessary perhaps to point out that the straws and chaffs constitute a class of feeds of extremely low nutritive value.

From a study of the analytical data of these elevator refuse, it will be evident that while some of these materials possess high nutritive qualities others are comparatively worthless for furnishing those nutrients for which meals and concentrated feed stuffs are more particularly bought. Since in the finely ground state it is almost impossible to form a correct estimate as to their worth, the necessity of purchasing on analysis will be obvious. Two other points must also be kept in mind, if large purchases are being considered: fineness of the meal to prevent dissemination of weed seeds, and palatableness to the stock it is intended for. The farmer should satisfy himself regarding these matters before making large purchases.

APPLE POMACE.

This was forwarded by a correspondent in Aylmer, Ont., last January, who writes: 'This pomace was made at our cider mill last autumn and is taken from a large pile that is still left. For the past month or so we have been feeding it to 4 dairy cows and they are keeping right up in their milk flow. We commenced with a pail full of pomace and now feed half a bushel to each cow twice a day. They also have 3 quarts of oat and wheat chop (5 parts oats to 1 part wheat) twice a day, corn stalks twice with hay at noon. How do you think the pomace compares with roots?' In a letter some three weeks later the same correspondent says 'Occasionally we would omit a feed of pomace and we noticed that at the next milking there would be a falling off of about 1½ lbs.—we weigh the milk at every milking. The pomace is fed directly after milking, otherwise it would taint the milk.'

Analysis.

	Per cent.
Water	80·30
Protein	1·17
Fat	·67
Carbohydrates	16·77
Fibre	·48
Ash	·61
	100·00

The dry matter of pomace is not so valuable as that of mangels, since it is destitute of sugar. Mangels contain usually in the neighbourhood of 10 per cent dry matter; but varieties differ in this respect, the 'sugar' mangels being much richer, many of them containing 13 per cent, one-half of which may be sugar. Since this pomace contains practically half as much more dry matter (19·70 per cent), it will probably be found, that used judiciously, it has a feeding value approximately equal to this class of roots. The percentage of dry matter in the pomace is approximately equal to that in corn ensilage, but its protein content is slightly less.

There seems to be an impression among many farmers that apple pomace tends to dry off the cows, but data to confirm this seem to be wanting.

MEAT MEALS FOR POULTRY.

Several analyses of these concentrated foods were given in the report of this division for 1904, to which the reader is referred for information regarding the general character and use of these substances. Last year two brands were examined for the Poultry Division and the data are here given in the expectation that they may be interesting to poultry feeders.

—	Moisture.	Protein.	Fat.	Total Ash.	Ash Insoluble in Acid, (Sand, &c.)
No. 1.—Cypher's Beef Scrap	7·97	66·56	14·66	4·92*	·37
No. 2.—Morgan's Meat Meal	4·92	36·44	14·47	35·15	

* Containing 3·62 p.c. bone.

No. 1.—An excellent meal, well calculated for use to increase the protein ratio in poultry food. It differs from the majority of the better samples examined in 1904 by possessing a larger proportion of protein, but a small percentage of bone.

No. 2.—For furnishing protein, this meal is worth but little more than half No. 1. A comparison with the results obtained on the Morgan product in 1904 shows that its composition is practically identical with the meal then manufactured.

THE NUTRITIVE VALUE OF FROZEN WHEAT STRAW AND CHAFF.

It occasionally has happened in certain districts of the northwestern provinces that frost has overtaken the wheat crop while the grain is still immature, or in other words not fully ripe. Under such circumstances, development of the grain is arrested and a small, more or less shrivelled, kernel results. This frosted wheat, as we showed some years ago, is very valuable from the feeding standpoint, though injured for flour making purposes. Our data proved that its protein content is considerably higher than that of the unfrozen, fully ripened wheat.

We are now able to present data respecting the straw and chaff of frozen wheat, the desirability of the work being brought before us by a correspondent in the northwest who considered that such straw and chaff might possess an enhanced feeding value. Our correspondent writes: 'Some wheat was injured by frost a week or ten days before it was ripe, or about September 2, (1905). Thinking the straw worthless, we put it at the bottom of the stack. However, the cattle discovered it and ate it in preference to the upper part of the stack, which was left standing until there was danger of it falling over. Can you give me any reason for this preference? Evidently the frozen straw has a higher feeding value.'

Accordingly, we obtained samples of frozen straw and chaff and also, for the purposes of comparison, straw and chaff from similar wheat that had been fully matured. As these were from adjacent fields the conditions of growth were probably very much alike until such time as the frost occurred. As the samples were from the thresher and contained as a consequence broken grain and more or less foreign matter, they were all carefully picked over before grinding for analysis. The data, therefore, represent in each case the composition of straw and the chaff perfectly free from any admixture or impurity.

ANALYSIS.

—	Water.	Protein.	Fat.	Carbo-hydrates.	Fibre.	Ash.
Straw.						
Frozen	5·74	4·41	1·42	44·07	38·36	6·00
Not frozen	6·55	3·78	1·46	43·40	38·33	6·48
Chaff.						
Frozen	4·55	3·94	·83	42·88	33·50	14·30
Not frozen	4·05	3·59	·78	44·01	32 13	15·44

These data, while showing that no very great differences exist, are sufficiently clear to confirm the conjecture that the frozen straw and chaff have the higher nutritive value.

The frozen straw contains ·63 per cent or about one-seventh more protein than the straw from the unfrozen, fully ripened grain; and, similarly, we find in the frozen chaff a higher protein content (about ·39 per cent) than in that from the fully matured wheat.

Since the cattle prefer the frozen straw there can be no doubt about its greater palatability. This is partly due to its being less hard and possibly in part to the development of a certain amount of sugar by the frost—a point unfortunately overlooked at the time of analysis, but upon which it is intended to obtain data on some future occasion. It may further be supposed that the digestibility of the immature straw will be somewhat higher than that from the fully ripened grain.

Certain agricultural authorities have stated that wheat-chaff contains a higher percentage of crude protein than wheat straw. Our data do not confirm this statement. The principal points of difference between the chaff and the straw as brought out by the present analyses are that the chaff contains less fat and less fibre, but considerably more ash than the straw. The higher percentage of ash in both samples of chaff is worthy of note, especially in view of the fact that they were carefully freed from foreign matter.

As to the comparative feeding value of the straw and chaff from the same crop, the writer is of the opinion that while the former is slightly richer in protein and fat, the latter by reason of its lower fibre and the fact that it is more readily eaten by stock is, practically, the more valuable fodder.

THE RELATIVE VALUE OF ROOTS.

The past season marks the seventh of this investigation. The value of the work will be obvious on consultation of the data, which show that very large differences in dry matter and sugar may exist between varieties in the same class of roots, grown under the same climatic and cultural conditions. It, therefore, behooves the farmer when considering the yields per acre with a view to selection of the variety for sowing, that he should also consult the analytical data in this and past reports of the Chemical Division. The larger the percentages of dry matter and sugar the higher the feeding value of the root.

Incidentally also the results are of interest in furnishing information respecting the effect of seasonal conditions on the composition of the root, though in this matter the figures must not be too closely interpreted. It is impossible to say that the strain or parentage of seed sold under the same name remains the same for a number of years—and the breed factor has considerable determinative value, as will be noted further on in the present report.

Mangels.—In the subjoined table we present the results from the analysis of 16 varieties of mangels. The varieties are named in the order of their dry matter. Between the first and the last there is a difference of 5·53 per cent dry matter (practically 40 per cent of the total dry matter), and of 4·67 per cent sugar (practically 67 per cent of the total sugar). These are significant figures when we remember that all the varieties were grown on practically the same soil and that necessarily the conditions of rainfall, temperature, &c., were the same for all.

ANALYSIS of Mangels, C.E.F., Ottawa, Ont., 1906.

Variety.	Water.	Dry Matter.	Sugar in Juice.	Average Weight of One Root.	
	p.c.	p.c.	p.c.	Lbs.	ozs.
Half Long Sugar Rosy	86·48	13·52	6·89	1	14
Yellow Intermediate	86·84	13·16	7·53	2	10
Gate Post	87·10	12·90	6·59	2	2
Giant Yellow Globe	87·27	12·73	6·45	1	8
Selected Mammoth Long Red	87·34	12·66	5·20	2	4
Prize Mammoth Long Red	87·48	12·52	7·35	3	1
Giant Sugar	87·59	12·41	7·52	2	11
Selected Yellow Globe	88·15	11·85	5·50	1	14
Half Long Sugar White	88·24	11·76	6·28	2	10
Mammoth Yellow Intermediate	88·56	11·44	6·10	2	4
Mammoth Long Red	89·03	10·97	6·57	3	3
Giant Yellow Intermediate	89·11	10·89	5·53	2	13
Triumph Yellow Globe	89·21	10·79	4·53	2	1
Leviathan Long Red	89·26	10·74	4·93	2	13
Prize Winner Yellow Globe	90·22	9·78	5·71	2	4
Lion Yellow Intermediate	92·01	7·99	2·22	2	2

Compared with the results of the previous year (1905), they are on the whole, considerably better, undoubtedly due to the more favourable climatic conditions that prevailed in the autumn months of 1906.

The data for the past three years are subjoined.

Year.	Varieties analysed.	Dry matter. Per cent.	Sugar. Per cent.
1904	10	11·69	6·62
1905	17	10·04	4·67
1906	16	11·63	5·93

Turnips.—Twenty varieties of turnips have been analysed. Their dry matter ranges from 10·99 per cent to 13·61 per cent, and their sugar content from ·96 per cent to 6·23 per cent. As a class, there are not the differences observable in mangels, and especially is this true as regards dry matter. The variety (Bangholm selected) giving 6·23 per cent sugar is exceptional, the highest among the remaining 19 varieties being only 2·74 per cent.

ANALYSIS of Turnips, C.E.F., Ottawa, Ont., 1906.

Variety.	Water.	Dry Matter.	Sugar in Juice.	Average Weight of One Root.	
	p.c.	p.c.	p.c.	Lbs.	Ozs.
Magnum Bonum	86·39	13·61	1·50	1	6
Drummond Purple Top	86·79	13·21	2·74	1	10
East Lothian	87·15	12·85	1·83	2	0
Jumbo	87·23	12·77	1·43	1	9
Bangholm Selected	87·32	12·68	6·23	1	9
Halewood's Bronze Top	87·36	12·64	1·32	1	11
Kangaroo	87·39	12·61	1·32	1	8
Selected Purple Top	87·36	12·64	1·10	1	3
New Century	87·74	12·26	1·26	1	8
Hartley's Bronze	87·84	12·16	1·52	1	9
Mammoth Clyde	87·87	12·13	1·33	1	7
Emperor Swede	88·16	11·84	0·96	1	15
Skirvings	88·21	11·79	1·21	1	12
Hall's Westbury	88·24	11·76	1·61	1	13
Elephant's Master	88·29	11·71	1·33	2	1
Imperial Swede	88·42	11·58	1·11	1	8
Perfection Swede	88·29	11·71	1·20	1	8
Carter's Elephant	88·48	11·52	3·85	1	11
Sutton's Champion	88·85	11·15	1·53	1	8
Good Luck	89·01	10·99	1·32	1	12

The average results for the past two years are as follows:—

Year.	Varieties analysed.	Dry matter. Per cent.	Sugar. Per cent.
1905	20	10·09	1·10
1906	20	12·18	1·78

It will be seen, therefore, that the past season, as in the case of the mangels, has produced a more nutritious root.

Our results again give evidence that owing to greater uniformity in composition there is not the same necessity for selection in the case of turnips as with mangels—that is, from the nutritive standpoint—and that yield and keeping qualities are the important factors to consider when determining the varieties to grow.

Carrots.—The extremes in dry matter are 12·46 per cent and 9 per cent. In sugar content the variation is much greater, namely, from 1·97 per cent to 6·59 per cent. The percentage of sugar this year is apparently altogether independent of the proportion of dry matter present, a peculiarity not general among roots, but which we have noticed in past seasons to a certain degree in examining carrots.

ANALYSIS of Carrots, C.E.F., Ottawa, Ont., 1906.

Variety.	Water.	Dry Matter.	Sugar in Juice.	Average Weight of One Root.	
	p. c.	p. c.	p. c.	Lbs.	oz.
Carter's Orange Giant	87·54	12·46	2·86	1	3
Ontario Champion	88·48	11·52	3·13	1	2
Long Yellow Stump Rooted	88·76	11·24	2·75	1	3
White Belgian	88·97	11·03	2·27	1	4
Half Long Chantenay	88·99	11·01	3·50	0	15
New White Intermediate	89·79	10·21	1·97	1	5
Giant White Vosges	90·00	10·00	4·37	1	4
Early Gem	90·19	9·81	3·41	1	2
Mammoth White Intermediate	90·39	9·61	2·79	1	1
Improved Short White	91·00	9·00	6·59	1	2

Averages for the past two seasons are as follows:—

Year.	Varieties analysed.	Dry matter. Per cent.	Sugar. Per cent.
1905	11	10·25	2·52
1906	10	10·59	3·36

The improvement over the roots of 1905 is again apparent, though the difference in this instance is observable in the sugar content rather than in the increased proportion of dry matter.

INFLUENCE OF INHERITED QUALITIES.

The influence of inherited qualities as shown in the percentage of dry matter and sugar has been investigated by us for a number of years past by the annual analysis of two varieties—the Gate Post and the Giant Yellow Globe. For six successive seasons the former has been considerably the better variety. Thus, speaking of this matter in my last annual report and reviewing the averages then obtained, I said that: 'The difference between these varieties, as far as can be ascertained by chemical analysis, shows that weight for weight the Gate Post should be worth between one-third and one-fourth more than the Giant Yellow Globe for feeding purposes.' Although as in every previous year of this investigation, the Giant Yellow Globe again falls behind the Gate Post in dry matter and sugar, the differences in 1906 are very slight. The reason for this cannot be stated; the only one that seems to accord with past results is that the seed sown as Giant Yellow Globe is of some other and richer variety—the mistake in naming having occurred before the purchase of the seed by the experimental Farm. This is, of course, merely conjecture, but it is difficult to account for the exceptional high results obtained on any other ground.

DRY Matter and Sugar in Gate Post and Giant Yellow Globe Mangels.

Season of Growth.	Gate Post.		Giant Yellow Globe.	
	Dry Matter.	Sugar in Juice.	Dry Matter.	Sugar in Juice.
	p. c.	p. c.	p. c.	p. c.
1900	11·14	6·15	8·19	2·64
1901	9·41	4·15	9·10	4·08
1902	13·90	9·39	10·24	5·24
1903	12·93	7·38	10·89	6·17
1904	12·64	7·62	9·24	5·26
1905	12·07	6·83	8·64	3·55
1906	12·90	6·59	12·73	6·45
Average for seven years, 1900-06	12·14	6·87	9·72	4·77

SUGAR BEETS, FOR FACTORY PURPOSES.

Following the course adopted some years ago, we have again analysed the three chief varieties of sugar beets used for sugar extraction, as grown on the several Experimental Farms. The names of the varieties are Vilmorin's Improved, Klein's Wanzleben, and Très Riche (French Very Rich).

SUGAR BEETS Grown on the Dominion Experimental Farms, 1906.

Variety.	Locality.	Percentage of Sugar in Juice.	Percentage of Solids in Juice.	Co-efficient of Purity.	Average Weight of One Root.	
					Lbs.	oz.
Vilmorin's Improved	Nappan, N.S	15·81	22·01	71·8	0	12
"	Ottawa, Ont	15·48	18·23	84·9	1	10
"	Brandon, Man	16·03	17·89	89·6	1	13
"	Indian Head, Sask	14·65	19·83	73·9	1	8
"	Agassiz, B.C	14·48	17·80	81·3	1	4
Klein Wanzleben	Nappan, N.S	15·90	19·87	80·0	0	11
"	Ottawa, Ont	12·25	20·33	60·2	1	5
"	Brandon, Man	15·97	19·17	83·3	2	1
"	Indian Head, Sask	16·87	21·46	78·5	1	10
"	Agassiz, B.C	13·68	17·10	80·0	1	8
Très Riche	Nappan, N.S	19·53	23·89	81·7	0	9
"	Ottawa, Ont	15·39	18·23	84·4	1	11
"	Brandon, Man	14.50	16·69	86·8	1	9
"	Indian Head, Sask	13·20	17·83	74·0	1	12
"	Agassiz, B.C	14·53	18·06	80·4	0	15

Any detailed discussion of these data is scarcely necessary, the season at all the branch farms apparently being favourable to sugar production, though not in all cases being suitable to a satisfactory tonnage.

The highest percentages are from beets grown at Nappan, N.S., and this may be acounted for by the fact that the roots were much smaller than usual owing to the drought that prevailed there last summer.

The results from the beets grown at Ottawa show a decided improvement over those of 1905, which it may be remembered was a rather exceptional season and one not conducive to the proper ripening of the beet.

The beets from the Farm at Brandon are of very good quality, both as regards richness in sugar and purity of juice. The data are considerably higher than those obtained from the crop of 1905.

Very satisfactory results, as far as analysis is concerned, were obtained from the beets grown at Indian Head, Sask., though the co-efficient of purity is decidedly lower than that of the Brandon beets.

Though not equal to the crop of 1905, the beets grown at Agassiz this past season may be considered roots of fair average quality and sufficiently rich for factory purposes.

In the following table we present the average results, as regards the percentage of sugar in juice, from the three varieties, Vilmorin's Improved, Klein Wanzleben, the Très Riche, grown on the Experimental Farms for the past five years:—

AVERAGE Percentage of Sugar in Juice in Sugar Beets Grown on the Experimental Farms, 1902-1906.

Locality.	1902.	1903.	1904.	1905.	1906.
Nappan, N.S.	15·87	15·33	14·41	16·52	17·08
Ottawa, Ont.	16·77	15·34	16·91	12·45	14·37
Brandon, Man.	....	11·36	16·62	11·09	15·50
Indian Head, Sask.	15·15	16·54	15·24	14·94	14·91
Agassiz, B.C.	....	17·44	8·10?	17·32	14·23

A careful survey of our work in this connection since the establishment of the Experimental Farms has shown that an intimate relationship exists between seasonal conditions and sugar production. Inherited richness (obtained by breeding and selection) and the culture which the beet receives are undoubtedly important factors, but looking back over the records of the past 19 years, I think our data will serve to demonstrate the susceptibility of the beet to excessive or abnormal rainfall and temperature, especially during the autumn months. Dr. H. W. Wiley, Chief Chemist, Department of Agriculture, Washington, D.C., U.S.A., has for many years been studying the effect of various factors—altitude, temperature, &c.—upon the sugar content of beets and from his published results I gather that his conclusions and ours are in the main identical. It would seem that ideal climatic conditions for sugar production include a moderate and well distributed rainfall during May, June, July, and August, with fairly dry weather in September and October, when the beets are maturing; and, further, that a low mean summer temperature, say, 60° F., with few sudden or great changes in the latter part of the season are especially conducive to a high sugar content. In every instance where the percentage of sugar has fallen exceptionally low we have been able to trace the cause to what might be termed abnormal weather conditions; similarly, very high percentages have been found to follow good seasons—that is, those that conform more or less closely with those just described as particularly favourable for the sugar beet.

THE IDEAL BUTTER SEPARATOR.*

This, it is claimed, is 'a new invention which will produce a maximum quantity of pure butter from sweet or sour milk and cream in five to ten minutes.' After giv-

* Manufactured by the Iroquois Machine Works, Iroquois, Ont.

ing a description of the churn, or separator as it is called, the printed circular advertising the machine proceeds to explain the process in the following language: 'The butter is separated by the combined action of the agitation of the dasher and the aeration of the air. The air is sucked down from the outside to near the bottom of the milk or cream, where it is distributed by centrifugal action and bubbles up, causing the separation of the butter globules.'

To avoid any suspicion of exaggeration on the part of the writer regarding the seemingly extravagant claims made for this churn the 'advantages' as set forth in the circular already referred to are given, as follows:—

'1.—More butter is produced from a given quantity of milk or cream than by any churn. This is because it separates the globules of butter from the cream without breaking them. The old process broke them up by the continued friction produced by agitation.'

'2.—The butter will keep better since it is pure and has been thoroughly aerated. It has no mixture of casein or milk in it.'

'3.—The residue is pure and sweet and may be used for table use.'

'4.—The separation is more rapid than any other separator and the air introduced is always pure and does not bubble through more than once. This is because the air is drawn from outside the vessel.'

'5.—The gearing is simple and a child can operate it with safety. No cogwheels to catch the fingers.'

'6.—No casein, albumen or impurity in the butter. It is not possible to remove these by any other process. The ordinary churning beat the butter-fat into an oily mass containing all the impurities such as casein and albumen. The Ideal Separator causes the butter globules to form separately and cohere together. The butter will thus not become rancid or smell offensively.'

In order to ascertain how far the claims made for this invention might be supported in practice, a series of tests or trials have been carried out according to the printed directions, using cream and milk, both sour and sweet. This investigation, as far as the butter-making was concerned, was conducted at the dairy of the Experimental Farm, the work of manipulation from the beginning to the end of the process being left entirely in the hands of a representative of the Iroquois Machine Works, sent specially for that purpose. The weight of the cream or milk used in the tests, of the buttermilk and washwater, and of the resultant butters were all checked by the writer, who also took notes of temperatures, &c., throughout the various operations. Samples of the creams and milks used, of all the by-products, and of the butters were taken and subsequently submitted to analysis in the Farm laboratories.

It is thus evident that all the necessary data were carefully obtained for tracing the butter-fat throughout the whole process, and thus to learn with what degree of economy butter could be made by this process.

For convenient reference, the weights, temperatures, and the chief analytical data will be presented in tabular form, the following notes supplying all other necessary information regarding the working of the process in the several trials.

NOTES ON THE PROCESS.

Trial 'A.' Sour or Ripened Cream.—At the time of churning this cream was one day old. It proved on analysis to contain 20·41 per cent fat. After it had been agitated in the machine or churn for a few minutes the operator added a quantity of water at 70° F., claiming that the cream was too thick for satisfactory working. The butter gathered in about 8 minutes, when the granules were about the size of small wheat. The buttermilk was then drawn off and wash water at 52° F. poured on the granular butter in the churn. After a few turns of the dasher this wash water was run off, the butter taken out and worked on the table, salted, weighed and sampled, and the remainder placed in the cool storage room in order that its keeping qualities could be subsequently ascertained.

Trial 'B.' Sweet Cream.—This was freshly separated cream. As in Trial 'A,' the operator added a large quantity of water at about 70° F. to the cream in the churn. Ten minutes sufficed for the churning. Very considerable difficulty was experienced in removing the butter, which adheres to the dasher and rotating disc—the construction of the machine being such that some loss of butter must invariably follow from this cause. It was found that only by the use of hot water could the internal parts of the apparatus be perfectly cleansed of butter-fat.

Trial 'C.' Sweet Milk.—This was started in the churn at a temperature of 72° F., and the butter began to gather in 5 minutes. It was evident, however, from the appearance of the milk that the separation was imperfect, and the operator continued further churning for half an hour, during which time the temperature fell 10 degrees. The granules were very small, oily and refused to properly coalesce. The operator claimed that this, for some unknown cause, was an unsatisfactory test, and he was allowed to repeat it with a fresh quantity of milk (Trial 'C1'). All the weights were, however, taken and samples of the by-products and butter collected for analysis, so that data would be available for the determination of the loss of butter-fat.

Trial 'C1.' Sweet Milk.—This milk was somewhat richer than in the previous test. It was churned at a temperature of 71° F., and the butter began to gather in 10 minutes. Though a more satisfactory test than 'C,' the granules were exceedingly small and of a more or less oily consistency, making it extremely difficult to remove the butter from the churn.

Trial 'D.' Sour Milk.—This milk was 24 to 30 hours old when churned. The time of churning, 10 minutes. The granules were very small and refused to gather, and, as in the case of 'C.' and 'C1,' had to be collected on a fine sieve. From the appearance of the drawn off buttermilk, it was evident that there was a considerable loss of butter-fat—and this fact had been noticed in all the previous trials save 'A' with sour cream. The subsequent analyses proved the correctness of this conclusion.

DISCUSSION OF THE DATA AND CONCLUSIONS.

To the butter-maker the tables here presented will require but little explanation; it may serve a useful purpose, however, to emphasize one or two of the more important facts they disclose and which we are obliged to admit are directly against this method of butter making.

TABLE I.—THE IDEAL BUTTER SEPARATOR.

(The 3-gallon size machine was used in all the trials.)

Trial.	Weight of Cream or Milk taken.		Fat in Cream or Milk.		Buttermilk.			
			Per cent.	Total Weight.	Weight.		Fat in Buttermilk. Per cent.	Fat in Buttermilk. Weight.
	Lbs.	ozs.		Ozs.	Lbs.	ozs.		Ozs.
A—Sour cream	22	15	20·41	74·9	23	9½	·27	1·0
B—Sweet cream	26	14½	29·68	127·8	53	0	1·05	8·9
C—Sweet milk	25	3	5·19	20·9	28	0	1·65	7·4
C1—Sweet milk	15	2	5·78	14·0	15	6	1·37	2·0
D—Sour milk	25	0	4·59	18·4	20	7½	1·09	3·6

Trial.	Wash water.				Butter.			
	Weight.		Fat in Wash water.		Weight.		Fat in Butter.	
			Per cent.	Weight.			Per cent.	Weight.
	Lbs.	ozs.		Ozs.	Lbs.	ozs.		Ozs.
A—Sour cream	22	9½	Traces.	Traces.	5	12	79·89	73·5
B—Sweet cream	26	7½	Traces.	Traces.	8	14½	81·48	116·1
C—Sweet milk	31	1	·29	1·4		10½	82·61	8·7
C1—Sweet milk	14	10	·01	·06		11¼	82·93	9·3
D—Sour milk	25	5½	·105	·4		14¾	82·31	12·1

Table 1.—This shows that in all the trials except that with sour cream there was *an excessive loss of butter-fat in the butter-milk.* Butter-milk, ordinarily, contains between ·1 per cent and ·2 per cent fat—in four of these trials it was between 1 per cent and 2 per cent. Owing to the proportionately large amount of butter-milk in these trials—due to water added during churning—the loss of fat in this by-product is much greater than is indicated even by these high percentages. Thus, in the case of the sweet cream churning, of the 128 ounces (approximately) of butter-fat in the cream used, 9 ounces (approximately) were found in the butter-milk—with an ordinary churn and good work the amount of fat in the butter-milk would not exceed ¾ ounce. But bad as this is, the showing is much worse with the milk, both sweet and sour. Leaving out of consideration trial 'C,' which it might be held was not representative, we find with sweet milk one-seventh, or more than 14 per cent of the total butter-fat in the butter-milk, and with the sour milk, one-fifth, or 20 per cent of the total fat was lost in the butter-milk.

TABLE II—DETAILS OF CHURNING.

Trial.	Temperature.		Time of Churning.	Size of Granules.	Temperature of Wash-water
	Before Churning.	After Churning.			
	°F.	°F.	Min.		°F.
A	70	70	8	Small wheat	52
B	69	69	10	Wheat.	52
C	72	62	5 to 8	Millet.	50
C1	71	69	10	Millet.	50
D	69	69·5	13	Millet.	52

Table II.—Affords a partial explanation at least of the loss in the butter-milk just referred to. It reveals the very high churning temperatures used in this process. Ordinarily, this temperature is about 50 degrees F. Higher temperatures, it has been shown, tend to the escape of fat in the butter-milk. This well-known fact being pointed out to the operator, he stated that the machine required the cream or milk to be about 70° F. for a satisfactory churning—by which the writer presumes he meant that butter could not be obtained in the time specified unless the cream or milk were at this high temperature.

The temperature of the wash-water, it will be noticed, also was higher than customary—about 10 degrees above the temperature of the wash-water as used in the dairy of the Experimental Farm. As a result of this high wash-water temperature, in conjunction with the high churning temperature, we might with confidence predict that butter would be obtained containing a large quantity of water.

TABLE III.—COMPOSITION OF BUTTERS.

Sample.	A.	B.	C.	C¹.	D.
Water	16·68	15·97	13·99	14·41	15·64
Fat	78·89	81·48	82·61	82·93	82·31
Salt	2·29	1·37	1·60	1·27	·58
Curd	1·14	1·18	1.80	1·39	1·47
	100·00	100·00	100·00	100·00	100 00

Table III.—The correctness of the conjecture made in the preceding paragraph is well supported by the high percentages of water in these butters. In one instance the water exceeds the legal limit; in two cases the percentages are dangerously close to this limit and in the two remaining butters from fresh milk the percentages are 13·99 and 14·41—considerably higher than is desirable for butter with good keeping qualities.

In other respects the butters are fairly normal. The percentages of curd present show that the claim that the butter made by this process is free from this constituent, falls to the ground.

TABLE IV.—ECONOMY OF THE PROCESS.

Trial.	Total Weight of Fat in Cream or Milk.	Total Yield of Butter.		Over-run Per-centage.	Fat Recovered in			Total loss of Butter Fat.	Per-centage loss of Butter-fat
					Butter.	Butter-milk.	Wash-water.		
	Ozs.	Lbs.	ozs.		Ozs.	Ozs.	Ozs.	Ozs.	
A.	74·9	5	12	23	73·5	1·0	Trace.	1·4	1·9
B	127·8	8	14½	11	116·1	8·9	Trace.	11·7	9·1
C	20·9		10½	....	8·7	7·4	1·4	12·2	58·3
C	14·0		11¼	....	9·3	2·0	Trace.	4·7	33·6
D	18·4		14¾	......	12·1	3·6	·4	6·3	34·2

Table IV.—This is a most instructive table, since it traces the butter-fat throughout the whole process and gives the amount and percentages of the loss of this very important constituent that occurred in the several trials. Using sour or ripened cream. this loss is almost 2 per cent; with sweet cream it amounts to 9 per cent of the total butter-fat. If we except the 'unsatisfactory' trial 'C,' the loss with sweet and sour milk is 33 per cent and 34 per cent, respectively—practically two-thirds only of the butter-fat is found in the resultant butter.

If the weight of the fat in the butter-milk and wash water be added to that contained in the butter and the sum compared with the amount in the cream or milk placed in the churn, it will be found that in each trial there is a weight of fat varying from ·4 ozs. to 3·4 ozs.—to be accounted for. This represents largely the butter-fat unavoidably lost in the apparatus. It has already been remarked that owing to the construction of the machine it is impossible to remove *all* the butter from the mechanism of the churn. Every effort was made to accomplish this, but it was very evident to all present that a considerable loss must ensue from this cause. Hot water was required to thoroughly cleanse the mechanism (dasher and disc) of fat before proceeding to the next trial.

In conclusion, as far as our investigation gives proof, the only claim made good is that regarding the time of churning. The process appears to be one of the most wasteful of all those that have been put forward to supercede the ordinary or orthodox methods of butter-making and which have been examined in the Farm laboratories during the past twenty years.

INSECTICIDES AND FUNGICIDES.

NEW FORMS OF KEROSENE EMULSIONS.

In an investigation carried on about a year and a half ago to ascertain the emulsifying effect of certain materials—and more particularly lime, as advocated by Professor Close—in the preparation of Kerosene Emulsion, it occurred to the writer that flour might answer for this purpose of holding coal oil in suspension. Experiments proved this to be the case, a very satisfactory emulsion for immediate use resulting. Eight ounces of flour were found sufficient to hold in perfect suspension one quart of coal oil. The emulsion is simply and easily made as follows:—

The requisite amount of coal oil (Kerosene) is poured into the pail or barrel and flour added in the proportion of 8 ounces to 1 quart of coal oil, the mass thoroughly stirred and the water added—2 gallons for every quart of coal oil. The whole is then vigorously churned, say for 5 minutes, by means of pump and coarse nozzle or a wooden paddle or dasher as used in upright churns—and the emulsion is ready for use. The spray is smooth, easily atomized and does not clog the nozzle.

During the last few weeks, this investigation, at the suggestion and with the assistance of Mr. Macoun, has been extended to the preparation with flour of certain sprays that might prove useful both as insecticides and fungicides,—Winter washes to be employed on dormant wood only and sprays that would combine the properties of Bordeaux mixture and Kerosene Emulsion for summer use. The following notes give briefly information regarding the emulsions which it has been thought might be serviceable to the fruit grower.

WINTER WASHES.

Bluestone 1 per cent, Kerosene 10 per cent.

Formula:

Bluestone	4 lbs.
Flour	8 "
Kerosene	4 gals.
Water	36 "

Mix the flour with the kerosene, as before described. The bluestone being dissolved in the water, pour about one-half of the solution, (the exact quantity is a matter of no moment) on to the Kerosene-Flour mixture and churn for 5 minutes. Pour in the remainder of the bluestone solution, stir, and the emulsion is ready for use.

On standing this spray separates into two layers, which, however, are readily remixed by stirring. Free oil does not appear, if the churning has been efficient, for at least 20 hours.

Caustic Soda 2 per cent, Kerosene 10 per cent.

Formula

Caustic Soda	8 lbs.
Flour	8 "
Kerosene	4 gals.
Water	36 "

Caustic Soda 2 per cent, Kerosene 5 per cent.

Formula

Caustic Soda	8 lbs.
Flour	8 "
Kerosene	2 gals.
Water	38 "

Caustic Soda 1 per cent, Kerosene 5 per cent.

Formula

Caustic Soda	4 lbs.
Flour	4 "
Kerosene	2 gals.
Water	38 "

It will be noticed that these three emulsions contain the same ingredients, but differ in strength, *i.e.*, in proportion of caustic soda and kerosene. The preparation is alike in all. The flour and the kerosene being mixed in the desired proportion, the solution of the caustic soda (lye) is poured on and the whole churned for 5 minutes. They are all remarkably stable, no free oil appearing after standing for 4 days, save in the case of the last formula, which contains but 4 lbs. flour per 40 gallons. The stability or permanence of these emulsions is undoubtedly due to the action of the caustic soda on the floor, making a viscous fluid which is eminently adapted for holding the coal oil in suspension.

SUMMER SPRAYS.

Bordeaux and Kerosene.

Formula

Bluestone	4 lbs.
Lime	4 "
Kerosene	4 gals.
Water	36 "

This is the usual Bordeaux mixture plus 10 per cent kerosene. It is best made as follows: To the freshly slaked lime add one-half the total volume of water and pour in the requisite amount of coal oil, emulsify for 5 minutes, then pour in the remainder of the water, in which the bluestone has been dissolved, and stir well for 1 minute. Though on standing a thick creamy layer forms, there is no separation of oil for at least 24 hours and simple stirring is all that is necessary, within a few days of making, to bring about a perfect mixture.

Bordeaux, Flour and Kerosene.

Formula

Bluestone	4 lbs.
Lime	4 "
Flour	4 "
Kerosene	4 gals.
Water	36 "

This, it will be observed, is the Bordeaux Kerosene Emulsion just described plus flour. To the diluted slaked lime the kerosene containing the flour is added and the whole emulsified, for 5 minutes; the solution of bluestone (approximately one-half of the total volume) is then poured in and the whole well stirred. This is a particularly stable emulsion, no free oil showing after two months. The thick layer that had separated at the end of this period, and which contained the oil, readily mixed again, forming a perfect emulsion. As a spray furnishing at once Bordeaux mixture and coal oil—a combined fungicide and insecticide—one simply made and of excellent keeping quality, this formula gives great promise. Certainly from the standpoint of preparation and the laboratory tests it leaves nothing to be desired.

COMMERCIAL BLUESTONE.

The fact that there was a larger proportion of smutty grain in Manitoba and Saskatchewan in 1905 than for several years previous aroused a suspicion in the minds of many regarding the quality of the bluestone (sulphate of copper) used in treating the wheat. To ascertain what foundation there might be for this suspicion we considered it desirable to procure samples from farmers and dealers at various points in the Northwest, and submit them to analysis. This was done during the early months of 1906, the samples examined numbering about thirty.

Analysis of Commercial Bluestones*—1906.

Designation.	Oxide of Copper. — (CuO.)	Oxide of Iron. — (Fe_2O_3)	Designation.	Oxide of Copper. — (CuO.)	Oxide of Iron. — (Fe_2O_3)
Pure copper sulphate	31·88		Manitoba—*Con.*:		
Pure iron sulphate.......	....	28·74	McG. Bros., Mackenzie	30·56	0·80
Manitoba—			J. A., Roblin..........	29·66	1·10
C. Bros., Lenora	31·40	0·80	M. G. T., Highbluff...	30·38	0·90
" "	31·02	0·86	T. W. M., Portage la		
W.H.M., Gilbert Plains	30·64	0·72	Prairie............	30·60	0·76
J.A., Turnbull	30·88	0·76	J. O. C., "	31·78	0·78
A. McP., Dauphin.....	30·70	0·94	H. L., Foxwarren......	31·08	0·52
A.B. & Co., Swan River	31·14	0·74	M. B. J., Hamiota.....	31·46	0·74
S. & S., Dauphin......	30·98	0·70	Saskatchewan—		
S. C., "	30·42	0·66	——, Wapella.........	....	0·85
M. Co., Swan River...	31·78	0·50	A. M., Indian Head ...	....	0·93
J. G., Russell.........	30·94	0·98	D. & B., Langenburg ..	30·72	0·72
A. H., Hartney........	32·58	0·78	E. S., Fleming.........	30·94	0·30
E. A. M., Mackenzie ..	31·36	0·64	J. B., "	31·24	0·36
T. M. H., Foxwarren ..	30·24	0·76	L. L. D., Leofield	31·72	0·36
" " ...	30·12	0·80	Ontario—		
" " ..	30·20	0·68	W. T. M. Ottawa......	29·64	0·36

* The copper and iron present were determined and are returned as oxides; for the calculation of the results to sulphates it is only necessary to add that 31·88 per cent copper oxide corresponds to 100 per cen pure sulphate of copper and 28·74 per cent oxide of iron to 100 per cent sulphate of iron.

These data did not, in my opinion, reveal the presence of any adulteration, and all the samples were reported as commercial bluestone of the usual quality or grade.

This finding does not, of course, mean that these samples were chemically pure sulphate of copper; commercial bluestone invariably contains a small percentage of sulphate of iron and other impurities and the samples under examination proved no exception to the rule. The amount of sulphate of iron obtained varied from 1·04 per cent to 3·82 per cent, which percentages, as we have intimated, are not greater than those which have always been found in the ordinary bluestone upon the market.

Some years ago (1890) there was offered for sale in the Northwest a so-called 'Agricultural Bluestone,' which on analysis proved to contain a very large proportion of sulphate of iron—from 30 to 60 per cent. Experiments undertaken by us with this material—which differs from ordinary bluestone by the crystals being of a light greenish-blue colour—showed conclusively that it was much less effective in smut prevention than bluestone. Further investigation made it clear that sulphate of iron was practically valueless for smut destruction and consequently that its presence in any large proportion would considerably reduce the beneficial action of the bluestone, The amount in the ordinary commercial bluestone, however, in the writer's opinion, is not large enough to materially lower the value of the bluestone for the treatment of wheat. It may be added that no sample of 'Agricultural Bluestone' has been received at the Experimental Farm laboratory for a number of years, so that we may suppose this spurious article is not now for sale in the Northwest.

In many of the samples of bluestone received from farmers for examination the crystals were more or less covered with an efflorescence or white incrustation. This was taken as an indication of impurity or at all events of inferior quality. The formation of this incrustation is due to a loss of a part of the water of crystallization in the bluestone, due to exposure of the material to dry air. The extent to which this drying out occurs, or, stated otherwise, the amount of incrustation formed, will depend on the surface exposed, the relative dryness of the air and the length of the period the bluestone has been exposed. Bluestone kept in bottles or jars tightly corked or stoppered will not show this incrustation. This incrustation, however, implies no loss of strength, but rather the reverse, as weight for weight, this incrusted bluestone will contain somewhat more copper sulphate than the normal blue crystals. As such incrusted crystals readily enter into solution it may be used without hesitation and the solution will be found to be equally effective as that from the unchanged bluestone.

AGRICULTURAL TOUR IN BRITISH COLUMBIA.

In June, 1904, the writer, in company with Mr. J. R. Anderson, Deputy Minister of Agriculture for British Columbia, made a tour in that province with the view of obtaining from personal observation and inspection information regarding the agricultural capabilities and possibilities of certain districts—more particularly the Okanagan and Nicola Valleys, which were being brought prominently before the notice of incoming settlers. An account of this trip was given in the Annual Report of the Chemical Division of the Experimental Farms for that year. The knowledge of the various soils and of the climatic conditions under which the soils must be worked proved of such great value in helping those who had already taken up land and to those intending settling in these districts, that by direction of the Honourable the Minister of Agriculture, Ottawa, the writer made a further tour during the past summer to continue this agricultural survey, and more particularly with the object of traversing ground which was not covered in 1904 and which was coming into notice as fruit growing districts. Accordingly, in the latter part of last July the writer joined Mr. Anderson, in Victoria, to enter upon an itinerary previously agreed upon and which would more especially take us through the valley of the Columbia, the East Kootenay and the Boundary districts.

As on the former occasion meetings of farmers and fruit growers were held at all points where the settlement promised an attendance. In all, 38 meetings were addressed, the subjects for discussion being soils, their origin, nature and economic management; the value of legumes for soil enrichment; the control of soil moisture; fertilizers, their composition and profitable employment, and allied subjects. Mr. Anderson also gave addresses in connection with commercial fruit growing and institute matters. It is a great pleasure to record the enthusiasm and intelligence evinced by those attending these meetings. Many had to travel long distances to be present and it was very evident from the interest taken in the discussions that all were determined to benefit to the fullest degree by our visit. Such time during the day that was not spent in travelling from place to place was employed in going over the land, examining soils and collecting samples for future analysis, taking notes of the crops, water supply, &c., and in giving practical demonstrations in the field. This latter feature proved most attractive and apparently very helpful to the farmers and enabled us to gain much valuable information that could not otherwise have been obtained as to the practices and experience of those actually engaged in tilling the soil.

Vancouver Island.—Before proceeding to the mainland, a few days were spent by special request in visiting certain districts in the vicinity of Victoria, and which had been omitted from the programme on the occasion of our previous survey tour.

The Saanich Peninsula, though containing a considerable area of rough, rocky and uncleared land, will undoubtedly become an important fruit growing district. Of all branches of agriculture it seems best adapted to this industry and from the acreage now being planted to fruit it will not be long before there is a considerable amount of produce for export. Apples, plums, cherries and strawberries—especially the latter—do exceedingly well and no doubt other fruits will be added to the list. Hitherto the land has been tilled chiefly in patches along the valleys, but the probabilities are that the slopes and higher grounds will be found even more suitable, chiefly by reason of the better drainage there afforded. In the lower lands potatoes and oats have up to this time been the main crops, to the detriment of the soil from depletion of humus and nitrogen and the loss of water-holding capacity. It is not unusual for this district in common with a large area in this part of the island to suffer from drought during the months of July and August. Hence, the necessity for fruit and vegetables of early and constant cultivation to form an earth mulch to check surface evaporation. Orchards in sod were found, as might be expected, to be a failure. All classes of soil were noticed, light, sandy and gravelly loams, clays and muck soils. The desirability of growing more clover, which succeeds admirably here, was pointed out for the two former, and the advantage of tile drainage for the heavier lands emphasized.

Metchosin.—The drive to Metchosin, which lies to the south of Victoria, was largely through a heavily timbered country containing many very fine trees. For the most part, the clearings seemed small and oats appeared to be the principal crop. The premature ripening of this grain gave evidence of the dry season, and examination of many of the soils showed that the effect of the drought had been accentuated by the small proportion of humus present. These matters furnished subjects for the address in the evening, in which was pointed out the desirability of adopting a rotation that would from time to time furnish humus. The value of cultivation and mulching for conserving moisture was also dwelt upon. This is a district in which as yet very little fruit planting has been done. With more attention to enrichment of the land, cultivation and mulching, however, there is no reason why this industry of fruit growing should not be more largely entered upon.

Pitt Meadows.—This was the first district visited on the mainland, being reached via Westminster Junction, where we were met by appointment by Mr. John Oliver, M.L.A. Mr. Oliver had been in correspondence with me for some time, giving me his experience regarding this district and forwarding samples of soil for analysis. He had made a special request that I should visit the 'Meadows' when next I went to British Columbia.

Pitt Meadows, situated at the confluence of the Pitt with the Fraser river, is of deltaic origin—the result of the deposition of the alluvial detritus brought down by the Pitt river. The 'Meadows' has an approximate area of 15,000 acres. A description of the soil formation by Mr. Oliver is as follows: 'The foundation on which this soil rests is first a quicksand found at a depth of from 8 to 10 feet from the surface, next follows a true river sediment on the top of which is soil composed largely of decayed vegetable matter mixed with river deposit; the nearer the surface the less river deposit is contained in the soil. In some places the river deposit shows on the surface, but there is an average depth of about a foot of muck and then follows the mixture of decayed vegetable matter with the river deposit.'

In traversing this area, or rather a limited portion of it, the writer found a considerable portion of the surface soil to be a silt of fine mechanical condition and rich in semi-decayed vegetable matter. As Mr. Oliver had pointed out, however, there were also large areas covered with muck deposits. These occurred in natural depressions in the Meadows and according to our measurements varied from 2 to 18 inches in depth, the greater number of our trial pits indicating depths of from 9 to 12 inches, the muck everywhere being underlaid by the river deposit. In many places there was no clear line of demarkation between the surface and subsoil, the one merging into the other.

Analyses made in 1894 of the surface soil collected where there was no overlying muck showed that this alluvial deposit was a silty clay loam possessing a large amount of vegetable matter and particularly rich in nitrogen and fairly well supplied with potash and phosphoric acid, but somewhat deficient in lime. I then reported that this soil, chemically and physically, might rank with the most productive soils on the continent, provided there was efficient drainage. The slight sourness might be neutralized with lime, and that in all probability phosphatic and potassic fertilizers would only be necessary where excessive cropping had been carried on without manuring. I suggested basic slag as the phosphoric fertilizer and stated that if it were employed there was no need of liming, since in addition to phosphoric acid it contained a considerable amount of free lime.

It is the areas covered with muck chiefly where failures have occurred. Analyses of this material, collected this year, have shown, as might have been expected, an excess of vegetable matter but slightly decomposed, traces of clay and sand and a general deficiency of mineral plant food. Such soil is undoubtedly difficult to bring into profitable cultivation, but with drainage and an intermixture with the underlying silt, it can in time be made productive. Basic slag and potash salts are the rational fertilizers for these areas, though, as has been proved by Mr. Oliver, a dressing of barnyard manure may be profitable, due no doubt to the fact that it furnishes a supply of immediately available nitrogen (not present in muck, though it is a highly nitrogenous material) and the further useful property of introducing bacteria whose function is to make ready the plant food for crops from the inert matter in the soil.

In the past, farming on the Pitt Meadows has only been carried on with partial success, depending largely on the character of the season. From my survey, and a careful consideration of the analytical data we have obtained, I am convinced that the chief trouble has been from the free water being too near the surface. It is quite clear that there is a necessity over a large portion of this area of lowering the water table. Signs of poor drainage, of sourness, were apparent, and I firmly believe that if by pumping the water-table were lowered those areas included by dykes could be brought into profitable cultivation. There is much latent fertility, especially in the river deposit; such land requires drainage and cultivation only to make it most productive. And for those parts in which an excessive amount of vegetable matter is present, there should be in addition the supply of the mineral elements by the means that I have indicated.

It is very encouraging to know that Mr. Oliver has commenced a series of experiments with various fertilizers. I am sure his results will be found most useful by those who are in this district, which is now very largely given over to hay growing and pasturing.

Upon our return to the railway station an impromptu meeting was held, a number of farmers having come together and brought samples of their soils with them. The character of these soils was explained and advice given on the several problems in soil management and crop growing that those attending had met with in their work.

Penticton and Keremeos.—From Westminster Junction we went to Penticton via Sicamous and the Okanagan route. Penticton lies at the southern extremity of Okanagan lake. The district in the immediate vicinity of the town is evidently destined to be one of great fruit production, though there is also a certain area well adapted to dairying. Comparatively speaking, this is a new country, and it is only within the last two or three years that extensive irrigation systems have been constructed, the land supplied with water and offered for settlement. This work of preparation is being actively pushed forward by the Southern Okanagan Company on the areas more particularly bordering on the lake and at the time of our visit settlers were fast coming in to take up lots which were chiefly of 10 to 20 acres. Quite a large area has already been planted with apple and peach trees and still more will be planted this spring. The summer had been exceedingly hot and dry, but where a sufficiency of water had been supplied the young trees had not suffered and judging by appearances, had made fair growth. Much of the land was surrounding the lake and is very similar to that of the benches higher up, as at Peachland and Fruitland, the character of which we discussed in our report for 1904, in our account of the Okanagan district. On small holdings devoted to fruit culture very few animals are kept and hence the supply of the manure will not be adequate for the soil's needs. It will be a matter of considerable importance to keep up the humus content of the soil by the occasional turning under of leguminous crops, for excessive cultivation will undoubtedly materially reduce the small supply now present. It is characteristic of a semi-arid district that the soils are not rich in vegetable matter, and the climatic conditions are against its accumulation. With a soil fairly rich in humus less irrigation water will be necessary, for it will then be more retentive of moisture. Undoubtedly much better results will be obtained by keeping the soil fairly well supplied with organic matter, followed by cultivation to check surface evaporation, than when irrigation is entirely depended on to furnish all the water required by the growing trees—for such invariably leads to surface washing, leaching of the plant food, and on the lower levels injury to vegetation from seepage.

In comparison with the prairie soils of the northwestern provinces these bench soils are not excessively rich in plant food; indeed, many of them are distinctly poor, but it is believed that subsequent analysis will show a considerable portion of their plant food to be in a more less available condition. Such is generally the case with soils in a semi-arid country. If this be so, it behooves those entering on these virgin lands to adopt methods that will minimize their depletion and exhaustion. These soils give exceptionally good returns at first, but the excessive use of irrigation water, with no return of humus-forming material will prove disastrous and render the fruit-grower in time entirely dependent on commercial fertilizers.

In this matter of fertilizers, I would not be misunderstood. Those who are purposing raising early vegetables and small fruits will undoubtedly find the judicious use of fertilizers profitable, but for apples and larger fruits especially such a course should scarcely be necessary, at all events until such time as the orchards are in bearing.

The soils that are lower—the bottom lands—and which we have spoken of as suitable for dairying are very much richer, and will need little or no addition of plant food for many years. Drainage and a rotation of crops are all that is at present necessary for very profitable returns. On them we saw many excellent crops of hay, roots, forage plants and oats.

Our thanks are due to Mr. W. T. Shatford, the local manager of the S. K. Co., who drove us over a considerable area of the land the Company had recently laid out in lots and planted, showed us their extensive irrigation system and generally supplied us with information respecting the district.

A very interesting and well attended meeting was held in the evening at which the nature of the soil and its rational treatment were discussed. Many local problems were brought forward and advice given as to the best means to meet the difficulty. Mr. Anderson gave a practical address on the planting and management of orchards, and in concluding outlined the benefits to be derived from the establishment of a farmer's institute and co-operative society, as regards marketing products.

From Penticton we drove to Keremeos, a distance of 35 miles, in the Similkameen valley. There has been but little land taken up along this route for agricultural purposes; much of it is sandy. In parts it is well timbered, but irrigation is necessary for agriculture, and this so far has only been possible in a very limited way at one or two points. About half way, Mr. Kitely has a small area planted, but unfortunately his supply of water was not of good quality; of good water the supply was apparently quite inadequate for the area requiring irrigation. Certain areas showed decided indications of alkali and it was evident that caution will have to be exercised that the water used for irrigation is not too highly charged with saline matter, or more harm than good will result.

Keremeos.—At Keremeos we were entertained by the pioneer settler of the Similkameen, Mr. Frank Richter, whose splendid orchards gave emphatic evidence of the great capabilities of this district as a fruit-growing country. Apples, peaches, apricots, nectarines, grapes, and other fruits all flourish here. The valley, about 18 miles long and from 1 to 2 miles wide, lies north and south, and is surrounded by mountains. Its situation seems favourable for the culture of tender fruits and no doubt the growing of early vegetables will prove very profitable. The mines at present take the greater part of the products of the land, but as the Great Northern Railway has now its construction as far as Keremeos, transportation facilities for export will soon be offered and there will be a large influx of those taking up land for fruit growing. The soil of the valley for the most part is excellent, decidedly richer than much we had seen in the semi-dry belt and no doubt has been largely formed by detritus brought down by the Similkameen river. The summer temperatures here are higher than those of the Okanagan and apparently there is no reason why fruits of a semi-tropical character cannot be grown successfully. Much land was being cleared of sage brush and being staked off into lots, which we understood were being taken up rapidly. Mention must be made of the magnificent growth of alfalfa here; a third crop on Mr. Richter's farm being at the time of our visit waist high. With irrigation, there appears to be no reason why this valley should not become a most flourishing district, the climate and, for the most part, the soil being very favourable to successful agriculture in many branches.

Returning to the main line of the C.P.R., the first stop-over was made at Vernon, where we visited several orchards and fruit ranches in the vicinity, giving advice on soils, water supplies and other matters that the residents of the district desired information upon. A very bad weed, the Prickly Lettuce (*Lactuca scariola*), it was noticed, had in many fields taken possession. It was evident that stringent measures ought to be taken at once for its eradication or its rapid spread would prove in the near future a serious menace to successful agriculture.

A largely attended meeting was held in the evening at which the use of commercial fertilizers was more particularly discussed. For bearing orchards and the forcing of early vegetables and tomatoes no doubt fertilizers, if employed with judiciousness, will in many cases be found profitable, but the soil for the most part is of such good quality that if the humus content is maintained, as by the turning under of green crops, we scarcely think they should be generally necessary.

It was a great pleasure to visit the Coldstream ranch, the property of Lord Aberdeen, and which for a number of years has been under the management of Mr. W. C. Ricardo. The orchards were in a flourishing condition, betokening the care and thoroughness with which all the operations on the ranch are carried on.

A considerable area of most desirable land has recently been put under irrigation and put upon the market by the Coldstream Estate Co., and this is being rapidly taken up by an excellent class of settlers. It will only be a few years before the output of fruit from this district exceeds manyfold that now exported.

From Vernon we drove to Armstrong, where we were met by Mr. Heggie, the president of the Spallumcheen Farmers' Institute, and the manager of the Stepney ranch. A meeting was held at which several local problems were discussed and we then proceeded to Enderby, stopping at a number of ranches on the way to inspect the soil and talk over matters with the farmers.

This is a district in which much heavy clay prevails, and I feel convinced from what I saw on this occasion as well as in 1904, that it is one which would be much benefited by more extensive irrigation than it now enjoys. Tile drainage here is also a matter of the greatest importance and should be more generally introduced. It is a district better adapted to dairying than fruit-growing. With improvement in the mechanical condition of the soil, corn would assuredly flourish. Again, we noticed that alfalfa made in general a meagre growth and gave but one crop in a season.

With irrigation and drainage we are confident that this most valuable crop would yield two or three cuttings in a season. In the past the impression has been that the rainfall is ample for all purposes, but on the occasion of both of my visits the district was suffering badly from drought. The initial outlay for irrigation and drainage would undoubtedly be repaid in a short time by the increased crop yields, and I placed this matter before the farmers in a strong light for their earnest consideration.

Revelstoke.—Very little agriculture on anything like an extensive plan has been done here. There are some small orchards set out, and dairying, chiefly to supply milk to the town, is carried on to a limited extent. The land is heavily timbered and unfortunately in clearing it much of the vegetable matter in the soil is being destroyed. The soil, generally speaking, is light and sandy, and consequently the fire burns deeply, with the loss of the greater part of the humus and nitrogen that has been accumulating for centuries. This matter was explained fully at the meeting held in the evening and which was well attended. The use of fire in clearing the land is necessary, but by piling the brush in heaps it can be confined and a large area saved from its most injurious effects. Irrigation is not necessary here, there being an ample rainfall. Clover does excellently and should be more commonly used to enrich the soil, which, as already remarked, is of a light and open character. Climatic conditions are evidently suitable for cherries and plums, and experience no doubt will show that the district is one favourable for a large number of fruits and for dairying.

The Upper Columbia and the Kootenay.—From Revelstoke the train was taken to Golden, the starting point for our survey of the valleys of the Upper Columbia and the Kootenay. The journey from Golden to Cranbrook, a distance between 175 and 200 miles, was made by private conveyance in order to allow us the better to visit the ranches along the way, to examine the soils and make observations as to general conditions and possibilities of the district for agriculture. This trip occupied ten days.

Before leaving Golden, a few places in the immediate vicinity where orchard-planting had been begun were visited. The soil was generally light and gravelly—and clover-growing was advised to supplement the small supply of manure that was available. By request, we went over the hospital grounds with a view to making suggestions for their management. It is a pleasure to record our appreciation of the splendid order and care that this institution evinced in its administration both in the grounds and the hospital itself.

For some miles after leaving Golden the stage road follows the river closely, the valley being narrow. There is consequently very little settlement and ranches are small and only occur at comparatively long distances, more particularly at spots where the Rockies have receded, leaving a cultivatable area between their foothills and the Columbia. In places, however, valleys strike back into the mountains, affording opportunities for agriculture on a more extended scale. A projected railway, the Kootenay Central, from the main line of the C.P.R. to the Crow's Nest line is being constructed and we noticed that some 10 or 12 miles from Golden had been graded. When completed, a new impetus will be given to this valley, as at present besides the stage the only means of transportation is by steamer which plies during the summer twice a week between Golden and Windermere. At low water this service is irregular and uncertain and settlers have difficulty in reaching the landings. The expense attached to shipments and the necessary delay, it is stated by settlers, are now such that they cannot put their products upon the market profitably. Undoubtedly the advent of the railway will do much towards settling this valley, which has assuredly a future in the production of fruit, of dairy products and vegetables that will find a ready market in the Northwest. Settlement, as I have said, is sparse and irregular, but many no doubt will find when means of access are better that there are considerable areas of fertile soil that can be profitably cultivated.

At Spillimacheen, 18 miles from Golden, and at various points between that place and Briscoe, 50 miles out, the soil was of excellent quality, producing apples, and small fruits abundantly. At Briscoe we were entertained by Messrs. Mitchell Bros., who have made considerable progress. Their ranch is beautifully situated and it is being managed with intelligence. The soil here is a rather heavy clay. Cattle and sheep apparently do well on the native grasses. Mr. Henry Aitcheson's place was also visited. Small fruits and vegetables flourished with him and, from the prices mentioned, I should say paid well. Poultry also proved lucrative, as excellent prices for eggs could apparently be obtained at all seasons of the year. Hay was being baled here, showing that the cultivation of this crop on the large areas of the lower flats of the valley could be prosecuted. The growth of clover was very good, so there should be little difficulty in keeping up the fertility of the land economically.

From Briscoe we continued the drive to Windermere, about 40 miles, calling by the way at several ranches, making inspection of the soils and conversing with the farmers as to their crops, prospects, &c. Shortly after leaving Briscoe the character of the country begins to change—it is less wooded and the characteristic sage brush of the semi-arid belt appears and the soil is lighter. Irrigation becomes necessary, owing to inadequate rainfall, as we approached Windermere, but there are many streams from the Rocky mountains that can be utilized for this purpose. It was noticed that several of these were highly charged with carbonate of lime, giving rise on evaporation to deposits of this material. The purity of this carbonate suggests that on burning a good quality of lime could be produced.

Windermere is very pleasantly situated on rising ground overlooking the beautiful lake of that name. A young orchard just beginning to bear belonging to Mr. Kimpton, planted in a well protected valley about 2 miles from the village, was visited. This orchard gave great promise, the soil was excellent, there was plenty of water for irrigation and the trees had been well cared for. I was very pleased to see this ranch, for it served to demonstrate that successful, profitable orcharding could be carried on in this valley if only intelligence and industry were exercised—and provided water can be put on the land without too great an expense. Mr. Kimpton's homestead is in the village and here his garden betokens again the suitability of the country for vegetables and small fruits and his skill in raising them. To quote from Mr. Kimpton's record; 'Three pounds of Uncle Sam potatoes had produced 211 lbs.; 3 lbs. Carman No. 3, 237 lbs., and 3 lbs. Superior No. 7, 253 lbs.' Mr. Kimpton has gone extensively into poultry raising, which he finds pays well and he has also a large flock of turkeys which has proved particularly profitable. Several orchards are being planted in the vicinity, one belonging to Mr. R. R. Bruce looked very promising. The evil effect of excessive irrigation unaccompanied by drainage was well illustrated in a low-lying piece of ground. Alkali had appeared and no crop was possible where a few years ago excellent yields had been obtained.

From Windermere we paid a very interesting visit to the ranch of Mr. C. D. Ellis, across the lake. This is situated in a valley, the lower end of which is shut off by a dyke some 20 feet in height. The lower end of this valley is evidently the bed of an extinct lake. Mr. Ellis and his partner are about to cut a tunnel through this natural dam for the purpose of drainage and to prevent possible flooding at any future time. Much of the soil was of a mucky character and requiring drainage and mineral fertilizers, but the higher lands are of fair quality and gave evidence of considerable fertility.

A well attended meeting was held at Windermere, at which there was a good discussion of local problems.

Wilmer and Athelmer.—In company with Mr. R. R. Bruce we went to Wilmer and Athelmer on the west side of the lake, and drove over a large extent of the country and some eight miles southward as far as Mr. Kinnee's ranch, which lies in a valley and where some very fine crops were seen. There is a considerable area of plateau or bench land overlooking Lake Windermere on the west side awaiting the application of water. Irrigation will have to be undertaken on an extensive scale. For this there are two large streams available, Toby creek and Horse Thief creek, but the scheme is one that will involve a considerable expenditure. This land lies from 50 to 200 feet above the lake and should prove suitable for apples and other hardy fruits. As Lake Windermere is between 2,600 and 2,700 feet above the sea-level, tender varieties are naturally precluded. Very little agriculturally has, so far, been done about Wilmer, which has been a mining centre, but our meeting there was largely attended and it was evident from the interest in the various subjects discussed that in the near future a good deal of planting will be done. However, no extensive progress towards the opening up of the available land in this district will occur till the advent of the railroad and the scheme for irrigation is put through.

Fairmont.—Journeying southward from Windermere, our first stopping place was at Fairmont, where Mr. Brewer had some fine apple trees in bearing. His ranch had an ample supply of irrigation water from a large creek. He had found stock-raising profitable, cutting a large quantity of wild hay on the low lands of the vicinity. A splendid crop of clover—the third that season—was seen. It is evidently a country in which clover and alfalfa do well.

Thunder Hill was reached at noon, where Mr. Santo has a fine ranch, most beautifully situated. Garden produce was looking very well and some excellent poultry were seen, notes being taken of certain new crosses between White Wyandottes, Barred Plymouth Rocks, and Black Minorcas, which struck me as very good. The only other ranches in this district are those of Mr. Douglas Grainger and Mr. Hardwick Grainger.

Sheep Creek about 40 miles from Windermere was reached at nightfall. Mr. Alex. Emery has a small area under cultivation, but very little has been done here except cutting hay and raising some produce for local consumption and the lumber camps. The creek, however, is a large one and we were told there is a considerable area of land that could be cultivated, and for which water would be available, at some distance back from the road.

Soon after leaving Windermere the country loses in part its open character and is in places densely wooded, Douglas fir and poplar predominating. Reaching the Columbia lake, the Yellow pine (*Pinus ponderosa*) is seen and timber increases as one proceeds from Canal Flat to Wasa, where there is an excellent growth of larch with some Yellow pine and Douglas fir. We noticed that larch makes a fine growth all through this part of East Kootenay.

Wasa.—A stop-over of several hours was made at Wasa 26 miles from Sheep Creek, where there is an excellent up-to-date hotel kept by Mr. Nils Hansen, who has also a ranch and small orchard. The latter was suffering from too much irrigation water accompanied by insufficient drainage. As the trees were now old and worthless we selected a more suitable site on the slope of the hill on which Mr. Hansen will plant a new orchard. Above Wasa on the benches are the ranches of Mr. H. Barr and Peter Winfeldt, where good crops of grain and hay grown under irrigation were found. Small orchards on both places were doing fairly well, but it was quite evident here, as in several other ranches visited, that an elementary knowledge, at least, regarding the requirements of young trees is most desirable at the outset.

Fort Steele.—This was the next point reached; it is about 30 miles from Sheep Creek. This once thriving village is now almost deserted, owing to the decline in mining and the fact that Cranbrook, 12 miles distance on the Crow's Nest road, has attracted many of its inhabitants. Under the guidance of Mr. R. L. T. Galbraith, Government Agent, and Dr. Watt, we visited many of the ranches in the vicinity and learned that small fruits and vegetables were the chief crops, these finding a good sale in Cranbrook. We held a meeting here in the evening, at which about 40 attended. The chief difficulty appeared to be that the price of labour was so high and competition in truck growing so keen by the Chinese, who were tilling small areas, that profits were very small. In passing it may be noted that Chinese, wherever we found them, invariably made a success of their work in vegetable and small fruit growing, evidently due to their industry and the knowledge they have brought with them of this branch of agriculture. From what we saw, apples and cherries of the Morello type thrive well in this locality.

Cranbrook.—From Fort Steele we continued to drive to Cranbrook, about 12 miles, stopping en route at St. Eugene Mission, where we found garden crops and apples doing well. Cranbrook on the Crow's Nest line of the C.P.R. is a thriving town, with some fair agricultural land in the vicinity. In company with the Government Agent, Mr. Armstrong, we visited several ranches in the neighbourhood upon which vegetables and small fruits were raised. Apples also can be grown here, but their commercial success has not yet been proven. The altitude of Cranbrook, about 3,100 feet above sea-level, probably precludes the growing of tender fruits.

Nelson.—This was made headquarters for several days as it formed a central point from which we could conveniently visit ranches in the surrounding district. Great activity is here evident in the matter of opening up and selling land for small fruit ranches, and a considerable number of settlers have recently been attracted by the accounts of success of those few who planted some years ago, and whose trees are now producing fruit. Much of the soil is poor, being, generally speaking, light and sandy and in some places partially covered with boulders. Nevertheless, we found on most unpromising looking sites, vigorous trees producing splendid fruit of many descriptions. Evidently the climatic conditions are very favourable and more than counterbalance deficiencies in the soil. Available areas, on both sides of the lake, many of them necessarily small, are rapidly being taken up, cleared and planted and means taken to provide for the necessary irrigation. We pointed out the great desirability of more care in clearing the land by fire, so that as little as possible of its vegetable matter should be destroyed. It would be difficult to realize, unless one had seen it, the degree of success in fruit-growing that is possible under conditions that appear at first sight so unsuitable. The probability is that our analyses will show that while the total amount of plant food in the soil is comparatively small there is relatively a large proportion of it in a readily assimilable condition.

Two meetings were held here, both very well attended and at which a number of local problems in connection with soil management, irrigation and kindred subjects were discussed.

Slocan City.—This was the next spot visited and I was pleased to note considerable areas of very good land in the neighbourhood, and indeed, all along the Slocan river. As yet very little has been cleared and as it is fairly heavily wooded it will be some time before this district—one of great natural beauty, will be thickly settled. In time, Slocan City, now almost deserted through the decline in mining, should become the centre of an excellent fruit producing district. We saw some very fine apples, cherries (sweet), and plums, and in selected sites no doubt peaches and grapes would thrive. Tomatoes, Indian corn, and vegetables generally also did very well. On the lower lands dairying should be profitable, but many of these first require clearing and draining. Mr. Hall's ranch, about 6 miles distant, was visited and some advice given regarding drainage and soil management. Mr. Hall is making a success of dairying; everything was being done well and thoroughly and in a few years he will have a very fine ranch.

Mr. Anderson and I, in company with Mr. Dennis, visited a number of ranches, spending the day in field demonstrations. In the evening an interesting meeting was held at which there was a good attendance. As Mr. Anderson remarked; 'With the revival of mining and the fine lumbering facilities, the excellent opportunities for fruit-growing and dairying, the Slocan district would surely become of importance.'

Kaslo.—From Slocan we returned to Nelson and thence took the boat for Kaslo, a town which has also suffered through the decline of mining, but which has great possibilities for fruit growing, as available areas for planting are larger here than at most points in this part of East Kootenay. The soil for the most part is a red loam and stated to be excellent for fruit. In company with Mr. Cockle and a number of others a day was spent in visiting the recently cleared and planted areas in the vicinity. As yet fruit-growing here is in its infancy, but interest in this industry has been awakened and orchard planting is progressing fairly rapidly. Note must be made of the beautiful garden and grounds of Mr. George Alexander, where flowers and fruits were in abundance. Mr. Alexander is experimenting with a number of English apples, which so far, have given great promise. The meeting in the evening was given up to the discussion of topics of importance to those just starting orchards and fruit-growing, and it was very gratifying to note the intelligence, interest and enthusiasm evinced by the ranchers in this, for them, new venture.

Proctor.—From Kaslo we went to Proctor, where we were met by Mr. Renwick, the Government Agent, Mr. Proctor and others, and made an inspection of several newly planted orchards in this district. By means of a gasoline launch we were enabled to visit the larger number of ranches on both sides of the lake between this point and Nelson. With a few exceptions these were quite new, very little planting being seen more than two or three years old, and the greater part but one year old. The soil over a good deal of this area is light and sandy and in many places anything but promising, nevertheless where the trees had been supplied with a sufficiency of water good growth had been made. Unfortunately, in clearing the land a large proportion of its humus had been destroyed by fire and we consequently advised the more careful restriction of this agent, so necessary and yet so injurious in its effects on the soil, in the clearing up preparatory to planting. No doubt the ashes so produced have furnished a considerable amount of mineral plant food, very useful to the young trees, but it will be necessary to grow clover or some other leguminous crop to return the elements that have been destroyed and dissipated by the fire. A young orchard's requirements in plant food are but small for a number of years, and this undoubtedly accounts in a large measure for the progress the trees at first make, but as they come into bearing more attention will have to be paid to keeping the soil in good heart. As the supplies of farmyard manure will be very limited, leguminous cover crops turned under, supplemented by potash and phosphates will in all probability be the means used to ensure good yields. Many of the areas are on steep slopes and irrigation must be carefully done to prevent washing. Several samples of soil taken at various points were collected and forwarded to the Experimental Farm Laboratories, Ottawa, for future study.

In concluding this brief notice of the East Kootenay district, I must state that I was deeply impressed with its fruit-growing possibilities, not so much from the soil—though that from the mechanical standpoint is satisfactory—as from the practical evidences afforded in those orchards which have attained a bearing age. There can be little doubt but that favourable climatic conditions for the most part, must prevail for this industry. And I might remark in this connection that experience in other countries has shown that favourable temperature conditions with judicious irrigation can produce wonderful effects even when the soil is apparently very poor.

Grand Forks.—This, our next point, at the junction of the North and South branches of the Kettle river, is in the Boundary district. Here we spent several days visiting the farms and orchards in the neighbourhood. First we went over the pioneer orchard, planted by Mr. Covert and now in full bearing. It is now in the hands of Mr. Honsberger, who at the time of our visit was daily making large shipments of fruit. A large area is planted with prunes, which we were told had proved a most profitable crop. This ranch has its own water supply from Fourth of July creek. A portion of the original ranch has been laid off in lots of 10 and 20 acres, all of which are supplied with water laid on for irrigation by a system of piping. Several of these lots have been taken up and judging from the immense crops of fine vegetables and fruits there can be no doubt as to the excellence of the soil and the suitability of the district for the growing of a large variety of horticultural produce. Some very fine soil was noticed, but unfortunately through careless irrigation 'washing' had occurred at several places. The district also is one favourable to fodder crops, alfalfa fields bearing third crops, waist high, being seen.

On much of the lower land, adjoining the Kettle river, and contiguous to American territory there is at present no water supply for irrigation and the trees and the crops are consequently poor. A comprehensive scheme, however, is under serious consideration for pumping water from the Kettle river. When this is in force some 2,000 acres of very good land will be rendered available for fruit-growing and general farming.

The orchard and extensive nursery grounds of Mr. Martin Burrell were next visited. They are located about three miles from the town and beautifully situated on the lower benches of the Kettle and watered by creeks from the mountain. It is a pleasure to record the excellent condition in which we found the nurseries; the young stock was healthy and vigorous, though unfortunately a considerable loss had been sustained by an attack of the Flatheaded Apple Tree Borer. Very fine and luscious pears, plums and peaches, in abundance were seen in the older plantations, and the apples also, though this season not bearing so heavily, gave promise of a good crop. Much of Mr. Burrell's soil is of an excellent type, rich and light and well adapted to fruit-growing. With provision for irrigation this district will undoubtedly become one of the most productive fruit-growing areas in British Columbia.

In concluding this account of our tour I would say that this record of what we saw and did constitutes but the first part of the work I had in mind. The itinerary has put me in possession of information otherwise unattainable; it brought me into direct contact with the men tilling the soil and whom, I think, I am now in a better position to help with advice. Further, as time permits, the large collection of soil samples will be carefully analysed, and I have no doubt that this work will furnish many interesting and helpful data for future guidance regarding soil management and the nature of the fertilizers that may be necessary for the most profitable results.

To Mr. Anderson I am very much indebted. Without him the tour would have been much less valuable and far less pleasant. He is thoroughly conversant with the country we travelled over and his knowledge of local conditions and possibilities were of the greatest assistance to me every day of our itinerary.

NOTES ON THE CHARACTER OF THE SOIL BETWEEN LANGDON AND GLEICHEN, ALBERTA, IN WESTERN SECTION OF IRRIGATION BLOCK OF THE CANADIAN PACIFIC RAILWAY COMPANY.

At the request of Mr. J. S. Dennis, Superintendent of Irrigation, C.P.R., Calgary, Alta., I made a survey of the lands which this company are placing under irrigation between Langdon and Gleichen, and are now being offered for settlement. Between two and three days were spent in this work, at the conclusion of the tour just described, and from the notes taken during this rapid survey, I have prepared the following brief report. Later it is expected to examine chemically samples of the soils collected at various points in this district.

The first examination was made a few hundred yards north of the railway station at Langdon. The surface soil was found to be a black, heavy loam, evidently well supplied with humus (semi-decomposed vegetable matter), and containing such a proportion of clay as to constitute it a 'strong' soil. Technically, it would be classified as a clay loam. Several trials showed it to have a depth of from 4 to 6 inches. The subsoil is a heavy, chocolate coloured clay. The probabilities are that analysis would show considerable percentages of organic matter and nitrogen in this clay—at any rate for some few inches—as the surface soil, characterized by such rich stores of these constituents, passes without any strong line of demarkation into the subsoil.

Crossing the railway track, we drove to the company's farm (Sec. XV.) and inspected the soil at a number of points upon it and as far south as the secondary irrigation canal 'A.' The surface soil, apparently similar in all respects to that north of the railway track, had a depth of from 4 to 8 inches and was underlaid by the heavy, chocolate coloured clay already described.

Following east from Langdon along the Blackfoot trail, the soil was examined in four places between Langdon and the canal between sections 6 and 7, T. 23, R. 25. The soil throughout was extremely uniform in character, a black loam from 4 to 8 inches in depth, and underlaid by a heavy, chocolate coloured subsoil.

After crossing the ditch, an examination was made in N.E. ¼ Sec. 6, T. 23, R. 25, where the same heavy, black loam prevailed with a depth of 4 to 6 inches. The subsoil was practically identical with that found at points previously inspected.

Driving northwest towards Strathmore, an examination was made on Sec. 29, T. 23, R. 25, and no change of mark could be noticed either in soil or subsoil.

The next day we drove south from Strathmore and made the first soil inspection about 2½ miles from that place, on Sec. 3, T. 24, R. 25. A change in the texture of the soil was here observable—there was decidedly more sand, both in the surface and subsoil. Although lighter in character than that previously examined, the soil showed no appreciable diminution in vegetable matter, being deep black and well supplied with root fibre. The subsoil was of a sandy nature. In a depression or hollow, 15 inches of black, sandy loam was found, but on the upland the depth of the surface soil did not vary to any degree from that already noted.

Turning northward, two inspections were made between the latter point and Strathmore, the first on Sec. 3, and the second on Sec. 2, T. 24, R. 25. In both instances a deep, black sandy loam formed the surface soil, with a depth of about 6 inches, underlaid by a brownish-red sandy subsoil. The soil in the immediate neighbourhood of the C.P.R. Co. construction camp at Strathmore, was a black, sandy loam about 5 inches deep, underlaid by sand.

Proceeding to the company's farm, on Sec. 11, T. 24, R. 25, four to six inches of black, sandy loam was found to constitute the surface soil, underlaid by about 2 inches of sand, beneath which was clay. An examination at Secondary Canal, Sec. 12, T. 24, R. 25, showed a black loam, rather light in character, with a depth of about 3 inches with a sandy subsoil.

From Strathmore to Gleichen, the route lies southeast, the trail running north of lakes Eagle and Namaka, and in a general sense parallel to the C.P.R. track, though considerably north of it. On Sec. 1, T. 24, R. 24, the black loam that formed the surface soil was from 4 to 6 inches deep, and it, as well as the subsoil, was considerably heavier (less sandy) than in the neighbourhood of Strathmore.

From six to eight inches of a moderately heavy, black loam were found on Sec. 32, T. 22, R. 23, with a subsoil of comparatively stiff clay. A further trial pit was made on Sec. 23, T. 22, R. 23, and revealed a depth of about six inches of black soil underlaid by a distinctly heavy clay.

One examination was made east of Gleichen, on a breaking about half a mile from the village. Here there was a depth of fully eight inches of heavy, black soil underlaid by a chocolate coloured clay.

The lighter character of the soil in the neighbourhood of Strathmore, has already been remarked upon. With this exception it will be observed that the surface soil along the whole route travelled presented a certain well marked uniformity, more particularly noticeable in humus-content (as judged by the colour) and depth. Such uniformity constitutes a distinguishing feature of prairie lands. A more detailed and extended survey might show a greater variation than was noticed, and possibly analysis might disclose differences not otherwise detectable, but as far as examination allows a judgment, it would appear that the whole area traversed is overlaid by a surface soil rich in humus and plant food and bearing all the signs of a highly productive soil if provided with adequate moisture.

WELL WATERS FROM FARM HOMESTEADS.

The excessive drought that prevailed over certain areas, more especially in Ontario, during the later summer months of 1906, was undoubtedly answerable in a great measure for the unusually large number of samples of well-water forwarded for examination last year. Under such conditions the water in the farmyard and back-door well frequently becomes a serious menace to health. It is indeed a fortunate occurrence that such water, by its offensive taste, odour or appearance, often carries its own condemnation. The absence of such indications of pollution, however, must not be considered as evidences of purity. In the majority of cases the wholesomeness of a water can only be satisfactorily ascertained by a chemical analysis.

Of the 281 samples of water received, 90 were submitted to analysis, the remainder being rejected by reason of insufficiency in quantity or dirty bottles or corks. It is earnestly desired that those farmers desiring an analysis of their well-water should first obtain a copy of the instructions, forwarded on application to this Division, for the proper collection and shipment of the sample.

The 90 waters analysed were reported as follows: Good and wholesome, 28; Suspicious and probably dangerous, 21; Contaminated and totally condemned, 30; Saline, 11.

The value of an abundance of pure water for the farmer and dairyman can scarcely be overestimated. The relation of water to health is obvious when we remember the very important part that water plays in the nourishment of the body, that more than half the body weight is water, that the blood which bathes every tissue is very largely water, that the food is digested and assimilated by the aid of water, that the waste products of the body must be largely got rid of by means of water, and that this water, which we have seen becomes part and parcel of ourselves, is from the water we drink or take in our food.

Further, the health and thrift of the stock is largely dependent on the quality of the water supply. It is just as desirable, as necessary to have pure water for the farm animals as for man, and intelligent, progressive farmers have recognized this fact.

And, lastly, in the dairy, creamery and cheese factory, pure water is essential; indeed it is an absolute necessity if the dairy products are to be pure, of first class quality and flavour and keep well. There is an active movement on foot for the official inspection and analysis of the water supplies of all farms, dairies, &c., in Ontario, supplying dairy products to the public and I have no doubt but that such a measure would result in much benefit to all concerned.

ANALYSES OF WELL WATERS, 1906.

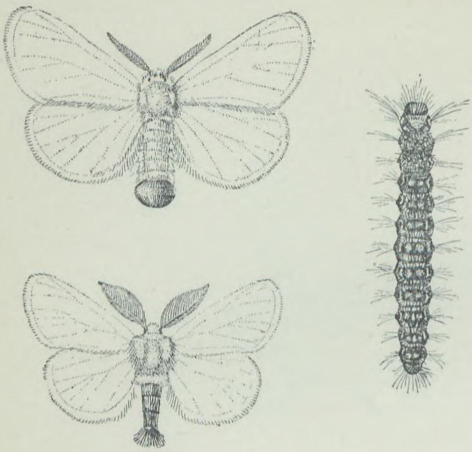
RESULTS STATED IN PARTS PER MILLION.

Number.	Locality.	Marks.	Date.	Free Ammonia.	Albuminoid Ammonia.	Nitrogen in Nitrates and Nitrites.	Chlorine.	Total Solids at 105° F.	Solids after Ignition.	Loss on Ignition.	Phosphates.	Report.
			1906.									
1	Knowlton, Que.........	S. & J...........	Jan. 23	Free.	·25	·181	Trace.	56·4	12·0	44·4	H. traces...	Free from pollution.
2	"	"	" 23	Free.	·525	·194	1·0	99·2	14·4	84·8	" ...	" "
3	Portage du Fort, Que...	G. E. R.........	" 24	·075	·355	·968	1·0	154·0	78·0	76·0	" ...	Very suspicious.
4	Almonte, Ont..........	R. M. P	" 30	·23	·24	27·61	110·0	884·0	442·0	442·0	V. h. traces.	Dangerously polluted.
5	Carleton Place, Ont.....	M. A. Mc......	Mar. 2	Free.	·07	1·91	8·5	311·2	207·6	103·6	" ..	Very suspicious.
6	Montmorency, Que......	A. V...........	" 17	Free.	·09	·238	1·0	92·8	55·6	37·2	Traces......	Very good.
7	Medora Station, Man....	T. A. T........	" 26	·915	·13	·16	22·0	1269·6	1005·2	264·4	V. h. trace..	Contaminated.
8	Skaro, Alta.............	R. H. S........	Apr. 27	2·41	·937	None.	27·5	3512·0	2886·0	626·0	Traces......	Saline water.
9	Dauphin, Man	F. B..........	" 30	2·26	1·54	·115	2400·0	7606·0	6538·0	1068·0	"	" "
10	Arthurette, N.B.........	E. H. M.	May 7	Free.	·05	·115	Traces.	36·8	....	....	"	Pure and wholesome.
11	N. D. de Lourdes, Man..	B. B..........	" 21	1·465	·21	·086	1·0	366·4	198·8	167·6	Ppt	Very seriously contaminated.
12	Dauphin, Man	D. M. L......	" 28	3·25	·30	1·47	700·0	3374·8	3248·4	126·4	Traces......	Saline water.
13	Portage du Fort, Que....	R. & Co........	" 31	Free.	·05	·815	1·3	286·4	192·4	94·0	V. h. traces.	Excellent.
14	Upper Sheffield, N.B....	J. H. W......	" 31	·36	·04	·082	4·0	114·0	72·0	42·0	None.	Suspicious.
15	Rothbury, Sask.........	P. S...........	June 7	·50	·145	·041	40·0	1317·2	885·2	432·0	Traces......	"
16	Vernon, B.C............	M. P. W. ...	" 7	·04	·155	·082	12·0	589·2	410·4	178·8	S. traces....	Wholesome.
17	Barb, Ont.....	H. O. D	" 12	·15	·24	·065	19·0	211·0	93·0	118·0	Traces......	Polluted.
18	Sperling, Man	J. H. H........	" 12	5·45	·625	·70	4450·0	9940·0	8678·0	1262·0	H. traces...	Strongly saline.
19	Eastman's Springs, Ont..	H. C........	" 16	7·79	·36	2·12	3400·0	6218·0	5896·0	322·0	V. h. traces.	Contaminated.
20	Varennes, Que........	G. N...........	" 27	·47	·32	None.	278·0	789·6	622·8	166·8	Trace. ...	Suspicious.
21	Vernon, B.C......	B. L. W.......	July 3	·15	·08	·057	1·0	424·8	310·8	114·0	Traces......	Very suspicious.
22	Ottawa East, Ont.	J. B. No. 1....	" 4	·25	·145	·485	12·0	236·0	135·6	100·4	"	
23	"	" " 2....	" 4	·335	·12	·514	10·0	224·8	124·0	100·8	Trace	
24	"	" " 3..	" 4	·27	·125	·527	9·5	232·8	135·6	97·2	"	
25	Kemptville, Ont........	T. A. R........	" 5	·18	·42	·119	....	520·0	366·0	154·0	"	
26	"	"	" 5	·16	·32	·053	....	....	....	....	....	
27	Gratton, Ont.	F. K.	" 17	·27	·29	9·28	340·0	2092·0	1095·6	996·4	Trace ...	Seriously polluted.
28	Oyama, B.C..	S. H. P........	" 26	·067	·21	·241	29·0	930·0	700·0	230·0	Ppt........	Rather suspicious.
29	Antigonish, N.S........	F. W. T........	" 31	·19	·295	6·497	55·0	312·0	259·2	52·8	H. traces. ..	Very seriously polluted.
30	Ottawa, Ont...........	G. C. E........	" 31	Free.	·055	·403	6·0	130·0	88·4	41·8	" ..	Wholesome.
31	Montreal, Que	F. D. M......	Aug. 2	·19	·205	Free.	24·0	818·8	574·8	244·0	Traces......	Suspicious.
32	Stapleton, Ont......	D. G...........	" 7	1·03	·27	·016	12·0	476·0	352·0	124·0	"	Seriously polluted.
33	Ottawa, Ont...........	T. D. H........	" 10	·05	·13	11·22	32·0	503·2	297·2	206·0	" ...	Seriously contaminated.
34	Wrightville, Que..	A. C...	" 14	·55	·70	·172	17·0	330·4	188·8	141·6	H. traces..	Contaminated.
35	St. Eugene, Ont.........	W. J. McC....	" 14	·44	·25	·032	37·0	278·8	176·0	102·8	Free..	

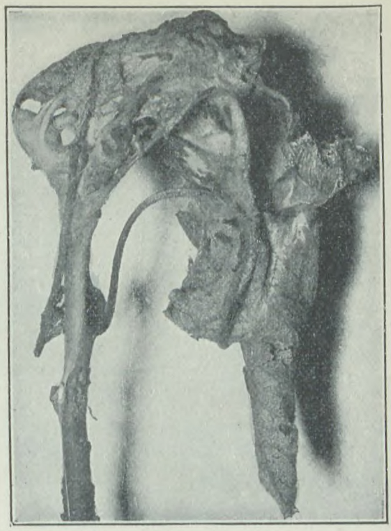
ANALYSIS OF WELL WATERS, 1906—*Concluded.*

Number.	Locality.	Marks.	Date.	Free Ammonia.	Albuminoid Ammonia.	Nitrogen in Nitrates and Nitrites.	Chlorine.	Total Solids at 105° F.	Solids after Ignition.	Loss on Ignition.	Phosphates.	Report.
			1906.									
36	Sault au Recollet, Que.	J. F.	" 30	2·0	1·17	·016	14·0	705·6	496·8	208·8	Traces	Dangerously polluted.
37	Ottawa, Ont	A. P. J.	" 31	·485	·65	Free.	6·0	350·0	196·0	154·0	"	Seriously contaminated.
38	"	A. B.	" 31	·06	·115	1·12	2·0	296·0	240·0	56·0	"	Contaminated.
39	St. Eugene, Ont.	W. J. McC.	" 31	·345	·18	·02	54·5	383·2	239·2	144·0	"	Polluted.
40	Oak Lake, N.B.	J. O. M.	Sept. 4	·01	·115	·848	9·0	134·4	71·2	63·2	V. sl. traces.	Suspicious.
41	Shawville, Que	G. P.	" 15	42·85	5·06	Free.	170·0	1865·0	1345·0	520·0	Traces	Dangerously polluted.
42	"	"	" 15	19·28	2·84	4·32	153·0	1237·6	977·6	260·0	"	" "
43	Perley, Sask	A. M.	" 15	·03	·20	·115	20·0	2394·4	1913·6	480·8	V. h. trace	Suspicious.
44	Carrivale, Sask.	J. B.	" 15	·87	1·40	Free.	75·0	11644·0	8519·0	3125·0	Traces	Saline.
45	"	"	" 15	·41	·205	·32	203·0	838·0	665·0	173·0	V. sl. trace	Polluted.
46	Ville Marie, Que	L. E. R.	" 20	·03	·16	·08	Free.	50·8	26·0	24·8	Trace	Excellent.
47	Snowflake, Man.	W. H. M.	" 22	2·095	·126	·263	170·0	1777·6	1706·4	71·2	H. traces	Saline.
48	"	J. F. D.	" 22	1·538	·115	·242	28·0	1595·6	1303·6	292·0	Trace	"
49	"	W. H. R.	" 22	·02	·345	·757	50·0	5750·4	4831·2	919·2	Traces	"
50	Deer Park, Ont.	C. E. S.	" 24	·09	·145	1·07	25·3	468·0	344·0	124·0	"	
51	Hintonburg, Ont	R. F. No. 1	" 25	·02	·105	·065	9·0	289·2	183·6	105·6	"	Suspicious.
52	"	" " 2	" 25	Free.	·11	·148	2·5	255·6	170·4	85·2	"	Wholesome.
53	"	" " 3	" 25	·05	·125	·131	6·0	214·8	140·4	74·4	"	"
54	"	" " 4	" 25	·07	·195	·123	7·0	368·8	244·8	124·8	"	Probably wholesome.
55	London, Ont	W. E. S. No. 1	Oct. 8	1·81	·25	Free.	·5	360·0	213·6	146·4	Free.	Suspicious.
56	London, Ont.	" No. 2	Oct. 8	1·48	·19	Free.	2·0	342·4	236·0	106·4	Free.	"
57	Forest, Ont	E. T.	" 19	·04	·485	11·07	125·0	778·0	625·0	93·0	"	Seriously contaminated.
58	Winchester, Ont	H. A. W.	" 20	·05	·34	27·49	1675·0	3844·0	2955·2	388·8	Traces	" "
59	"	S.	" 20	·15	·23	18·01	230·0	1280·0	979·2	300·8	V. h. trace	" "
60	Knowlton, Que	T. P. W. No 1.	" 23	·05	·09	2·68	9·0	120·0	72·8	47·2	Free.	
61	"	" No. 2.	" 23	·07	·105	·106	1·5	89·6	40·8	48·8	"	
62	Hull, Que	A. McC	" 24	·02	·105	·955	2·5	322·0	259·0	64·0	"	Wholesome.
63	Summerside, P.E.I	R. H.	" 29	Free.	·05	7·938	48·0	316·8	227·2	89·6	Traces	Suspicious.
64	St. Johns, Que	J. A. L.	" 29	1·29	·085	Free.	56·0	405·6	335·2	70·4	"	"
65	St. George, N.B	J. D. W.	Nov. 5	·02	·12	7·494	60·0	328·0	160·0	168·0	"	Contaminated.
66	Utterson, Ont.	J. W. No. 1	" 8	·01	·155	·115	9·0	42·0	27·0	15·0	Free.	Wholesome.
67	"	" No. 2	" 8	·045	·33	5·91	10·0	207·0	102·0	105·0	Traces	Very suspicious.
68	London, Ont.	W. E. S. No. 1	" 12	1·725	·34	·573	·5	571·2	419·2	152·0	Free.	
69	"	" No. 2	" 12	1·62	·16	Free.	1·0	416·4	273·6	142·8	......	
70	Quill Lake, Sask.	A. E. J	" 12	·03	·21	·015	30·0	4224·0	3328·0	896·0	Traces	Saline.
71	Winchester, Ont	A. S	" 13	·015	·15	12·513	235·0	1326·0	963·0	363·0	V. h. trace	Seriously polluted.

72	Bloomfield Stn., N.B....	G. R. No. 1.....	"	14	Free....	·06	10·902	130·0	464·4	335·2	129·2	Traces......	Very seriously polluted.
73	" "	" No. 2.....	"	14	Free....	·03	12·976	21·0	410·8	190·4	250·4	"	Contaminated.
74	" "	" No. 3.....	"	14	·04	·075	·033	7·0	40·0	23·2	16·8	"	Pure.
75	" "	F. W. T. No. 1..	"	14	·06	·145	10·08	35·0	437·2	212·8	224·4	"	Suspicious.
76	" "	" No. 2..	"	14	·08	·047	·675	5·0	128·0	88·0	40·0	"	Wholesome.
77	North Lancaster, Ont...	A. P. Mc........	"	28	214·88	7·0	Free....	240·0	1608·0	1212·0	396·0	H. traces....	Most seriously polluted.
78	St. Johns, Que......	J. L.	Dec.	1	·965	·245	·022	52·0	380·8	298·4	82·4	V. h. traces.	Wholesome.
79	Hillier, Ont............	L. P. H.......	"	3	·016	·865	2·62	10·0	1868·4	1416·4	452·0	Traces......	Contaminated.
80	Craik, Sask...........	P. O. L.........	"	4	Free....	·645	Free....	200·0	8786·4	7384·0	1402·4	V. sl. trace..	Saline.
81	Ellisboro, Sask....... ..	R. D. P.........	"	5	·02	·80	Free....	50·0	8902·8	6932·4	1970·4	" ..	"
82	Appleton, Ont........ ..	E. W. F. C.....	"	10	Free....	·085	1·52	20·0	408·4	327·6	70·8	Free........	Contaminated.
83	Vankleek Hill, Ont.....	A. E. M.........	"	18	·15	·095	Free....	Free....	290·0	203·2	86·8	Traces.....	Suspicious.
			1907.										
84	St. Hyacinthe, Que.....	A. B............	Jan.	9	·39	·11	1·69	113·0	851·2	548·4	302·8	"	Seriously contaminated.
85	London, Ont...........	A. H. C.........	"	10	·03	·365	·914	84·0	715·0	475·0	240·0	Free........	Decidedly suspicious.
86	Oka, Que.............	G. R............	"	16	·01	·14	10·1	55·0	660·0	314·0	346·0	Traces......	Dangerously contaminated.
87	Sault au Récollet, Que...	J. F............	"	25	Trace...	·02	Trace...	Free....	8·0	4·0	4·0	H. traces. ..	Excellent.
88	Clay Bank, Ont.	R. J. D. No. 1..	Feb.	4	Free....	·09	2·05	495·0	1262·8	1030·0	232·8	V. h. trace..	Suspicious.
89	"	" No. 2..	"	4	Free....	·14	·115	5·0	208·4	117·2	91·2	" ..	Free from contamination.
90	Sault au Récollet, Que...	J. F.......	"	7	Free....	·03	·51	6·0	358·8	241·2	117·6	Sl. traces...	Wholesome.



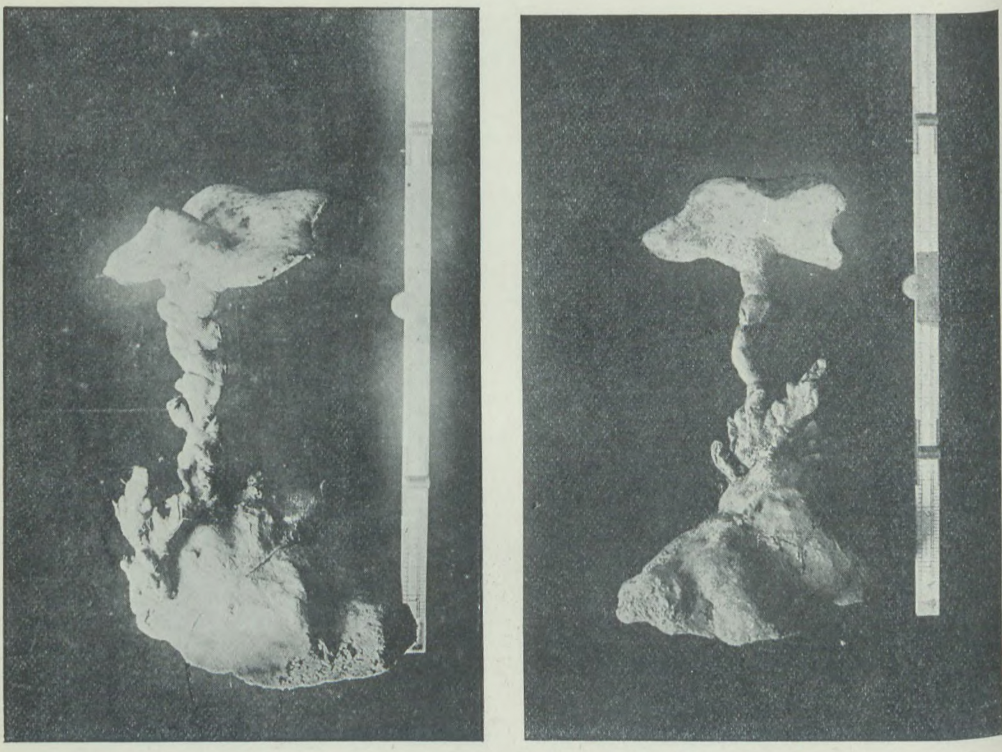
Female and male moths ; full-grown caterpillar.



Winter nest. (After Kirkland.)

THE BROWN-TAIL MOTH ; *Euproctis chrysorrhœa*, L.

(Figures from Howard, U.S. Dept. of Agr. Farmers' Bull. 264.)



A NORTHWESTERN TUCKAHOE.

One specimen seen from opposite sides.

(Photographed by F. T. Shutt.)

REPORT

OF THE

ENTOMOLOGIST AND BOTANIST.

(JAMES FLETCHER, LL.D., F.L.S., F.R.S.C.)

1906.

OTTAWA, April 1, 1907.

DR. WM. SAUNDERS, C.M.G.,
Director of Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to hand you herewith a report on some of the more important subjects which have been brought officially before the Division of Entomology and Botany during the past fiscal year. There are a great many other subjects which have taken up some of the time of the staff; but as these have been either treated of before, or are as yet under investigation, they do not require special treatment in this report. The number of applications for information continues to increase year by year and the Division has become a recognized source for reference by all students of economic natural science and scientific farming. The farmers and fruit-growers of Canada to-day, carry on their work in an entirely different manner from that which was generally adopted ten years ago, and there is a constant demand for accurate information as to the nature of plants grown for crops and as to the various enemies belonging to the animal and vegetable world which reduce the profits of the agriculturist and horticulturist. The value of a scientific knowledge on all matters related to farming has been recognized by the important place which has recently been given to nature study and similar subjects in the educational systems of the various provinces. The staff of the Division of Entomology and Botany have been frequently called upon, and have willingly given their services, to help school teachers, normal school students and pupils of all grades in their natural history work. Large collections of plants and insects have been received from such students from all parts of the Dominion. Many addresses have also been delivered to schools, drawing attention to the value of these studies and giving suggestions as to the best way of prosecuting them.

Collections.—The collections in the Division have been largely increased during the past season and have now been rendered much more complete and useful than they have been for many years. The entomological cabinets have been increased in number, and many specimens of insects have been taken from store boxes and mounted for arranging in their natural orders. This was made possible owing to extra assistance allowed me by the Honourable Minister of Agriculture for this special purpose. The collections have also been materially increased by valuable donations from several correspondents, amongst whom the following may be mentioned:—

Thos. Baird, High River, Alta.—Several specimens of rare western lepidoptera.

A. H. Bush, Vancouver, B.C.—A pair of *Lepisesia ulalume.*

J. W. Cockle, Kaslo, B.C.—Various insects in different orders, including many rare species.

Norman Criddle, Treesbank, Man.—Many specimens of rare Manitoban insects.

J. D. Evans, Trenton, Ont.—A pair of *Dytiscus circumcinctus.* These are interesting as coming from the type locality, Winnipeg.

Paul Hahn, Toronto, Ont.—A specimen of *Autographa surena* taken at Quebec.

C. Garrett, Calgary, Alberta.—Six specimens of *Erebia discoidalis.*

E. F. Heath, Cartwright, Man.—A large collection of Manitoban moths in papers.

R. V. Harvey, Vancouver, B.C.—British Columbian insects.

Wm. McIntosh, St. John, N.B.—Local lepidoptera from St. John, N.B.

L. E. Marmont, Rounthwaite, Man.—Several rare insects from Manitoba.

W. Metcalfe, Ottawa.—A large collection of flies taken at Ottawa.

J. Perrin, MacNab's Island, Halifax, N.S.—Rare lepidoptera from Nova Scotia.

T. W. Ramm, Ross Mount, Ont.—Two perfect specimens of *Basilona imperialis* taken at Ross Mount.

J. Russell, Digby, N.S.—Several rare lepidoptera from Nova Scotia including *Erora læta, Incisalia irus,* var. *arsace,* and *Hadena minuscula.*

Rev. G. W. Taylor, Wellington, B.C.—Some named specimens of British Columbian geometridæ and several noctuids.

E. P. Venables, Vernon, B.C.—Specimens of desirable species from the Okanagan valley, B.C.

E. S. Wilmot, Vernon, B.C.—*Apantesis superba.*

J. B. Williams, Toronto.—Larva of *Ecpantheria deflorata.*

T. N. Willing, Regina, Sask.—Lepidoptera and other insects from Saskatchewan.

F. H. Wolley-Dod, Millarville, Alberta.—Northwest insects.

C. H. Young, Ottawa.—Microlepidoptera and some noctuids.

The botanical collections have also been very much increased by mounting up specimens of species poorly represented or shown only from a single locality. These have been mostly from collections of previous years which had been stored away in the Division. The collections of weeds and weed seeds have been largely increased and the index of the Herbarium is now finished. The following donations for the Herbarium have been received:—

J. R. Anderson, Victoria, B.C.—Several rare British Columbian plants.

Norman Criddle, Treesbank, Man.—Seeds and botanical specimens of several desirable Manitoban plants.

W. M. Crawford, Millerton, N.B.—A fine series of the rare aquatics *Lophotocarpus spongiosus* and *Limosella aquatica* from New Brunswick.

J. M. Dickson, Hamilton, Ont.—Specimens of *Erythronium albidum* from Caledonia, Ont.

George Fraser, Ucluelet, B.C.—Rare plants from Vancouver Island, living roots and botanical specimens.

D. Gellatly, Gellatly, B.C.—Fungi collected as food by squirrels.

D. W. Hamilton, Kingston, N.B.—Desirable specimens of plants.

Miss I. Hargrave.—Rare plants from the interior of British Columbia.

J. J. Freeborn, Dundas, Ont.—Seeds and other natural history specimens from Dundas.

F. J. A. Morris, Port Hope, Ont.—A fine series of specimens of *Botrychium simplex* from Newtonville, Ont.

Mrs. D. W. Stewart, Renfrew, Ont.—*Medicago falcata* and other botanical specimens.

Geo. E. Sanders, Guelph, Ont.—Seeds of Canadian weeds.

Mrs. R. N. Stoker, Cowichan Lake, B.C.—A large collection of the seeds of rare British Columbian plants.

Meetings.—Meetings of farmers' institutes and other agricultural associations, teachers' associations, &c., have been attended and addresses delivered whenever other official duties would permit:—

April 17: Toronto.—Ontario Educational Association: 'Nature Study and Natural History.'

May 8: Ottawa.—Ottawa Horticultural Society: 'Insect Enemies of the Gardener and how to prepare for them.'

May 14: Petewawa, Ont.—Inspecting Central Camp and giving advice as to controlling sand.

May 17: Guelph, Ont.—Ontario Agricultural College. Address to Nature Study class: 'Life Zones and the Value of Nature Study.'

May 17: Guelph.—Ontario Agricultural College. Illustrated lecture to 3rd year students: 'Insects and Nature Study.'

May 29: Ottawa.—Address to Frœbel Union: 'Nature Studies for Kindergarten classes.'

July 5: Ottawa.—Summer School of Science. Address on 'Insects.'

July 9: Ottawa.—Summer School of Science. Address on 'Birds.'

July 12: Ottawa.—Summer School of Science. Address on 'Insects.'

July 16: Ottawa.—Summer School of Science. Address on 'Birds.'

August 29 and 30: Chateauguay Basin, Que.—Pomological and Fruit-growing Association of the Province of Quebec: 1. 'Fruit Insects of the season.' 2. 'House Plants and their Culture.' 3. 'The preparation of House Plants for Winter.' 4. 'Injurious Insects and their Control.'

December 12: Wolfville, N.S.—Fruit-growers' Association of Nova Scotia: 1. 'Insects Injurious to Nova Scotian Orchards in 1906.' 2. 'Nature Study and Natural History.'

December 17: St. John, N.B.—Natural History Society of New Brunswick: 'Insects, what they do and where they are found.'

December 19 and 20: Knowlton, Que.—1. 'Orchard Insects in the Province of Quebec in 1906.' 2. 'Garden Insects and their Control.'

January 19, 1907: Toronto.—Canadian Institute: 'Some things that every one ought to know about Plants and Insects.'

February 14: Ottawa.—McLeod Street Sunday School: 'The value of definite knowledge of common things.'

March 6: Ottawa.—Select Standing Committee of the House of Commons on Agriculture and Colonization: Evidence on the work of the Division and particularly on the San José Scale situation.

March 8: St. Catharines.—Niagara Fruit-Growers' Association: 'The San José Scale and its Control.'

March 8: St. Catharines.—St. Catharines Horticultural Society: 'Injurious Insects and their Habits.'

March 11: Toronto.—Address in the Normal School: 'Spring work in Nature Study.'

March 22: Ottawa.—Ottawa Ladies' College. Addresses: 1. 'Insects and Plants, Injurious and Beneficial.' 2. 'Knowledge of Common Things a Duty.'

March 26: Ottawa.—Normal School: 'Nature Study work with Birds.'

Correspondence.—The large correspondence of the Division has been of the usual varied character and shows a considerable increase in the number of letters received and answered. From April 1, 1906, to March 30, 1907, the number of letters, exclusive of circulars, registered as received, was 3,372, and the number despatched was 2,862. Of the letters sent out many are of the nature of articles for publication, as very frequently correspondents hand them to the local newspapers, so that their neighbours may have the benefit of the advice given concerning injurious insects or noxious weeds.

Acknowledgments.—I take pleasure in gratefully acknowledging my obligation to my many correspondents in all parts of the Dominion, to practical farmers who have much aided the work of the Division by promptly reporting outbreaks of injurious insects and noxious weeds, by sending specimens, and at request making observations upon points of special interest. My thanks are also specially due to the following specialists who have helped me on many occasions with the exact identifications of species of plants and insects which were unknown to me:

Prof. John Macoun, of Ottawa, for the identification of plants.

Dr. P. A. Rydberg, of New York, for identifying plants.

Dr. B. T. Galloway, Chief of the Bureau of Plant Industry, Washington, U.S., and the officers of his staff, for information concerning parasitic fungi.

Dr. L. O. Howard, Chief of the Bureau of Entomology, Washington, U.S., and the officers of his staff, for the identification of scale insects and species of various orders. I am under obligations to Dr. Dyar, and Messrs. Marlatt, Coquillett, Chittenden and Busck.

Dr. J. B. Smith, New Brunswick, N.J., who has examined and named large numbers of noctuids and other moths for this office and for Canadian collectors.

Mr. W. D. Kearfott, Montclair, N.J., who has been untiring in his efforts to help our collectors in the identification of microlepidoptera.

Mr. W. H. Harrington, Ottawa, for identifying coleoptera.

Dr. E. M. Walker, Toronto, for examining and naming large collections of Canadian odonata.

In conclusion, I have much pleasure in testifying to the assiduity and excellence of the work performed by my assistants, Messrs. J. A. Guignard and Arthur Gibson.

I have the honour to be, Sir,

Your obedient servant,

JAMES FLETCHER,

Entomologist and Botanist.

DIVISION OF ENTOMOLOGY.

CEREALS.

Grain crops on the whole were fairly good in all parts of the Dominion in 1907, and there were very few complaints of injury by the ordinary pests of the staple grains. In the Northwest Territories a rather extensive outbreak of the Red-backed Cutworm and some allied species, was the cause of serious loss, not only in grain crops, but in all garden vegetables and root crops. There was no complaint of injury by grasshoppers, Hessian Fly or the Greater Wheat-stem Maggot. In British Columbia the Wheat Midge reduced considerably the small crop of wheat in the fertile districts of the Fraser river valley and the adjoining districts. In Prince Edward Island the Joint-worm did much harm to wheat, and there was a noticeable occurrence, although not very severe, of Hessian Fly.

Injury to Fall Wheat by Bibo gracilis, Whr.—An interesting injury to fall wheat in Alberta was by the larvæ of a fly belonging to the family known as Spring Flies, or March Flies, so called from the fact that they occur in large numbers for a few days in spring, when they are very conspicuous from their sluggish habits. The mature flies are of about the same size, or a little larger, than the common House Fly, with slender black and hairy bodies. They fly slowly and settle in large numbers in low shrubs and other vegetation. The common species *Bibio albipennis,* Say, occurs widely throughout the country and is frequently sent in under the supposition that it may be injurious. As far as can be learnt, however, the brown tough-skinned larvæ, with short fleshy spines or processes along the sides, do little harm, although they are known occasionally to feed on the roots of grasses and grain. Kellogg states in his 'American Insects' that they 'may do serious damage, and *Bibio tristis,* Will., discovered in Kansas in 1891, appeared in great numbers in wheat fields and frightened many wheat growers.' The larvæ of the common White-winged March Fly, *Bibio albipennis,* Say, are sometimes found in very large numbers at the roots of grasses or in manure that has been ploughed down the year before and has become almost disintegrated. It is very seldom that injury of any kind is attributable to the larvæ of these flies; but in August last, Mr. D. K. Husband wrote from Carstairs, Alta., that he had sown good seed of fall wheat, from the previous year's crop, which had not been treated in any way for the prevention of smut or other fungous diseases, whereby it might have been injured, but that it failed to germinate evenly, and very little came up. On examining the field to discover the reason, he found that the central portion of most of the grain had been eaten out by the larvæ of a species of Bibio which was afterwards kindly identified for me by Mr. D. W. Coquillett, as *Bibio gracilis,* Wkr. The larvæ ate the heart out of the grain, and there were from three to seven found at each grain. In view of the importance of the fall wheat crop in the Province of Alberta, it seems well to draw attention to this insect, although it is hardly likely that it will develop into a regularly occurring or serious pest of the wheat grower.

Mr. Husband writes as follows:—

Carstairs, Alta., September 18, 1906.—'I have never previously known of such an outbreak nor have any of the older and most successful growers in this neighbourhood. The land was broken during the first two weeks in August, 100 acres. It had never been broken before, my land being a school section. I would, however, say that I find this same insect in sod which has not yet been turned, that is on each side of my ploughed field.'

From the above it would appear that this attack, notwithstanding its severity, may have merely been accidental. The sod upon the roots of which the larvæ had been feeding having been turned under, the insects attacked the roots of the young wheat because it happened to be at hand.

CUTWORMS.—There was extensive injury to fields of grain and roots in the West during 1906 by several species of cutworms with habits similar to those of the common Red-backed Cutworm, *Paragrotis ochrogaster*, Gn. A great many letters were received from all the prairie provinces, and through the kindness of Mr. Arch, Mitchell, of the Provincial Department of Agriculture at Edmonton, I was kept regularly in touch with the progress of the infestation. The attack was so severe in many districts in the foot-hill country, extending from Northern Alberta right down to the international boundary, and also in the northern country as far east as the eastern boundary of Manitoba, as to be described by many correspondents as a perfect plague. Whole fields of grain of from 30 to 50 acres were entirely cleared off, as well as vegetables in gardens. In Southern Alberta, where the cultivation of beets for sugar has been much encouraged, great losses occurred in some localities. Mr. Arch. Mitchell did excellent service by promptly distributing a circular containing suggestions towards combating the attack, and recommended the use of the poisoned bran mash, now so well known as an effective remedy against this class of destructive insects. The formula recommended was the standard remedy which has always been adopted by this Division, viz.: Half a pound of Paris green mixed with 50 pounds of bran slightly moistened with water to which a small quantity of sugar or salt has been added. Many farmers doubled the proportion of Paris green on account of the excessive injuries which they were suffering; but this practice is not to be advised, on account of the corrosive nature of the Paris green upon vegetation; and, when distributing the poisoned material, it is very difficult to scatter it through a crop, particularly of beets or other roots, without some of it falling into the heart of the young plants. The quantity recommended, one pound of Paris green in 100 pounds of bran, is ample for all purposes, and, even in the worst attacks, 100 lbs. of bran can be distributed over two or three acres. A very light sprinkling on the surface of the ground is all that is necessary. The cutworms are night-feeding insects, and this material seems to be so attractive to them, when they crawl about on the surface of the land looking for food. that they actually eat it in preference to the succulent vegetation. It has sometimes been doubted, by farmers who have not tried the poisoned bran mash for cutworms, whether it is a practical remedy for field crops on large areas. The following statement by Mr. George Harcourt, Deputy Minister of Agriculture for Alberta, should dispose of such doubts: 'Reports have been received from all parts of the province that the Paris green treatment, where used according to instructions, was entirely successful in exterminating this pest.' (Alberta Crop Report, July 5, 1906.) It must be remembered that this outbreak was a very severe one, extending over a wide area and involving very large fields of grain and other crops.

Mr. W. H. Holland of Norquay, Man., among many others, writes under date September 25: 'I have found your poisoned bran remedy a perfect discharger of cutworms.'

I am indebted to Mr. George Batho, the editor of the *Nor-West Farmer* of Winnipeg, for the following extract from his issue of June 5, 1906, relating to the use of the poisoned bran remedy on a large scale:—

'Wm. Harris, writing in the Raymond Chronicle, has this to say about the poisoning of cutworms in the beet fields of Southern Alberta:—

"Of late much has been said about the cutworms. They are certainly doing a great damage; in some fields replanting is necessary. Some may urge the cutworms as an objection to early thinning of beets, claiming that then the cutworms have but one beet to work at in a place. I have been experimenting along this line this spring and have demonstrated that the cutworms can be killed off at a very small cost. Mix dry 100 lbs. bran with from 1 to 1½ lbs. Paris green. Dampen through a sprinkling can with about 5 gallons water to the 100 lbs. bran, and mix thoroughly until each flake of bran shows the green shade.

"This mixture can either be sown by hand or through a beet drill. If by hand, take a sack made to hang about the neck, and walking between two rows and using both hands, string the bran along between the two rows on each side. In this way a 16 year old boy can apply the bran to 8 or 10 acres per day; and it can be strewn thickly enough by using 20 to 30 lbs. to the acre.

"The cost to cover five acres will be as follows: 100 lbs. bran, 80 cents; 1½ lbs. Paris green, 35 cents; labour $1. This will amount to 43 cents per acre, and if done in this way it will rid the field of cutworms. Can we afford to run the risk with this pest when one ton of beets will cover the cost of poisoning nearly 13 acres? If you do not see many dead worms, do not conclude that it has done no good. The worms come out at night, eat the bran and a great many crawl back into the ground and die; but you will be able to see many of them on top."'

There is a constant inquiry for remedies for cutworms, and, as the subject was of such enormous importance to farmers in the West last season, I repeat again the remedies for these insects which were given in Bulletin No. 52 of this Division, 'Insects Injurious to Grain and Fodder Crops, Root Crops and Vegetables.' The demand for this bulletin has been so great that it is already almost exhausted.

FOR CUTWORMS IN GRAIN.

Remedies.—When grain is found to be attacked by cutworms the fields should at once be examined to discover, if possible, what species is at work. If the cutworms are of a surface-feeding kind, like the Red-backed Cutworm, they may frequently be controlled with comparative ease by scattering poisoned bran lightly through the grain, near the spots where the caterpillars are most numerous, or ahead of them, when they are so numerous as to have assumed the marching habit. If land is systematically kept clear of weeds in autumn, there will seldom be trouble from cutworms in the crop of the following year. Prairie or sod land which is to be broken for seeding the next year should be fed off as late as possible or mowed before breaking. In this way the female moths will not be attracted to the tall vegetation on such lands when laying their eggs.

FOR CUTWORMS IN GENERAL CROPS.

Remedies.—(1.) Clean Farming.—The keeping down of all weeds and the burning up of all haulms, stems of reaped crops and refuse, as early as possible in the autumn after crops are reaped, will destroy many eggs and prevent the deposition of others by presenting no suitable place for the moths to lay their eggs. The eggs are laid in autumn or spring, and such places are chosen by the moths as where there will be an abundance of food for the young caterpillars on hatching.

(2.) Traps.—Large numbers may be destroyed by placing between the rows of an infested crop, or at short distances apart on infested land, bundles of any succulent weed or other vegetation which has been previously poisoned by dipping it, after tying in bundles, into a strong mixture of Paris green, 1 oz. in a pail of water. The cutworms eat the poisoned plants, then bury themselves and die. In hot, dry weather these bundles should be put out after sundown, and a shingle may be placed on each to keep it from fading.

(3.) Banding and wrapping:—

(*a*) It will be found to well repay the trouble and expense to place a band of tin around each cabbage or other plant at the time of setting out. These may very easily be made by taking pieces of tin 6 inches long and 2½ inches wide, and bending them around a spade or broom handle so as to form short tubes. In placing them around a plant the two ends can be sprung apart to admit the plant, and then the tube should be pressed about half an inch into the ground. I have found this a useful means of disposing of empty tomato and other cans. To prepare these easily they need only be thrown into a bonfire, when the tops and bottoms fall off and the sides become unsoldered. The central piece of tin can then be cut down the centre with a pair of shears and forms two tubes.

(*b*) Wrapping a piece of paper round the stems of plants when setting them out will also save a great many.

Hand-picking or digging out the cutworm whenever a plant is seen to be cut off should, of course, always be practised.

(4.) Poisoned Bran Mash.—The most remarkably effective remedy against cutworms is the poisoned bran mash which has lately come into such wide use. This is made by mixing half a pound of Paris green with fifty pounds of slightly moistened bran. In making this, it is best first to dampen some of the bran slightly with water containing a little sugar or salt half a pound to a gallon. After mixing thoroughly, add the Paris green by dusting it on the surface and stirring all the time. We have found that when Paris green is added to perfectly dry bran, owing to its weight, it will sink at once to the bottom when stirred, in the same way that it does in water. Half a pound of Paris green is enough to poison fifty pounds of bran, although double this amount may be used. If the mixture is too wet, more dry bran should be stirred in until the mixture will crumble easily and run through the fingers without adhering.

When required for garden use, all that is necessary is to sprinkle a little of the poisoned mixture by hand around such plants as are liable to attack. When crops are planted in drills or in rows, a convenient way is to make the mixture rather dry and then distribute it by means of a Planet Jr., or other wheel seeder. In field practice, among such close growing crops as standing grain, which are sometimes injured by the Red-backed Cutworm, the poisoned bran remedy is also serviceable. The mixture can be distributed by means of a paddle or shingle and can be thrown easily to a distance of twenty feet. When distributed in this way, there is much less danger of chickens and birds picking it up than if it is placed in lumps.

The question of danger from the use of this poisoned bait is one which must be considered. It is frequently inquired about by correspondents, and some instances of the poisoning of poultry where it has been used, seemed to be justly attributable to their having eaten some of it. As a rule, there is little danger from this cause. The quantity used is so small that it is not noticed by poultry; and then, in gardens, poultry do so much harm to plants that they should never be admitted at the time of year when cutworms occur injuriously and only at special times of the year when there are no crops to injure. If, however, there should be a bad infestation by cutworms and there is no means of barring out or driving away the chickens, the owner of the crops must decide whether he will lose his crop or take special means of protecting his chickens. The experience of a great many people who have used this remedy without taking any special precautions, is that injury to domestic animals is extremely rare; and, although I have been on the watch for any trouble of this sort for many years, I do not know of a single instance when poultry have been poisoned, without doubt, by eating poisoned bran put out for cutworms. However, there will be many occasions when plants in gardens may be protected by putting out the poisoned bran in small heaps and then covering these up with a piece of shingle or some other covering, so that the material cannot be got at by stray chickens and other poultry.

It has also been asked whether there is any danger of plants absorbing Paris green from this mixture when placed near their roots. In reply to this, it is only necessary to point out that Paris green is practically insoluble and therefore cannot be absorbed by the plant. The only danger in its use is from its corrosive effects on vegetation, if thrown accidentally on to foliage where it can remain for some time.

WESTERN WHEAT-STEM SAWFLY (*Cephus occidentalis,* Riley and Marlatt).—From time to time specimens of this sawfly have been reared from the stubble of wheat fields in Manitoba and the Northwest provinces; but the attack has never been of a serious nature, and it was thought that probably the insect was naturally a depredator on some of the native western grasses. The matter has been investigated very carefully by Mr. Norman Criddle, of Aweme, Manitoba, and he has found that two or three native grasses are regularly attacked, even when growing in close proximity to fields of grain. He writes: 'The Western Wheat-stem Sawfly was enormously abundant this year. I think fully three-quarters of the stems of the bunch grass which we have been calling *Agropyrum caninum,* contained the larvæ. Wheat and rye were also infested to a moderate extent round the edges of the fields next to the prairie. Fully 10 per cent of the cultivated Western Rye grass, *Agropyrum tenerum,* had also larvæ in the stems, which of course prevented the seed from forming. During the winter and early spring the larvæ can be found about an inch below the ground in the stems near the root.'

The remedies which suggest themselves for this insect are the burning over of stubble in autumn or early spring, and the mowing of the coarse-stemmed grasses round the edges of wheat fields.

ROOTS AND VEGETABLES.

There has been the usual loss in gardens and in field root crops from the well known pests; but careful clean gardening and prompt attention have, as is always the case, prevented extensive injury. In one or two instances, as the cutworms in the West, which attacked not only field crops, but spread into every garden in the infested districts, the Sugar Beet Webworm in Southern Alberta, and an outbreak of the Spotted Cutworm, *Noctua c-nigrum,* L., at Leeds, Ont., it required much effort to hold the devastating swarms in check.

The COLORADO POTATO BEETLE was more than usually abundant in Manitoba.

Aweme, Man., November 26.—'The Colorado Potato Beetle was plentiful everywhere and did a great deal of damage to the foliage of potatoes. I noticed, however, that it was in much larger numbers on the plants of the Three-flowered Nightshade, *Solanum triflorum.*'—N. CRIDDLE.

Norquay, Man., September 25.—'The Colorado Beetle has been worse than ever before; it appeared in great numbers and very early on my early potatoes, which they would have destroyed utterly, if I had not sprayed them. They did not attack the main crop, which was put in later, until quite late in the season, and then only in patches. This fact was also noticed by several others in the neighbourhood. The insect was so general all over the province that the supply of Paris green was cleared out to the last ounce. The newspapers spoke of this beetle as a new thing in Manitoba; but I saw it here in 1889, and about 1893 a patch of potatoes planted in a small clearing in the bush about a mile from me was entirely devoured. Since that time I have been using Paris green every year until last year, when I did not see a single beetle.'—W. H. HOLLAND.

Several other correspondents in Manitoba spoke of the destruction by the Colorado Potato Beetle, and an effort was made to secure combined action in controlling the insect. In the older provinces there was the usual occurrence of this insect, and, where the plants were not sprayed, there was much loss. In Prince Edward Island the loss was reported as unusually large and the beetles as more numerous than for many years. The Rev. Father Burke states that prompt application of the ordinary remedy, Paris green invariably gave good results. The Colorado Potato Beetle and the Potato Rot, a fungous disease, are now of such regular occurrence throughout all the eastern parts of Canada that spraying the vines regularly with the poisoned Bordeaux mixture by means of the best spraying implements obtainable, should be recognized as a regular part of the practice of growing potatoes commercially, as well as in gardens, even of only limited extent. The cost and labour are comparatively small, but the profits are certain. The formula which is recommended for potatoes, is:—

Copper sulphate (bluestone)..	6 lbs.
Lime (unslaked)..	4 "
Water..	40 gals.
Paris green..	8 ozs.

If preferred, 3 lbs. of arsenate of lead may be used instead of the 8 ozs. of Paris green. This material is supplied in the market in the form of a thick paste. It is necessary that it should be thoroughly thinned with some water before putting into the spraying mixture. This is easily done; but, if the paste is put into the mixture without first dissolving it, it will not mix thoroughly. One of the advantages of arsenate of lead is that it remains on the foliage much longer than Paris green, and it is well known that it is not so destructive to the foliage.

In addition to the Colorado Potato Beetle, extensive injury is sometimes done by a small flea-beetle known as the Cucumber Flea-beetle, *Epitrix cucumeris,* Harr. This beetle, strange to say, is difficult to control with the ordinary applications of Paris green; but, if the poison is mixed with Bordeaux mixture, it is very effective, and it, like all other foliage eating insects, can be prevented from injuring the crop.

Enemies.—A subject which is always of much interest is the detection of the parasitic and predaceous enemies of any common injurious insect. During the past year specimens of the useful and beautiful little Carab, *Lebia grandis,* Hentz, were observed with interest and in some numbers, by Mr. Richard Gibson, of Delaware, Ont. He noticed them on several occasions attacking the larvæ of the Potato Beetle and destroying them. The Rev. Robert Hamilton, of Grenville, Que., also sent me specimens of the predaceous bug, *Podisus spinosus,* Dall., which he had found preying on the larvæ of the Colorado Potato Beetle. He had seen a great many of these larvæ lying dead among his potatoes and was induced to look for the cause, when he found an unusual number of the predaceous bugs. There are a great many parasites of this regular enemy of the potato grower; but, unfortunately, they are never abundant enough to affect appreciably its numbers, and spraying potatoes will probably always be every year a necessary part of the successful cultivation of that important crop.

THE POTATO-LEAF APHIS, *Nectarophora solanifolii,* Ashm.—An occasional but destructive enemy of the potato is the above named plant-louse, which in the spring of 1906 was very abundant at Ottawa. The potato fields in the month of June were much infested, and the plants were stunted by the attacks of the insects, thus aggravating to a marked degree the effects of the protracted drought which prevailed in the Ottawa valley. About the beginning of July the insects suddenly disappeared, and in favourable localities the plants to some extent outgrew the injury. The life habits of this species of aphis are as yet unknown; but it is probable that at that time the species migrates to some other food-plant, as is known to be the case with other species. Although some kinds of ladybird beetles were observed on the plants, it was considered that they were not in sufficient numbers to account for the sudden diminution in the numbers of the plant-louse. On a small scale, experiments in spraying with the ordinary insecticides for this class of insects were quite effective. Whale-oil soap, 1 lb. in 5 gallons of water, and kerosene emulsion made with Tak-a-Nap soap gave the best results.

No reports of injury were received in 1906 from Nova Scotia, where considerable injury was done in 1904.

The Small White Cabbage Butterfly, *Pontia rapæ*, L.—This well-known enemy of the cabbage was remarkably abundant and destructive in Manitoba during the summer of 1906.

Aweme, Man., September 20.—'The larvæ of *Pontia rapæ* were more abundant this year in our district than I have ever known them to be, and, as a result, in those districts where the use of pyrethrum insect powder was not known, cabbages were seriously and in some places wholly destroyed. Here a couple of dustings of the powder a week apart, mixed according to your directions, completely exterminated the caterpillars, so that no further damage was done, and we had a good crop. Turnips wild mustard, wild radish, and even the notorious Stinkweed, were also attacked, as well as, I suppose, many other cruciferous plants which I did not notice.'—N. Criddle.

Norquay, Man., September 25.—'The Cabbage Butterfly has descended on us as a scourge; every cabbage patch I know has been destroyed, also mignonette in the flower garden. Later they attacked Swede turnips rather savagely. I note your remedy (insect powder and flour) which I will have ready for them next year.'—W. H. Holland.

Macgregor, Man., October 25.—'The White Cabbage Butterfly appeared suddenly this year in immense numbers, and the caterpillars entirely destroyed the cabbage crop. There were but four cabbages at our local show on the 3rd instant; two of these were completely riddled by the caterpillars, and the other two, although not so bad, were injured to some extent. I saw no tickets attached to any of them. What I would like to know, is: Are these butterflies likely to turn up again next season, or are they only occasional visitors? They are distinct from the cabbage butterfly that is in Ireland and they seem to be harder to deal with, as the grubs get into the centre of the cabbage, while those in Ireland live on the outer leaves.'—T. Rowan.

Cypress River, Man., March, 1907.—'Last year the White Cabbage Butterflies were so numerous as to be quite a plague in this part of Manitoba, and no one here had a cabbage for winter use. The whole cabbage was like a skeleton. I tried quick lime (that was a specific in the old country), but it was of no avail here; and then I tried salt, but they seemed to like that all the more, and then I tried ashes.'—John Marten, Sr.

The caterpillars of the Small White Cabbage Butterfly, commonly known as Cabbage Worms, are, when full grown, about an inch long, of a velvety green colour, with a broken yellow line along each side and an unbroken one down the middle of of the back. The eggs are laid on the leaves on any part of the plant and on both sides of the leaves. The young caterpillars hatch after about a week and at once feed on the soft tissues close around the egg from which they have emerged. As they grow larger, they bore into the heads of the cabbage and do a large amount of injury, compared with their size. Being of the same green colour as the leaves, they are difficult to detect and may be in large numbers upon the plants without being noticed, except for their injuries. After feeding for about a fortnight the chrysalis condition is assumed, and in about a month after the eggs are laid the butterflies appear. There are two regular broods during the growing season and, besides this, sometimes a late supplementary brood of which the caterpillars are found as late as November. Cruciferous plants of nearly all kinds are attacked by this insect, as well as plants belonging to the Caper and Mignonette families, which are closely allied to the Cruciferæ.

This insect, which has now spread right across the Dominion and is every year the cause of enormous losses, not only in crops of cabbages, but also in turnips, swedes, and rape, is a comparatively recent importation from Europe. The first records of its occurrence in America were about 1860, when it was observed near Quebec; and it is supposed that it was brought across the Atlantic on some of the ships running into Quebec from European ports.

Remedy.—Although every year responsible for a great deal of loss to farmers and gardeners, this insect is one of the easiest pests to control. There are many remedies which are more or less exploited; but the one which has given us most satisfaction at Ottawa and has certainly proved very satisfactory to every one who has tried it, is to dust the plants, as soon as the caterpillars are noticed, with a mixture of 1 pound of pyrethrum insect powder in 4 pounds of cheap flour, or any other perfectly dry powder. Mix the whole together and keep it in a tightly closed canister or jar for 24 hours. The powder is then ready for use and may be dusted over the cabbages either with a cheese-cloth bag tapped lightly with a slender stick, or from one of the various insect guns, or dusters, now sold by seedsmen. The advantage of this remedy over many others which are recommended is that, although insect powder is so deadly to the caterpillars and most insects, it is quite harmless to human beings and the higher animals.

The rather prevalent custom of using Paris green and other arsenical poisons on cabbages and other vegetables, must be condemned as being very dangerous without any commensurate advantage.

It is claimed, as the heading up of cabbages is a development from the central axis and not an infolding of the leaves, that there is no danger of the Paris green or other poison being inclosed in the cabbage head; but these cabbage worms and several other kinds of caterpillars which feed upon the cabbage, bore holes into the heads, thus giving an opportunity for these poisons to be washed into them, and, as a matter of fact, some actual instances of poisoning in this way are recorded. Two or at most three applications of the insect powder have always been found enough on our grounds at Ottawa to clear cabbages and cauliflowers thoroughly.

THE SPINED RUSTIC *Barathra curialis,* Smith.—In the report of this Division for 1905, pp. 179-180, considerable space was given to a notice of a remarkable outbreak of a usually rare noctuid moth under the name of *Barathra occidentata,* Grote. During the season of 1906 a few specimens of the moth were taken at night in various parts of the country within the range where the moths and caterpillars had been observed the previous season, but there was no widespread occurrence similar to that of 1905. One instance of noticeable injury was reported to me by Dr. C. A. Hamilton, of Mahone Bay, N.S. This was in the garden of a neighbour, where fully half of a large patch of cabbage was destroyed by the caterpillars. Dr. Hamilton had none of the insects in his own garden and heard of no other growers who suffered. There was, however, an occurrence recorded by the United States Bureau of Entomology in the State of Vermont.

As stated above, the insect was treated of in my 1905 report under the name of *Barathra occidentata,* Grt.; but I have since learnt from Sir George Hampson, of the British Museum, that the species is really *Barathra curialis,* Smith; and this identification has been confirmed by Dr. J. B. Smith, the describer of the species, and also by Dr. H. G. Dyar.

A NEW CABBAGE PEST, *Barynotus schœnherri,* Zett.—To the already large list of insects which attack the cabbage, another has to be added, in the large gray Otiorhyncid beetle above named, as is shown by the following letter:—

Lawrencetown, N.S., July 7.—'I send specimens of a beetle that is doing a great deal of damage to the cabbage crop in this locality. They attack the young cabbages and cauliflowers when set out in the field, stripping the leaf right down to the ground. I shall be glad if you can give me the name and a remedy, if one is known to you.' —COLIN HILTZ.

This beetle is interesting from a scientific standpoint on account of its occurrence in Nova Scotia. It is a European species, but was detected in Nova Scotia on the sea coast some years ago by Mr. W. H. Harrington, in company with some other European insects such as *Otiorhynchus rugifrons,* Gyll., *O. sulcatus,* Fab., and *Sciaphilus muricatus,* Fab. These are all common insects of Northern Europe. All three of the last named have been found in Newfoundland, as well as on the coast of Nova Scotia; but no complaint has ever been made of injury by *O. rugifrons,* nor previously of depredations by *Barynotus schœnherri. Otiorhynchus sulcatus,* on the other hand, has on several occasions been reported as a rather troublesome pest in old beds of strawberries. In Europe it has been called the Black Vine Weevil, from the frequency of its injuries to the grape vine.

Remedy.—Soon after the injury to cabbages was reported as above by Mr. Hiltz, the beetles disappeared. The remedies suggested were based on the structure of the beetle. Although provided with well developed wing cases, these insects, like most of the others belonging to the same natural family, have no true wings; so they can only gain access to their food plant by crawling. Preventive remedies were therefore recommended. Watering the plants with a kerosene emulsion, it was thought, might keep the beetles away from plants so protected. The surrounding of the plants with tin bands, as is done for cutworms, would also doubtless be effective, and perhaps a band of paper might answer for the same purpose. It was further suggested that as this insect is nocturnal in habit, traps in the shape of shingles or other easily handled shelters might be placed about the field for the beetles to hide under during the day, from which they might be collected in the morning and killed by dropping them into some receptacle containing water on the top of which some coal oil had been poured. There was no opportunity for trying these remedies; but they may be remembered at any future time, should the insect appear again in destructive numbers.

This weevil is easily recognized by its thick-set oval shape, about ⅜ of an inch in length, its uniform grayish-brown colour and its short thick beak. Very little is known about its food habits; but it is probable that it has other food plants besides members of the Mustard family, and, if this should prove to be the case, some of these might be used as traps by poisoning them with Paris green and, after tying them in bundles, distributing them about the field at short intervals.

Asparagus Beetles, *Crioceris asparagi,* L., and *C. 12-punctata,* L.—The two species of Asparagus beetles are now a regularly occurring trouble to asparagus growers in the Lake Erie and Lake Ontario counties. These insects are slender beetles about a quarter of an inch in length and are very unlike in appearance and habits. The Common Asparagus Beetle is conspicuously marked with six yellowish white blotches on the wing-cases, which are of a metallic blue-black colour. The neck and the borders of the wing cases are reddish. The 12-spotted Asparagus Beetle is of a bright reddish orange with 12 round black spots on the wing covers. The larvæ of the first are of a dull olive green colour and slug-like in appearance. The eggs are laid early in spring by the over-wintering beetles and are of a greenish black colour. They are frequently laid in large numbers upon the young shoots rendering these unsightly for the market. The grubs feed upon the green growth and are produced throughout the season. The grubs of the 12-spotted species are similar in shape to those of the Common Asparagus Beetle, but are of a dirty yellowish colour and feed only inside the berries of the plant. The asparagus beetles made their first appearance in Canada, in the Niagara peninsula in 1898, and have not only persisted there, but have gradually spread in every direction since that date. They appeared in Toronto three or four years ago and are now the cause of much anxiety to asparagus growers; nevertheless, the spread, on the whole, is far less extensive that it was at first feared it might be. During the past season, however, there was a wide extension. No mention has been made of injury by the beetles to any distance east of Toronto; but on the 20th September last, a few specimens of the larvæ of the Common Asparagus Beetle were found at Ottawa upon an isolated bed of asparagus which had been planted for about twenty years and to which no new plants had been brought in from outside. The beetles, therefore, must have flown to it from some distance. These larvæ buried soon after they were found, and nearly a month later the perfect beetles were found in the breeding jar. The two species of Asparagus Beetles seem to have spread in company. The common species, as a rule, in the United States preceded to some extent the 12-spotted form; but in Western Ontario this rule seems to have been reversed in most instances. So far, however, the 12-spotted form has not appeared at Ottawa.

Remedies.—(1.) Dusting with lime. The most effective remedy is probably the destruction of the larvæ by dusting the plants systematically every three or four days with fresh air-slaked lime, which kills all those with which it comes in contact. (2.) Poisoning. Active poisons, as a mixture of Paris green and flour, or, better, Paris green mixed with the lime mentioned above, and dusted through the plants, will kill not only by contact with the larvæ, but will destroy both them and the perfect beetles which eat the poisoned foliage. (4.) Beating. Beetles and larvæ may be beaten from the old plants into nets or broad pans containing water and coal oil. Nets made especially for the purpose are most convenient. The larvæ may also be brushed off the plants with a stick, and, if this is done in the middle of a hot day, it is claimed that few will be able to get back again. (5.) Young chickens and ducks, when available, are very useful in eating the beetles when they first appear in spring.

As the perfect beetles appear early in spring and feed and lay their eggs in large numbers upon the young shoots, early cutting not only of the heads when fit for the market, but also of the small shoots which are of no use for that purpose, should be practised. In this way many of the larvæ are prevented from hatching, and the numbers of the pest to that extent reduced. When the 12-spotted Asparagus Beetle is known to be present, the berry-bearing plants should be cut off and burnt before the berries turn red so as to destroy the contained larvæ.

THE RED TURNIP BEETLE, *Entomoscelis adonidis,* Fab.—This showy scarlet beetle which is two-thirds the size of the Colorado Potato Beetle, and has three black stripes down its back, is now becoming well-known to the settlers on the prairies and in British Columbia. As the prairies are more settled up and the weeds belonging to the Mustard family become scarcer, there is every probability that the depredations of this insect upon cultivated crops will become more noticeable. Specimens were sent in last season from several places in Manitoba, the Northwest and the interior of British Columbia. As a remedy, dusting the plants with Paris green and flour (1 to 50) answered well. A rather severe outbreak at Fort Ellice, Man., is recorded by Mr. Louis Worms, as follows:—

'I reported to you in the spring of 1904 the depredations of the previous year in my garden at St. Lazare by the Red Turnip Beetle. In 1904 my garden was inundated in spring, and I only finished sowing my seeds in the beginning of June. During that year I did not notice any appreciable injury done by insects. It was quite otherwise in 1905. On the same piece of land which had been used as a garden for the two preceding years, I put out in the beginning of June, and in excellent condition, 450 fine plants of different varieties of cabbages. They took well, but I soon noticed that the leaves were much cut up and covered with beetles. The strongest plants resisted and in the end gave me a poor crop of about 50 imperfect cabbages. A bed of kohl-rabi was likewise checked in its growth by the same insect. Another field of white turnips about a quarter of a mile off were also much injured, and I was able toward the end of August to count as many as 15 or 20 beetles on a single turnip plant. I cannot explain where these insects could have come from in such numbers. Many of my neighbours also had their gardens infested, and one of them sowed his Swede turnips three times; another was equally unfortunate with me. How do these insects get to the plants?'

It was explained to Mr. Worms that the Red Turnip Beetle, like many others of the family to which it belongs, has well formed wings beneath the hard wing cases, by means of which it can fly long distances from place to place. The species seems to be more attracted by its native food plants, the Gray Tansy-mustard and the Prairie

Wallflowers, than by cultivated crops, but on many occasions great injury has been done to crops of turnips and cabbages of all kinds.

The Red-edged Leaf-hopper, *Oncometopia lateralis,* Fab.—As the prairie lands of the West are gradually brought under cultivation, it must be expected that some of the native insects will occasionally turn their attention to cultivated crops and also that some of them may become regular enemies of the farmer or tree-grower.

In May last, specimens of the above-named leaf-hopper were sent in by Mr. J. A. Mitchell, of Pakan, Alberta, with the report that they were occurring in destructive numbers upon his young seedlings of the Ash-leaved Maple (*Acer Negundo*). These were insects which had passed the winter in the mature condition. In August Mr. S. S. Galbraith sent several specimens of a new brood which he had found in great numbers on his vegetables. They were especially thick on the stems of parsnips, beets, &c., and it was noticed that they discharged frequently drops of a colourless liquid, evidently the sap which they had sucked from the plants. No particular damage was noticed and the insects disappeared suddenly after a heavy rain storm. Should these leaf-hoppers ever occur in sufficient numbers to become injurious, contact insecticides such as whale-oil soap or kerosene emulsion should be sprayed over the infested plants.

The Hop Flea-beetle, *Psylliodes punctulata,* Melsh.—For several years complaints of extensive injury to the hop plants in the Fraser river valley of British Columbia by a small black flea-beetle have been reported. Specimens have been received from Mr. John Wilson, the manager of large hop-yards belonging to Sir Arthur Stepney. Mr. Wilson writes on September 14 last:—

Agassiz, B.C.—'I am sending you a package of hops, just as I pulled them from the vines. I am now all through with my hop picking, and we had a very light crop—only 42 bales where we ought to have had 240. This shortage is due to the work of the flea-beetle. At the present price of hops, I consider that Sir Arthur Stepney will be a loser of from $15,000 to $20,000, so, you will see what a serious matter this is.'

Mr. Wilson tried many experiments with insecticides, but with little effect; and I must acknowledge that I cannot understand his failures, unless perhaps his spraying apparatus may have been inadequate. The remedy recommended was the ordinary poisoned Bordeaux mixture, made according to the 4-4-40 formula, with from 4 to 8 ounces of Paris green to the 40 gallons. He also tried the Bordeaux mixture poisoned with 4 pounds of arsenate of lead to the same amount of mixture. Either of these applications should certainly kill this insect on hops, as they have been found to do on rhubarb in the Northwest and Manitoba.

Mr. Thomas Cunningham, the Provincial Inspector of Fruit Pests of British Columbia, visited the infested hop yards and helped Mr. Wilson in his efforts at controlling the beetle. He writes to me in December last:—

Vancouver, B.C.—'I am free to confess that very litte impression was made by arsenical spraying. Dusting seemed to do better. I have a Leggett powder gun which does excellent dusting; but the trouble is, as soon as the dust or spray strikes the vines, the fleas hop off on to the ground. In all my experience with insects, I have never seen anything that will approach the fleas in resistance to all kinds of treatment.'

Mr. H. Hulburt, of Sardis, B.C., has also had experience with the Hop Flea-beetle, and has destroyed large numbers by catching them on tarred sheets as they flew from the vines after being disturbed.

The Hop Flea-beetle is a native insect, and there are two broods in the year, the first appearing in June and the second in August. It is quite different from the flea-beetles which are found on hops in England. Up to the present time little progress has been made towards getting a practical remedy; but steps have been taken to carry out further experiments next season, which it is hoped, will be more satisfactory.

FRUIT CROPS.

The fruit crops of the Dominion were very irregular, variable both in quality and in quantity according to the local conditions which prevailed. The apple crop was the one most affected by injurious insects. This important crop in the Maritime Provinces was poorer than usual. Father Burke speaks of the Codling Moth as very abundant in Prince Edward Island. In Western Ontario the ravages of the Codling Moth were extremely severe, and probably owing to the short plum crop the Plum Curculio did more harm to apples than in any year of which we have statistics. Plums were very short in quantity everywhere, except in British Columbia, owing to inclement weather which affected the buds and blossoms. In Ontario, sweet cherries were much reduced by the winter-killing of the buds and by the falling of the fruit after setting. Sour cherries gave an excellent crop in Ontario, quite free from insect injury. Small fruits were abundant in all provinces with the exception of strawberries, which were very much winter-killed in Ontario and Quebec, owing to the lack of snow and the mild changeable winter with one or two snaps of intense cold.

The Codling Moth, *Carpocapsa pomonella*, L.—Mr. George E. Fisher, of Freeman, Ont., writes: 'The remarkable increase of the San José Scale and Fall Webworm and the unprecedented injury by the Codling Worm upon the apple crop were the most conspicuous features of the past season.' And Mr. A. McNeill, in his September, 1906, Fruit Crop Report, writes: 'The marked feature of insects for this month is the pronounced appearance of the work of the Codling Moth. No doubt the crop of this year will be more affected by Codling Moth than any of the last four or five years. The Fall Webworm is the only other insect of which serious complaint is now made.' Mr. Fisher also, in his report as Director of the Entomological Society of Ontario, for the Hamilton district, states: 'There is no insect so widely distributed and so destructive to the fruit crop of the country as the Codling Moth, which causes the loss of many thousands of dollars annually. 1906 was pre-eminently a Codling Moth year, the worst on record. In many apple orchards one-half of the crop was wormy, and in some the proportion of injury was even greater. How to lessen the ravages of the Codling Worm is an intricate problem for apple and pear growers, who resort to various means. The most popular remedies are spraying with arsenites, bandaging, and keeping hogs and sheep in the orchard. Spraying will reduce the first brood. Bandages should be applied early in July after the rough bark has been scraped from the trunk and large limbs. If at intervals of ten days these bandages be removed and, after the worms have been destroyed, the bands are put back on the trees, continuing the work throughout the season until the crop is harvested, the evil will be materially lessened.'

Remedies.—Great stress has been laid in the past on the importance of spraying apple orchards while the calyx remains open and before the fruit turns down owing to its increasing weight. I think that possibly this feature of the case has been somewhat overdrawn. It is true that a large proportion of the young larvæ gain access to the apple through the calyx end; but the eggs are laid mostly on the sides of the apple and also in large numbers on the foliage. The young larvæ, on hatching, feed on the foliage to some extent, as was observed by the late Mr. Simpson of the United States Department of Agriculture, who published a very complete treatise on his experiments with the Codling Moth. If spraying has not been done before the apples turn down, there is still ample time to do much good for some time afterwards, as the calyx lobes do not close sufficiently to exclude the young larvæ for some time after that. I have found freshly laid eggs on crab apples that were half an inch in diameter, and good results followed from spraying the orchard in which they were growing, even at that time. The remedies for the Codling Moth must be devised in accordance with its life history. Those founded on our Ottawa observations and experiments, are given below and, where applied regularly year after year, have given perfectly satisfactory results. As in Canada east of a point about Toronto there is only one regular annual brood of the Codling Moth, the insect can there be controlled almost entirely with careful and regular spraying with the poisoned Bordeaux mixture. West of Toronto there are two broods, the second of which is by far the more destructive and difficult to cope with. It has been found that in this latter district it is necessary to supplement the spring spraying by wrapping the trees with loose bands of burlap or some other material which will serve as a refuge in which the caterpillars will spin their cocoons, these to be removed regularly and the caterpillars killed at short intervals after the middle of July, when the caterpillars begin to spin up. Care must be taken to scrape or brush the bark beneath these bands with a stiff brush or some other implement so as to remove all of the cocoons which are frequently sunk into the substance of the bark by the caterpillars gnawing away the surface. The insects in the bands may be killed by dropping the latter into boiling water or by crushing the cocoons. The poisoned Bordeaux mixture made with 4 lbs. of fresh lime, 4 lbs. of bluestone and 4 ounces of Paris green (or instead of the 4 ozs. of Paris green, 3 lbs. of Arsenate of lead) in 40 gallons of water, we have found to be a sure remedy against the Codling Moth, if applied every year. Three applications are necessary, the first one applied a week after the blossoms have fallen, and the others afterwards at intervals of fifteen days. In orchards which have not been previously treated for a year or two, four sprayings should be given.

The Codling Moth, which is such a destructive enemy of the apple in almost every locality where that favourite fruit can be grown, has in the past for some remarkable and unexplainable reason, never appeared in British Columbian orchards. There can be no doubt about infested fruit having been taken into the province very frequently; for I have heard of injured apples being found on the tables of the railway dining cars, and in addition many carloads of apples from Eastern Canada and the United States, where the insect is abundant, have of recent years been imported into British Columbia. It is quite impossible that even the most careful inspection could detect every infested apple; but yet the fact remained that, up to a year or two ago, there was no record of the insect having been found in the Pacific province. During the summer of 1906 specimens of the moth that had been reared from larvæ taken in the open on trees growing at Kamloops and at Kaslo, were sent to me for identificaton. The first specimens came from Mr. J. W. Cockle, of Kaslo, and were from cocoons which he had found in 1905 on the trunk of an apple tree growing in a garden within the limits of the town of Kaslo. Some other cocoons were found at the same time, and the work of the insect has also been further observed during the past summer. The Kamloops ocurrence is referred to by the finder in the following letter:—

Kamloops, B.C., June 6, 1906.—'For the past two or three years the apple crop in the gardens of this city has been almost destroyed by a worm which in appearance and general characteristics closely resembles the Codling Moth, yet I do not think it is quite identical with that moth as it is found in Eastern Canada. I am forwarding to your address two living specimens of the moth.'—E. Stuart Wood.

The two specimens sent by Mr. Wood were, like those sent by Mr. Cockle, undoubted specimens of the Codling Moth and quite identical with the form so common in the East. Fortunately for the fruit growers of British Columbia, the energetic Inspector of Fruit Pests, Mr. Thomas Cunningham, is carrying on a vigorous campaign in persuading every one who grows fruit, of the great advantage of spraying their trees persistently. By spraying, not only can the Codling Moth be controlled, but also many other pests of the orchard.

The Plum Curculio, *Conotrachelus nenuphar*, Herbst.—Plums were a very short crop over the whole of Eastern Canada in 1906. In consequence of this, there were more complaints of injury to apples, cherries, and peaches, by the Curculio than has been the case for many years. The greatest injury was done to the apple crop, and there were several instances of severe attack in the provinces of Quebec and Ontario. One of the worst was at Eglinton, Ont., near Toronto, on the grounds of Mr. John

Annable, who sent me during the first three weeks of July, some consignments of apples which had fallen from his trees. These apples each contained from one to five of the grubs of the Plum Curculio. The whole crop of this orchard was ruined. The loss from this insect was also considerable in the apple orchards of the Eastern Townships of the province of Quebec. When plums and apples are attacked by the Plum Curculio, the fruit drops freely, when about half-grown or less. Cherries hang on the trees much longer. From the fact that many young apples fall naturally during June, the injuries by the Curculio are frequently overlooked. Mr. Annable states that when he was sending off the injured fruit at my request for examination, his neighbours made great fun of him, telling him that there was nothing the matter with them and that it was natural for the young apples to fall off at that time of year.

Remedy.—In our Canadian experience we have always found that spraying with arsenical poisons was by far the best remedy for the Plum Curculio, and it has been a surprise to me that this method is not more advised and practised in the United States. The jarring method is by far too expensive in labour for adoption here, when the results of the two practices are compared. The effects of spraying for Curculio on plums are all that a paying remedy calls for. On apples, the effects seem to be less marked; but, even on that crop, there is a decided advantage far in excess of the cost.

Plums are grown in large quantities in the Niagara district and all of the most successful growers have adopted spraying with arsenites as the standard remedy for the Curculio.

Wolfville, N.S.—'I have known the "Little Turk" from boyhood and used to follow him up with mallet and sheet. Then I trained a hen and a flock of chicks to follow and pick up the beetles as they fell. This was far easier and quite as effectual. The chicks used to think it grand fun. Since spraying has become general, the damage to the plum crop by Curculio has not been so great.'—R. W. Starr.

Homer, Ont.—'With regard to spraying for Plum Curculio, I spray about four days after the blossoms drop. If I leave the plums till they are about the size of beans, and the beetles have begun to cut or sting them, then no amount of poison will save the crop. I find arsenate of lead away ahead of Paris green, because it does not burn the leaves and does not wash off so easily with the rain. Last year I sprayed all my plum orchards with arsenate of lead and really found none of the fruit cut by the first hatching of the curculio.'—F. G. Stewart.

St. Catharines, Ont.—'I use 3 ozs. of Paris green and 5 lbs. of lime to a barrel of water for the first spraying. For the second application, 2 ozs. of Paris green and 5 lbs. of lime. If the spraying is done carefully the first time, I find it is not necessary to spray twice in some seasons. The spraying should be done as soon as the blossoms drop.'—Alex. Glass.

St. Catharines, Ont.—'A thorough spraying with Bordeaux mixture, I have found to be the best remedy for Curculio. Generally speaking, plum trees load very heavily and the loss from Curculio after spraying is a help in thinning out the crop.—E. McArdle.

St. Catharines, Ont.—'I have never used any mixture for Curculio but the ordinary 4-4-40 Bordeaux mixture with 4 ozs. of Paris green. During the last five seasons I have not missed one crop of plums, and I attribute this entirely to spraying. I think it absolutely useless to attempt to grow plums in this section without spraying, since, even if the fruit escapes the Curculio, the "Shot-hole" fungus will destroy the foliage so early that the next season's crop is discounted. In fact, I consider spraying more important, if anything, than cultivation to ensure a crop of plums.'—R. F. Robinson.

The above are a very few quotations from many decided letters on this subject; and, although a few of my correspondents still adhere to the old-fashioned remedy of jarring, spraying is so effective that these are becoming fewer every year. The remedies recommended by this Division are: (1.) Spraying the trees with the 4-4-40 poisoned Bordeaux mixture very early in the season, directly the fruit is set. This destroys the beetles, which for some time feed upon the buds and opening leaves of plum trees. The second spraying, with poisoned Bordeaux mixture, should be made when the plums are about as large as peas. This will coat the young fruit so that the beetles are destroyed when they feed on the fruit or cut the crescents for egg-laying. (2.) The destruction of all windfalls or injured fruit that drops, so as to clear away all fruit before the larvæ emerge and enter the ground to pupate. Poultry, pigs and sheep help well in this work. (3.) The ploughing up and cultivation of orchards so as to remove grass and other vegetation which, besides weakening the trees, gives places for the insects to hide in. The depth at which the larvæ pupate, is about an inch beneath the surface, and the pupation in this part of Canada takes place during July; therefore cultivation during that month will destroy many of the pupæ, and this has been found the remedy which has given the best results in old orchards which had been in sod for many years and in which the fruit had been seriously injured year after year.

The jarring of plum trees, which is much written about and highly recommended, will certainly destroy many of the beetles, but costs too much for labour when compared with spraying with insecticides, which give more certain results in my experience.

THE APPLE MAGGOT, *Rhagoletis pomonella,* Walsh.—This destructive insect has appeared in new localities during the past season. At Como, Que., on the Ottawa river, the attack was not less severe than in the previous year. This was undoubtedly due to the lack of concerted action on the part of all the apple-growers in the district. Some of the owners of the largest orchards made a great effort to destroy the infested fruit by feeding it to stock or burying it; but there were a large number of small orchards where nothing was done, and, as a consequence, the whole community had to suffer. Severe outbreaks occurred near Woodstock, in New Brunswick, and in Prince Edward county, Ontario. One or two other reports proved to be of other insects, which were spoken of under the wrong names.

THE OYSTER-SHELL SCALE, *Mytilaspis ulmi,* L.,=*Lepidosaphes ulmi,* L.—One of the remarkable occurrences of the past season was of the well-known Oyster-shell Scale, and this was not only on weak trees and in badly kept orchards, but was a special development of the season, which involved trees in well-worked orchards and vigorous shrubs in gardens. Unless some unexpected help comes from insect or fungous parasites, it is to be feared that there will be much destruction by this insect during the coming season. It is comparatively inconspicuous; and, even with those fruit-growers who have learned to detect the common enemies of their trees, it is so familiar that its possibilities of doing harm are frequently underestimated. Wherever this insect is found in orchards in large numbers, steps should be taken to invigorate the trees by special fertilizing and cultivation, and also to destroy the insects by spraying with whale-oil soap solution or kerosene emulsion, as soon as the young bark-lice are seen to be moving. This will be probably about the first of June in Central Ontario, a little earlier in Western Ontario, and gradually becoming later going eastward to the maritime provinces, where the young insects sometimes do not appear till towards the end of the month. After the leaves have fallen in the autumn, all infested trees should be thoroughly sprayed with a limewash, made of 1 lb. of fresh lime in each gallon of water. Two coats of the whitewash should be applied, and the second one may be sprayed on to the trees immediately after the first is dry. In sections where the lime-sulphur wash is used for San José Scale, fungous diseases or other pests, no other treatment will be necessary.

THE BUFFALO TREE-HOPPER, *Ceresa bubalus,* Fab.—From several localities in Ontario and Quebec, branches of apple trees have been sent in, which were injured by the females of the Buffalo Tree-hopper when they were laying their eggs. The remedy which is advised for this insect is close pruning in winter, by which as many as possible of the egg clusters are removed, and the keeping down of all weeds and low growth in orchards, upon which the full grown and immature insects feed. They are particularly attracted, it is claimed, to beans, and it has been suggested that some of these should be planted between the trees in infested orchards, as traps, the plants being sprayed with strong mixtures of kerosene emulsion or whale-oil soap when the larvæ or nymphs are found to be numerous. Although the eggs are laid in the wood of trees, the young insects spend very little time on the trees and resort almost entirely to low herbage for their sustenance.

THE SAN JOSÉ SCALE, *Aspidiotus perniciosus,* Comstk.—This terrible enemy of the fruit-grower continues to spread alarmingly in the district of Ontario which, from its first appearance in Canada, has been the only part of the province where it has gained a foothold. This area extends through the counties immediately north of Lake Erie, and as far east around Lake Ontario as a point a little east of Burlington in Halton county. The losses are certainly enormous every year, but the satisfactory fact must be recorded that, even in the worst infested districts good clean crops are being reaped by careful fruit-growers, who use the lime-sulphur wash systematically every year. A renewal of interest in the subject has recently taken place, owing to the activity of certain fruit-growers in the St. Catharines district, and to the energy displayed by a few public-spirited men in the neighbourhood of Chatham, Ont. In response to inquiries made by Mr. Herbert S. Clements, M.P. for the West Riding of Kent, and by instruction of the Hon. Minister of Agriculture, the whole question of the occurrence of the San José Scale in Canada was discussed before the Select Standing Committee of the House of Commons on Agriculture and Colonization, on March 6, 1907. Immediately afterwards, on March 8, a convention was held at St. Catharines by the Niagara Fruit Growers' Association, at which the subject of treating the San José Scale was the chief topic. This meeting was largely attended; and, in addition to the information imparted by the Dominion Entomologist, valuable addresses were given by Prof. H. A. Surface, of Pennsylvania, and by several of the practical fruit-growers who were in attendance. The consensus of opinion at this meeting was that, where the lime-sulphur wash had been carefully applied, the Scale had been controlled and good crops produced. It was also apparent, however, that a large majority of those who grew fruit in the district were taking no steps whatever to control the pest, and, as a consequence, their neighbours were subjected to much loss and expense. One point which was urged upon the meeting was that a uniform formula should be decided upon for making the lime-sulphur wash. During the discussion a remarkable diversity of opinion was expressed as to the exact quantities of ingredients to use and as to the time necessary to boil these so as to produce the proper chemical combination. Naturally, each experimenter considered that the formula which he had been using was the best one. As a result of this discussion, a committee of representative men from the various sections was chosen, and they were requested in the name of the association to investigate this matter, and that each one should during the coming season experiment with at least one other formula besides the one which he considered best. One great advantage of the lime-sulphur wash, which was acknowledged by all, and which, perhaps, accounts for its wide adoption by a large number of fruit-growers, is its undoubted efficacy in controlling a large number of fungous diseases. The manufacture and use of the lime-sulphur wash are decidedly unpleasant and troublesome; but its great value in destroying scale insects and many other fruit pests, besides fungous diseases, has rendered it very popular with all who have tried it.

WHITE GRUBS (*Lachnosterna* species).—A very common enemy of strawberry-growers is the White Grub so-called. This is the larva of one of the species of May Beetles or June Bugs. There are several species with somewhat similar habits, and, although most of these in American literature have been treated of under the name of *Lachnosterna fusca,* Froh., that species is by no means responsible for all the injury reported. There is even yet a good deal of uncertainty as to the exact time required for the larvæ or grubs to attain full growth. The usual statement is that the eggs are laid early in June. The young grubs hatch from ten to eighteen days afterwards and feed on the roots of various plants until autumn. As winter approaches, they burrow deeply into the ground, and, returning again to the surface on the opening of spring, do much harm by eating the roots of grasses and many other kinds of plants, particularly corn and potatoes, when sown on sod turned down the previous year. It is claimed by Dr. S. A. Forbes, of Illinois, that a second winter, and part of the following summer, are passed in the larval condition, and that the grubs do not change to pupæ till June and July of the third season. The perfect beetles, in such a case, would issue from the pupæ in August and September of the same year, but would remain through the winter in the ground and emerge the following May and June; thus three full years would be required from the time the eggs were laid until the perfect beetles appeared. It is probable that some of the confusion is due to the fact that several species with differing habits are spoken of under the one name of White Grubs. From a practical standpoint, it is a very important point to decide what the exact habits are, of any species prevalent in a certain district. It is probable that, during the first year after hatching, little harm is done by the grubs if they live for the longer period. On the other hand, if the larval period covers only two seasons, any one finding the nearly full-grown grubs in spring, in land which it is desired to put under crop, can by a slight change in the rotation of his crops use the land for a crop which may be sown late in June or early in July, and which would make small root growth before the time that the grubs ceased feeding to pupate in June and July. If, on the other hand, the species lives for three seasons in the land, a crop planted on fields seen to be infested in spring might be seriously injured by the grubs if they were in the second year of their growth and would be able to attack the crop throughout the season, no matter at what time it was sown.

The strawberry plant seems to be particularly attractive to the beetles for laying their eggs, and it is probable that more complaints come in concerning depredations on strawberries than upon any other crop. As general remedies, there are unfortunately no measures which can be depended upon for the destruction of White Grubs in farm crops; but, as the eggs are laid mainly in grass lands, land which has been in sod for several years should not be planted to corn or potatoes the first year after breaking. During the year of ploughing, the grass to a large measure feeds any grubs which may be in the ground, and the next year the roots of the crop grown on the land receive the full attack. It has been noticed that clover is seldom attacked by White Grubs; therefore, this crop becomes of special value for growing on land before it is to be used for corn or potatoes. In strawberry beds it is possible to avoid injury by adopting what is now known as the 'one-crop method,' which consists of taking only one crop of fruit from the beds, instead of leaving these down as was usually done in the past for several years. Mr. Macoun, the Horticulturist of the Central Experimental Farm, tells me that this is the best method, not only for controlling the White Grubs, but also in getting paying returns form the fruit crop. His experiments show that the best results are obtained from planting young runners in spring in new beds. By autumn these have grown into strong plants, from which the crop is gathered the following summer, and the beds are then ploughed down at once. If young plants are required in numbers of any variety, the beds can be left for a second year; but, to get large berries, which always pay best, the single-crop plan is the most satisfactory, and all beds should as a general practice be ploughed down after two crops of fruit at the most. Under this plan, the grubs have not time to complete their stages and produce beetles before the beds are ploughed down. Not only is this treatment an excellent way of controlling the White Grub, but two other serious enemies of this crop are also prevented from increasing. These are the Black Vine Weevil, *Otiorhynchus sulcatus*, Fab., and the Sleepy Weevil, *Otiorhynchus ovatus*, L., two beetles which on many occasions have done serious injury in strawberry beds, both on the Atlantic and Pacific seaboards. It has been particularly noticed with regard to these, as well as with the White Grubs, that their injuries are most severe in old beds which have been left standing for several years. Another advantage in growing strawberries under this new method, is that the Strawberry Rust and some other fungous diseases are also checked.

THE BROWN-TAIL MOTH, *Euproctis chrysorrhœa*, L.—Four years ago the first specimen of the destructive Brown-tail Moth was taken near St. John, N.B., and in July, 1905, another specimen was taken at Digby, N.S. Students of insects in Canada have been on the alert to detect any further specimens of this insect in those parts of Canada with which there was frequent intercourse with those infested States of New England where the insect was known to be doing so much harm. Although there have been frequent references in the daily press to the occurrence of the insect in destructive numbers, in various parts of the maritime provinces, all of these when investigated were found to be based on erroneous information. Early in the present spring an undoubted nest containing the caterpillars of the Brown-tail Moth was received from Mr. C. Perry Foote, of Lakeville, N.S. This was the first actual instance of the larvæ being found in Canada. Mr. Foote writes:

'On February 23, I was looking for nests of Tussock Moth and picked the webbed leaves I am sending you. As there were no eggs on the outside, I tore the nest open and was not a little surprised when I found inside it a great number of small caterpillars. I took them into the house and, being near the fire, in a very few minutes they were active, but did not move very much.'

Immediately on the receipt of these caterpillars, an article giving the habits of the Brown-tail Moth and advice as to measures which should be immediately put in force, was sent off to the leading agricultural journals in Canada, as well as to the local press in the places in Nova Scotia where it was thought that the insect would probably be found. At the same time the provincial government of Nova Scotia, through Prof. M. Cumming, Principal of the Agricultural College at Truro, took active measures towards the eradication of this serious enemy before it became more widely distributed. The following article was published in the *Farmer's Advocate* of London, the *Montreal Daily* and *Weekly Star*, the *Maritime Farmer* and other papers. Several local papers have reprinted such parts of the article as they considered of most interest to their readers:

THE BROWN-TAIL MOTH IN CANADA.

In 1902 Mr. William McIntosh, of St. John, New Brunswick, took a single male specimen of the Brown-tail Moth (*Euproctis chrysorrhœa*, L.) about 20 miles from St. John, N.B. About the same time another specimen was taken by Mr. Gordon Leavitt, at St. John; and in July of 1905, Mr. John Russell took a third specimen at Digby, Nova Scotia. Up to the present time these have been the only authentic records of this much-to-be-dreaded insect having been taken in Canada. Recently, however, I have received from Mr. C. Perry Foote, of Lakeville, Nova Scotia, one of the winter nests of the Brown-tail Moth, filled with the living caterpillars, thus proving that this insect has established itself at one place at least in Canada.

It was to be expected that the moths might be found here at any time, having been brought up direct from Massachusetts on one of the steamboats which ply regularly between Boston and the Maritime Provinces; but this would not necessarily prove that the insect had established itself. The occurrence of the young caterpillars, however, is a more serious matter, and shews that energetic measures are necessary at once to suppress and possibly to wipe out this unwelcome visitor before it becomes more widespread. The recognition of the winter nests is an easy matter, and this is the time of year to attend to their destruction. The Brown-tail Moth passes the winter as a very young caterpillar, and large numbers of these form colonies at the tips of the branches of the trees upon which they have been feeding the previous summer. The eggs are laid during July, and, on hatching, the caterpillars feed for some time on the upper surface of the leaves. As winter approaches, they crawl to the tip of a branch and bind together a few leaves so as to make a tent. This is securely closed up with silk, and the caterpillars remain dormant all through the winter and until the buds burst the following spring. These winter nests are easily recognized. from being almost invariably at the tips of the branches, and from being at this time of the year the only nests which contain colonies of living caterpillars. These latter are black, but covered with rusty hairs, and on the 10th and 11th segments towards the end of the body there are two very conspicuous reddish-yellow cushion-like tubercles, one on each segment, which the caterpillars can elevate or depress at pleasure.

WHAT TO DO NOW.

The only way in which the Brown-tail Moth passes the winter is in the shape of these half-grown caterpillars, little more than one-quarter of an inch in length, in colonies of between two and three hundred, inside these nests of leaves at the tips of the branches. These are easily seen, and everybody in Nova Scotia and New Brunswick who is concerned in the successful management of orchards, and every citizen who is interested in the beauty of the town he lives in, should examine and look to the destruction of every nest of leaves found to contain caterpillars, which he may notice. The destruction of these winter nests is the most effective means of keeping this enemy within bounds.

A DANGEROUS ENEMY.

With the exception of the San José Scale, there are no two insects which have attracted so much public attention, nor with regard to which so much money has been spent in America by the State and Federal Governments of the United States, as the Gypsy Moth and the Brown-tail Moth. Both of these are pests introduced into America from Europe—the Gypsy Moth about 1869, and the Brown-tail Moth somewhere about 1890. Millions of dollars have now been spent on fighting the Gypsy Moth and the Brown-tail Moth in Massachusetts and the adjoining States. Dr. Howard, when treating of this insect and of an effort which is being made to introduce European parasites, says, in the Yearbook of the Department of Agriculture for 1905: 'The Brown-tail Moth has become even more abundant and injurious than the Gypsy Moth, and, owing to the fact that the female flies readily, whereas the female of the Gypsy Moth does not fly at all, the Brown-tail Moth has far exceeded the Gypsy Moth in its spread.'

PLANTS INJURED.

These caterpillars injure nearly all of the large and small fruits, and many perennial plants. The pear and apple seem to be favourites; but stone fruits, elms, maples and the oak are also commonly injured. A list of over 80 different kinds of food plants was published in 1903. Thousands of fruit trees in the vicinity of Boston, Dr. Howard says, have been killed by the Brown-tail Moth.

THE BROWN-TAIL RASH.

Not only are the caterpillars of this insect voracious feeders upon the foliage of many kinds of trees, but they cause much annoyance from their stinging hairs, which cause excessive irritation when they come in contact with the human skin. Each hair is barbed, and at the time the cocoons are spun these hairs are broken off and carried by the wind, when they fall on the neck and other exposed parts of the body, giving rise to the painful rash, which is very serious with some people, even although they may not have actually touched the caterpillars. Dr. Howard's assistants who have been working on this insect, have suffered very severely; and persons engaged in removing the nests from trees in the winter time must be careful not to handle these nests too freely, or they may be inconvenienced by this rash. The nests should be cut off from the trees, placed in a basket with as little handling as possible, and burnt at once. Dr. Howard states that 'a large part of the popular feeling in New England that the Brown-tail Moth must be exterminated, is due as much to the annoyance of this rash as to the loss of vegetation from the caterpillars.' As a remedy for this rash a free use of vaseline is recommended.

DESCRIPTION OF INSECT.

The Brown-tail Moth resembles very closely the well-known Fall Webworm, being of a beautiful pure white, except the tip of the body, which in both sexes is brown, and from which the popular name is derived. The female bears at the tip of the body an almost globular tuft of brown hairs. Both sexes fly freely, and are much attracted to lights—a fact of some importance as affecting their spread. The search-lights of night-sailing passenger steamers have attracted so many as to have drawn the attention of the officers of such vessels, who reported that moths had alighted upon their ships in great numbers in the vicinity of Boston about midnight on several occasions, and the introduction of the species at more than one sea port in Maine is attributed by Dr. Howard to vessels coming from the infested districts rather than by natural spread by direct flight.

ONLY ONE BROOD IN THE YEAR.

The eggs are laid in masses containing about 300 eggs. These masses are brown in colour from a thick covering of the golden brown hairs from the tip of the body of the female moth; and the whole egg mass more nearly resembles a silky, downy caterpillar than a cluster of eggs. These masses average about two-thirds of an inch in length by one-fourth of an inch in width, and are found on the lower surface of the leaves in July. The caterpillars hatch in August, but do not injure the trees much before winter. As soon as the buds burst in spring, they are at once attacked by the caterpillars, which emerge from their winter shelters and do much harm

SUMMER TREATMENT.

If the winter nests of the caterpillars have not been destroyed, trees should be sprayed with arsenical or other poisonous washes, so as to destroy the caterpillars during May and June. The caterpillars of the Brown-tail Moth are not so resistant to the poisonous effects of Paris green as are those of the Gypsy Moth. The spraying of all orchards with the poisoned Bordeaux mixture as a regular practice is recommended to all Canadian fruit-growers as the best general means of securing first-class fruit free of most of the ordinary pests which injure fruits. As the Brown-tail Moth caterpillars attack many other kinds of trees than fruit trees, it will be necessary that they should also be sprayed, and for this purpose Paris green may be used. A good useful poison wash consists of Paris green, 1 pound; fresh lime, 1 pound; water, 160 gallons. It is a very usual practice, however, among fruit-growers to use more than 1 pound of Paris green with lime in the 160 gallons, and, indeed, 2 pounds may be used without danger if 2 pounds of lime are added. Arsenate of lead is a newer remedy of great value, from the fact that it does not injure foliage so much, and remains on the leaves for a longer time. Three pounds of arsenate of lead may be used in 40 gallons of water without injury.

RÉSUMÉ.

The Brown-tail Moth, which has been the cause of enormous loss in Europe and the United States, is undoubtedly established in one locality in Nova Scotia, and probably in several others. It is important to find out as soon as possible the range of infestation; and everybody is urged to send in as soon as possible any suspicious nests of insects, or clusters of leaves webbed together, particularly if they contain caterpillars, whenever any are noticed on their trees.

The collection of the winter nests is the best and easiest means of controlling this insect.

The collection of these nests must be done carefully, with as little handling as possible, and all should be burnt at once when cut from the trees.

This work must be done before the buds burst.

Any trees bearing nests of the Brown-tail Moth, after the buds have opened, must be sprayed with some poisonous mixture for the destruction of the caterpillars.

The establishment of the Brown-tail Moth in Canada is a serious matter, affecting everybody in the district where the insects occur.

What is now only a matter of considerable interest, may, if neglected, become a public calamity.

Specimens for examination may be sent to the Entomologist, Central Experimental Farm, Ottawa. If so addressed, no postage will be required.

JAMES FLETCHER.

Since the appearance of this article a vigorous campaign has been inaugurated by the officers of the Agricultural College, several members of the Fruit Growers' Association of Nova Scotia, school teachers and others. As a consequence, the fruit-growing districts of the province of Nova Scotia have been pretty thoroughly examined. Prof. Cumming writes that, as soon as he learnt of the occurrence of the Brown-tail Moth in Nova Scotia, he telegraphed to various places and arranged meetings where Prof. Sears and Prof. Smith, of the Agricultural College Staff, and Mr. G. H. Vroom, Inspector for Nova Scotia of the Fruit Division of the Dominion Department of Agriculture, could meet the people and learn all that was possible about the spread of the insect. As a result of this personal method of spreading information, a great deal of good work has been done. Prof. Cumming thinks that something like 2,000 nests of the larvæ have been destroyed. As each of these contains from 200 to 300 caterpillars, it is easy to see how strongly established the insect had become before it was detected. This was probably owing to the close resemblance between the Brown-tail Moth and the moths of the much less destructive Fall Webworm, which would be flying about the same time. It is of course also possible that some mistakes may have been made in identifying the caterpillars. This I found was very frequently the case on the part of some of my correspondents who sent specimens to Ottawa. The cocoons of the two common Tussock Moths were most often sent in with the inquiry as to whether they were the Brown-tail Moth nests or not. There was no excuse for this mistake, because the two insects do not resemble each other in any of their stages; but a very natural mistake was made in confusing the larval nests of the American Tent Caterpillars about the time that they first began to spin their tents, with the winter larval tents of the Brown-tail Moth. By examining them carefully, the differences can at once be noted; but to those who have made no special study of insects, this confusion of the two species is easily accounted for. Unfortunately, the discovery of the Brown-tail Moth in Nova Scotia was made so late in the spring that there was little time for destroying the nests before the larvæ began to leave them and attack the foliage. This difficulty was to a large measure obviated by the energetic measures adopted by Professors Cumming, Sears and Smith. Prof. Cumming reports: 'We have had five men going through the valley. As they have gone west, they have found the insect more thickly distributed. The worst infested district is at Doucetville near Weymouth, in Digby county. Unfortunately, some of the people there are backward in matters pertaining to agriculture; but our own men have destroyed all the nests they could find in that district, and last week the school children were started at work through a bounty of 3 cents per nest offered by our department. This bounty will hold good until May 31. I have already had word from two school teachers, one of whom reports 80 nests destroyed and the other 70 nests destroyed by the pupils. I visited Digby myself and went over part of the infested area with Mr. Vroom. I also discussed the whole situation with him and Prof. Smith. I was in hopes that we might be able to run one or two spraying outfits in some of the districts; but I found that this would be quite impracticable; for, although I have given the impression that a considerable number of nests had been found, yet this is the result of a very extensive search. In a four-mile drive we found altogether 15 nests. Many of these were in trees considerably removed from the roadside. If one were to attempt spraying in these areas after the leaves come out, I do not know how he could locate the trees, unless perchance they were so badly stripped that there were no leaves left to hold the spray. Another unfortunate feature is that most of the orchards in Digby county where the pest is located, are not of more than half an acre to two acres in extent, and they are so irregular and thickly planted, that Mr. Vroom, who has had a large experience in spraying, says that it would be a most difficult thing to work a sprayer in such places.'

The measures adopted by the provincial authorities under Prof. Cumming were the best that could be done under the circumstances; but it is now of the greatest importance that everybody during the coming summer should spray their orchards with great care. The remedy recommended is the poisoned Bordeaux mixture mentioned above; and as there is now no possible doubt that spraying is a paying operation from the fruit-grower's standpoint, it will have a double advantage in giving better crops of fruit, while, at the same time, everything will be done that is possible to control the Brown-tail Moth. The farmers and fruit-growers of Nova Scotia seem keenly interested in this matter and will probably do a great deal this summer and next winter to control this infestation. The government is anxious to adopt the wisest measures under the circumstances and every effort will be made during the coming summer to obtain advice and assistance from those best informed upon the subject.

In order that the insect may be recognized with ease, the following short descriptions of the various stages are submitted; but it would be wise for any one who has the slightest doubt upon the subject, to submit specimens either direct to this office or to send them to the Agricultural College at Truro, N.S., when the fullest information and advice will be gladly given. The descriptions are condensed from Dr. Howard's valuable pamphlet 'The Brown-tail Moth and How to Control it.' (U.S. Dept. of Agriculture, Farmers' Bulletin No. 264).

The Eggs.—The eggs are small and globular and are laid in elongated oval masses beneath the leaves in late July. The egg masses are brown and covered with silky hair, each mass containing about 300 eggs. The masses average about two-thirds of an inch in length by one-quarter of an inch in width.

The Caterpillar.—The full grown caterpillar is about two inches long, reddish-brown in colour with a broken white stripe on each side and two red dots on the back near the hind end. It has also patches of orange and is covered with tubercles bearing long barbed hairs. The tubercules along the back and sides are covered with short brown hairs as well as the longer ones. These give the tubercles when magnified, an appearance like velvet. The head is pale brown with dark motlings. The young caterpillars are blackish, covered with reddish-brown hairs, the head jet black. Close examination will show projecting from the back of the fourth and fifth abdominal segments (that is the eighth and ninth segments of the body counting the head as the first) a large tuft of reddish-brown hairs; and on the middle line of the ninth and tenth body segments is an orange or reddish tubercle, which may be withdrawn into the body. After the second spring moult the caterpillar is about three-eighths of an inch long, the yellow markings on the body are more apparent than before, but the brown tufts on the back less so, while the bands of white dashes along the sides characteristic of the full grown caterpillar, are now noticeable.

The Pupa.—The full grown caterpillar spins a cocoon of grayish silk so loose in construction that the pupa may be seen through it. The pupa is five-eighths of an inch long and dark brown in colour. It has yellowish-brown hairs scattered over the abdomen and on the top of the thorax. The cocoons are by preference spun among the leaves at the tips of branches, a dozen or more caterpillars frequently spinning one web, within which each individual forms its own cocoon and changes to a pupa. The cocoons are also found under fences and beneath the edges of clap-boards. A mass of cocoons nearly two feet across was found in the cornice of a house by Mr. A. H. Kirkland.

The Adult Moth.—The moths are pure white, with the end of the adbomen brown. Both sexes bear at the tip of the abdomen, but more conspicuously with the female, a tuft of brown hairs, almost globular in form. This is the only moth occurring in America to which this description applies, and it is therefore unmistakable. The female expands about one and one-half inches and the male is smaller. The moths fly in New England from the 1st to the 20th of July, the time varying with the season. It is a night-flying insect, few being seen on the wing in the day time. The time of greatest activity is from 10 o'clock to midnight. They are strong fliers and are attracted to light.

The Winter Webs.—The webs in which the caterpillars pass the winter are very characteristic, there being no other insect structures found upon trees in winter which can be mistaken for them. Any web consisting of two or three leaves spun together near the tips of branches and containing small brownish downy caterpillars in winter time, must be those of the Brown-tail Moth. In early spring, as soon as the buds begin to appear upon fruit trees, these young caterpillars, which are at that time one-fourth grown, issue from the nests and attack the leaf-buds and blossoms and later the foliage of the trees upon which they have wintered. The growth of the caterpillar is rapid; it reaches full size and begins to spin its cocoon during the last half of June, when it changes to a pupa and remains in this condition for about three weeks before the moths appear.

In addition to the above enemies, several other insects have been more abundant than usual in certain localities. In Nova Scotian orchards two insects have been conspicuous by their numbers and injuries. The White-marked Tussock Moth, *Hemerocampa leucostigma,* S. & A., and the Red or Rusty Tussock Moth, *Notolophus antiqua,* L., have been widespread, and not only devoured the leaves of the trees, but did much harm by gnawing cavities in the sides of the growing apples. Since the discovery of the Brown-tail Moth in New Brunswick and Nova Scotia, a great many specimens of the cocoons of Tussock Moths have been received for examination. These were found to be so much infested by various parasites that there is every hope that the injury by these insects will be very small during 1907.

Two other species which have been very much commoner than for many years, are the Yellow-necked Apple-tree Caterpillar, *Datana ministra,* Drury, and the Red-humped Apple-tree Caterpillar, *Schizura concinna,* S. & A. They are both large and voracious caterpillars which feed in colonies and sometimes strip a whole branch of a tree before their presence is noticed. I have never known either species to be in sufficient numbers to require any other treatment than the cutting off of the colonies and destroying them. A remarkable fact about the Red-humped Apple-tree Caterpillar is the very large proportion which are always found to be parasitized. This was the case last season in Nova Scotia and was also observed in Maine by Miss Patch, the State Entomologist. The parasite which does good work, is a small four-winged fly about $\frac{1}{4}$ of an inch long, with a black body and red legs, prettily banded with black and white. The eggs are inserted into the body of the caterpillar and the grubs become fully developed before the caterpillars are half grown. They then spin a thin double cocoon, loose and white outside, but black, and of almost skin-like texture within, inside the dried up skin of the caterpillar, which soon turns white and shows by contrast very conspicuously the black head and tubercles of the dead larva. The name of the friendly parasite is *Limneria Guignardi*, Prov.

A CHERRY FRUIT-FLY (*Rhagoletis cingulata,* Loew.).—I have received from Mr. W. R. Palmer, of Rockside Orchard, Victoria, B.C., some specimens of puparia of a fruit-fly which is justly causing him much anxiety from its injuries to cherries in his orchard.

Victoria, B.C., October 10.—'I send you samples of Olivet cherries which have been infested by a small white maggot. I also send you some of the puparia for your inspection. Their presence is first noticeable by a small round hole in the fruit. On opening the cherries the grub will be generally found inside. It works around the stone and when full grown leaves by the hole and drops to the ground. The maggots all disappear from the fruit as soon as it is fully ripe, but the cherry is spoiled by being made rotten around the stone and is rendered of a darker colour.

'As they have increased this year, I have become very much interested in them and hope you will be able to identify them and give me some means of preventing their injury.'

Mr. Palmer was written that the insect answered in every particular to the Cherry Fruit-fly described by Prof. Slingerland in Cornell Bulletin 172, September, 1899. This insect had never so far been recorded as injuring cherries in any part of Canada, the occurrence, therefore, was of great interest and all facts concerning it were asked for.

Victoria, November 5.—'I will try and give you all the particulars I can regarding the cherry insect, *Rhagoletis cingulata* (?), as you call it. Unfortunately, I did not keep exact dates. I first noticed the holes in 1904. Last year my brother found one in a Novelle Royal, and this year they were quite numerous on two particular trees that we think are dying from defective root stocks and which therefore are not in a very healthy condition. They have confined themselves so far to three varieties, Olivet, Novelle Royal and Morello. The last named they do not seem to care very much for; but we found a few in them this year. The trees are eleven years old. I do not know of these insects being anywhere else. I think our trees were the first planted here of these varieties, the other growers who have them, have very few in bearing. A great many of the Olivet are now being planted.

We have not found any in the Sweet cherries, either early or late, so I am inclined to believe that they prefer preserving cherries, perhaps the reason is they are softer and more juicy. I will try the gas-lime treatment you recommend and shall apply it at once.'—W. R. PALMER.

If the identification of the insect which is attacking cherries in British Columbia is correct, the parent of the maggots is a pretty little black and white fly very much like the fly of the Apple Maggot.

Unfortunately, up to the present time, no remedy has been found to be effective against this enemy, and although an autumn application of gas lime to the land under the trees which were infested, was recommended, I have since learnt that this was not found effective in some Australian experiments. It is claimed that this fly spreads slowly and the drastic measure has been suggested of destroying all the fruit on an infested tree as soon as the presence of the maggot is detected.

FOREST AND SHADE TREES.

There has been frequent inquiry during the past year with regard to the depredations of insects upon forest trees and also upon trees grown for shade or ornament in cities. The Tent Caterpillars are again becoming numerous in some parts of Quebec and the Maritime Provinces. The Forest Tent Caterpillar has been particularly noticeable in Nova Scotia, and Father Burke reports their webs as 'conspicuous everywhere' in Prince Edward Island. The Tussock Moth, *Hemerocampa leucostigma*, S. & A., still does harm in the streets of Toronto and, to a less degree, in Montreal. Active measures are being taken by the city authorities, and there is no reason why the unsightly injury to the shade trees, which are such an ornament and advantage in crowded cities, should not be entirely wiped out. The Fall Webworm, *Hyphantria textor*, Harris, is decidedly on the increase throughout Ontario and eastward to the coast. Its injuries seem to be most severe on elm trees; but every kind of shrub and deciduous tree is at times eaten by the larvæ. In one instance the foliage of a strawberry bed near Ottawa was badly stripped. In Manitoba and the North-west Provinces the Ash-leaved Maples were much disfigured by an Anthomyian Gall-fly and the specimens of the fleshy galls received during June and July were filled with the red larvæ of the fly. This attack has been observed in the West for many years, and the galls are known by the name of the Fleshy Negundo Leaf-gall. Although unsightly on the trees, both in the fleshy condition and after they dry up for some time, no permanent injury is done to the trees. In the Eastern Townships of Quebec province, in several of the towns, the elms were badly infested by the Woolly Elm-leaf Aphis, *Schizoneura americana*, Riley, which gave the trees a dirty appearance and rendered resting under these trees very uncomfortable from the large amount of honeydew which was emitted.

There was considerable inquiry with regard to scale insects of all kinds, both on fruit trees and ornamental shrubbery. This was a direct outcome of the revived interest which has taken place in the injuries of the San José Scale.

The Spruce Gall-louse, *Chermes abietis*, L., has spread widely and during the past summer was much inquired about from those in Western Ontario who had bought or who were growing spruces for ornament. The insect was treated of in full in my Report for 1905, at page 190.

The Vancouver Island Oak-looper, *Therina somniaria*, Hulst.—This destructive insect was again enormously abundant on the beautiful oaks around Victoria, B.C., and from these trees the hordes of caterpillars spread to some other trees in the vicinity and stripped them also of their leaves. Small trees were easily protected by spraying with arsenites.

An occurrence of more than usual interest was the destruction of the seeds of the Silver Maple, *Acer dasycarpum*, at Ottawa by the larvæ of a small Nitidulid beetle, *Epuræa rufa*, Say. The seed of this tree was produced abundantly in 1906; it was ripe by the middle of June, and at that time fell to the ground. Towards the end of June some sacks of the seed were raked up from the ground and saved for sowing. They had lain on the ground for some days, but were apparently in good condition. Upon examining some of these about a month later, it was found that nearly every seed contained from 12 to 18 slender grubs about a quarter of an inch long, of a dirty white colour, with a honey-coloured roughened patch across the middle of each segment on the back. When fully fed these grubs left the seeds, of which they had reduced the contents to a green meal-like powder. The pupal condition was passed just beneath the surface of the ground and in August swarms of the beetles emerged. There were also found large numbers of the cocoons of a parasite, which emerged early the following spring. The beetles of the family to which *Epuræa rufa* belongs, are for the most part scavengers in habit, living on dead and decaying animal and vegetable substances. In the above instance, however, sound seeds were certainly attacked, and this species can evidently be a destructive enemy of one of our favourite shade trees.

The White Cedar Twig-borer.—For the past two years the White Cedar or American Arbor-vitæ has been seriously disfigured in the Ottawa district by the attacks of the caterpillars of some minute moths. These have been reared, and, through the kindness of Mr. Aug. Busck, the species have been identified. The injuries of these minute insects have been so severe throughout the Ottawa district, both on cultivated trees and in the woods and swamps, as to give a rusty sickly appearance to all of the White Cedars in the district, on account of the large number of the tips of the young twigs which have been killed by the minute caterpillars boring inside them in autumn and again in spring after they had revived from their winter torpor. These tiny caterpillars are about one-eighth of an inch long when winter sets in, very slender, of a general olive green colour, brownish towards anal end. The head is black and shining, the thoracic shield piceous. These caterpillars pass the winter singly inside the mines and revive again the next year in the hot weather at the end of April. They are about one-quarter of an inch long when full grown. The beautiful little moths, silvery white with brown markings, were found flying in clouds around the trees during the latter half of June. It had been noticed last year that there were apparently two different kinds of moths at work on the White Cedars. Consequently, last spring a supply of the infested twigs were sent to Mr. Busck, the eminent tineïdologist of the United States National Museum, who kindly examined the material carefully and sent me much valuable information concerning the species he found. Mr. Busck writes as follows:—

'June 13th. I hurry to inform you that the moths from the mines on *Thuya occidentalis* which you sent me last week for determination, are now issuing, and I find that only a small fraction prove to be *Recurvaria thujaella,* Kearfott. The large majority (20 to 1) belong to what Packard described as *Bucculatrix thuiella.* The species, however, does not belong to *Bucculatrix,* but to the genus *Argyresthia,* Hubner, and should thus be known as *Argyresthia thuiella,* Packard.

'This then is the species which is of economic importance in your case, and I am very glad to have become personally acquainted with it.'

June 18.—'Please send me some more of the infested twigs of *Thuya occidentalis,* because this morning I have found a third species of moth which has issued from the material you sent me before. I should like to get more of this, and there are still several points in the life history of all three species which might profitably be studied more carefully.

'So as not to get matters mixed up, let me recapitulate. First. I have bred in very large numbers a small pearly white moth with brownish obscure markings (costal-dorsal and apical spots), white head and thorax, white brown-ringed antennæ. This is a species of *Argyresthia* and is the same as was described as *Bucculatrix thuiella* by Packard. This, in spite of the fact, as I was well aware, that Packard described cocoons from which his moths were supposed to have issued, while the present species does not spin a cocoon, but issues directly from the mines (at least, in captivity), as you have rightly observed.

'Packard may have observed and wrongly connected with his species other small cocoons, for example those of *Recurvaria thujaella,* which may have been quite numerous in his lot and which are rather striking objects, naturally connected with the issuing species, whichever it be. Strangely enough, the genus *Argyresthia* generally spins just such a cocoon as described, and I have another species on Cypress which has nice normal cocoons; so, in this particular our species is aberrant. My reasons for identifying the species as Packard's Bucculatrix, which I have all along suspected to be an Argyresthia, are shortly that: (1) no Bucculatrix, so far as I know, feeds on this group of plants; (2) a large part of the genus Argyresthia is attached to Juniperus and its allies; (3) Packard's description fits our species well; (4) no other species is known on Thuya, which could possibly be confounded with it; (5) his figure—however poor—is not that of a Bucculatrix, but fits decidedly the present species.

'Second. Connected with this species and working in a similar manner, but in insignificant numbers, I have bred *Recurvaria thujaella*, Kearf. This species spins a small whitish cocoon.

'Thirdly. I have to-day bred one specimen of another species *Argyresthia freyella*, Wlsm., which belongs to the golden metallic group and is a juniper feeder.

'I have also bred the same little parasite with flagellate, five-branched antennæ in the male, which Packard mentions. Dr. Ashmead has identified this as *Pentacnemus bucculatricis*, Howard. Besides this interesting little parasite, I have also bred *Derostenes trifasciatus*, Ashm., a fine blue chalcid with coloured wings, determined by Dr. Ashmead and a *Hemiteles* sp. as yet not determined.'

These same parasites mentioned by Mr. Busck were also reared here at Ottawa in very large numbers; but they did not seem to be sufficiently numerous to reduce to any material extent the severity of the infestation; for the trees are still much disfigured by the injured twigs, which have been conspicuous during the past autumn and now (March 30) still contain the living larvæ, which will continue their work on the return of warm weather. The larger number of parasites, however, gives every reason to hope that this outbreak will soon come to an end.

DIVISION OF BOTANY

A NORTHWEST TUCKAHOE.

From time to time farmers in Manitoba and the Northwest plough up in their fields large black irregular balls of an india-rubber-like substance which always give rise to much curiosity, and many have been received for report. These when received had usually been out of the ground for a considerable time and were hard and almost stone-like in consistency. Last summer, through the courtesy of the *Farmer's Advocate* and of the Winnipeg *Free Press,* a request was published for fresh material, and several correspondents sent me specimens. When received they were of a firm elastic consistency like india-rubber and, as stated by Prof. Farlow, of Cambridge, Mass., were evidently the sclerotia of some fungus, probably a Polyporus. These objects were of a somewhat spherical shape, varying from 3 to 9 inches in diameter and weighing from 1 to 7 pounds. The outside was smooth and black; the inside very dark olive-black and the substance granulated by reason of the ramifications of mycelial threads. Most of them also contained in the substance, coarse grains of sand. All showed traces of having been at some time attached to the roots of shrubs or trees. One specimen surrounded a piece of poplar wood, showing the bark plainly. From this and from available evidence, it would appear that the fungus is at first parasitic on poplars and perhaps willows. In July, 1906, I received from the West, three of the large sclerotia or fungous masses in a fresh condition, and these were buried in the earth about 6 inches beneath the surface. On July 3, 1907, I had the great satisfaction of finding two fleshy toadstools, yellowish-white above, white beneath, of a species of *Polyporus,* which so far I have not had identified. Mr. F. T. Shutt has kindly made the excellent photograph which I give herewith, showing one of the toadstools attached to the sclerotium. Owing to the great interest which has been evinced in this matter by western farmers, I publish this preliminary note.

Prof. Roland Thaxter, of Cambridge, Mass., who had planted last year one of the sclerotia for Dr. Farlow, to whom I had sent it, writes under date of July 18, 1907:—

'A week or two ago the sclerotium which Dr. Farlow gave me and which I planted two years ago, fruited as yours has done. I sent the Polyporus directly to Dr. Farlow who recognized it as a European species which I believe he had not seen before. It is a beautiful thing and I think he will no doubt write you further concerning it.'

Dr. Farlow tells me that this Northwest fungus is most nearly allied with the Southern Tuckahoe or 'Indian Bread' upon which an article appeared, by J. H. Gore, in the *Smithsonian Institution Miscellaneous Collections,* Vol. XXV., 1883.

I have no knowledge of this fungus having been used for food, and, owing to the large amount of sand and grit sometimes inclosed, it could probably hardly be used. It is tasteless when masticated raw. In one of the extracts given below from some of the letters received, it is spoken of as having been used by the Indians for medicinal purposes.

Winnipeg, April 25, 1903.—'Under a separate cover I mail you a curious ball of rubbery substance 7 inches in diameter, found about 15 miles northeast of Winnipeg, at Moose Nose—part of Birds Hill. This has hardened since found last summer. Will you please tell me what it is; its nature, name, and composition. Also refer me to any printed matter about similar formations.'—HOWARD T. IRVINE.

Cromwell, Man., May 7, 1906.—'I notice a letter of yours regarding a black ball-like fungus ploughed up in parts of Manitoba. I ploughed up several last summer, and when I backset the land next week, no doubt I shall find some more. I was at a loss to explain what was the nature of the growth for some time, but I think I have found out the real nature of the fungus. A few years ago this land was covered over with large white poplar trees, which had very large fungi on the trunks when they began to decay; then they decayed and blew down. The fungus has not decayed so rapidly and being of a spongy nature is not very easy to burn, as I have tried to burn them. They are never found on prairie land, only on old bush land.'—George Boyd.

Welwyn, Sask., May 8.—'A day or two ago I read in the *Farmer's Advocate* your request for a certain fungus, but never having seen one did not expect to be able to accommodate you with a specimen. However, to-day, when grubbing out some willow and poplar roots from a piece of backsetting, I found the object which I am forwarding under a separate cover and which I feel positive from your description, is what you want. There was of course, considering the time of year, no fungus attached to it.'—F. J. Collyer.

Notre-Dame de Lourdes, Man., May 12.—'I send you by mail a black ball-like fungus, as you ask in the *Farmer's Advocate*. It was attached to the back of the stump of a poplar, which I send you too in the box.'—Albert de Briant.

Saint Louis, Sask., May 18, 1906.—'I saw in the *Farmer's Advocate* your letter concerning the "curious black ball-like fungus." This fungus is very common in our district, and I noticed it long ago. The Indians call it "Médecine de terre" (ground medicine). They use it for poulticing. I do not discuss its properties in this respect.'—Jules Godard.

Cromwell, Man., May 22, 1906.—'Yours of the 16th to hand. I am sending a specimen of fungus growth that I ploughed up to-day. It is slightly cut with the plough share, and not very large. I got several last year, as large as a man's head.' Geo. W. Boyd.

Togo, Sask., May 26.—I saw in the Winnipeg *Free Press* you want to get a sample of fungus. I presume this is the fungus you want. I have ploughed up several pieces of this same, some pieces weighing 3 to 4 pounds. This piece, I ploughed up alongside of a poplar bluff. I have ploughed this piece of ground three times, and I think it is a new piece.'—Joseph Dickie.

Miami, Man., June 4.—'I am sending you specimens of fungus as per your request in the *Farmer's Advocate*. The specimen that is cut with the plough, has only been unearthed a few days. The other, I found on top of the ground a week or so ago. The freshest one had its stem embedded in a piece of rotten wood. I have noticed what appears to be the same fungus, growing on old logs where some soil has got knocked on to them, generally burnt logs. Those I have found on the logs have always been small and flat, and without the stems that the larger ones have. Larger ones are generally deeper in the ground than the smaller ones. Have found them as deep as 8 or 10 inches to the bottom of them, and having a diameter of 4 to 6 inches.'—H. T. Duncalfe.

Togo, Sask., June 8.—'I received your letter of May 31. I herewith send a small piece of fungus I picked up since I sent you the first. It is somewhat dried, but I thought I had better send it. I do not expect to be able to get any more this summer, as I never get it or see it only when ploughing stubble; so I think it must either grow quick or is deeper in the soil than the breaking of the prairie sod. The soil is a sandy, very rich and mellow, subsoil clay. I have ploughed up several pieces of fungus, have examined them and thrown them away. If I had known sooner, I could have sent you plenty. Hope this small piece may be of use to you, and if I get any more, I will send it to you.'—Joseph Dickie.

Gilbert Plains, Man., June 23.—Some time ago I saw an article in the *Farmer's Advocate* from you about a certain fungus growth sometimes ploughed up in this district, requesting that specimens be sent you. You will find inclosed a small one of them which was ploughed up a day or so ago. There was nothing attached to it in any way, but was just as it is inclosed. I would be very much pleased to know the name of this fungus, as there have been a number of them ploughed up here at different times, always, I believe on light land.'—E. R. Dow.

Duck Lake, Sask., June 25.—'I am this day sending you by mail a sample of what appears to me to be a fungus. This grows, or is found, about 6 or 8 inches below the surface by farmers when ploughing in some localities. I have had several samples brought me by different ones for information. The two I am sending you are quite fresh now. When exposed, it becomes as if petrified. I saw an article written by you requesting any one finding such a substance (and this I believe corresponds to the article you describe), to send it to you for investigation by a specialist in fungi. After this research I should like very much to receive the results for the benefit of myself and farmer friends.'—R. T. SHEPHERD.

Holland, Man., July 9.—'I send you a fresh fungus ball, which I have just ploughed up. Will you kindly let me know about it? It was cut by the plough.'—JOHN C. WALKER.

Gilbert Plains, Man., July 14.—'I have received your letter of the 28th of June, acknowledging the receipt of the fungus which I had sent you and asking for further information about the same. I have been trying to learn something further about this, but so far, have not succeeded in getting much information. You ask if it does not always grow on land where there are, or have been, poplars growing recently. I do not think this is correct, as, while the land where it is found is generally more or less covered with poplar and willows, it is found on open spaces of land where there have never been trees. I cannot find that it has been, in this district at least, found attached to any plant, although there are sometimes marks or grooves on its surface caused by its growing among roots. You are correct as to their growing at a depth of four or five inches. As to the size of the largest I have seen, I have one at present that measures six by eight inches, and weighs about six pounds. I have seen larger ones than this, but did not measure or weigh them. I think the largest would be nine or ten inches in diameter, but could not say as to the weight. If I notice any large toadstools at any time, I will dig down and see whether one of these fungi is attached, and I will be pleased to send you any further information which I may obtain. I may say that while it is usually found on light gritty soil, it is sometimes found on heavier soil, although not of so large size as on the light.

'While writing the above another of these fungi was ploughed up, which I have weighed and measured. It is six and a half by nine inches in diameter, and weighs nine pounds. This is about as large a one as I have seen. As I thought you might like to have it, I am sending it along with this.'—E. R. Dow.

Mekiwin, Man., July 14.—'I have to-day sent you by mail a specimen of a black fungus which grows under the ground, principally in wooded parts of the country, and more plentiful when the woods have been destroyed by fire. I think this is the fungus which you were desirous of getting. I do not think that it has any connection with any toadstool above the ground, as toadstools are very scarce in this part of the country. This fungus is found only on first breaking the soil. I have never seen any on old ploughings. Trusting it reaches you safely, and that it is what you were desirous of getting.'—ARCHD. S. MCGREGOR.

Moosomin, Sask., November 8.—'I saw by *Farmer's Advocate* last summer that you wished to get samples of a kind of fungus that grew in the ground. I will send with same mail as this, one that I found one day this week, and which I think is the kind you want. I found it when doing a little bit of breaking, and as you will see, the plough share took a slice off the top side of it. The soil where I found it, was clay loam, with black soil on top, perhaps 10 yards from a small slough with scrub between and some small bushes all around. I also found one of the same kind a few years ago when breaking, it was near a slough too, and there was also scrub near it, but I think rather lower and heavier land. The scrub in both cases was small, mostly medium sized willow. I also took the top off that one with the plough too. The soil where I found this one was full of roots from the bushes and weeds.'—W. R. ADAMSON.

REPORT OF THE CEREALIST.

CHAS. E. SAUNDERS, B.A., Ph. D.

OTTAWA, March 30, 1907.

DR. WM. SAUNDERS, C.M.G.,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith the fourth annual report of the Cereal Division.

During the past year, as in previous years, a large proportion of my time has been given to the various problems connected with the growing of wheat in those parts of Canada which have only comparatively recently been open to settlers; but, at the same time, the needs of the other districts, where farming has been carried on for many years, have not been overlooked. Attention has also been given to the other important cereals, as well as to those fodder crops which are included in the scope of this Division.

The very large number of details which required my personal attention in connection with the crossing and selecting of cereals, the grinding of wheat and the baking tests of flour made it impracticable for me, this past year, to attend meetings away from Ottawa or to undertake any long journeys for the study of cereal growing in Canada. I attended, however, the annual meeting of the Canadian Seed Growers' Association held in Ottawa in June and presented a paper on 'Quality in Wheat.'

For samples of interesting cereals, I am indebted to the Department of Agriculture of the United States, the Colorado Agricultural Experiment Station, Mr. George Aitken of Woodstock, Vermont, the Guinness Research Laboratories, Dublin, and the Department of Agriculture of Russia.

It gives me pleasure to acknowledge the very valuable help which has been rendered to me by Mr. George J. Fixter, foreman in charge of the field work of this Division.

In the following pages I have endeavoured to give a fairly complete though necessarily very brief account of some of the most important experiments carried on during the past year.

I have the honour to be, sir,
Your obedient servant,
CHARLES E. SAUNDERS,
Cerealist.

CROSSING AND SELECTION OF CEREALS.

Only a few new crosses were attempted this year, as the selection of the progeny of the very large number of cross-bred sorts now on hand occupies all the time that can possibly be spared for such work. Crossing is a comparatively simple matter, but the work of selection which necessarily follows, for several years after the cross has been made, is difficult and exacting.

About 1,400 very small plots of cross-bred cereals, most of which are not yet fixed in type, were sown and from these about 4,500 plants were selected at harvest time.

Careful study of these during the autumn and winter months made possible the rejection of most of them, leaving the seeds from about 700 plants to be sown this spring. Among these there are many very promising varieties.

From the seeds produced by crossing in 1905, some very interesting plants were grown this past season. Two groups of these deserve special mention, on account of their scientific interest as well as because of the useful varieties of grain which may be produced from them by selection. Mensury barley, a bearded, six-row sort, which retains its hull when threshed, was crossed with Triple Naked, a beardless, two-row, hulless sort. Eight seeds were obtained (in 1905) using the Mensury as female, and six using the Tripple Naked as female. All the seeds germinated when sown this past season and the fourteen plants were all alike. The heads of grain produced were beardless and almost of the pure two-row type, although the four rows of empty scales sometimes contained a few small kernels. The kernels retained their hull. The entire absence of the normal, long awns in these cross-bred plants is in accord with observations made in other cases where bearded and (so-called) beardless kinds of barley have been crossed.

In crossing cereals it does not seem to make any difference in the progeny whether one or the other parent is used as female. The writer has studied several cases where the cross has been made both ways and has not yet found a single instance where any difference could be seen between the two.

The work of carefully re-selecting the most important varieties of cereals grown on this farm has been continued during the past year. Many of the new strains of wheat were on hand in sufficient quantity for the sowing of 1/40-acre plots, the result of the use of this selected seed being a great gain in uniformity and sometimes in other respects also. It is important to notice that each of these new strains has been bred from a single, selected plant. For several years past the seed for some of the plots has been obtained by the selection of heads just before the grain was harvested; but it has been found that the improvement effected by this method is much less marked than that produced by selecting one extra good plant and multiplying the seed of that plant until a sufficient quantity is on hand for a whole plot. This latter method also enables one to avoid the very real danger attendant upon the selection of extra large heads which sometimes owe their unusual size to the fact that they are produced from comparatively unproductive plants (bearing only one head), while in other cases they belong to some different variety which has become mixed to a certain extent with the desired sort.

SAMPLES OF GRAIN FOR GRADE AND NAME.

Attention is called to the fact that the Cerealist, while always willing to give any information in his power in regard to the quality of samples of grain submitted to him, cannot undertake to state what grade would be given to them by the regular inspectors. Although the Grain Inspection Act defines to a certain extent the different grades of grain, much necessarily depends on the judgment of the inspector himself, and it is therefore quite impossible in many cases for any one else to determine what grade will be given to the grain when it reaches the office of the inspector.

Samples submitted for name should always be sent in the head and accompanied by such details in regard to earliness, length of straw, &c., as can be given. When threshed grain alone is sent, without any information, it is frequently impossible to determine the name of the variety.

Samples are carried free through the mails if addressed to the Cerealist, Experimental Farm, Ottawa.

QUALITY IN WHEAT.

During the past two winters the writer has been carrying on milling tests of wheat and baking tests of flour. The objects of these tests have been to gain information in regard to the quality of the ordinary commercial varieties of wheat, such new sorts as might be imported and the large number of new cross-bred kinds which have been produced at this farm. In previous years it was not possible to obtain this highly desirable information until quite a large quantity of each variety was grown; but now, by the use of a small, experimental flour mill and by the development of a suitable system of baking tests it is quite practicable to determine the quality of every variety when only a small amount of seed is on hand and before it has been distributed for test elsewhere. It is felt therefore that under the present improved conditions it would be unwise to introduce any new wheat until after its quality has been determined.

The details of this investigation are too lengthy for insertion in this report, and it is therefore proposed to publish them in bulletin form. One or two of the most important conclusions drawn may, however, be given here.

The practical identity of the flour made from White Fife wheat with that produced from Red Fife wheat has been established. It has also been shown that these two varieties produce flour of the very highest baking strength.

Among the winter wheats it has been shown that Turkey Red yields flour of quite remarkable strength, very little inferior to Red Fife.

The strength of flour from very hard wheat has been shown to be much greater than that from very soft wheat of the same variety when grown in the same district and in the same season.

Some very decided variations in strength have also been observed when studying similar samples of the same variety grown in different climates.

The beneficial effect of age on the baking strength of flour has also been shown.

CEREALS IN SMALL PLOTS.

An alphabetical list of the principal varieties of the different cereals grown in small plots during the past season is here given. The total number of these plots was about 70. Those varieties which are given under letters and numbers are new sorts produced at this farm, and now fixed in type but not yet named. The numerous small plots of unfixed cereals are not referred to in this list.

Spring Wheat.

Bishop (3 strains).
Campbell's White Chaff.
Club.
Downy Riga D.
Early Haynes' Blue Stem.
Early Russian.
Grant Yellow.
Herisson Beardless.
John Brown.
Ladoga
Miller.
Moscow.
Preston (5 strains).
Princess.
Pringle's Champlain (3 strains).
Red Fife (6 strains).
Stanley C.
White Fife (5 strains).
3 B 3 (Dawn × Red Fife).
6 F 2 (Red Fife × Polish).
6 T " "
7 D 3 (Red Fife × Roumanian).
7 E 3 " "
7 J 4 " "

Durum (or Macaroni) Wheat.

Cretan.

Oats.

Black Mesdag.
Sixty Day White.
Sixty Day Yellow.

Six-row Barley.

Archangel, No. 59.
Archangel, No. 62.
Success.
Vologda, No. 447.
Vologda Blue, No. 448.
Vologda White, No. 448.

Two-row Barley.

Black Two-row.
Caucasian Hulless.
Early Chevalier.
Eriwan.
Kars.
Kinver Chevalier.
Large Naked.
Triple Naked.

Peas.

Arthur Selected.
Forrest Brownie.
Green Marrowfat.
Zulu.

UNIFORM TEST PLOTS OF CEREALS, FIELD ROOTS AND FODDER CORN.

The standard and new varieties of cereals which are obtainable commercially are annually grown in plots of one-fortieth of an acre, along with the cross-bred sorts produced at this farm and other varieties obtained from various sources. The field roots and fodder corn are grown in somewhat similar plots, the yield being usually estimated from the crop obtained from one-hundredth of an acre. The object of these tests is to determine the relative productiveness, earliness, &c., of the different varieties. Those which for a series of years are found to be distinctly inferior are rejected, in order to keep the list within as small bounds as possible.

The number of these larger plots grown during the past season was as follows:—Spring wheat, 65; durum wheat, 15; winter wheat 23 sown, 4 harvested; emmer and spelt, 12; oats, 67; six-row barley, 34; two-row barley, 30; peas, 26; spring rye, 2; winter rye, 3; mixed grain, 6; field beans, 4; flax, 7; turnips, 20; mangels, 16; carrots, 10; sugar beets, 8; Indian corn, 35; making a total of 333 plots. These represent about 355 varieties.

IMPORTANCE OF EARLY SOWING OF CEREALS.

Repeated tests have been made at this farm to ascertain the best time in spring for the sowing of cereals in order to obtain the largest possible yield. The experiments have proved that in this climate cereals should generally be sown about as soon as the land can be brought into proper condition. The reduction in yield due to delay in seeding is usually considerable, even when the delay is only a week long. The loss is especially serious with wheat and oats, and is sometimes quite disastrous in seasons when rust is abundant. The comparatively large yields obtained in the experimental plots on this farm are due in part to early sowing.

The best time for sowing cereals on this farm has been found to be from about April 20th to 26th in an ordinary season.

WEATHER.

Spring and early summer were favourable, but the dry weather which set in about midsummer and continued without much break into the autumn, kept down the yield of some of the cereals as well as of the field roots and fodder corn. The very early cereals did well. Rust was noticed in considerable quantities, but did less damage than in some other seasons.

SPRING WHEAT.

Several new varieties and selections of wheat were added to the regular plots last season. It seems unnecessary to give descriptions of these so long as they are under test at this farm only; but such sorts as are being sent to some of the other experimental farms, or elsewhere, for trial are here described.

Aurora.—This variety was obtained by the selection of a very early and strong plant produced by growing some mixed wheat imported from India under the name of 'Gehun.' Kernels hard, of a dark red colour and of about medium size, but somewhat long. Heads of medium length, tapering, bearded. Chaff downy and of a straw-yellow colour. Straw short and of good strength. Ripens remarkably early and gives a good yield. This variety produces flour which is of a somewhat deeper cream colour than that made from Red Fife, and of distinctly lower baking strength. It is not recommended as a desirable wheat for export, but is likely to be of value as a parent in cross-breeding.

Bobs.—This variety was received from the originator, the late Wm. Farrer of New South Wales. It is regarded in Australia as an excellent wheat for milling and baking and is said to have considerable power to resist rust in the warmer districts of that country. At Ottawa it is quite as much subject to rust as most other varieties, but its earliness and the high quality of the flour obtained from it are strong points in its favour. Unfortunately the kernels have a yellow skin which, in view of the present laws and prejudices in favour of red wheats, will in all likelihood prevent this variety from being grown in the great wheat-producing provinces where (in some sections at least) it would probably be of great value. Kernels yellow, of medium size, usually quite hard. Heads of medium length, not sharply pointed, beardless. Chaff smooth and of a straw-yellow colour. Straw stiff, rather below medium length. Ripens a few days before Red Fife. Yields flour which very closely resembles that produced from Red Fife or White Fife, both in appearance and in baking strength.

Chelsea.—This wheat is a selected, superior strain of the variety grown for some years under the name of 'Chester.' Parentage, Alpha (female) crossed with Gehun (male). (Alpha was produced by crossing Ladoga with White Fife. Gehun was a mixture of very early varieties obtained from India). Kernels hard, red, of about medium size, but a little longer as a rule than Red Fife. Heads beardless, tapering, rather long. Chaff yellowish, smooth. Straw stiff and rather long. Ripens a few days before Red Fife. Produces very strong flour of very good colour.

Colorado No. 50.—This wheat was produced at the Colorado State Agricultural Experiment Station, at Fort Collins, and is of rather complex pedigree, Fife and Indian varieties, however, predominating. It is entirely distinct from the wheat commonly called 'Colorado' in this country. The description of Colorado No. 50, as grown at Ottawa is as follows:—Kernels yellow, moderately hard, of about medium size. Heads of medium length, rather blunt and essentially beardless, though having a few short awns at the tip. Chaff yellowish, smooth. Straw short and stiff. Produces good flour.

Gatineau.—This variety, previously recorded as 8C, comes from a cross of Red Fife (female), with Goose (male), made by the writer in the year 1900. It is of special interest in several respects and though not promising for cultivation in rather moist climates, such as that of Ottawa, is worthy of careful test in some of the drier districts of Canada. Kernels hard, red, above medium size. Heads bearded, of medium or somewhat beyond medium length, rather narrow, tapering. Chaff yellowish, smooth. Straw long and not very strong when grown in good soil with an abundance of moisture. Ripens about with Red Fife wheat. Produces very strong flour which is of very good colour and rich in albuminoids.

Marquis.—This wheat is a selected, superior strain of the variety formerly grown at this farm under the name of 'Markham' Parentage, Hard Red Calcutta (female), crossed with Red Fife (male). Kernels rather dark red, hard, of about medium size, but rather short. Heads of medium length, beardless, pointed. Chaff yellowish, smooth. Straw stiff and of medium or rather below medium length. Ripens a few days before Red Fife. Produces very strong flour of very good colour.

Red Fife H.—This is a selected, early strain of Red Fife, which produces flour of remarkably high baking strength.

Stanley A.—This wheat is one of the most promising of all the strains selected from the various crosses of Ladoga. It yields flour which is superior to most of the others both in strength and in colour.

Yellow Cross.—This variety is a selection from an unfixed sort grown for some years under the name of 'Plumper.' Parentage, Colorado (female), crossed with Gehun (male). Kernels yellow, hard, about medium size. Heads bearded, pointed, below medium length. Chaff yellowish, downy. Straw stiff and rather short. Ripens quite early. This variety may prove useful for the making of rolled wheat as the kernels are rather unusually plump. The flour from this wheat showed only medium strength for bread-making when tested about six months after harvest, but when kept over for a year longer the strength was found to have improved so much that it ranked quite equal with Red Fife flour of the age of six months.

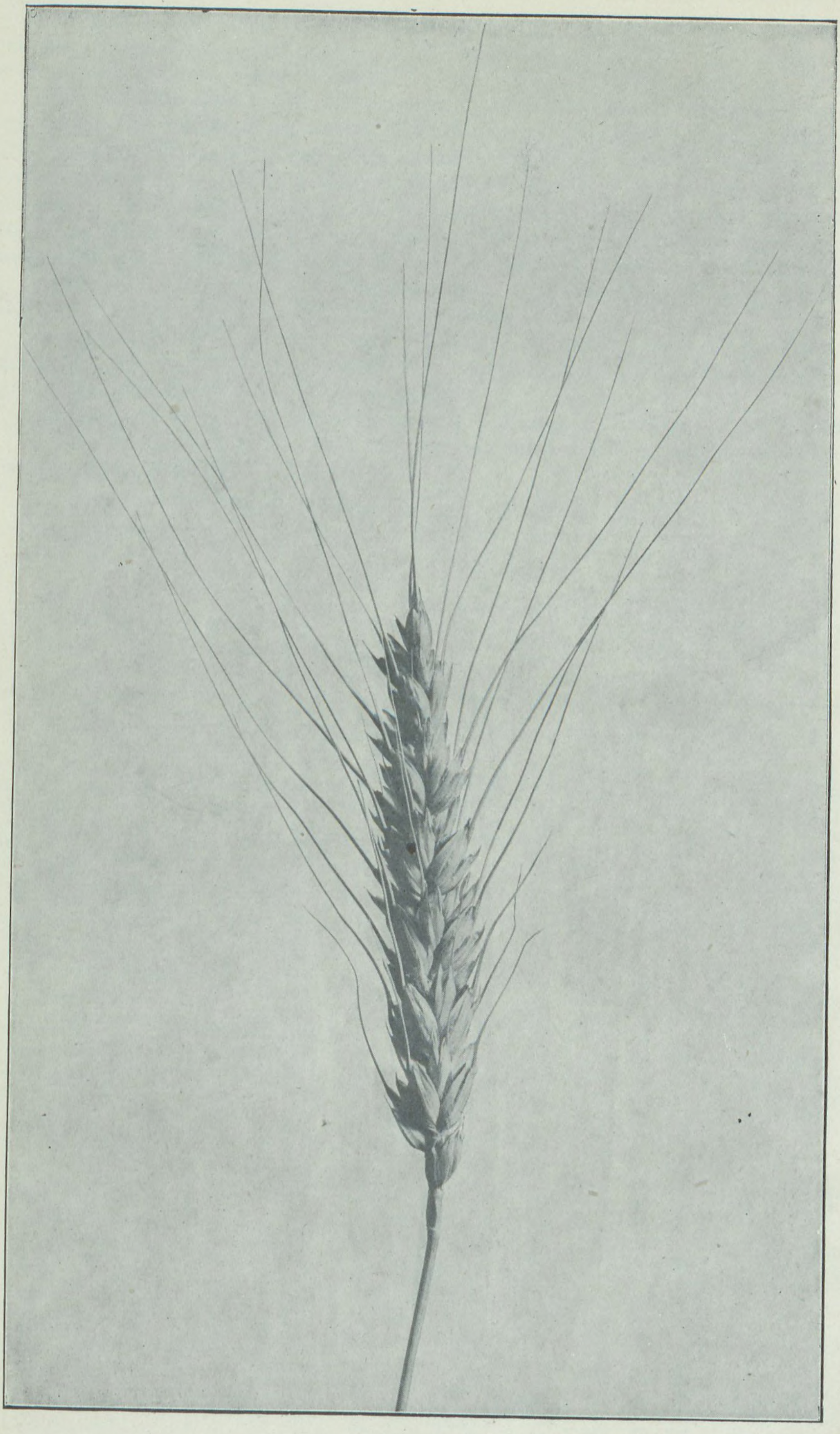
The test plots of wheat were sown on May 1 and 2, and were all one-fortieth of and acre in extent. The seed was used at the rate of 1½ bushels to the acre. The soil was a moderately heavy loam of good quality.

The yield per acre is expressed in pounds and also in 'bushels' of 60 pounds.

* Varieties and selected strains produced at the Central Experimental Farm are marked with an asterisk.

SPRING WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average length of Straw including head.	Character of Straw.	Average Length of Head.	Yield per Acre.	Yield per Acre.		Weight per measured bushel after cleaning.	RUSTED.
				Inches.		In.	Lbs.	Bush.	Lbs.	Lbs.	
1	Bishop*	Aug. 7	98	51	Medium	3	2,500	41	40	61	Slightly.
2	Ebert Selected*	" 2	93	45	Stiff	3	2,420	40	20	63	Considerably.
3	Colorado	" 8	99	51	Medium	2¾	2,400	40	..	61½	Slightly.
4	Aurora*	" 1	92	43	Stiff	3¼	2,320	38	40	61	Considerably.
5	Chelsea*	" 8	99	50	"	3½	2,300	38	20	59½	"
6	Hungarian White	" 9	100	49	Medium	3¼	2,260	37	40	61½	"
7	Huron Selected*	" 11	102	46	Stiff	3½	2,180	36	20	61	Slightly.
8	Bobs	" 8	99	46	"	3¼	2,180	36	20	61¼	Considerably.
9	Australian F.	" 11	102	48	Medium	3¼	2,180	36	20	57	Badly.
10	Preston A*	" 8	98	49	Stiff	3½	2,060	34	20	61	Slightly.
11	Percy A*	" 6	96	50	"	3¼	2,020	33	40	61	"
12	Pringle's Champlain	" 11	101	50	Medium	3½	2,020	33	40	60½	Badly.
13	Red Preston*	" 6	96	49	Stiff	3¼	2,020	33	40	59½	Slightly.
14	9 G*	" 9	99	49	Weak	2¼	2,020	33	40	57¾	Considerably.
15	Prospect E*	" 6	96	48	Stiff	3¼	1,980	33	..	57½	"
16	Herisson Bearded	" 8	99	52	"	1¾	1,960	32	40	63	Badly.
17	Laurel*	" 12	102	49	"	3½	1,940	32	20	58½	Considerably.
18	Riga M*	" 1	91	45	"	2½	1,940	32	20	60	Slightly.
19	Outlook*	" 11	101	50	"	4	1,920	32	..	59½	Badly.
20	Colorado No. 50.	" 12	103	42	"	3¼	1,900	31	40	58½	"
21	Marquis*	" 9	99	45	"	3¼	1,860	31	..	61	"
22	Red Fife H*	" 12	102	47	"	3¼	1,780	29	40	60	Slightly.
23	White Russian	" 13	103	49	"	3¼	1,780	29	40	60	Considerably.
24	Stanley A*	" 11	101	49	"	3¼	1,740	29	..	57½	Badly.
25	Alpha Selected*	" 9	100	50	Medium	3½	1,700	28	20	56	"
26	Persian Black	" 4	94	44	"	2½	1,700	28	20	57	Considerably.
27	Yellow Cross*	" 6	96	44	Stiff	2½	1,700	28	20	63¼	Slightly.
28	10 F*	" 9	99	48	Weak	2½	1,680	28	..	56½	Considerably.
29	Blue Stem	" 13	104	52	"	3½	1,660	27	40	55	"
30	White Fife	" 13	103	47	Stiff	3¼	1,540	25	40	60½	"
31	Yellow Fife*	" 1	91	44	"	3½	1,540	25	40	58½	Slightly.
32	Haynes' Blue Stem (Minn. 169)	" 13	104	48	"	3½	1,500	25	..	57½	"
33	Red Fern	" 12	102	53	Medium	3¾	1,480	24	40	60	Considerably.
34	Spence Yellow*	" 1	91	48	Stiff	2½	1,460	24	20	63¾	"
35	Yellow Queen*	" 7	97	46	"	3	1,400	23	20	61	"
36	Marvel	" 14	104	49	Weak	3¾	1,380	23	..	49¾	"
37	Gatineau*	" 13	103	52	"	3¼	1,320	22	..	58¾	"



Head of Turkey Red Winter Wheat, Natural Size.

Most Productive Varieties of Spring Wheat.—Excluding the durum wheats, which are considered separately, the following varieties of wheat have shown unusual productiveness for a series of years on this farm:—Preston, Pringle's Champlain, Huron, Herisson Bearded and Bishop. The first four of these are red wheats with bearded heads. Bishop is a white wheat and is beardless. Of the five varieties, Pringle's Champlain is probably the best for the production of strong flour.

Somewhat lower in yield, but superior in the strength of their flour, are Red Fern (bearded), Red Fife (beardless), and White Fife (beardless).

Earliest Varieties of Spring Wheat.—Several very early varieties of spring wheat are being grown on this farm, but they are not at present being distributed or recommended for general cultivation. Farmers applying for very early sorts should remember that extreme earliness is frequently associated with a rather small yield, short straw, liability to rust or some other defect to which the more vigorous wheats are less subject.

The earliest wheats which are as yet included in the regular distribution of seed grain from this farm are Pringle's Champlain, Preston, Huron, Stanley and Percy. These are all somewhat earlier than Red Fife. Stanley and Percy are beardless sorts.

DURUM OR MACARONI WHEAT.

The term 'Macaroni' wheat is often employed to designate those varieties having very large, hard kernels of which 'Goose' or 'Wild Goose' is the best known example in Canada. As these wheats are not all suitable for the making of macaroni it is perhaps better to employ the term 'Durum' (meaning *hard*) which is used in many countries and is both accurate and scientific. The different sorts of durum wheat are by no means identical in quality, though they are usually considered to be so. Excellent bread can be made from some of them, but the extreme hardness of the kernels and the somewhat unusual qualities of the flour produced make the wheats of this class unpopular at present, with both millers and bakers. Farmers who grow any of the durum wheats should exercise great care to prevent them from becoming mixed with wheat which is to be sold for flour-making.

As a rule, these varieties suffer less from drought and from rust than other sorts. They may therefore, in some cases, be grown to advantage, especially in any rather dry district where rust is apt to be severe. They are not, however, to be generally recommended for damp climates. It should also be borne in mind that the market price of durum wheat is usually lower than that paid for varieties which are popular for milling purposes.

The plots of durum wheat were one-fortieth of an acre in extent. The seed was sown on April 27, at the rate of 1¾ bushels to the acre. The soil was a rather sandy loam.

The yield per acre is expressed in pounds and also in 'bushels' of 60 pounds.

DURUM OR MACARONI WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.		No. of Days Maturing.	Average Length of Straw, including Head.	Character of Straw.	Average Length of Head.	Yield per Acre.	Yield per Acre.		Weight per measured bushel after cleaning.	Rusted.
					In.		In.	Lbs.	Bush.	Lbs.	Lbs.	
1	Roumanian	Aug.	9	104	55	Stiff	2¾	2,460	41	..	63	Slightly.
2	Gharnovka	"	9	101	54	"	2½	2,400	40	..	63	"
3	Goose	"	6	101	50	"	2¼	2,340	39	..	63	"
4	Beloturka	"	8	103	56	"	2¼	2,200	36	40	62½	"
5	Kahla	"	9	104	50	Weak	2½	2,000	33	20	60	Considerably.
6	Kubanka	"	11	106	45	Stiff	2¼	1,980	33	..	62	"
7	Yellow Gharnovka	"	11	106	51	Weak	2¾	1,900	31	40	62	Slightly,
8	Black Don	"	7	102	51	Medium	2½	1,860	31	..	61	Badly.
9	Italian	"	20	115	47	Stiff	2¾	1,700	28	20	57½	Slightly.
10	Red Indian	"	7	102	49	"	3	1,620	27	.	59	"
11	Mahmoudi	"	14	109	46	"	2½	1,120	18	40	59	Badly.
12	Velvet Don	"	7	102	45	Medium	2¾	1,080	18	..	61	"

Roumanian which stands at the head of the list this year, has also given the heighest average yield during the past five years.

WINTER WHEAT.

The winter wheat was sown on August 29, 1905. The plots were one-fortieth of an acre in extent, and the seed was used at the rate of 1¾ bushels to the acre. The soil was a clay loam.

The young plants made good growth in the autumn, but the rather mild and very changeable weather during the winter killed the majority of them, on nearly all the plots, so that it was necessary when spring came to plough up the greater part of the land devoted to these experiments. Only one variety, Padi, withstood in a satisfactory manner the trying conditions of the winter. This variety ripened on July 23, and yielded at the rate of 2,440 lbs. (40 bushels 40 lbs.) per acre. Unfortunately this wheat cannot be recommended for general cultivation for flour-making purposes on account of the very poor and unattractive colour of the bread which is produced from it.

WINTER WHEAT IN ALBERTA.

It seems necessary to call the attention of wheat-growers in Alberta to the fact that the high reputation of Alberta winter wheat has been gained largely because the variety known as Turkey Red has been most extensively grown. Turkey Red produces stronger flour than most of the other red winter wheats and it will be impossible to keep up the quality of Alberta winter wheat if all the red varieties are regarded as equally desirable. Unfortunately the term Alberta Red is now often used as if it were the name of a variety, whereas it is only the designation of a grade and, according to the law, any red winter wheat grown in Alberta is Alberta Red, (unless it be a very poor sample). Appearances in wheat are often extremely deceptive, and a fine, hard red sample of winter wheat may not produce flour of good baking strength if the variety (or breed) of the wheat is poor. Hardness and colour alone, are no guarantee of flour strength.

Wheat growers in Alberta are therefore strongly advised to sow only pure Turkey Red when they wish to produce hard red wheat of the best strength. To aid in discriminating between the true Turkey Red and other red winter wheats a description of this variety is here given.

Turkey Red (Turkish Red).—The terms 'Alberta Red' and 'Kansas Red' are general, commercial terms for red winter wheat. Wheat sold under either of these names may or may not be Turkey Red. Kernels red, usually hard, about medium size, but somewhat long. Heads bearded, tapering, not broad, not above medium length. Chaff yellowish, smooth. Straw stiff and of about medium length. Produces flour of very good colour and very high strength.

The annexed plate shows a typical head (natural size) of Turkey Red winter wheat.

EMMER AND SPELT.

The plots of emmer and spelt were one-fortieth of an acre each. The grain was sown on April 28 and May 2, at the rate of about 120 lbs. (or four bushels by measure) to the acre. The soil was a rather light loam.

The varieties 9 J 3 and 9 K 2, which appear in the list this year for the first time are crosses between Common Emmer and Colorado wheat, in which the Emmer characteristics predominate somewhat.

EMMER AND SPELT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.		No. of Days Maturing.	Average Length of Straw, including Head.	Character of Straw.	Average Length of Head.	Yield per Acre.	Weight per measured bushel after cleaning.	Rusted.
					In.		In.	Lbs.	Lbs.	
1	Common Emmer	Aug.	6	100	40	Weak	1¾	2,720	36	Slightly.
2	Red Emmer	"	9	103	47	"	3	2,680	32	"
3	Double Emmer	"	6	100	45	"	1¾	2,540	29	"
4	9 J 3	"	5	95	49	Stiff	2¾	2,220	30½	"
5	Red Spelt	"	14	108	53	"	4⅓	2,100	25	"
6	Smooth Spelt	"	15	109	44	"	4¾	1,800	25⅓	"
7	White Spelt	"	14	108	51	"	5	1,740	21½	Considerably.
8	White Emmer	"	15	109	49	Medium	3¼	1,500	24	Slightly.
9	Thick Emmer	"	15	109	40	Weak	2¼	1,400	28	Badly.
10	White Bearded Spelt	"	14	108	43	Stiff	4¾	1,200	23½	Considerably.
11	9 K 2	"	11	105	33	Medium	1¾	600	27	"

OATS.

The following varieties were added to the plots this season:—

Bergs.—A black oat obtained from Mr. C. Boije, of Finland. It has compact heads and ripens rather early.

Early Ripe.—A small, very early oat obtained from Prof. C. A. Zavitz, of Guelph, Ont. Chiefly white, but containing some yellow oats as well.

Sixty Day.—A small, very early oat obtained from Vermont. This oat is a mixture of at least two varieties, one being white and the other yellow. Selections have been made and are being propagated. While the name 'Sixty Day' is distinctly misleading, this oat seems to be the earliest ever grown at this farm.

White Wonder.—This variety which was grown for some years and then rejected from the plots has been re-introduced. It does not give a large yield but is rather early in ripening. The oats are white, short and small.

Several varieties have been dropped from the list. Among these may be mentioned especially, Holstein Prolific and Uberfluss. These are both productive sorts, but have the disadvantage of being mixtures of white and yellow oats; while at the same time they are not more productive than some of the pure varieties of white oats which are being grown here.

The name of the variety formerly recorded as Virginia White Abundance has been shortened to 'Virginia White.'

The plots were one-fortieth of an acre, and were sown on May 4th, the seed being used at the rate of two bushels per acre for most varieties, but in somewhat greater quantity whenever the oats were of unusually large size. The soil was a light loam.

The yield per acre is expressed in pounds and also in 'bushels' of 34 pounds.

* Varieties and selected strains produced at the Central Experimental Farm are marked with an asterisk.

OATS—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.		No. of Days Maturing.	Average Length of Straw including Head.	Character of Straw.	Average Length of Head.	Yield per Acre.	Yield per Acre.		Weight per measured bushel after cleaning.	Rusted.
					In.		In.	Lbs.	Bush.	Lbs.	Lbs.	
1	Gold Rain	Aug.	7	95	51	Medium	7½	2,540	74	24	34½	Considerably.
2	Thousand Dollar	"	8	96	51	Weak	8	2,520	74	4	33	"
3	Fichtel Mountain	"	7	95	49	"	7½	2,420	71	6	32	"
4	Irish Victor	"	14	102	56	"	8¾	2,400	70	20	28½	"
5	Joanette (black)	"	17	105	42	"	7½	2,400	70	20	30½	Badly.
6	Golden Beauty	"	8	96	42	Medium	7¼	2,340	68	28	30	Considerably.
7	Banner A*	"	12	100	46	Stiff	7	2,320	68	8	31	Slightly.
8	Twentieth Century	"	7	95	49	Weak	8	2,320	68	8	32½	Considerably.
9	Lincoln	"	8	96	44	Stiff	7½	2,320	68	8	33	Slightly.
10	Daubeney Selected*	July	30	87	45	"	6½	2,320	68	8	33	Considerably.
11	Welcome	Aug.	7	95	42	"	8	2,300	67	22	33	Slightly.
12	American Beauty	"	7	95	42	Medium	7	2,300	67	22	34¼	Considerably.
13	Mennonite	"	8	96	44	Weak	7½	2,260	66	16	29¾	"
14	Sixty Day	July	24	81	39	Medium	5½	2,260	66	16	28½	Slightly.
15	Columbus Selected*	Aug.	4	92	47	Weak	7	2,200	64	24	32	Badly.
16	Excelsior (black)	"	8	96	48	Medium	7½	2,200	64	24	33½	"
17	Wide Awake	"	6	94	44	Weak	7½	2,180	64	4	30	Considerably.
18	White Giant Selected*	"	7	95	42	Stiff	8	2,180	64	4	31½	Slightly.
19	Bavarian	"	12	100	47	Medium	7¼	2,180	64	4	32	"
20	Improved Ligowo	"	8	96	49	Weak	7¼	2,160	63	18	33½	Considerably.
21	Tartar King	"	7	95	45	Stiff	8¼	2,140	62	32	33	"
22	Atlantic	"	7	95	46	Weak	7½	2,100	61	26	38	"
23	Danish Island	"	7	95	44	Stiff	8	2,100	61	26	33½	Slightly.
24	Sorgenfrei	"	6	94	46	Weak	7½	2,080	61	6	33	Considerably.
25	Kirsche	"	6	94	41	"	7	2,080	61	6	30	"
26	Siberian	"	8	96	47	Medium	8	2,080	61	6	32¼	"
27	Kendal White*	"	7	95	45	"	7½	2,060	60	20	30½	"
28	Golden Fleece	"	8	96	46	Stiff	6¾	2,060	60	20	31½	"
29	Black Beauty	"	8	96	48	Weak	8½	2,060	60	20	29	Badly.
30	Tlola (black)	July	30	87	48	"	8	2,040	60	..	28¼	Considerably.
31	Green Russian	Aug.	11	99	46	"	7¾	2,040	60	..	30	Badly.
32	Banner B*	"	12	100	46	Stiff	7	2,020	59	14	32	Slightly.
33	Garton's Abundance	"	8	96	45	Weak	8¼	2,000	58	28	34	Considerably.
34	White Wonder	"	1	89	46	"	8½	2,000	58	28	36	"
35	Kendal Black*	"	14	102	48	"	8¼	2,000	58	28	30	Badly.
36	Swedish Select	"	6	94	48	"	7¼	1,980	58	8	32	Considerably.
37	Goldfinder	"	8	96	41	"	7¾	1,980	58	8	30½	Slightly.
38	Buckbee's Illinois	"	8	96	49	"	7¾	1,940	57	2	32	Considerably.
39	Pioneer (black)	"	8	96	46	Stiff	8½	1,940	57	2	31¾	"
40	Dinauer	"	7	95	47	"	8¼	1,920	56	16	31½	"
41	Milford White*	"	8	96	46	Weak	7¼	1,920	56	16	32	"
42	Improved American	"	8	96	47	Medium	8	1,900	55	30	30	"
43	American Triumph	"	7	95	42	"	7½	1,860	54	24	34½	"
44	Sensation	"	7	95	46	"	8	1,860	54	24	33½	Slightly.
45	Bergs (black)	"	7	95	45	Weak	7	1,840	54	4	36¼	Considerably.
46	Olive Black*	"	8	96	44	Medium	8	1,840	54	4	32½	"
47	Waverley	"	10	98	49	"	8	1,840	54	4	31	"
48	Golden Giant	"	14	102	47	Stiff	8	1,780	52	12	27½	Badly.
49	Whiting	"	10	98	48	Medium	7¾	1,780	52	12	33	Considerably.
50	Early Ripe	July	30	87	44	Stiff	6½	1,780	52	12	27½	"
51	Abundance	Aug.	7	95	45	Medium	8¼	1,740	51	6	32½	"
52	Virginia White	"	10	98	46	Weak	6½	1,700	50	..	30	Badly.
53	Milford Black*	"	10	98	46	"	7¼	1,660	48	28	30	"
54	Colossal	"	7	95	47	Medium	9¼	1,620	47	22	33	Considerably.
55	Bell (black)	"	12	100	50	"	7½	1,600	47	2	32	"
56	Swedish Ligowo	"	8	96	36	Weak	6	1,540	45	10	33	"
57	Chinese Naked	"	8	96	48	"	7¼	1,520	44	24	46½	"
58	Early Angus	"	13	101	44	"	7	1,180	34	24	33½	Badly.
59	Storm King	"	8	96	46	Stiff	8½	920	27	2	34¼	Considerably

Most Productive Varieties of Oats.

Among the most productive varieties of oats grown for the past five years at this farm the following varieties deserve special mention:—Banner (sometimes called 'American Banner'), Twentieth Century, White Giant and Lincoln. These are all white oats, and one or more of these kinds can be obtained from any good seedsman. Golden Beauty, Columbus and Mennonite are very productive yellow oats, but do not seem to possess any points of superiority over the best white oats. Among the black oats two of the best sorts are Black Beauty and Joanette. These are, however, usually less productive than the best white kinds. The Joanette has short straw, which makes it a desirable variety to sow in some cases. It is readily obtainable in commerce, sometimes under its own name and at other times under the designation 'Black Goanette.'

Earliest Varieties of Oats.—The variety known as 'Sixty Day' is perhaps the earliest oat ever grown at this farm. It was ready to cut, last season, in 81 days from the time of sowing. Somewhat less early but probably more productive, as a rule, are Tartar King, Welcome and Daubeney. These are all white oats (except the Sixty Day, which is a mixture of white and yellow) and give a fair crop. They are obtainable in commerce, but farmers are not advised to grow them except in cases where earliness is of very great importance. The white oats mentioned in the preceding paragraph will generally be found more profitable.

SIX-ROW BARLEY.

The *Manchurian* barley added to the plots this year is a selected strain obtained from Mensury.

Small Blue Naked is a bearded, hulless variety the kernels of which would be described as 'white' rather than 'blue.' It is not a promising sort.

Taganrog is a variety of Russian origin.

Owing to some inequality in the soil, the plot of Odessa barley was almost a failure this year and is therefore omitted from the list.

The plots were all one-fortieth of an acre. The seed was sown on April 28th at the rate of 1¾ bushels per acre. The soil was a loam of fair quality, but variable in character.

The yield per acre is expressed in pounds and also in 'bushels' of 48 pounds.

* Varieties and selected strains produced at the Central Experimental Farm are marked with an asterisk.

SIX-ROW BARLEY—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including head.	Character of Straw.	Average Length of Head.	Yield per Acre.	Yield per Acre.		Weight per measured bushel after cleaning.	Rusted.
				In.		In.	Lbs.	Bush.	Lbs.	Lbs.	
1	Albert*	July 30	93	43	Weak	2¼	3,700	77	4	47¾	Slightly.
2	Black Japan	" 28	91	33	Stiff	2	3,500	72	44	47½	Considerably.
3	Mandscheuri	" 30	93	47	Medium	3	3,360	70	..	48¼	Slightly.
4	Trooper*	" 23	86	43	Stiff	3¼	3,320	69	8	45½	"
5	Taganrog	" 31	94	37	Weak	2¾	3,320	69	8	49	Considerably.
6	Mensury	" 28	91	48	Stiff	3¼	3,220	67	4	48	Slightly.
7	Escourgeon	" 31	94	42	Weak	3¼	3,140	65	20	51	"
8	Nugent*	" 30	93	47	Medium	3¼	3,120	65	..	46	"
9	Sisolsk	" 29	92	46	"	3½	3,100	64	28	45	"
10	Manchurian*	" 28	91	49	"	3¼	3,040	63	16	45½	"
11	Bere	" 25	88	40	"	3¼	3,040	63	16	45½	"
12	Empire*	" 31	94	47	Weak	3	3,000	62	24	47½	Considerably.
13	Argyle*	" 30	93	47	Medium	3	2,980	62	4	48	Slightly.
14	Blue Long Head	" 31	94	36	"	3	2,960	61	32	40½	Considerably.
15	Yale*	" 31	94	48	Stiff	2¾	2,800	58	16	47½	Slightly.
16	Mansfield*	" 31	94	49	"	2¼	2,780	57	44	48	"
17	Eclipse	" 31	94	46	Medium	3¼	2,640	55	..	45	Considerably.
18	Common	" 30	93	38	Weak	2¾	2,5[illegible]0	53	36	48	"
19	Summit*	" 30	93	48	Stiff	3¼	2,480	51	32	45½	Slightly.
20	Claude*	Aug. 2	96	43	Weak	2¼	2,460	51	12	47	Considerably.
21	Hulless Black	July 23	86	30	"	2¼	2,420	50	20	60½	"
22	Stella*	Aug. 1	95	48	"	3¼	2,260	47	4	43½	Slightly.
23	Oderbruch	" 3	97	41	Medium	3¼	2,040	42	24	43	"
24	Brome*	" 3	97	41	Weak	3	2,040	42	24	46	"
25	Royal*	" 1	95	47	Stiff	3¼	2,000	41	32	41¼	"
26	Small Blue Naked	" 3	97	36	Weak	2¾	1,660	34	28	52½	Considerably.
27	Champion (beardless)	July 30	93	43	"	3	1,560	32	24	34	"

Most Productive Varieties of Six-Row Barley.—Among the most productive sorts which have been tested for several years at this farm are Mensury, Odessa, Nugent, Trooper and Blue Long Head. Mensury is obtainable from most seedsmen, and small samples of Odessa are usually available for distribution from this farm to any farmers who apply early in the winter.

Earliest Varieties of Six-Row Barley.—The differences in earliness among the varieties of six-row barley are not very striking. Among the earliest sorts are Mensury and Odessa.

Beardless Six-Row Barley.—Champion is the best variety of beardless barley that has been grown here. It ripens early, but gives a poor yield and is not to be recommended. It is obtainable in commerce.

Hulless Six-Row Barley.—The most productive variety of hulless barley which has been tested at this farm is Hulless Black. This is a bearded sort and can be obtained in commerce. It ripens early, but has weak straw and gives a small yield.

TWO-ROW BARLEY.

Erfurt White, Gambrinus, Hofbrau and *Jewel* are varieties recently obtained from Germany.

Old Irish was obtained from Ireland.

The plots of two-row barley were sown on April 30th and May 1st, the seed being used at the rate of two bushels to the acre. The soil was a loam of fair quality but not of uniform character.

The yield per acre is expressed in pounds and also in 'bushels' of 48 pounds.

* Varieties and selected strains produced at the Central Experimental Farm are marked with an asterisk.

TWO-ROW BARLEY—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.		No. of Days Maturing.	Average Length of Straw, including head.	Character of Straw.	Average Length of Head.	Yield per Acre.	Yield per Acre.		Weight per measured bushel after cleaning.	Rusted.
					In.		In.	Lbs.	Bush.	Lbs.	Lbs.	
1	Hannchen....	July	31	92	40	Medium..	3½	3,600	75	..	51½	Slightly.
2	Standwell..........	"	31	92	48	" ..	3½	3,260	67	44	47	"
3	Erfurt White........	"	30	90	38	Weak....	3½	3,200	66	32	44¼	"
4	Swan's Neck.........	"	31	92	39	"	2¾	3,020	62	44	49	Considerably.
5	Invincible...	Aug.	1	93	49	"	3	3,000	62	24	48½	Slightly.
6	Old Irish...........	July	31	91	48	Stiff......	3½	2,860	59	28	49	"
7	Jewel	Aug.	3	95	41	Weak....	3¼	2,820	58	36	47	"
8	French Chevalier.....	"	3	95	53	Medium..	3¾	2,780	57	44	48½	"
9	Beaver*..............	July	31	92	48	" ..	4½	2,760	57	24	48	"
10	Jarvis*.....	Aug.	1	93	57	Stiff......	4	2,740	57	4	50	"
11	Princess Svalof.......	"	6	98	38	Weak....	3¼	2,740	57	4	46	Considerably.
12	Gordon*.......	"	1	93	53	Medium..	2¾	2,720	56	32	50	Slightly.
13	Canadian Thorpe.....	"	3	95	45	Weak....	2¾	2,700	56	12	46	"
14	Swedish Chevalier....	"	3	95	42	"	3¾	2,700	56	12	47	"
15	Brewer's Favourite....	"	6	98	45	"	3	2,640	55	..	47	Considerably.
16	Clifford*........... ...	"	2	94	54	Stiff......	3¾	2,620	54	28	48½	Slightly.
17	Dunham*......	"	2	94	52	Medium..	3¾	2,580	53	36	48	Considerably
18	Sidney*.............	"	1	93	48	Stiff......	3¼	2,540	52	44	50	"
19	Danish Chevalier......	"	2	94	51	"	4¼	2,540	52	44	46¼	Slightly.
20	Fichtel Mountain.....	"	2	94	44	Medium..	3½	2,540	52	44	49¼	"
21	Archer Chevalier.....	"	6	98	35	Weak....	3¾	2,520	52	24	46½	Considerably.
22	Harvey*...	"	1	93	52	Stiff......	3¾	2,340	48	36	50¼	Slightly.
23	Hofbrau...	July	31	91	41	Weak...	4¼	2,340	48	36	46	"
24	Maltster....... ...	Aug.	6	98	46	" ..	2¾	2,240	46	32	44	Considerably.
25	Primus............	"	2	94	50	" ...	3	2,160	45	..	47	Slightly.
26	Gambrinus....... ..	"	5	96	38	"	4	2,120	14	8	46	Considerably.
27	Logan*.....	"	1	93	56	Stiff......	3½	2,060	42	44	49	"
28	Princess......	"	3	95	40	Weak...	4	1,940	40	20	46	Slightly.

Most Productive Varieties of Two-Row Barley.—Taking the average of the returns for the past five years, the varieties of two-row barley found to be the most productive on this farm are French Chevalier, Danish Chevalier, Canadian Thorpe, Princess Svalof and Standwell. The Chevalier barleys ripen somewhat earlier, as a rule, than the three other sorts in this list.

Earliest Varieties of Two-Row Barley.—The earliest sorts among those tested for not less than five years at this farm are Beaver and Jarvis. These ripen usually about two or three days before French Chevalier. They give good yields, but have not proved so productive as the best Chevalier barleys.

Beardless and Hulless Two-Row Barley.—The varieties of beardless and of hulless two-row barley which have been tested at this farm have not sufficient strength of straw to make them profitable sorts for farmers to cultivate.

WINTER SIX-ROW BARLEY.

A plot of winter barley of the variety known as Zero, was sown on August 29th, 1905. It made good growth in the autumn, but was entirely killed owing to the changeable weather during the winter.

PEAS.

The plots of peas were one-fortieth of an acre each. The soil was a sandy loam. The seed was sown on May 7th at the rate of two to three bushels per acre, according to the size of the pea. The crop obtained was considerably below the average owing to the insufficient rainfall during July and August.

The yield per acre is expressed in pounds and also in 'bushels' of 60 pounds.

* Varieties and selected strains produced at the Central Experimental Farm are marked with an asterisk.

PEAS.—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.		Number of Days Maturing.	Character of Growth.	Average Length of Straw.	Average Length of Pod.	Yield per Acre.	Yield per Acre.		Weight per measured bushel after cleaning.	Size of Pea.
						In.	In.	Lbs.	Bu.	lbs.	Lbs.	
1	Chancellor..	Aug.	9	94	Strong....	68	2¼	2,080	34	40	62½	Small.
2	Arthur*..	"	9	94	" ...	61	2¼	1,980	33	..	62	Medium.
3	Early Britain........	"	16	101	" ...	71	2¼	1,900	31	40	61	"
4	English Grey.........	"	16	101	" ...	73	2¼	1,880	31	20	62	"
5	Archer*	"	14	99	" ...	73	2	1,780	29	40	64	"
6	Canadian Beauty.....	"	13	98	" ...	71	2½	1,780	29	40	62	Large.
7	Field Grey.....	"	13	98	" ...	66	2	1,780	29	40	63	Small.
8	Pearl*............. .	"	14	99	" ...	73	2¾	1,780	29	40	61	Large.
9	Golden Vine..........	"	14	99	" ...	73	2¼	1,700	28	20	64¼	Small.
10	Duke*..	"	14	99	" ...	73	2¼	1,700	28	20	62½	Large.
11	Agnes*............	"	14	99	" ...	68	2½	1,660	27	40	63	"
12	Gregory*............	"	16	101	" ...	71	2½	1,660	27	40	63¼	Medium.
13	Black-eye Marrowfat.	"	16	101	" ...	73	2¾	1,620	27	..	62	Large.
14	Daniel O'Rourke	"	13	98	" ...	71	2½	1,620	27	..	63½	Small.
15	Picton*....	"	13	98	" ...	66	2¼	1,620	27	..	62½	Large.
16	Prussian Blue.	"	7	92	" ...	68	2½	1,620	27	..	62¼	Medium.
17	Wisconsin Blue.......	"	11	96	" ...	58	2¼	1,600	26	40	62½	"
18	Kent*...	"	13	98	" ...	70	2½	1,500	25	..	61½	Large.
19	Mackay*	"	13	98	" ...	71	2½	1,500	25	..	62½	Medium.
20	Nelson*	"	7	92	" ...	53	2¼	1,480	24	40	62½	"
21	Paragon*....	"	7	92	" ...	63	2¼	1,480	24	40	62	"
22	Prince Albert	"	14	99	" ...	68	2¼	1,480	24	40	62½	Small.
23	Prince*....	"	13	98	" ...	68	2¼	1,460	24	20	62¼	Large.
24	Victoria*.......	"	16	101	" ...	68	2	1,420	23	40	62	Medium.
25	White Marrowfat.....	"	11	96	" ...	63	2½	1,300	21	40	62½	Large.

Most Productive Varieties of Peas.—Among the most productive sorts of peas grown for the past five years at this farm are Golden Vine, Canadian Beauty, Prussian Blue, Mackay and Chancellor. One or more of these varieties can be obtained from almost any seedsman.

Earliest Varieties of Peas.—Chancellor and Prussian Blue are among the earliest varieties, but Golden Vine and Canadian Beauty are almost as early.

SPRING RYE.

Two plots of one-fortieth acre each were sown on May 7th, the seed being used at the rate of 1½ bushels to the acre. The soil was a rather light loam.

The *Ottawa Select* rye is a new strain produced at this farm by selection.

The yield per acre is expressed in pounds and also in 'bushels' of 56 pounds.

SPRING RYE—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.		No. of Days Maturing.	Average Length of Straw, including Head.	Character of Straw.	Length of Head.	Yield per Acre.	Yield per Acre.		Weight per measured bushel after cleaning.	Rusted.
					Inches.		Inches.	Lbs.	Bush.	Lbs.	Lbs.	
1	Common	Aug.	7	92	49	Stiff	3	2,260	40	20	57	Slightly.
2	Ottawa Select	"	7	92	49	"	3¼	2,200	39	16	56	"

WINTER RYE.

Three plots of winter rye were sown August 29th, 1905. The plots were one-fortieth of an acre, and the seed was used at the rate of 1½ bushels per acre. The rye made good growth in the autumn, but was somewhat injured by the unusual weather during the winter. It gave, however, a large crop of grain. The soil was a clay loam.

The variety called *Dominion* is a new strain produced at this farm by selection.

The yield per acre is expressed in pounds and also in 'bushels' of 56 pounds.

WINTER RYE—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.		No. of Days maturing.	Average Length of Straw, including Head.	Character of Straw.	Average Length of Head.	Yield per Acre.	Yield per Acre.		Weight per measured bushel after cleaning.	Rusted.
					Inches.		Inches.	Lbs.	Bush.	Lbs.	Lbs.	
1	Thousandfold	July	23	328	58	Stiff	4½	2,720	48	32	58	Slightly.
2	Mammoth White....	"	23	328	61	"	4¾	2,460	43	52	59	"
3	Dominion	"	23	328	55	"	4½	2,440	43	32	59½	"

GRAIN SOWN IN DIFFERENT QUANTITIES PER ACRE ON SANDY LOAM.

These experiments were conducted on plots of one-fortieth of an acre each. All the grain was sown on May 7th. The wheat was ripe August 10th, the oats August 11th and the barley July 28th.

The results obtained this season are given in the following table.

Name of Variety.	Quantity Sown per Acre.	Number of Days from Sowing to Harvesting.	Yield per Acre.	
	Bush.		Bush.	lbs.
Preston Wheat	1	95	29	..
"	1¼	95	29	40
"	1½	95	32	20
"	2	95	33	40
"	2½	95	31	..
"	3	95	25	40
Banner Oats	1½	96	59	14
"	2	96	63	18
"	2½	96	48	28
"	3	96	52	12
"	3½	96	48	8
"	4	96	49	14
Mensury Barley	1½	82	72	4
"	2	82	70	20
"	2½	82	66	32
"	3	82	62	4
"	3½	82	63	16
"	4	82	57	24

These experiments have now been carried on for six years and, though the results obtained have been somewhat irregular, they show clearly that on sandy loam there is no gain in sowing more than about 1½ bushels per acre of Preston wheat. The tests with larger quantities of seed than this will therefore be discontinued.

With Banner oats the lowest average yields for six years have been obtained by sowing 1½ and 4 bushels per acre. These two rates of seeding will therefore be discontinued.

With Mensury barley the results obtained thus far have varied so much from season to season that no definite conclusions can yet be drawn.

PLOTS OF MIXED GRAIN.

In choosing the varieties for these plots the greatest care is exercised to sow together only such sorts as are known to mature in almost the same number of days, so that they may both be ready for cutting at the same time. Only one column is given for the number of days maturing, as in every case the mixtures ripened with great uniformity.

The plots were one-fortieth of an acre and the seed was sown on May 5th. Wheat was sown at the rate of 60 lbs. per acre, oats 40 lbs. per acre, barley 50 lbs. per acre and emmer 70 lbs. per acre. The soil was a sandy loam.

Varieties.	Date of Ripening.	Number of Days Maturing.	Yield per Acre.	Proportions in Crop Harvested.
			Lbs.	
Wheat and Oats :—				
Pringle's Champlain Wheat and American Triumph Oats........	Aug. 11...	98	1,860	48 per cent wheat = 893 lbs. per acre. 52 " " oats = 967 " "
Preston Wheat and White Giant Oats	" 12..	99	1,320	73 per cent wheat = 964 " " 27 " " oats = 356 " "
Wheat and Two-row Barley :—				
Gehun Wheat and French Chevalier Barley......	" 5..	92	2,020	19 per cent wheat = 384 " " 81 " " barley = 1,636 " "
Oats and Two-row Barley :—				
American Beauty Oats and Princess Svalof Barley	" 7..	94	2,520	65 per cent oats = 1,638 " " 35 " " barley = 882 " "
Welcome Oats and French Chevalier Barley..........................	" 6..	93	2,300	30 per cent oats = 690 " " 70 " " barley = 1,610 " "
Oats and Emmer :—				
Banner Oats and Common Emmer....	" 14..	101	1,200	66 per cent oats = 792 " " 34 " " emmer = 408 " "

FIELD BEANS.

Four plots, one-fortieth of an acre each, were sown on May 21st. The soil was a sandy loam.

The yield per acre is expressed in pounds and also in 'bushels' of 60 pounds.

FIELD BEANS—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw.	Average Length of Pod.	Yield per Acre.	Yield per Acre.		Weight per Measured Bushel after Cleaning.
				Inches.	Inches.	Lbs.	Bush.	Lbs.	Lbs.
1	Marrowfat.............	Aug. 20..	91	19	3¼	1,620	27	..	63
2	White Field.	" 20..	91	24	4¼	1,600	26	40	63
3	Norwegian Brown.. ..	" 14..	85	15	4¾	1,440	24	..	61
4	California Pea Bean...	" 20..	91	16	3¾	1,280	21	20	64½

FLAX.

The plots of flax were one-fortieth of an acre. The seed was sown on May 21st at the rate of 60 lbs. to the acre. The soil was a sandy loam.

The yield per acre is expressed in pounds and also in 'bushels' of 56 pounds.

FLAX- VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Plants.	Yield per Acre.	Yield per Acre.		Weight per Measured Bushel after Cleaning.
				Inches.	Lbs.	Bush.	Lbs.	Lbs.
1	Novarossick	Aug. 17	88	29	1,020	18	12	55
2	Common	" 9	80	38	800	14	16	55½
3	La Plata	" 9	80	30	760	13	32	55
4	Russian	" 7	78	34	720	12	48	54½
5	Yellow Seed	" 7	78	31	720	12	48	54
6	Riga	" 7	78	35	640	11	24	54
7	White Flowering	" 7	78	26	640	11	24	55

FIELD ROOTS.

The advantage of late pulling for field roots having been clearly proved by the experience of several years, comparative tests, by pulling on two different dates about two weeks apart, have been discontinued. All the roots were harvested at the one time, but the harvesting was left until quite late so as to enable the roots to make as large a growth as possible.

The yield per acre of the field roots is calculated from the weight of the crop gathered from one-hundredth of an acre.

The soil on which the field roots were grown was a clay loam.

It is probable that in some instances varieties which are mentioned in these tables under different names are identical in all essential respects.

In Canada the ton contains 2,000 pounds.

TURNIPS.

Two sowings were made of each variety, the first on May 15th and the second on May 29th. The seed was used at the rate of about four pounds per acre. Before sowing, the land was made up in drills two feet apart and rolled with a heavy land roller, which flattened the drills nearly one-half, leaving a firm seed bed. When the young plants were about three inches high they were thinned out, leaving them about seven inches apart in the rows.

The roots were pulled on October 24th.

TURNIPS- VARIETIES.

Number.	Name of Variety.	Yield per Acre from 1st Sowing.		Yield per Acre from 2nd Sowing.	
		Tons.	Lbs.	Tons.	Lbs.
1	New Century	22	300	14	250
2	Perfection Swede	21	300	15	800
3	Mammoth Clyde	19	600	13	1,500
4	Selected Purple Top	19	300	15	1,150
5	Skirvings	18	800	13	1,100
6	Sutton's Champion	17	1,000	15	1,000
7	Imperial Swede	17	500	13	100
8	Hall's Westbury	16	1,650	12	1,100
9	Jumbo	16	150	12	1,500
10	Kangaroo	15	1,700	11	950
11	Hartley's Bronze	15	1,500	12	400
12	Halewood's Bronze Top	15	1,150	10	1,950
13	Magnum Bonum	15	850	11	1,600
14	Carter's Elephant	14	100	8	1,550
15	Elephant's Master	14	50	9	1,650
16	Good Luck	13	1,550	10	1,900
17	Emperor Swede	12	1,950	10	1,800
18	Bangholm Selected	11	1,800	8	450
19	East Lothian	11	....	8	1,350
20	Drummond Purple Top	10	1,550	7	1,200

The average yield from the 1st sowing was 15 tons 1,890 lbs. per acre.
The average yield from the 2nd sowing was 11 tons 1,765 lbs. per acre.

MANGELS.

Two sowings were made of each variety, the first on May 15th, and the second on May 29th. The seed was used at the rate of about six pounds per acre. Before sowing, the land was made up in drills two feet apart and rolled with a heavy land roller to make a firm seed bed. When the young plants were about three inches high they were thinned out, leaving them about seven inches apart in the rows. The roots were pulled October 24th.

MANGELS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per acre from 1st Sowing.		Yield per acre from 2nd Sowing.	
		Tons.	Lbs.	Tons.	Lbs.
1	Selected Mammoth Long Red	40	1,550	28	1,000
2	Mammoth Long Red	38	800	25	609
3	Yellow Intermediate	37	1,050	31	700
4	Triumph Yellow Globe	36	700	24	1,450
5	Prize Mammoth Long Red	35	600	24	650
6	Selected Yellow Globe	34	900	25	1,650
7	Mammoth Yellow Intermediate	33	800	26	1,900
8	Prize Winner Yellow Globe	33	200	23	1,400
9	Lion Yellow Intermediate	32	300	24	1,800
10	Giant Sugar Mangel	30	1,600	23	1,550
11	Giant Yellow Intermediate	29	1,250	28	700
12	Leviathan Long Red	28	400	27	200
13	Half Sugar Rosy	27	700	27	1,200
14	Half Sugar White	25	700	32	500
15	Gate Post	24	1,500	24	1,500
16	Giant Yellow Globe	21	50	20	1,850

The average yield from the first sowing was 31 tons 1,569 lbs. per acre.
The average yield from the second sowing was 26 tons 541 lbs. per acre.

CARROTS.

Two sowings were made of each variety, the first on May 15th, and the second on May 29th. The seed was used at the rate of about six pounds per acre. Before sowing, the land was made up in drills two feet apart and rolled with a heavy land roller to make a firm seed bed. When the young plants were about three inches high they were thinned out, leaving them about five inches apart in the rows. The roots were pulled October 25th.

CARROTS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per acre from 1st Sowing.		Yield per acre from 2nd Sowing.	
		Tons.	Lbs.	Tons.	Lbs.
1	Mammoth White Intermediate	25	1,950	31	500
2	Improved Short White	25	1,200	28	700
3	Ontario Champion	21	1,000	21	1,850
4	Giant White Vosges	21	900	28	1,200
5	Long Yellow Stump-rooted	20	1,300	25	1,000
6	New White Intermediate	20	900	27	1,000
7	Carter's Orange Giant	16	1,600	21	1,850
8	White Belgian	15	1,200	17	100
9	Early Gem	15	800	23	50
10	Half Long Chantenay	14	1,200	23	1,500

The average yield from the 1st sowing was 19 tons 1,605 lbs. per acre.
The average yield from the 2nd sowing was 24 tons 1,875 lbs. per acre.

SUGAR BEETS.

Two sowings were made of each variety, the first on May 15th, and the second on May 29th. The seed was used at the rate of about six pounds per acre. Before sowing, the land was made up in drills two feet apart and rolled with a heavy land roller to make a firm seed bed. When the young plants were about three inches high they were thinned out, leaving them about five inches apart in the rows. The roots were pulled on October 25th.

Though all the varieties mentioned here are commonly classed as sugar beets, it should be noted that the only ones recommended for use in the manufacture of sugar are Wanzleben, French Very Rich, and Vilmorin's Improved.

SUGAR BEETS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per acre from 1st Sowing.		Yield per acre from 2nd Sowing.	
		Tons.	Lbs.	Tons.	Lbs.
1	Danish Red Top	35	50	27	1,550
2	Improved Imperial	34	150	30	500
3	Red Top Sugar	33	350	29	..
4	Danish Improved	31	1,950	27	450
5	Royal Giant	31	1,350	24	600
6	French Very Rich	28	300	26	100
7	Wanzleben	26	1,700	23	..
8	Vilmorin's Improved	25	800	21	1,300

The average yield from the first sowing was 30 tons 1,581 lbs. per acre.
The average yield from the second sowing was 26 tons 313 lbs. per acre.

INDIAN CORN.

The corn was sown with the seed drill in rows thirty-five inches apart, and was also sown in hills thirty-five inches apart each way. When the plants were about six inches high they were thinned out, leaving them from six to eight inches apart in the rows, and leaving four or five plants in each hill. The seed was sown May 28th, and the corn was cut green for ensilage September 11th. The yield has been calculated from the weight of crop cut from two rows, each 66 feet long. The soil was a clay loam.

For the making of ensilage the corn should be cut when the kernels are in the late milk or doughy stage; but the summer at Ottawa is not always warm enough to bring the later varieties to this state of maturity before it is necessary to cut the crop to avoid frost.

In Canada the ton contains 2,000 pounds.

Indian Corn—Test of Varieties.

Number.	Name of Variety.	Character of Growth.	Height.	Leafiness.	Condition when Cut.	Weight per Acre grown in Rows.		Weight per Acre grown in Hills.	
			Inches.			Tons.	Lbs.	Tons.	Lbs.
1	Wood's Northern White Dent	Medium	70 to 75	Leafy	Early milk ...	15	690	12	1,960
2	Early Mastodon	"	70 " 75	"	"	14	1,920	16	450
3	Early Butler.	"	70 " 75	"	"	14	1,590	15	1,900
4	Selected Leaming..........	"	65 " 70	"	Late milk	14	50	11	50
5	Red Cob Ensilage	Fairly strong..	75 " 80	" ...	Very few cobs.	13	1,940	14	1,480
6	Mammoth Cuban	" ..	70 " 75	" ...	Early milk....	13	1,720	13	400
7	Early Leaming	Medium	65 " 70	"	Late milk	13	950	11	990
8	Giant Prolific Ensilage.....	Fairly strong..	70 " 75	"	Early milk....	13	840	13	1,500
9	Superior Fodder	Strong........	75 " 80	Very leafy	Few cobs.....	13	730	15	250
10	Thoroughbred White Flint.	Medium......	60 " 65	Leafy	Early milk....	12	1,740	15	1,240
11	Longfellow.	"	60 " 65	Medium ..	Doughy	12	310	10	350
12	Compton's Early...........	Fairly strong..	55 " 60	" ...	"	11	1,320	12	200
13	Evergreen Sugar...........	Medium	55 " 60	Leafy	Early milk ...	11	1,210	12	970
14	King Philip	"	60 " 65	Medium ..	Doughy	11	110	9	1,360
15	Eureka...................	Very strong ..	80 " 85	Leafy	No cobs	11	..	16	560
16	Early Longfellow..........	Medium	60 " 65	Medium ..	Doughy	11	..	9	1,140
17	Champion White Pearl	"	70 " 75	Leafy	Early milk....	10	1,450	13	1,060
18	North Dakota White	"	60 " 65	"	"	10	570	12	200
19	Salzer's All Gold....	"	65 " 70	"	"	8	1,600	12	970
20	Cloud's Early Yellow	"	70 " 75	"	Late milk	8	1,160	13	1,170
21	Angel of Midnight.........	Short growth..	55 " 60	"	Early milk....	7	1,290	9	1,360
22	Pride of the North	Fairly strong..	70 " 75	"	" ...	7	1,290	15	470
23	White Cap Yellow Dent....	Short growth..	60 " 65	"	"	7	190	11	1,100

The average yield from the rows was 11 tons 1,420 lbs. per acre.
The average yield from the hills was 13 tons 223 lbs. per acre.

INDIAN CORN SOWN AT DIFFERENT DISTANCES.

Three varieties were chosen for this test: Champion White Pearl, Selected Leaming, and Longfellow. The seed was sown May 28th, and the corn was cut for ensilage September 11th. Sixteen rows of each variety were sown, that is, four rows at each of the distances mentioned, and the yield per acre has been calculated from the weight of crop obtained from the two inner rows in each case. The length of the portions of the rows cut for weighing was 66 feet.

Name of Variety.	Distance between the Rows.	Character of Growth.	Height when Cut.	Condition when Cut.	Yield per Acre.	
	In.		In.		Tons.	Lbs.
Champion White Pearl	21	Very strong.	80—85	Early milk.	23	305
" "	28	Strong	70—75	"	19	1,762
" "	35	"	70—75	"	13	1,390
" "	42	Very strong.	85—90	"	16	1,840
Selected Leaming	21	Strong.	65—70	"	19	367
"	28	"	65—70	"	17	404
"	35	"	65—70	"	9	920
"	42	"	70—75	"	13	1,918
Longfellow	21	"	60—65	Late milk	16	1,075
"	28	"	60—65	"	14	1,460
"	35	Medium	55—60	"	6	650
"	42	Strong	65—70	"	10	868

It will be seen that in every instance the largest yield per acre was obtained when the rows were closest together.

FIELD PLOTS OF POTATOES.

As the experimental plots of field roots and fodder corn do not occupy the whole of the field in which they are placed, the remaining space is usually filled with potatoes, such varieties being grown as are likely to be of service in the annual distribution of samples from this farm.

The area devoted to the different varieties varies considerably. This season most of the plots were from about one-half to one and one-half acres in area.

The potatoes were planted May 16th to 18th. The soil varied from a very sandy loam to a moderately heavy loam. On account of the dry weather in July and August the yield of potatoes was not large.

The yield per acre is expressed in pounds and also in 'bushels' of 60 pounds. The yield given includes only the sound potatoes. There was not much loss from rot this season.

Number.	Variety.	Time of Maturing.	Colour.	Yield per Acre.	Yield per Acre.
				Lbs.	Bushels.
1	Everett	Early	Pink	15,540	259
2	Early White Prize	Very early	White	14,340	239
3	Carman No. 1	Mid-season to late	"	12,120	202
4	Late Puritan	" "	"	11,580	193
5	Gold Coin	" "	"	10,380	173
6	Uncle Sam	" "	"	10,140	169
7	Money Maker	" "	"	9,900	165
8	Rochester Rose	Very early	Pink	9,360	156
9	Vick's Extra Early	Early	Pink & white	8,100	135
10	Burpee's Extra Early	Very early	White	7,740	129
11	Ashleaf Kidney	Mid-season to late	"	7,740	129
12	Bovee	Very early	Pink & white	7,320	122
13	Burnaby Mammoth	Mid-season to late	" "	7,260	121
14	Dooley	" "	White	6,000	100

REPORT OF THE POULTRY MANAGER.

(A. G. GILBERT.)

DR. WM. SAUNDERS, C.M.G.,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the pleasure of submitting to you the nineteenth annual report of the poultry division of the Central Experimental Farm.

Among the subjects discussed are certain changes in the winter housing and feeding of poultry, and which changes are calculated to increase the value of poultry-keeping as a branch of farm work. Whether this laudable object will be fully, or partially attained in this northern latitude, is for experience to decide. Meanwhile, careful note of effects from various standpoints is being made. Some results which have already become conspicuous are discussed in the following report.

A remarkable indication of poultry development is the large number of letters received from numerous settlers who have made their home in the western provinces, notably those of Saskatchewan and Alberta. Many of these letters contain requests for a pattern of a winter house which will suitably comply with the winter conditions of the latter named provinces. To be satisfactory these houses should be—

(a) Cheap in construction, owing to the scarcity of lumber;
(b) Fairly comfortable in winter;
(c) Dry and affording ample floor space for each fowl.

In order to disseminate as much information, on these points, as is at present available in our department, the views of a correspondent in Saskatchewan, who, has given the subject careful consideration, are given in a following page.

The alteration in methods, already remarked on, and the nature of these changes, with details of the most important experimental work of the year, will be found in their proper places.

I have much pleasure in noting the successful efforts of my assistant, Mr. Fortier, in conducting his part of the experimental work of the past year. He has given much attention to the effect of different rations on the production of eggs during winter and to the artificial hatching and rearing of chickens. During the year Mr. Fortier delivered addresses at 30 different places in the province of Quebec.

Mr. Summers has been most careful and assiduous in collecting data relative to the trap nests system, the feeding of different experimental rations, and in connection with the hatching of eggs by both hens and incubators. His efficiency in the recording of results is worthy of remark.

Mr. George Deavy, who has for many years past been connected with this department, has been energetic in the caring for the fowls and young chickens entrusted to him, and in keeping the different poultry houses and their surroundings in good order and condition.

The large increase in correspondence from all parts of the Dominion in connection with the work of this department has been very gratifying. It alone demands much time and careful consideration. The great increase in the number of letters received from the older province of Quebec, is particularly noticeable, and may be taken as a fair instance of the rapid development which is taking place in the poultry interests of that province.

It is earnestly desired that the information contained in the following report will be found of practical worth and interest,

I have the honour to be, sir,

Your obedient servant,

A. G. GILBERT.

REPORT OF THE POULTRY MANAGER.

During recent years marked advance has been made in the methods of operating the different indoor and outdoor branches of farm work. In this march of improvement the poultry department has kept well to the fore. Before entering into a detailed account of the experimental work of the past year it may be interesting and instructive to glance at some changes which are noteworthy features of this development. The more conspicuous of these changes are as follows:—

1. In the style of winter house for the laying stock.
2. In the method of feeding both hens and chickens.
3. In the manner of selection other than by trap nests.

These changes have been made because calculated to be of greater economic value, for unless improved arrangement of winter house or methods of management tend to increase the margin of profit in poultry keeping they will be of little advantage over previous methods.

A BRIEF RETROSPECT.

Some years ago when winter egg production was urged upon the farmers of the country as a source of money-making, a warm winter house was considered indispensable as a means to that end. This warmth, in many instances, was secured by artificial means; in others by the construction of an unnecessarily substantial building—oft times too small—wherein it was surmised the animal heat of the fowls would be conserved. But this plan entailed expense, besides ventilation received little or no consideration, and over-crowding, in order to obtain the desired end, was general. Meanwhile, experimental work which had been steadily going on, unmistakably showed, that fowls kept under either condition came out of their winter quarters with impaired vitality. As a result the hatching of chickens from their eggs, whether by hen or incubator, was equally unsatisfactory. The experience of several years plainly showed that, it was not until the fowls had opportunity to run outside that the egg germs became strong enough to hatch out a satisfactory number of chickens. This experience was not singular. Poultry keeping was rapidly becoming more general throughout the country, and from many sources letters were received to the following effect, 'My hens have laid well during the winter, but, I cannot get their early spring eggs to give satisfactory hatching results.' Investigation was carefully carried on for several years and much useful information bearing on the subject was gained and published from time to time in the annual reports of this department. Among the conclusions arrived at were, that more fresh air, even if cold; more exercise, and greater variety of rations were necessary as remedial agents. The outside poultry world had also been moving in this matter. The result of the combined experience gained, was the introduction into Canada of the poultry house with and the poultry house without, the scratching shed attachment. Both styles of houses were strongly recommended as likely to overcome the drawbacks in connection with the winter production of eggs and subsequent loss of constitutional vitality on the part of the breeding stock.

To-day we have throughout the country both styles of houses, the one which the scratching shed attached to it, the other without the shed addition. From our standpoint as one of the most northern experimental plants in America, experience gained in the trial of these styles of houses cannot fail to be of the greatest importance to all who are interested.

The House with Scratching Shed.—In this style of building the main poultry room is constructed of boards with a window facing south. In this room the fowls roost at night, lay their eggs during the day, and eat their soft food and cut bone from narrow troughs. In poultry parlance it is known as the 'laying and roosting room.' The floor, which is best made of cement, is covered with litter. The roosts and platform, with the trap nests under the latter, are at the back of the room. There is a cotton screen to let down in front of the roost, if necessary, on very cold nights. The scratching shed addition is intended as a room to afford exercise for the fowls. The front of the scratching shed, in numerous cases, is made of cotton, with a window in the centre, and should face south. On the floor which should also be made of cement, litter to the depth of 4 to 6 inches, is always kept. In this litter the daily whole grain ration is thrown with the object of having the birds search diligently for the grain kernels. In this way the fowls are incited to exercise. The cotton front of the shed is calculated to give diffusion of fresh air without draft. Through the window the sunshine will find its way into the interior, which is very desirable. The bad practice, of taking out the window sash and replacing it with cotton, prevents the ingress of the sunlight. Houses built on this principle, but differing in arrangement of detail, are now found in many different parts of Canada. In some cases, notably in the Eastern part of the United States, the front of the scratching shed is entirely open with a wire netting front.

The House without the Scratching Shed Addition.—This style of house is very much on the same principle as the other. It might also be termed a compromise between the one extreme of entirely open front and the bottled-up method of housing the birds. Instead of two rooms there is only one and this one room is made slightly larger than the roosting room with shed attachment. This style of house was first adopted by Mr. L. H. Baldwin of Deer Park, Toronto, some years ago when he erected his large poultry plant in the locality named. Since then it has become much in vogue, presumably, because cheap as well as compact. A description of one of the many apartments in the long row of buildings forming part of the plant of the Pembroke Poultry Yards Company, Ontario, will probably best convey an idea of an up-to-date application of this method. Each colony of fowls occupies one pen, 10 x 16 feet in size. In the south end of the pen there is a window 4 feet square. Above and below the window there is a frame covered with cotton, one foot deep by four broad. The air through these cotton openings is diffused through the pen without draft, while light and sunshine find their way through the window. The ventilation by this means is considered most satisfactory. The floor of the pen is cement and is covered with the usual quantity of litter. The ceiling is slatted and above the slats, straw, to a depth of 12 inches is placed for the purpose of absorbing moisture. During the coldest period of the past winter, I was assured that there had been no moisture in any of the pens, and this result is attributed to the straw and ventilation through the cotton frames. At the north end of the pen are the roosts, platform, and underneath the latter, the nests. In front of the roosting place there is a cotton covered frame, 6 x 8 feet. This frame swings to the wall and is only used on very cold nights for the purpose of keeping the fowls comfortable. A four compartment hopper contains grit, oyster shells and charcoal. Whole grain is thrown in the litter on the floor. Drink water is regularly supplied, and from time to time meat and vegetables. Cases of sickness have been rare. In each pen to the left of the roosting place there is a small crated enclosure to hold two male birds for use during the breeding season. I was assured that the pens so arranged had given entire satisfaction. Such results gained at so northern a position are most important.

A plant of similar design, but with cotton front to the pens, with a window in the centre of each front, the front facing the south, is a style adopted at the poultry plant of the Muskoka Free Hospital for Consumptives at Gravenhurst, Ontario. In this establishment the dry hopper feeding system has been adopted, and has proved most satisfactory. The plant is in charge of Mr. E. S. Turville, one of the patients, but an experienced and successful poultry man. Mr. Turville assured me that he is a firm believer in fresh air and plenty of it, even if it is cold. 'I give my fowls,' he said, 'the same treatment that we get here. Fresh air and any amount of it. We are told that it is good for us and why should it not be good for my fowls?'

'Do you get many eggs per day during the winter season?'

'To-day, February 18th, we have collected 120. Sometimes we have a greater or lesser number.'

Some Reasons why the Scratching Shed Addition was Abandoned.

In conversation with the manager of the Pembroke Poultry establishment, I asked him why he had not adopted the scratching shed addition to his houses. He replied, 'We do not require it. I consider the scratching shed attachment useless expense. Had we considered it an advantage we should have embraced it in our system.'

The foregoing is one reason from a practical source. Another may be given as follows.

Close observation for some winters past has shown that during cold dips the birds are inclined to 'bunch' in the roosting and laying room. If they do go to search for their whole grain food which has been thrown into the litter on the floor of the scratching shed, they quickly return to the other apartment. The lesson from this is obvious. It is that the birds prefer the roosting room as being less cold than the other. From this it is to be inferred that the latest style of house, which is really a combination of the two styles described, will likely be the most suitable for this district.

Winter Houses for Other Provinces.—But there are other and newer provinces in which poultry keeping is comparatively a new branch of work. In such cases an appropriate style of house is a matter of importance. In a recently written letter, Mr. A. W. Foley, Commissioner of Poultry for the Province of Alberta, states his intention of testing various patterns of houses calculated to be suitable to the winter conditions of his district. He also says he will be glad to try any suggested style that would likely prove to be effective and not costly. The results of experimental work of this nature cannot fail to be of very great interest.

From Sunny Plains, Saskatchewan, Mr. C. E. Robinson writes in reply to a request—from the writer—to suggest a style of winter house suitable to his province, as follows: 'Sunny Plains, Sask., February 20th, 1907. I regret that I have not the means to try an experimental frame and sod house combined. From what I have seen here of frame and sod houses for human habitation, I think a sod house can be made as warm as a frame one, in fact, warmer. A neighbouring settler here has a sod house which is the easiest one kept warm in the district, and which is also perfectly dry. I have been thinking that a sod poultry house might answer well, if properly constructed, to keep poultry in.' In a more recent letter, Mr. Robinson emphasizes an important feature in this sort of house by saying:—'Last winter showed us that when other buildings sweated, dripped and froze, the sod house was dry and fresh.'

A Manitoba correspondent has an idea that the large quantities of straw in that province and which in many cases go to waste, might be utilized to make comfortable and cheap poultry houses.

At the Macdonald College, Ste. Anne de Bellevue, P.Q., the colony house system of keeping the winter layers has been to a great extent adopted, and was found highly successful during the past cold season.

Can there be too much Exercise?

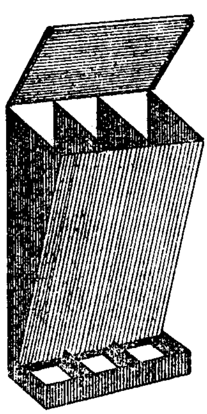
At this point it may fairly be asked if too much importance has not been heretofore placed on exercise? There is no intention to belittle the exercising of the fowls as a factor in the winter production of eggs. There is reason, however, to believe that in certain cases, this practice has been carried to an extreme. An experience of twenty-five years has given opportunity to the writer for extended and close observation of many phases of poultry keeping. Frequently, during this period, has he noted extraordinary results from fowls kept under conditions in defiance of popular and almost cast iron instructions. One or two of these observations may be noted as follows:—(1) Fairly good winter egg production, followed by strong germs in early spring eggs. which resulted in 10, 11 and 12 robust chickens, out of a sitting of 13 eggs. These results were obtained from eggs laid by hens which were almost overcrowded in a roughly constructed unheated house with thin board walls; there was a scanty supply of litter on the floor which was dry earth. There was little opportunity for exercise in consequence. But the rations which embraced the waste of table and kitchen, were of the most varied nature. It did seem as if variety in the rations had more beneficial effect than exercise.

(2) The 'bunching' of the birds, in the roosting and laying room led me to mention the incident to an enthusiastic advocate of exercise. I told him that I thought the cold made the fowls disinclined to search in the litter for their whole grain food. 'Oh,' he said, 'the birds *have* to come to the scratching shed to get their whole grain.' 'But,' I remarked, 'they return to the roosting room as quickly as they can and apparently take little time for exercise.' 'That is quite possible,' he said, 'but for all that they layed well during the winter.' 'Yes,' I remarked, 'in spite of their lack of exercise. Your remark tends to confirm previous experience.'

A Change in the Manner of Feeding Hens and Chickens.

The change which has taken place in the method of feeding hens and chickens is certainly radical in its nature. The methods differ in this way, viz.:—

1. By the old way the food was *given* to the fowls.
2. By the new method the fowls are allowed *to help themselves* to their food which is always before them in hoppers; hence the title of the 'Hopper system' of feeding.



But what is a hopper? The accompanying illustration will show its manner of construction.

Hoppers are made of different sizes, but usually of similar pattern. Some are divided into two compartments, while others have three and four. One style of hopper which is very commonly used is that shown by the illustration. Two or more hoppers are put in each pen, according to size of the poultry house, and they are usually placed on the walls of the building. The compartments of the hoppers are filled, from time to time, with whole or ground grain, bran, beef scraps, charcoal, grit and broken oyster shells, etc. There are two ways of using the Hopper system, viz., (a) by which the feeding of grain, whole or ground, grit, etc., (with the exception of meat and vegetables) is entirely done from the hopper. (b) A compromise plan by which the ground grains, bran, &c., with exceptions as noted in (a), are given in hoppers, but the whole grain rations are thrown in the litter, always to be found on the floor of a properly equipped poultry house. This is done with the object of affording opportunity for the birds to obtain exercise. Where rats or other vermin are present the ground grains are placed, in the morning, in narrow troughs, and what is not used during the day is taken away at night. But the principle is the same, as free access is allowed to the contents of the trough. Another device to prevent possible waste is to cover the projecting lip of the hopper with a lid of tin or galvanized iron. But the best prevention to the depredations of vermin has been found to be that of a concrete floor.

Arguments for and against the Hopper System of Feeding.

Much is said for and against the Hopper system. Briefly summed up, some of these objections may be given as follows:—

Favourable.—Because labour saving; preventing waste or fouling of food; allowing each bird opportunity to obtain what food it desires; convenient and economical in use.

Against.—For the reason that birds of the heavy breeds are apt to eat too much and as a result are disinclined to exercise; not economical; fowls are not likely to go to roost with their crops as full as desirable; fowls scratch or pick out the grain from the hoppers; when fed out-doors prevents foraging, &c.

But there seems to be little objection from either side to this method when applied to the feeding of young chicks, hatched either by hens or incubator, and which are able to run abroad and forage for themselves.

The system is really a continuation of the old practice of 'leaving the food before the hens and chickens all the time.'

The feeding of dry ground grains in an open trough, in one of our department houses, during the past winter, was considered satisfactory. From what has been seen of the hopper system of feeding—at home and abroad—there is every reason to conclude that it has come to stay. Its proper operation depends very much upon the style of hopper and manner in which it is used.

Methods other than the Trap Nest for Distinguishing Good from Bad Layers.

Another instance of poultry development may be noted in the advertising of methods of detecting the good and bad layers other than by the older trap nest system. These methods or systems are sold at prices ranging from one to ten dollars each and they are, more or less, successful according to the ability of the student to understand the system which is taught by printed instructions and sent to the purchaser. That these systems are in vogue is shown by the appearance, in agricultural journals, of advertisements which offer 'eggs for hatching from egg-laying fowls selected by our system.' The name of the inventor of the system is then given.

Meanwhile improvements which tend to simplify and make more effective the operation of trap nests are being made. A strong point in favour of the trap nests method is its mechanically correct determinations. The drawbacks to its use in a large establishment, on the ground of expense, have been noted in a previous report. Its value in arriving at correct conclusions, in experimental work, is shown in the Tables which are a part of the following report.

EXPERIMENTAL WORK OF THE PAST YEAR.

The experimental work of the past year—with the exception of an unfinished part in connection with the selection of future breeding stock by the trap nest system—will be found in the following pages. The obtaining of *data*—calculated to show the worth of each individual hen—by means of the trap nest system usually begun on November 1, and extended to October 31 of the following year. In so doing the winter and spring periods of highest prices and best egg production were fully covered. To depart from this practice would be to interfere with the continuity of the records and impair their usefulness. For these reasons the different tables which appear in the following report are, as heretofore, dated from the beginning of the winter season of one year to the end of the fall season of the next.

The spring work of 1906 commenced with the artificial hatching of chickens by incubators. At a later date some hens were used. One strong point in favour of the incubator is that it is always ready. Opportunity is so afforded to those who are not specialists to begin operations as early as circumstances will permit. It has been impressed upon the farmers of the country, in previous reports, that they are likely to have best results from their incubators when operated in early or middle April. There has been no reason to alter this advice.

An object aimed at in our departmental spring work of last year was to have all hatching by incubators over by the end of May. As conditions were favourable this result was attained. The experience of many years has clearly shown that chickens hatched in early May are the most satisfactory to rear in brooder or by hen. Should it be desired to successfully hatch and rear a number of chickens, in the late winter or early spring months, the aid of special facilities in the shape of incubator room and brooder house will be found indispensable.

HATCHING BY INCUBATORS.

The results of the hatching by incubators during the months of March, April and May of last year are shown in the following table. Distinction is marked between the eggs from the cold houses and those from the warmed ones. The incubators were filled at three different dates, viz.: March 29, April 7, and May 7, 1906:—

FIRST SETTING.—INCUBATORS FILLED MARCH 29, 1906.

Description of Eggs.	No. of Eggs.	Clear.	Dead germs.	Chickens dead in shell.	Chickens Hatched.	Percentage of Clear Eggs.	Percentage of Fertile Eggs.	Percentage of chickens dead in shell of selected Eggs.	Percentage Hatched of the Fertile selected Eggs.	Percentage hatched of total Eggs set.	Remarks.
Barred P. Rocks and W. Wyandottes	125	26	36	11	53	20¾	79¼	17¼	82¾	42¼	Eggs from unheated houses.
Buff Orpington's	52	11	17	7	17	21¼	78¾	29¼	70¾	32¾	" warmed houses.

SECOND PERIOD.—INCUBATORS FILLED APRIL 7, 1906.

Description of Eggs.	No. of Eggs.	Clear.	Dead Germs.	Chickens dead in shell.	Chickens Hatched.	Percentage of Clear Eggs.	Percentage of Fertile Eggs.	Percentage of chickens dead in shell of selected Eggs.	Percentage Hatched of selected Fertile Eggs.	Percentage hatched of total Eggs set.	Remarks.
Barred P. Rocks and W. Wyandottes..........	198	41	40	24	93	20¾	79¼	20½	79½	47	Eggs from unheated houses.
Barred P. Rocks, Leghorns, Orpingtons and Wyandottes	92	24	21	9	38	26¼	75¾	19¼	80¾	41¼	" warmed houses.

THIRD PERIOD.—INCUBATORS FILLED MAY 7, 1906.

Description of Eggs.	No. of Eggs.	Clear.	Dead Germs.	Chickens dead in shell.	Chickens Hatched.	Percentage of Clear Eggs.	Percentage of Fertile Eggs.	Percentage of chickens dead in shell of selected Eggs.	Percentage Hatched of selected Fertile Eggs.	Percentage hatched of total Eggs set.	Remarks.
Barred P. Rocks and W. Wyandottes.... ...	72	9	10	6	47	12½	87½	11¼	88¾	65¼	Eggs from unheated houses.
Plymouth Rocks, Wyandottes and Orpingtons.	62	8	15	3	36	12¾	87¼	7¾	92¼	58	" warmed houses.

Many useful deductions may be derived from a study of the above table. A few are noted as follows:—

1. There was little difference in the percentage of favourable results from the selected, or, fertile eggs of early or middle March and those of the same sort in May.

2. The percentage of clear eggs was less in the May eggs than in any other.

3. The percentage of chickens hatched from the fertile eggs of May was better than in any other month.

4. The difference between the percentage of 'fertile eggs' and results in chickens is most marked. This feature of incubation—particularly noticeable in early spring eggs—is fully discussed in the reports of the earlier work of this department 10 and 12 years ago.

5. Results go to emphasize the advice given to farmers and other poultry keepers, in this and preceding reports not to select eggs for hatching by incubator or hen until the fowls have had opportunity, in spring time, to run outside and recuperate from their long term of winter life and treatment.

6. The showing is in favour of the unheated house manner of keeping the laying stock during the winter season.

PROGRESS OF THE CHICKENS.

A strong germ which usually comes from constitutionally vigorous parent stock will, in most cases, emerge clear and clean from the shell as a robust chicken. But every chicken that hatches out in incubator or under hen is not such. The hen inadvertently tramps on or otherwise disposes of the weakling chicken. But the incubator nursery often sustains the weakling—unless meanwhile trampled to death by its more lusty mates—to reach the brooder, there to peep, or, mope itself to death. Frequently these weaklings are numerous and when they do most miserably perish, the incubator primarily and the brooder in the second place are held responsible in many instances for what mismanagement and improper feeding of the parent hens are directly responsible for.

The chickens were allowed to remain in the nursery of the incubators, or, under the mother hen for 24 hours, or, until strong on their legs. It was not desired that a weakling chicken, a deformed one or one unable to make its way out of the shell should be removed from the incubator. The rule to take no weakling from either shell, incubator or hen, should be rigidly observed. On being placed in the brooders, or with their mother hens removed to coops in a field, the chicks made satisfactory progress.

HOW THE CHICKENS WERE FED.

The care and treatment received by the chickens was the same as in preceding years. As inquiries are being frequently made as to best means of so doing the following summary may be permissible:—

First Day.—Little or no food. A few stale bread crumbs if absolutely required.

Second Day.—Stale bread soaked in milk and squeezed dry. Feed a little at a time and leave none to sour. A small quantity of hard boiled egg, chopped, fine may be added.

Third Day.—Add granulated oat meal to the foregoing. Finely crushed wheat may also be given, but in small quantity. Grit of small size should be now given to the chicks. Place it in small troughs or in shallow pans where it is easy of access.

From Third Day to Tenth Day.—Continue same treatment. At tenth day add finely crushed corn.

After this day whole wheat may be added. Give a small quantity at first. As the chicks grow older they should be given a mash composed of stale bread, shorts, cornmeal, ground meat, &c. Finely cut bone or meat will be found a great incentive to growth at this stage. On the chickens becoming eight weeks of age their rations may be dropped to three per day. Care should be taken that they are generously fed at last ration. For drink give skimmed milk or water or both. When fully feathered the hen-hatched chickens should be removed from their mothers. The chickens will be found to return to their coops as usual, and they are allowed to remain in them until removed to more commodious quarters in colony houses. On the incubator-hatched chickens becoming too large for the brooders they were also removed to colony houses.

Many breeders give only crushed ground grains from the first with grit of proper size always in supply. Excellent results have attended this method. Again, the hopper system of feeding the chickens is rapidly becoming popular. By this method the food is before the youngsters all the time, in hoppers, and they help themselves to what they want and when they feel inclined to take it.

The feeding of whole grain in open troughs, of small size, placed throughout the fields of our department last summer, was very satisfactory.

Water is given at an early period of life in some instances and in others not for 5 or 6 days.

It does not seem to have any different results in the desired progress of the chicks whether the soft or hard, wet or dry, system of feeding is adopted. What is of paramount importance is care and regular feeding.

THE FIRST PULLETS TO BEGIN LAYING.

The pullets commenced to lay in the following order and at the dates mentioned, viz.:—

Pullets.	Hatched.	First Egg.
	1906.	1906.
White Wyandotte	April 24	November 24
" "	" 24	" 28
" "	" 24	" 30
Salmon Faverolle	May 2	December 1
White Plymouth Rock	1st week in May.	" 6
Barred " "	"	" 10
Buff Orpington	April 24	" 18
Black Minorca	" 24	" 23

Eggs Laid from November 1, 1905, to March 31, 1907.

1905—	
November	355
December	954
1906—	
January	1,393
February	1,349
March	2,799
April	2,786
May	2,206
June	1,690
July	1,381
August	563
September	236
October	53
Total number	15,765
November	138
December	967
1907—	
January	1,561
February	1,773
March	2,415
Total number of eggs for 17 months	22,619

DISEASES OF POULTRY.

A number of inquiries were received during the year as to the nature of ailments affecting poultry in different parts of the Dominion. Remedies were suggested and advice given which were considered suitable to the exigencies of the various cases described. Several *postmortem* examinations of birds which had died from symptoms of infectious and contagious diseases were kindly made by Dr. Higgins, Pathologist, Biological Laboratory, during the year and much valuable information as to cause of death received.

BUILDING UP HARDY AND PROLIFIC EGG-LAYING STRAINS OF FOWLS.

WARM VS. COLD HOUSES.

The work of building up prolific egg-laying strains of fowls—with a view to their being hardy and good egg-layers during the winter season of high prices—was continued during the year. This work was commenced in the month of January, 1904. As aids in securing desired results, trap nests and unheated houses—with scratching shed attachments—were called into requisition. This work is one of the greatest importance and is unavoidably slow. The progress so far made is certainly satisfactory. In some instances as will be seen in the tables following, better egg-laying results have been undoubtedly secured, while in other cases the advantage of the unheated house (with its cold but fresh air, as compared with the warm one), is made evident.

The first table shows results from 12 Barred Plymouth Rock pullets kept in a warm house. Table No. 2, immediately following, gives results from a similar number of hens kept in an unheated house. A comparison between the two tables is full of import to all who are interested in this line of work.

TABLE I.—Individual hen records as shown by trap nests. 12 Barred Plymouth Rock pullets, hatched May 20, 1905. Pen 1. Warm house.

FROM NOVEMBER 1, 1905, TO OCTOBER 31, 1906.

Hen No.	November.	December.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	Total of Eggs laid.	Remarks.
	1905		1906											
8	0	0	4	13	6	7	8	8	10	0	0	0	56	Broody 3 times.
24	0	0	0	6	18	6	12	11	9	0	0	0	62	" 4 "
26	0	2	8	5	15	11	22	15	1	0	0	0	79	Showed no broodiness.
68	0	7	10	3	11	4	4	0	0	0	0	0	39	Broody in March. Used as setter from May 5 to July 4.
80	0	0	9	9	19	8	15	10	6	0	3	0	79	Broody once.
90	0	0	3	2	18	7	10	7	3	9	0	0	59	" twice.
92	0	0	13	8	13	9	13	14	4	7	0	0	81	" once.
99	0	14	13	7	15	7	8	6	1	12	0	0	83	Showed no broodiness.
20	0	0	0	1	10	13	11	10	6	2	10	0	63	Broody 3 times.
33	0	0	0	3	16	19	18	6	6	11	0	0	79	" once.
100	0	0	0	4	18	14	15	12	0	2	0	0	66	" 3 times.
64	0	1	2	3	10	13	6	10	0	0	7	0	52	" 4 "
									1				1	Laid in straw.
Totals.	0	24	62	64	169	118	142	110	46	43	20	0	799	Average egg yield 65¾ per hen.

It will be noticed that the above pullets were inmates of a pen in a warm house. The heating was done by coal stove situated in the centre of the building.

RATIONS USED IN ABOVE PEN 1.

The whole grain ration, which was fed morning and evening, was composed of ⅓ wheat; ⅓ buckwheat; ⅓ oats. The grains were mixed and thrown in the litter on the floor of the pen. -

Mash which was given in small quantity at noon of each day, was made of ⅖ bran; ⅕ ground oats; ⅕ ground corn; ⅕ meat meal.

Grit, broken oyster shells and pure water were in regular supply. No cut bone was given, as meat meal formed part of the mash.

Quantities of different grains, &c., used in the months specified, were whole grains 538 lbs.; mash, 198 lbs.; grit, 28 lbs.; oyster shells, 28 lbs.

TABLE II.—Pen 36. Showing the record of 13 Barred Plymouth Rock hens, 2 years of age, in an unheated house, as compared with 12 pullets of same variety in Pen 1, which was warmed.

The results in the following record are interesting when compared with those of the previous Table 1, as showing a difference in favour of the unheated winter house of modern design. Pen 36, which contained 13 two year old B. P. R. hens, was one of two apartments in an unheated house situated some distance from the main buildings. This apartment 36, as well as the other, had a scratching shed attachment, the front of which was entirely of cotton with a window in the centre, facing south. It was in this and other similarly constructed scratching shed attachments that the disinclination of the fowls to stay, during cold dips, was noticed. The centre divisions of the building were more substantially finished. They are known as the 'roosting and laying rooms,' for, in them the hens do both. Instead of cotton, the fronts are boards with windows in the centre. It was presumably because these apartments were less cold than the scratching sheds attached to them, that the fowls showed inclination to 'bunch' in them during cold periods. Notwithstanding, the winter egg record of this unheated Pen 36 is nearly 11 per cent greater than that of Pen No. 1 in a warmed building. It is to be borne in mind—in making a comparison—that the inmates of pen 36 were hens, two years of age, as compared with pullets in No. 1. Again, it is of import to know that the inmates of apartment 36 were never in any but unheated quarters, while the pullets in Pen 1 had not yet been in any but a comparatively warm habitation. The showing is in favour of the cold house principle and the early inuring of the young stock to the colder conditions. The figures of this experiment are as follows:—

TABLE II.—DETAILED ACCOUNT OF RESULTS.

B.P.R. — Hen No.	November.	December.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	Total of Eggs laid.	Remarks.
	1905		1906											
2	0	5	1	0	1	9	8	7	7	5	0	0	43	Broody three times.
4	0	1	17	4	8	9	11	12	5	1	5	0	73	" once.
*33	0	0	0	0	0	5	7	8	5	1	6	0	32	" three times.
34	0	0	0	0	0	9	12	14	7	3	0	0	45	Showed no broodiness.
46	0	3	20	19	22	8	11	1	0	0	0	0	84	Died August 23 of apoplexy. Broody once.
56	0	0	0	0	7	16	12	8	12	0	0	0	55	"
61	0	14	17	10	11	18	20	11	8	13	0	0	122	"
72	0	3	15	10	8	14	19	16	18	4	10	0	117	Showed no inclination to set.
74	0	0	11	7	14	15	5	13	12	2	0	0	79	Broody twice.
85	4	0	15	8	11	14	17	3	4	4	1	0	81	" "
94	0	9	10	4	8	17	15	18	11	2	11	0	105	" once.
96	0	0	0	0	2	19	19	13	10	11	0	0	74	" twice.
98	0	11	8	8	8	9	21	3	0	0	0	0	68	" "
		1		1					2	1			5	These eggs were laid on the floor.
Totals.	4	47	114	71	100	162	177	127	101	47	33	0	983	Average 76 eggs.

RATIONS.

The rations given to the fowls in the above pen 36, were in quantity and quality as follows:—

Whole grain ½ oats, ½ wheat. Fed morning and evening. The grain was thrown into the straw on the cement floor of the scratching shed and afforded good opportunity to exercise.

Mash composed of ground grains slightly dampened was fed at noon twice per week.

Cut bone.—When mash was not fed, cut bone was given.

Green food.—Mangels, turnips, &c., grit, oyster shells and water were always in supply.

Quantities fed—

Grain	641 lbs.
Mash	119½ "
Cut bone	44 "
Beets	85 "
Grit	37 "
Oyster shells	37 "

TABLE III.—Pen 37—Adjoining No. 36—under same roof and of same description, with cotton front scratching shed. The inmates were 13 White Wyandotte hens, two years of age in 1906. Trap nest record from November 1, 1905 to November 1, 1906.

As with the Barred Plymouth hens in adjoining pen 36, they had always been kept in cold quarters. Results are slightly over 8 per cent better than those from the birds in warmed pen 1 of house 1, and which is first given.

Hen No.	November.	December.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	Total of Eggs laid.	Remarks.
	1905		1906											
1	5	7	13	9	8	1	0	13	6	1	0	0	63	Broody twice.
3	1	12	9	9	11	4	6	0	0	0	0	0	52	Showing no broodiness.
5	0	1	0	2	8	7	18	16	6	0	0	0	58	"
15	9	4	0	6	11	8	18	22	17	10	0	0	105	"
19	0	17	16	17	11	14	12	9	9	9	0	0	114	Broody three times.
24	0	0	0	14	16	15	7	9	8	7	0	0	76	" " "
41	0	0	0	2	13	17	21	12	0	0	0	0	65	" once.
67	0	11	22	16	9	8	14	0	0	0	0	0	80	" " Died June 11.
68	0	0	0	6	11	10	6	10	5	5	0	0	53	" twice.
73	2	16	16	14	9	12	19	16	18	5	0	0	127	Showing no inclination to set.
77	0	0	7	0	7	12	15	0	9	0	0	0	50	Broody once.
83	2	5	8	8	12	11	7	12	4	0	0	0	69	Showing no broodiness.
92	3	8	6	7	12	3	2	3	5	0	0	0	49	Broody once.
		4							2				6	These 6 eggs were laid on floor.
Totals..	22	85	97	110	138	122	145	122	89	37	0	0	967	Average 74½ eggs per hen.

Rations were the same as given to the fowls in pen 36—the preceding one.

TABLE IV.—Pen 4. House No. 1. Warmed. Nine Buff Orpington pullets hatched May 20, 1905. From November 1, 1905 to November 1, 1906.

The showing made by these pullets is not as good as those of the Barred Plymouth Rock, or White Wyandotte hens of the cold 36 and 37 houses.

Hen No.	November.	December.	January.	February	March.	April.	May.	June.	July.	August.	September.	October.	Total of Eggs laid.	Remarks.
	1905		1906											
11	0	0	18	10	12	11	4	9	1	1	4	0	70	Broody three times.
18	0	3	6	6	3	10	3	0	10	0	0	2	43	Used as setter from May 5 to July 4. Broody once after.
*27	0	0	3	2	13	3	7	0	0	0	0	0	28	Showing no broodiness.
35	0	13	16	3	18	7	7	7	8	8	0	0	87	Broody three times.
59	0	21	23	14	20	13	20	14	14	7	4	0	150	" twice.
*68	0	0	0	0	1	5	3	0	0	0	0	0	9	" once.
70	0	0	5	17	19	10	7	7	9	0	0	0	74	" twice.
*75	0	0	0	2	7	4	2	0	10	5	3	0	33	" three times.
*96	0	11	4	0	0	2	1	2	6	1	0	0	27	" twice.
Totals..	0	48	75	54	93	65	54	39	58	22	11	2	521	Average 58 eggs per hen.

* The eggs from the four hens marked with a star were not used for breeding purposes.

Rations.—Whole grain ½ oats, ½ wheat; mash, ½ ground oats; ½ ground corn; Cut green bone twice per week. Grit, roots and drink water in regular supply.

Quantities fed.—Whole grain, 398 lbs.; ground grains, used in making mash which was given twice per week, 88½ lbs.; roots, 3 times per week, 58 lbs.; Cut bone, twice per week, 27½ lbs.

TABLE V.—House No. 1, pen 6: warm. Record of 12 White Leghorn pullets hatched in May, 1905. From November 1, 1905 to November 1, 1906.

The inmates of this pen made a better showing than any variety kept in the warmed houses.

FROM NOVEMBER 1, 1905, TO NOVEMBER 1, 1906.

Hen No.	November.	December.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	Total of Eggs laid.	Remarks.
	1905		1906											
7	5	11	12	14	20	11	11	14	12	7	0	0	117	
13	0	0	10	4	11	16	9	0	0	0	0	0	50	
*22	0	0	0	1	7	10	14	4	0	0	0	0	36	
30	2	15	11	12	4	5	9	10	11	1	0	0	80	Broody once in March.
32	0	15	15	18	13	10	7	8	17	0	0	0	103	
46	1	2	14	2	12	15	5	3	0	13	3	0	70	
58	0	6	15	6	17	15	3	0	0	0	0	0	62	
64	0	1	6	8	18	17	4	9	9	1	0	0	73	
76	6	9	13	16	19	16	9	13	18	1	0	0	120	
*83	0	0	0	4	9	7	5	5	0	0	0	0	30	
84	0	7	10	13	17	16	6	4	0	0	0	0	73	
93	0	8	12	8	16	16	10	14	16	0	0	0	108	
	....	2	2	....	....	....	...	....	...	..	...	....	4	These eggs were laid on the floor.
Totals..	14	76	120	106	163	154	92	84	83	31	3	0	926	Average 77$\frac{1}{6}$ eggs per hen.

* The eggs from hens marked with a star were not used for breedng purposes.

Rations and Manner of Feeding them:

Whole grain, ½ wheat, ½ oats; thrown every morning and evening in litter on the floor.

Mash.—Four parts shorts; 4 parts ground oats; 3 parts ground barley. Occasionally clover hay was mixed in mash during winter. The mash was given at noon every three days.

Cut green bone, every 3 days at noon when mash or green food was not given.

Green food, every 3 days.

Other essentials in supply.

Quantity of food used.—Whole grain, 517 lbs.; ground grains, 129 lbs.; cut bone, 35¼ lbs.; roots, 48 lbs.; grit, 18 lbs.; oyster shells, 19 lbs.

GOOD AND BAD STRAIN. THE BENEFICIAL RESULTS OF SELECTION BY TRAP NESTS.

TABLE VI.—Individual Records shown by trap nests of 5 White Leghorn pullets of good strain. Pen 19. House No. 2.

The following table shows satisfactory results from the use of trap nests and the benefit of securing a good laying strain of fowls to build from. Two years ago the parent stock of the following pullets were selected by trap nest:—

FROM NOVEMBER 1, 1905, TO NOVEMBER, 1906.

Hen No.	November.	December.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	Total of Eggs laid	Remarks.
	1905		1906											
2	0	8	13	18	21	18	2	9	5	4	0	9	98	
11	0	12	17	12	5	12	6	9	0	0	0	4	73	May 3, Broody and broken up.
19	0	9	15	15	20	16	15	15	14	6	0	0	125	
43	0	8	7	12	20	14	12	10	10	0	0	0	93	
64	0	12	18	17	21	19	6	11	12	2	0	0	118	
Totals..	0	49	70	74	87	79	41	54	41	12	0	0	507	Average 101$\frac{2}{5}$ eggs per hen.

TABLE VII.—Showing a poor egg-laying strain, bred from parent stock which trap nests recorded as inferior layers.

Individual records of 5 White Leghorn pullets as shown by trap nests from November 1, 1905, to November 1, 1906. Pen 18. House No. 2.

FROM NOVEMBER 1, 1905, to NOVEMBER 1, 1906.

Hen. No.	November.	December.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	Total of Eggs laid.	Remarks.
	1905		1906											
9	0	10	5	7	14	18	13	8	0	0	0	0	75	
18	0	7	13	8	11	14	13	9	12	5	5	7	[illegible]5	
41	0	7	17	3	18	14	15	7	6	8	0	0	[illegible]5	
47	0	0	1	6	6	7	4	10	0	0	0	0	4	
96	0	10	13	14	17	16	6	1	0	0	0	0	7	
	....	1	....	....	....	....	....	....	....	....	....	....	1	Laid on floor.
Totals..	0	35	49	38	66	69	51	35	18	14	5	7	387	Average, 77⅖.

The inmates of the above pens 19 and 18 were side by side in the same house and fed the same kind of rations, the conditions were thus identical in both cases.

For interesting particulars in relation to the above two pens, see table 5 on pages 244 and 245, 1905 report.

STOCK on hand on March 31, 1907.

Pen. No.	Breed.	Cocks.	Hens.	Cockerels.	Pullets.	Total.	Remarks.
1	B. Ply. Rocks..................	.....	14	1	.....	15	
2	Wh. "	1	9	.....	3	13	
3	Buff Orpingtons..................	.....	.....	1	14	15	
4	" "	1	15	.....	.....	16	
5	Wh. Leghorns..................	1	3	....	11	15	
6	" "	1	13	.....	.....	14	
7	Blk. Minorcas..................	1	7	.....	6	14	
8	Wh. Orpingtons..................	.....	.....	1	15	16	
9	Faverolles..................	.....	4	1	4	9	
16	Blk. Hamburgs..................	1	4	.....	4	9	
18	Wh. Leghorns..................	1	5	.....	..	6	Poor egg laying strain.
19	" "	1	5	.....	....	6	Good " "
20	Buff. "	1	5	....	1	7	
22	L. Brahmas..................	1	2	.....	5	8	
23	S. G. Dorkings..................	1	4	.....	1	6	
24	Wh. Orpingtons..................	.....	5	1	...	6	
25	S. L. Wyandottes..................	.....	4	1	4	9	
26	Mixed pullets..................	.....	.....	.....	7	7	
27	" "	.....	.....	.....	6	6	
28	B. Ply. Rocks..................	.....	.....	1	10	11	
34	" "	.....	.....	1	26	27	Unheated apartment.
35	Wh. Wyandottes..................	.....	.....	1	25	26	" "
36	B. Ply. Rocks..................	.....	20	1	.....	21	" "
37	Wh. Wyandottes..................	1	17	.....	.....	18	" "
22	Capons..................	.....	.....	3	.....	3	
	For breeding and eating purposes.	.....	.....	26	3	29	In different pens.
	Totals..................	12	136	39	145	332	

EXHIBITION AT THE CENTRAL CANADA FAIR.

An exhibition of a similar kind to that of the year before was given in the Experimental Farm building at the Exhibition of the Central Canada Fair, held in the early part of September of last year, in this city. The display embraced many interesting features. It showed the hatching and brooding of chickens by natural and artificial means; the best methods for care and management of the young chicks; models of suitable poultry houses; fattening crates and a number of specimens of the most popular utility varieties placed in wire coops of latest design. There were besides displays of dressed poultry and eggs laid by different breeds. The whole exhibit was well arranged and was both attractive, interesting and instructive.

THE PRESERVATION OF EGGS.

By Frank T. Shutt, M.A.
Chemist, Dominion Experimental Farms.

For eight successive seasons we have conducted experiments in egg preservation by means of various fluids, the formulæ of which had been collated from various sources. Three years ago we concluded that of the large number of solutions under trial, two only, viz., lime-water and sodium silicate (water glass), were worthy of further investigation. We also stated at that time that of these two preservatives, lime-water was from every point of view the more satisfactory. The results of the experiment now to be described, undertaken at the request of the Poultry Division, furnish still further evidence—and that of an emphatic character—in favour of lime-water.

Thirteen months ago fertilized and non-fertilized eggs were put (a) in lime-water, and (b) in 5 per cent solution of sodium silicate, the containers being stoppered bottles. During the whole period the bottles were kept in the laboratory, the temperature of which might vary between 60° and 80° F., with a mean of about 68° F.

LIME-WATER.

Fertilized Eggs.—The tinging of the 'white' was somewhat pronounced. The yolk was globular and of good colour. There was no marked odour from the broken egg. All the eggs examined in this test were sound and usable for cooking purposes, but they were distinctly inferior, both before and after poaching, to the non-fertilized eggs in the same preservative.

Non-fertilized Eggs.—The 'white' compared with that of freshly laid eggs, was faintly tinted with yellow and somewhat more limpid. The yolk was globular and of normal appearance. There was no adhesion of yolk to the side of the shell and no mixing of the yolk and white occurred in cracking the shell preparatory to poaching. Every egg opened was sound and usable. Several of the eggs were poached and not one of them developed any markedly unpleasant odour or taste, though, of course, the pleasant flavour of the newly laid egg was not present. The opinion expressed by the majority of those examining the poached eggs was that the flavour was 'slightly stale and limey.'

SODIUM SILICATE (WATER GLASS) 5 PER CENT SOLUTION.

Fertilized and Non-fertilized Eggs.—In this preservative there was practically no difference between the fertilized and non-fertilized eggs. The 'white' was distinctly discoloured, being of a pinkish-red, and very limpid. The yolk was thin, discoloured and degraded. On cracking the eggs preparatory to poaching it was found impossible to prevent the running together of the yolk and white, owing to the softening of the skin or envelope surrounding the yolk. Possibly from 50 per cent to 70 per cent of the eggs examined might be used for some classes of cooking, but certainly 30 per cent of them were thoroughly bad and totally unfit for human consumption in any form. The slightly 'alkaline' taste and odour and the distinctly disagreeable appearance of even the best of these eggs would entirely prevent their use on the table.

This has been, of course, a most severe test. Thirteen months at ordinary room temperatures constitute conditions not frequently required to be met, yet the saturated lime-water has under them proved itself a very satisfactory preservative and more especially so when the eggs are non-fertilized.

May 21, 1907.

EXPERIMENTAL FARM FOR THE MARITIME PROVINCES.

NAPPAN, N.S., March 30, 1907.

To DR. WM. SAUNDERS, C.M.G.,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith my report of the operations for the past year on the Experimental Farm for the Maritime Provinces at Nappan, N.S.

The past season was not a particularly good one, the long wet period in the spring had the effect of making all spring-sown crops from one to three weeks later than usual, which resulted in moderate crops of all sorts, except hay, which did not suffer so much from this cause. Hay was on the whole slightly better than usual. Following the particularly late spring came a prolonged dry spell in the later part of the season which resulted in grain ripening somewhat rapidly, causing the crop to be rather light and the quality of the grain not quite up to the average, while roots, and fall-growing crops suffered very materially. These conditions brought hay quite up to the average in crop, while grain was below the average both in quantity and quality. Mangels were better and turnips slightly below the average, while corn was quite up to the average. The new take of grass started well, but made poor growth during the latter part of the season. Pasture was decidedly poor, except in the very early part of the season. The lessening of the crop in some particulars has been more or less offset by the very high prices of all kinds of farm produce. The season's operations closed up very suddenly and left many farmers with much fall work unfinished.

I have again to acknowledge my indebtedness to Mr. J. Thomas Coates and Mr. R. Donaldson, who have kept all records of crop and live stock experiments in a careful and painstaking manner.

WEATHER.

December, 1905, commenced fine with light rain on the 3rd and light snow on the 4th. Another snowfall on the 10th made sleighing for the rest of the month. The thermometer registered 7° below on the 16th, which was the lowest for the month.

January opened fine until the 4th, when a warm rain fell, the mercury rising from zero to 40°. A light snow fell on the 9th. On the 12th and 13th rain fell and spoilt sleighing for the rest of the month. Another light snow fell on the 18th, but not enough to make sleighing. The rest of the month was fine excepting on the 24th, when a light rain fell. The thermometer went to zero on the 4th, 2° below zero on the 10th, the lowest being 9° below zero on the 11th.

February opened dull and foggy until the 3rd, when it turned cold. On the 6th there was a light snow storm and cold weather followed. On the 15th another snowstorm came, making good sleighing. The rest of the month was fine, finishing on the 28th with a rather heavy snowstorm. The mercury registered zero on the 4th, 14° below zero on the 17th, 5° below on the 18th, and zero on the 20th.

March opened with a cold rough storm, followed by fine weather until the 9th, after which the weather was much broken. A fine week from the 20th to the 27th was followed by rain and dull weather during the remainder of the month. The thermometer registered 2° below zero on the 1st and 3° below on the 19th.

In April snow fell on the 6th, 10th and 12th. The weather then continued fine until the 22nd, when a heavy rain (2 in.) fell. The remainder of the month was fine with the exception of the 26th, when a light rain fell at night.

During May we had an unusually heavy rainfall, 4·85 inches. Rain fell on twelve different dates during the month. From the 8th to the 26th the weather was fine with the exception of a light rain on the 10th and 13th. Seeding was begun on the 17th and continued until the 26th, after which heavy rains fell. The thermometer registered frost on the 4th, 9th, 12th, 22nd and 24th.

On June 3 the thermometer registered 32°, but no damage was done to fruits or tender plants. This month was much broken with showery weather, the rainfall being heavier than usual. Rain fell on nine different dates during the month and seeding operations were very much hindered, finishing only on the 30th. On the 28th the thermometer registered 79° and on the 29th 80°.

July opened fine and fair with a light rain on the 4th, followed by fine weather and crops grew well all this month. The temperature was higher than the previous year, 85° being recorded on the 15th, 84° on the 16th and 86° on the 23rd.

August was fine and very dry. The total rainfall for the month being only 1·72 inches. All crops suffered for want of rain. The hay crop, of which very little was cut before this month, ripened extremely fast. Grain also ripened fast and there was no growth of aftergrass. The thermometer registered 80° or above 80° on fourteen different dates, going as high as 84°, 85°, 89° and 91°, respectively, on the 6th, 10th, 19th and 20th of the month.

September was fine and fair practically all the month, the only rain of any consequence fell on the 23rd. The weather was ideal for harvesting, but particularly poor for the growth of roots or aftergrass. The lowest temperatures for the month being 31° on the 16th, and 30° on the 29th.

October was unusually dry and fine until towards the end of the month. Rain fell on the 23rd, 25th and 28th, 4·26 inches being the total rainfall for this month. On the 3rd, 9th, 13th, 14th, 15th, 17th, 18th, 19th, 22nd, 25th and 31st, 1°, 2°, 9°, 6°, 2°, 7°, 3°, 3°, 7°, 5° and 1° of frost were recorded respectively.

November was very rough with much rain and snow. 5·50 inches of rain fell during the month. Snow fell on the 6th, 8th, 12th, 14th, 22nd, 23rd and 27th. There was very little frost previous to the 22nd, when 7° was recorded and on the 25th, 27th, 28th, 29th, and 30th, 13°, 6°, 7°, 7° and 16° were recorded respectively.

The first half of December was cold and stormy. On the 16th the weather cleared and from then until the 19th was fine and moderate. From the 19th the balance of the month was rainy, dull and warm and no frost was recorded until the 31st, when the thermometer registered 15° of frost. The thermometer registered below zero on the 3rd, 6th, 8th, 9th, 10th and 19th, 15° below zero on the 10th being the lowest for the month.

January, 1907, opened with a light snowfall on the 1st, followed by fine weather until the 26th, except on the 4th and 13th, when light snow storms prevailed. On the 26th, snow fell and again on the 30th, the last day of the month being fine. On the 10th, 5° below zero was recorded and from the 16th until the end of the month the temperature was below zero every day with the exceptions of the 19th, 20th, 21st, 26th and 27th, 17° below zero on the 29th was the lowest temperature recorded.

February opened fine, followed by rain on the 2nd and a snow storm on the 5th. After this from the 6th to the 10th the weather was clear and cold. Snow fell on the 11th, 16th, 17th and 18th, and on the 21st a thaw nearly spoiled the sleighing. Snow fell again on the 25th, the remainder of the month being fine and cold, 4° below zero was recorded on the 4th, 7th and 9th, 13°, 3°, and 7° below zero on the 8th, 12th and 13th, respectively, zero on the 18th and 19th and from the 23rd until the end of the month the thermometer went below zero every night, 13° below on the 8th was the lowest for the month.

March. The first half of this month was fine with the exception of light snowfalls on the 2nd, 8th, 14th and 15th, the balance of the month being rough with high winds, rain and snowstorms. On the 1st, 4th, 5th and 6th, the mercury registered below zero, 15° below on the 6th being the lowest recorded for the month. From this date until the end of the month very little frost was experienced. The extremes for this time being 47° on the 31st, and 13° on the 16th.

METEOROLOGICAL RECORD.

The maximum and minimum monthly thermometrical observations for the year beginning December 1, 1905 and ending March 31, 1907.

Month.	Maximum.	Minimum.
December, 1905	3rd, 50 above zero	16th, 7 below zero.
January, 1906	24th, 52 "	12th, 13 "
February "	21st, 48 "	17th, 14 "
March "	4th, 46 "	19th, 3 "
April "	21st, 61 "	8th, 10 above zero.
May "	19th, 72 "	22nd, 28 "
June "	29th, 80 "	12th, 33 "
July "	23rd, 86 "	2nd and 6th, 38 above zero.
August "	19th, 89 "	18th, 41 above zero.
September "	13th, 76 "	29th, 30 "
October "	6th, 74 "	13th, 23 "
November "	19th, 56 "	30th, 16 "
December "	25th, 50 "	10th, 15 below zero.
January, 1907	20th, 51 "	18th, 18 "
February "	21st, 46 "	8th, 13 "
March "	31st, 47 "	6th, 15 "

EXPERIMENTS WITH OATS.

Experiments were again conducted this year with the leading sorts of oats which were grown in uniform test plots of one-fortieth acre each. Thirty-seven varieties were included in this test. The plots received the same treatment and were on soil practically uniform throughout.

The ground was a clay loam, on which mangels were grown the previous year (1905), for which crop twenty one-horse cart loads of barnyard manure per acre were used. Grain was grown on this land in 1903, and hay in 1904. The land was ploughed in the fall of 1905 and harrowed in the spring of 1906 with the spring-tooth and smoothing harrows, until a fine tilth was made. The seed was sown on May 18th with the seed drill at the rate of 2½ bushels per acre.

This ground was also seeded down to clover and timothy at the rate of 7 lbs. Mammoth Red clover, 3 lbs. Alsike clover and 12 lbs. Timothy seed, per acre, by means of a grass seed attachment to the grain seeder.

The seed was from selected heads of the previous season's crop, cut from the various plots at harvest time.

No fertilizer was used on these plots this season. The grain started well as did also the grass seed, but owing to the extreme drought through July and August, the grain ripened prematurely. The straw was fairly stiff, but showed a considerable amount of rust and a few heads of smut were noticed. The following yields were obtained:—

OATS—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw, including Head.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per measured Bushel after cleaning.
				Inches.		Inches.		Lbs.	Bush.	Lbs.	Lbs.
1	Goldfinder	Aug. 30	104	40 to 44	Stiff	6 to 9	Branching	3,400	63	18	33
2	Golden Beauty	" 27	101	40 " 44	"	6 " 8	"	3,880	57	2	31
3	Tartar King	" 27	101	46 " 50	"	6 " 7	Sided	3,880	56	16	37
4	Siberian	" 27	101	35 " 38	"	6 " 7	Branching	3,320	55	20	33
5	Kendal Black	" 27	101	39 " 43	"	6 " 8	Sided	3,400	55	10	36
6	Golden Fleece	" 29	103	40 " 43	"	6 " 8	Branching	2,840	55	10	34
7	Milford Black	" 27	101	36 " 40	"	6 " 8	Sided	3,800	54	26	36½
8	Lincoln	" 25	99	42 " 46	"	6 " 8	Branching	3,680	52	12	32.
9	Golden Giant	Sept. 5	110	40 " 44	"	6 " 9	Sided	3,720	51	26	32
10	Improved Ligowo	Aug. 25	99	36 " 40	"	6 " 8	Branching	3,600	50	20	36¼
11	Pionéer	" 25	99	38 " 42	"	6 " 8	"	3,600	50	20	35
12	American Beauty	" 28	102	40 " 43	"	6 " 9	"	3,080	50	20	31
13	Bavarian	" 27	101	36 " 40	"	7 " 9	"	2,960	50	0	33½
14	Swedish Select	" 27	101	42 " 46	"	6 " 8	"	2,800	49	14	32
15	Milford White	" 27	101	36 " 42	"	6 " 8	Sided	3,280	49	14	36½
16	Holstein Prolific	" 28	102	40 " 44	"	6 " 9	Branching	3,320	49	14	33
17	Thousand Dollar	" 25	99	44 " 48	"	6 " 8	"	2,920	48	28	32½
18	Virginia White	" 25	99	36 " 40	Medium	6 " 7	"	3,200	48	8	33½
19	Kendal White	" 27	101	38 " 41	Stiff	6 " 8	Sided	3,080	48	8	32½
20	Improved American	" 29	103	36 " 40	"	5 " 8	Branching	3,480	46	16	30
21	American Triumph	Sept. 5	110	44 " 48	"	6 " 9	"	3,760	45	30	35
22	Joanette	Aug. 25	99	36 " 39	Medium	5 " 8	"	3,520	45	10	32½
23	Banner	" 25	99	37 " 40	Stiff	6 " 8	"	2,920	44	24	33
24	Danish Island	" 28	102	36 " 40	"	5 " 7	"	2,760	44	24	32
25	Olive Black	" 27	101	37 " 40	"	6 " 8	Sided	3,600	44	24	35½
26	Twentieth Century	" 25	99	36 " 38	"	6 " 8	Branching	3,160	43	18	34
27	Columbus	" 29	103	36 " 38	Medium	5 " 7	"	3,060	43	18	31½
28	Storm King	" 27	101	44 " 48	Stiff	6 " 9	Sided	3,240	42	32	37
29	White Giant	" 27	101	36 " 38	Medium	5 " 7	Branching	2,920	42	12	31
30	Buckbee's Illinois	" 27	101	38 " 42	Stiff	6 " 8	"	2,840	41	6	32
31	Black Beauty	" 25	99	35 " 38	"	5 " 8	"	3,000	40	20	32½
32	Mennonite	" 27	101	38 " 42	"	5 " 7	"	2,800	40	20	33
33	Wide Awake	" 28	102	38 " 42	"	6 " 7	"	2,720	40	0	31
34	Irish Victor	" 27	101	36 " 40	"	5 " 6	"	2,480	40	0	33½
35	Waverley	" 27	101	35 " 38	Medium	5 " 7	"	2,720	38	28	34
36	Abundance	" 27	101	36 " 40	Stiff	6 " 8	"	2,880	38	8	31
37	Sensation	" 25	99	36 " 40	"	6 " 8	"	2,880	37	22	32½

EXPERIMENTS WITH BARLEY.

Eighteen varieties of six-rowed and fourteen varieties of two-rowed barley were sown in uniform plots of one-fortieth acre each, on May 19. The land was a clay loam on which mangels were grown the previous year (1905), for which crop barnyard manure at the rate of twenty one-horse cart loads per acre was used. There was grain on this land in 1903, and hay in 1904. No manure or fertilizer was used for this crop. This land was ploughed in the fall of 1905 and worked up in the spring of 1906, with the spring-tooth and smoothing harrows, and sown with seed selected from the previous year's crop by cutting picked heads at harvest time.

The grain was sown with the seed drill at the rate of 2 bushels per acre, and at the same time there was also sown 7 lbs. Mammoth Red clover, 3 lbs. Alsike clover and

12 lbs. Timothy seed per acre. The grain started very well. There was no rust, but considerable smut. The following yields were obtained:—

SIX-ROWED BARLEY.—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw, including Head	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per measured Bushel after cleaning.
				Inches.		Inches.	Lbs.	Bush.	lbs.	Lbs.
1	Odessa	Aug. 20	93	40 to 41	Stiff	2 to 2½	3,440	45	..	47¼
2	Mensury	" 21	94	38 " 41	Medium	2 " 3	3,280	43	16	48
3	Oderbuch	" 20	93	36 " 40	"	2 " 2½	3,320	42	44	49
4	Common	" 20	93	38 " 42	"	2 " 3	3,800	42	24	49½
5	Blue Long Head	" 21	94	36 " 40	Stiff	2 " 2¼	3,120	40	..	43
6	Albert	" 20	93	38 " 42	"	2 " 2½	3,480	39	8	52
7	Argyle	" 20	93	40 " 44	"	2 " 2½	3,720	38	16	49
8	Royal	" 22	95	38 " 42	"	2 " 2½	3,240	38	16	51
9	Claude	" 22	95	40 " 43	"	2 " 2½	3,600	38	16	50
10	Summit	" 25	98	37 " 41	"	2 " 2½	3,840	36	32	51
11	Empire	" 23	96	38 " 42	"	2 " 3	3,200	35	40	50½
12	Mansfield	" 21	94	43 " 46	"	2 " 3	3,360	35	20	49½
13	Stella	" 25	98	36 " 40	"	2 " 2½	4,240	34	8	51
14	Trooper	" 22	95	40 " 43	"	2 " 2½	2,920	33	16	50½
15	Yale	" 21	94	42 " 46	"	2 " 3	2,920	32	24	50
16	Brome	" 22	95	36 " 40	"	2 " 2½	3,000	30	20	49
17	Nugent	" 22	95	37 " 41	"	2 " 2½	2,880	27	44	50
18	Champion	" 18	91	43 " 47	Medium	2 " 3	2,640	25	40	45½

TWO-ROWED BARLEY—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw, including Head	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per measured Bushel after cleaning
				Inches.		Inches.	Lbs.	Bush.	lbs.	Lbs.
1	Danish Chevalier	Aug. 24	97	36 to 40	Medium	3 to 4	3,480	51	32	51
2	Swedish Chevalier	" 25	98	36 " 38	"	2½ " 3½	3,080	50	0	50½
3	French Chevalier	" 24	97	37 " 40	"	3 " 4	3,120	46	32	50½
4	Clifford	" 24	97	44 " 48	Stiff	3 " 3½	3,320	44	8	48½
5	Beaver	" 24	97	36 " 40	Medium	3 " 3½	3,200	39	8	51¼
6	Invincible	" 24	97	38 " 42	"	2 " 3	3,180	38	16	50
7	Jarvis	" 24	97	40 " 45	Stiff	2½ " 3	2,600	36	12	51¾
8	Logan	" 24	97	46 " 50	"	3 " 4	3,000	35	0	49¼
9	Gordon	" 24	97	44 " 48	"	2 " 3	2,640	34	28	48
10	Standwell	" 24	97	36 " 40	"	2 " 3	2,520	33	36	49
11	Harvey	" 24	97	45 " 48	"	2 " 3	2,800	32	24	49½
12	Dunham	" 25	98	45 " 50	"	3 " 3½	2,680	30	0	49
13	Sidney	" 25	98	40 " 44	"	2½ " 3	2,440	29	8	50½
14	Canadian Thorpe	" 25	98	38 " 40	"	2 " 3	2,600	25	40	48

EXPERIMENTS WITH SPRING WHEAT.

Sixteen varieties of spring wheat were sown in plots of one-fortieth acre each, on a clay loam soil that had been in mangels the previous season (1905), for which crop 20 one-horse cart-loads of barn-yard manure per acre were used. This land was in grain in 1903 and in hay in 1904. The land was ploughed in the fall of 1905 and in the spring of 1906 was well worked up with the spring-tooth and smoothing harrows, and sown with the drill seeder, May 17th at the rate of 1¾ bushels per acre, together with Mammoth Red clover, 7 lbs.; Alsike clover, 3 lbs.; and Timothy seed, 12 lbs.

The grain made very good growth in the early part of the season, but ripened somewhat prematurely on account of the extreme drought in the latter part of the summer. The straw was clean and no smut or rust was noticed. The following yields were obtained:—

WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.		No. of Days Maturing.	Length of Straw including head.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per measured bush. after cleaning.
					In.		In.		Lbs.	Bush.	Lbs.	Lbs.
1	Red Fern	Aug.	27	102	47 to 50	Stiff.	2½ to 3½	Bearded.	4,280	34	0	60
2	Red Fife	"	29	104	45 " 48	"	2½ " 3	Beardless	4,120	33	20	60
3	Bishop	"	23	103	45 " 48	"	2½ " 3	"	4,080	32	40	60
4	White Fife	"	30	105	48 " 50	"	3 " 3½	"	3,320	32	0	61
5	White Russian	"	30	105	47 " 50	"	3 " 3½	"	3,080	31	20	60
6	Colorado	"	24	99	46 " 50	"	2 " 3	Bearded.	3,880	30	40	60¾
7	Stanley	"	29	104	44 " 48	"	2 " 3	Beardless	4,200	30	0	60
8	Hungarian White	"	27	102	44 " 46	"	2 " 3	Bearded.	3,640	28	20	61¼
9	Preston	"	26	101	42 " 45	"	2½ " 3	"	3,400	28	0	60
10	Herisson Bearded	"	27	102	40 " 45	Medium	1½ " 2	"	3,280	28	0	60½
11	Percy	"	29	104	47 " 50	Stiff.	2 " 3	Beardless	3,600	27	40	59
12	Pringle's Champlain	"	24	99	45 " 48	"	2½ " 3½	Bearded.	3,200	27	20	61
13	Huron	"	27	102	40 " 46	"	2½ " 3	"	3,320	27	20	61½
14	Riga	"	30	105	44 " 47	"	2 " 3	Beardless	3,040	27	0	61
15	Haynes' Blue Stem	"	26	101	42 " 47	"	2 " 3	"	2,960	27	0	60
16	Laurel	"	30	105	46 " 46	"	2½ " 3½	"	2,880	26	40	59

EXPERIMENTS WITH DURUM OR MACARONI WHEAT.

Four varieties of Durum wheat were grown in plots of one-fortieth acre each, alongside of the other wheat plots. The land was similar in character and received the same treatment as in the spring wheat plots and was sown May 18. Following are the yields obtained:—

MACARONI WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.		No. of Days Maturing.	Length of Straw including head.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per measured bush. after cleaning.
					In.		In.		Lbs.	Bush.	Lbs.	Lbs.
1	Goose	Aug.	27	101	40 to 45	Stiff	1½ to 2	Bearded	3,480	22	40	63
2	Roumanian	"	28	102	42 " 46	"	2 " 2½	"	3,200	22	0	62½
3	Yellow Gharnovka	"	28	102	40 " 45	"	2 " 2½	"	2,880	20	40	62
4	Mahmoudi	"	28	102	34 " 38	"	1½ " 2	"	2,800	18	40	61

EXPERIMENTS WITH EMMER AND SPELT.

Two varieties each of Emmer and Spelt were sown May 14, in plots of one-fortieth acre each. The land was similar to that on which the other spring wheats were sown and received the same treatment. The yield from these plots is given in

Experimental Farm, Nappan, Nona Scotia, showing group of sample hedges.

pounds, as with the ordinary threshing the chaff is not separated from the kernels and cannot well be compared with the other sorts of wheat which are threshed clean. Following are the yields obtained:—

EMMER AND SPELT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No of Days Maturing.	Length of Straw including head	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.
				In.		In.		Lbs.	Lbs.
1	White Spelt	Sept. 5	110	38—42	Stiff	3 to 4	Bearded	4,920	2,120
2	Red Spelt	" 5	110	40—44	"	2 to 3	"	4,120	1,880
3	Common Emmer	Aug. 28	102	36—40	Medium	1½ to 2	"	3,800	1,760
4	Red Emmer	Sept. 5	110	34—36	Stiff	1½ to 2¼	"	3,520	1,040

EXPERIMENTS WITH PEASE.

Twenty-four varieties of pease were sown in uniform plots of one-fortieth acre each on a clay loam soil that had been in roots the previous year (1905). The land was ploughed in the fall and worked up in the spring with the disc, spring-tooth and smoothing harrows, and sown on May 22 with the seed drill seeder at the rate of from 2 to 3 bushels per acre. This ground was seeded down to clover and Timothy at the rate of 7 lbs. Mammoth Red clover, 3 lbs. Alsike clover and 12 lbs. timothy seed per acre. The following yields per acre were obtained:—

PEASE.—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	Number of Days Maturing.	Character of Growth.	Length of Straw.	Length of Pod.	Size of Pea.	Yield per Acre.		Weight per Bushel.
					Inches.	Inches.		Bush.	Lbs.	Lbs.
1	Paragon	Sept. 9	110	Good	35-40	1½-2	Medium	35	20	64
2	Prince	" 9	110	Medium	34-37	2 -2½	Large	30	0	62¼
3	Prince Albert	" 7	108	"	32-36	1½-2	Small	29	20	64
4	Victoria	" 9	110	Good	33-38	2 -2½	Medium	28	40	63
5	Early Britain	" 7	108	"	36-40	2 -3	Large	28	0	62½
6	Gregory	" 6	107	"	33-38	2 -2½	Medium	26	0	64½
7	Pearl	" 7	108	Medium	33-36	2 -2½	"	24	40	63
8	White Marrowfat	" 5	106	Good	34-38	2 -3	Large	24	0	63½
9	Duke	" 5	106	"	36-40	2 -2½	"	23	0	64
10	Wisconsin Blue	" 4	105	"	33-38	1½-2	Medium	22	40	65
11	Golden Vine	" 5	106	"	33-38	1½-2	Small	22	0	65½
12	Black Eyed Marrowfat	" 7	108	Medium	35-38	2 -3	Large	20	20	64
13	Picton	" 7	108	"	32-36	2 -2½	"	20	0	63½
14	Mackay	" 5	106	"	33-36	2 -2½	Medium	19	20	64
15	Daniel O'Rourke	" 3	104	"	30-34	1½-2	Small	19	0	65
16	Prussian Blue	" 4	105	"	35-36	2 -2½	Medium	19	0	64½
17	Nelson	" 5	106	"	30-34	2 -2½	"	18	40	64½
18	Archer	" 4	105	"	30-36	2 -3	Large	18	40	65
19	Chancellor	" 3	104	"	30-35	1½-2	Small	18	0	65½
20	Arthur	" 4	105	"	28-34	2 -2½	Medium	17	20	64
21	Agnes	" 5	106	"	30-36	2 -3	Large	16	40	64
22	Kent	" 6	107	"	34-38	2 -3	"	16	40	64
23	White Wonder	" 3	104	"	30-33	2 -2½	Medium	15	20	64
24	English Grey	" 4	105	"	30-36	2 -2½	"	14	40	63

EXPERIMENTS WITH BUCKWHEAT.

Five varieties of buckwheat were sown in uniform test plots of one-fortieth acre each. They were sown on June 18 and cut September 5. The land was a clay loam that had been in roots the previous year. The land had received a dressing of barnyard manure in 1902, when a crop of roots was grown. No fertilizer of any kind was used since. The land was ploughed in the fall and well worked up in the spring. The following yields were obtained:—

BUCKWHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Character of Soil.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw including Head.	Yield per Acre.		Weight per measured Bushel after cleaning.
						Inches.	Bush.	Lbs.	Lbs.
1	Rye Buckwheat	Clay loam	June 18	Sept. 5	79	35—40	26	32	48
2	Silver hull	"	" 18	" 5	79	48—42	26	12	48
3	Tartarian or Siberian	"	" 18	" 5	79	35—37	25	40	48
4	Grey	"	" 18	" 5	79	35—40	25	20	48
5	Japanese	"	" 18	" 5	79	36—40	22	24	48

FIELD CROPS OF GRAIN.

Thirteen and one-half acres of field grain were grown, eleven acres of which were in plots of one acre each, one two-acre plot and one one-half acre plot. The land was a clay loam, the previous crop having been roots and corn, for which crop barnyard manure at the rate of 20 tons per acre had been used. The land was ploughed in the fall of 1905 and well worked up in the spring of 1906, after which the grain was sown with the seed-drill with 3 bushels in the case of oats, 2 bushels in the case of barley and 3 bushels in the case of mixed grain per acre. Mammoth Red clover at the rate of 7 lbs., Alsike clover, 3 lbs., and Timothy seed, 12 lbs. per acre were sown with this crop. The crop harvested was as follows:—

FIELD CROPS OF GRAIN.

Crops.	Yield per Acre.		Weight per Bushel.
	Bush.	Lbs.	Lbs.
1 Acre Mixed Grain sown May 19, cut Aug. 30	41	20	40
1 " Waverley Oats " " 19, " " 30	42	30	35
1 " Mixed Grain " " 19, " " 30	43	15	40
1 " Black Tartarian Oats " " 19, " " 30	45	0	37
1 " Mixed Grain " " 19, " " 30	42	40	40
1 " Odessa Barley " " 21, " " 23	29	0	48
1 " Mixed Grain " " 21, " " 27	48	20	40
½ " Sensation Oats " " 21, " " 27	50	0	36
7 " Mixed Grain " June 18, " Sept. 18	41	6	40
1 " Odessa Barley " " 20, " " 5	25	12	48
1 " French Chevalier Barley " " 20, " " 7	32	24	48
1 " Waverley Oats " " 20, " " 19	34	17	35
1 " Pioneer Oats " " 20, " " 19	32	25	38
2 " Mixed Grain " " 20, " " 19	47	10	40

FIELD CROPS OF MIXED GRAIN.

Seven acres also were sown with mixed oats, barley and pease. The land was a clay loam, the previous crop being clover hay, the aftermath being ploughed under in the fall. No fertilizer was used for this crop. It was sown June 18 and cut September 18. The yield was 41 bushels 6 lbs. per acre, weighing 40 lbs. per bushel.

EXPERIMENTS WITH INDIAN CORN.

Twenty-three varieties of Indian corn were sown in rows 36 inches apart and also in hills 36 inches apart each way. The land was a clay loam, the previous crop having been clover hay. Stable manure at the rate of 20 loads per acre was spread on in the fall of 1905 and ploughed under together with the crop of grass in the spring of 1906. Early in June, just before planting, this was worked into a good condition of tilth, when a complete fertilizer at the rate of 300 lbs. per acre was sown broadcast and harrowed in.

The corn was planted June 8 by hand machine. When the plants were about 6 inches high they were thinned out, leaving them from 4 to 6 inches apart where in rows and from 3 to 6 plants per hill, where in hills. The land was gone over with a very light harrow before the plants came up and four times with the cultivator during the next four weeks. From the first this crop made satisfactory growth. The following yields were obtained:—

Corn—Test of Varieties.

Number.	Name of Variety.	Height.	Leafiness.	When Tasselled.	In Silk.	Condition when cut.	Weight per Acre grown in rows.		Weight per Acre grown in hills.	
		Inches.					Tons.	Lbs.	Tons.	Lbs.
1	Early Mastodon	106	Medium	Aug. 29	Sept. 7	Watery	25	600	19	1,380
2	Thoroughbred White Flint	94	"	" 27	" 15	"	25	160	17	1,750
3	Angel of Midnight	86	Leafy	" 15	Aug. 27	Soft glazed	24	1,500	16	1,550
4	Eureka	108	Fair	Sept. 5	......	"	23	1,850	18	850
5	Early Leaming	96	"	Aug. 27	Sept. 7	Watery	22	550	17	100
6	Evergreen Sugar	96	"	" 27	" 20	"	22	330	19	500
7	Compton's Early	86	Leafy	" 15	Aug. 27	Soft glazed	21	900	17	100
8	Champion White Pearl	90	Fair	" 29	Sept. 15	Watery	21	20	18	300
9	North Dakota White	84	Leafy	" 17	" 1	Soft glazed	20	1,800	20	1,470
10	Giant Prolific Ensilage	100	"	" 30	" 20	Watery	20	1,800	15	1,350
11	Selected Leaming	100	Medium	" 27	" 5	"	20	1,250	19	170
12	Cloud's Early Yellow	108	"	Sept. 5	......	Silking	20	920	20	150
13	Longfellow	87	"	Aug. 15	Aug. 27	Soft glazed	19	1,600	18	1,950
14	Red Cob Ensilage	104	Fair	" 31	Sept. 15	Watery	19	1,270	12	750
15	Early Butler	94	"	" 29	" 10	"	19	170	17	1,200
16	Superior Fodder	96	"	Sept. 5	......	......	18	1,950	18	1,400
17	Early Longfellow	80	Leafy	Aug. 15	Aug. 29	Soft glazed	18	1,950	17	650
18	White Cap Yellow Dent	96	Fair	" 22	Sept. 5	Watery	18	1,400	15	580
19	Mammoth Cuban	96	"	" 29	" 8	"	18	850	13	950
20	Pride of the North	104	"	Sept. 5	......	......	17	1,700	14	1,150
21	Salzer's All Gold	96	Leafy	Aug. 31	Sept. 15	Watery	17	650	13	1,500
22	Wood's Northern Dent	90	"	" 29	" 15	"	16	450	18	1,400
23	King Philip	80	"	" 20	" 1	Soft glazed	15	1,900	16	1,330

FIELD CROP OF INDIAN CORN.

Three acres of Indian corn were grown in four plots, two plots of one acre each and two plots of one-half acre each. The land was a clay loam, the previous crop being clover hay. The land was manured in the fall and early winter at the rate of 20 tons per acre, and ploughed under early in June along with the growth of grass. The ground was well worked up with the spade and smoothing harrows. The varieties known as Longfellow and Angel of Midnight were used for these plots—one acre of each and one-half acre of each.

The acre plot of Longfellow had manure only, the half acre plot had 300 lbs. per acre of commercial fertilizer added. The acre plot of Angel of Midnight had manure only, the half acre had 300 lbs. per acre of bone meal added. The corn was sown in rows 35 inches apart with the drill seeder on June 8. The land was gone over once with a light smoothing-harrow before the corn came up and cultivated with the one-horse cultivator four times during the summer. The crop made very satisfactory growth. The following table shows the results:—

FIELD CROP OF CORN.

Name of Variety, How Fertilized, Size of Plot.		Yield per Acre.	
		Tons.	Lbs.
Longfellow (Cut Oct. 6 to 8).			
½ acre—Manure, 20 loads; fertilizer, 300 lbs. per acre		16	1,100
1 " " only		15	1,500
Cost of commercial fertilizer, 300 lbs. at $30 per ton	$ 4 50		
Value of gain in crop over manure only 1 ton, 400 lbs. per acre at $2 per ton.	2 40		
Loss per acre	$ 2 10		
Angel of Midnight (Cut Oct. 4 and 5).			
½ acre—Manure, 20 loads; fertilizer, bone meal, 300 lbs. per acre		15	1,050
1 " " only		15	500
Cost of commercial fertilizer, 300 lbs. at $30 per ton	$ 4 50		
Value of gain in crop over manure only, 550 lbs. per acre at $2 per ton	0 55		
Loss per acre	$ 3 95		

EXPERIMENTS WITH TURNIPS.

Twenty varieties of turnips were sown this year on a clay loam soil that had been in clover the previous year.

The ground was ploughed early in the fall and harrowed once with the spring-tooth harrow. In the spring this was again cultivated with spade and spring-tooth harrow. Barnyard manure was then spread on with the manure spreader at the rate of 20 tons per acre, and ploughed under and again thoroughly cultivated. Complete fertilizer at the rate of 500 lbs. per acre was then sown broadcast and harrowed in with the smoothing harrow. Rows were made 24 inches apart, and the plants thinned out to one foot apart in the rows. This crop made a very satisfactory growth for a time, but continued dry weather in the latter part of the season materially reduced the prospective crop.

The yield was calculated from the weight obtained from two rows each 66 ft. long. The first plots were sown June 16, and duplicate lots sown June 30, and all pulled October 24.

TURNIPS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per acre.							
		1st Plot.				2nd Plot.			
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	New Century	30	166	1,002	40	24	1,120	818	40
2	Jumbo	30	..	1,000	..	25	880	848	.
3	Kangaroo	28	1,840	977	20	21	1,520	725	20
4	Hartley's Bronze	27	240	904	..	25	1,680	861	20
5	Imperial Swede	26	1,600	893	20	24	800	813	20
6	Hall's Westbury	26	1,440	890	40	24	..	800	..
7	Perfection Swede	26	800	880	..	23	80	768	..
8	Halewood's Bronze Top	26	320	872	..	21	880	714	40
9	Drummond Purple Top	26	160	869	20	21	1,140	717	20
10	Sutton's Champion	25	400	840	..	23	400	773	20
11	Magnum Bonum	24	1,600	826	40	16	1,600	560	..
12	Mammoth Clyde	24	1,280	821	20	25	720	845	20
13	Good Luck	23	1,680	794	40	21	1,360	722	40
14	Elephant's Master	23	1,040	784	..	22	1,760	762	40
15	Empire Swede	23	560	776	..	22	800	746	40
16	Selected Purple Top	22	1,600	760	..	18	1,760	629	20
17	Carter's Elephant	22	..	733	20	22	1,160	752	..
18	Skirvings	21	1,200	720	..	21	720	712	..
19	Bangholm Selected	21	400	706	40	17	560	576	.
20	East Lothian	20	1,920	698	40	19	1,360	656	..

FIELD CROPS OF TURNIPS.

Four acres of turnips were sown in four lots of one acre each. The land was a clay loam in a fair state of fertility, the previous crop having been clover hay. The sod was ploughed in the fall and harrowed with the spring-tooth harrow and worked up in the spring with the spade and smoothing harrows. Manure at the rate of 20 tons per acre was spread on and ploughed under.

Three of the four acres were divided into three parts. To one-third of two of those acres was added complete fertilizer (Bowker's Square brand) at the rate of 500 lbs. per acre, to another third complete fertilizer (Bowker's Square brand) at the rate of 250 lbs. per acre was added, the remaining third of each had manure only. To one-third of the third acre Basic slag at the rate of 1,000 lbs. per acre was added, to another third basic slag at the rate of 500 lbs. per acre was added, the remaining third had manure only. The fourth acre had barnyard manure only.

The fertilizer was put on top of rows and drilled in, the rows were run 24 inches apart and the seed sown on June 16, 21 and 28. The crop was harvested November 14, 15 and 17.

The following are the yields obtained:—

FIELD CROPS OF TURNIPS.

Name of Variety, How Fertilized, Size of Plot.		Yield per Acre.		Yield per Acre.	
		Tons.	Lbs.	Bush.	Lbs.
Kangaroo (Pulled October 26).					
1/8 acre—manure and fertilizer, 500 lbs. per acre		29	1,996	999	56
1/8 " " 250 "		28	1,264	954	24
1/8 " only		27	1,156	919	16
Cost per acre of 500 lbs. fertilizer at $30 per ton	$7 50				
Value per acre of gain in crop over manure only, 80 bush. 40 lbs. at 6 cts	4 84				
Loss per acre	$2 66				
Cost per acre of 250 lbs. fertilizer at $30	3 75				
Value per acre of gain in crop over manure only, 35 bush. 8 lbs. at 6 cts	2 11				
Loss per acre	$1 64				
Hartley's Bronze Top (Pulled November 14).					
1/8 acre—manure and fertilizer, 500 lbs per acre		29	1,028	983	48
1/8 " " 250 "		29	148	969	8
1/8 " only		28	900	948	20
Cost per acre of 500 lbs. fertilizer at $30	$7 50				
Value per acre of gain in crop over manure only, 35 bush. 26 lbs at 6 cts	2 13				
Loss per acre	$5 37				
Cost per acre of 250 lbs. fertilizer at $30	$3 75				
Value per acre of gain in crop over manure only, 20 bush. 46 lbs. at 6 cts	1 25				
Loss per acre	2 50				
Rennie's Purple Top (Sown June 21, pulled November 15.)					
1/8 acre—manure and Basic slag, 1,000 lbs. per acre		29	524	975	24
1/8 " " " 500 "		28	796	946	36
1/8 " only		27	60	901	..
Cost per acre of 1,000 lbs. Basic slag at $20	$10 00				
" " gain in crop over manure only, 74 bush. 24 lbs. cts	4 46				
Loss per acre	$5 54				
Cost per acre of 500 lbs. Basic slag at $20	5 00				
" " gain in crop over manure only, 28 bush. 48 lbs. at 6 cts	1 73				
Loss per acre	$3 27				
Mixed Kangaroo, Hartley's Bronze and Rennie's Purple Top. (Sown June 28, pulled November 17).					
1 acre—manure only		25	160	876	..

EXPERIMENTS WITH MANGELS.

Sixteen varieties of mangels were sown in uniform test plots. The land was a clay loam, the previous crop being clover hay. It was ploughed early last fall and a light crop of aftermath turned under, and cultivated in the spring. Barnyard manure at the rate of 20 tons per acre was spread on with the manure spreader and ploughed under and cultivated again. Complete fertilizer at the rate of 500 lbs. per acre was then sown broadcast and harrowed in with the smoothing harrow. The rows were made 24 inches apart, raked down and sown with the Planet Jr. hand seed drill in bunches 12 inches apart in the rows and from 4 to 8 seeds in each bunch. When about 3 to 4 inches high they were thinned out, leaving one plant in each spot. Two sowings were made of each variety, the first on June 14 and the second on June 28. This crop made very unsatisfactory growth, evidently owing to the lateness of the sowing and the extreme drought in the latter part of the season. The mangels were all pulled October 17. The yield was calculated in each case from the weight of roots gathered from two rows, each 66 feet long. The following are the results obtained:—

MANGELS.—TEST OF MANGELS.

Number.	Name of Variety.	Yield per acre.							
		1st plot.				2nd plot.			
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Yellow Intermediate	19	940	649	0	19	1,930	665	30
2	Half Long Sugar White	19	280	638	0	15	1,020	517	..
3	Selected Yellow Globe	18	960	616	0	17	815	580	45
4	Mammoth Long Red	18	465	607	45	17	650	577	30
5	Mammoth Yellow Intermediate	17	1,145	585	45	15	295	504	45
6	Prize Winner Yellow Globe	16	1,990	566	30	16	670	544	30
7	Prize Mammoth Long Red	16	1,495	558	15	15	360	506	..
8	Lion Yellow Intermediate	16	670	544	30	13	1,720	462	..
9	Leviathan Long Red	15	855	514	15	14	1,865	497	45
10	Triumph Yellow Globe	14	1,700	495	0	12	905	415	15
11	Half Long Sugar Rosy	14	1,205	486	45	13	730	445	30
12	Selected Mammoth Long Red	13	1,720	462	0	13	1,225	453	45
13	Gate Post	13	1,555	459	15	14	1,865	497	45
14	Giant Yellow Globe	13	730	445	30	14	1,040	484	..
15	Giant Sugar	13	565	442	45	13	235	437	15
16	Giant Yellow Intermediate	13	235	437	15	13	400	440	..

FIELD CROP OF MANGELS.

Three varieties of mangels were grown, Yellow Globe, Yellow Intermediate and Mammoth Long Red in three plots of $\frac{3}{20}$ acre each. The land was a clay loam in a good state of fertility, the previous crop having been clover hay. The sod was ploughed in the early fall and worked up with the spade harrow. In the spring it was again well worked up and barnyard manure at the rate of 20 tons to the acre was spread on with the manure spreader, ploughed under and well worked up. To one-third of each plot was added complete fertilizer (Bowker's Square brand) at the rate of 500 lbs. per acre; to another third at the rate of 250 lbs. per acre, and one-third left with manure alone.

The mangels were sown in drills 24 inches apart. They were sown June 16 and harvested Octover 20 to 24. The following are the yields obtained:—

FIELD CROP OF MANGELS.

Name of Variety, how Fertilized, Size of Plot.		Yield per Acre.		Yield per Acre.	
		Tons.	Lbs.	Bush.	Lbs.
Yellow Globe—(Pulled October 20).					
$\frac{1}{20}$ acre—manure and fertilizer, 500 lbs. per acre		24	1,100	818	20
$\frac{1}{20}$ " " " 250 "		24	200	803	20
$\frac{1}{20}$ " " only		22	1,100	751	40
Cost per acre of 500 lbs. fertilizer at $30 per ton	$7 50				
Value per acre in gain of crop over manure only, 66 bush. 40 lbs. at 6 cts	4 00				
Loss per acre	$3 50				
Cost per acre of 250 lbs. fertilizer at $30 per ton	$3 75				
Value per acre in gain of crop over manure only, 51 bush. 10 lbs. at 6 cts	3 10				
Gain per acre	$0 65				
Yellow Intermediate—(Pulled October 22).					
$\frac{1}{20}$ acre—manure and fertilizer, 500 lbs. per acre		22	500	741	40
$\frac{1}{20}$ " " " 250 "		20	1,400	690	..
$\frac{1}{20}$ " " only		20	1,500	691	40
Cost per acre of 500 lbs. fertilizer at $30 per ton	$7 50				
Value per acre of gain in crop over manure only, 50 bush. at 6 cts	3 00				
Loss per acre	$4 50				
Cost per acre of 250 lbs. fertilizer at $30 per ton	$3 75				
Value per acre of loss in crop over manure only, 1 bush. 40 lbs. at 6 cts	0 10				
Loss per acre	$3 65				
Mammoth Long Red—(Pulled October 22).					
$\frac{1}{20}$ acre—manure and fertilizer, 500 lbs. per acre		22	1,500	758	20
$\frac{1}{20}$ " " " 250 "		20	1,700	695	..
$\frac{1}{20}$ " " only		19	1,000	650	..
Cost per acre of 500 lbs. fertilizer at $30 per ton	$7 50				
Value per acre of gain in crop over manure only, 108 bush. 20 lbs. at 6 cts	6 50				
Loss per acre	$1 00				
Cost per acre of 250 lbs. fertilizer at $30 per ton	$3 75				
Value per acre of gain in crop over manure only, 45 bush. at 6 cts	2 70				
Loss per acre	$1 05				

EXPERIMENTS WITH CARROTS.

Ten varieties were sown in uniform test plots. Two sowings were made of each sort, the first on June 14, and the second on June 28, in rows 24 inches apart, and thinned to about 3 inches apart in the rows. The ground was similar to that used for the mangel plots and received the same treatment. The crop was pulled October 20, and the yield calculated from the weight of roots taken from two rows each 66 feet long. The following table gives the yield per acre obtained:—

CARROTS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per acre.							
		1st Plot.				2nd Plot.			
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	New White Intermediate	15	1,515	525	15	11	935	352	15
2	White Belgian	13	70	434	30	9	1,800	330	..
3	Ontario Champion	12	420	407	..	8	995	283	15
4	Half Long Chantenay	10	995	349	15	9	975	316	15
5	Long Yellow Stump-rooted	10	625	343	45	10	130	335	30
6	Giant White Vosges	10	460	341	..	8	5	266	45
7	Carter's Orange Giant	10	130	335	30	8	1,325	288	45
8	Early Gem	9	1,305	321	45	11	1,430	390	30
9	Improved Short White	9	150	302	30	7	850	247	30
10	Mammoth White Intermediate	8	665	277	45	8	1,490	291	30

EXPERIMENTS WITH SUGAR BEETS.

Eight varieties of sugar beets were sown. The land was similar to that on which the mangels were sown and received the same treatment. Two sowings were made of each sort, the first on June 14 and the second on June 28. The seed was sown in rows 24 inches apart, in bunches 12 inches apart in the rows. When the plants were about 3 to 4 inches high, the bunches were thinned out to one plant in each place. The whole crop was harvested on October 20 and the yield calculated from the weight obtained from two rows, each 66 feet long. The following are the results:—

SUGAR BEETS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per acre.							
		1st Plot.				2nd Plot.			
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Danish Improved	13	1,225	453	45	12	90	401	30
2	Improved Imperial	12	1,410	423	30	10	130	335	30
3	Danish Red Top	11	1,430	390	30	11	1,100	385	..
4	French Very Rich	11	605	376	45	8	1,325	288	45
5	Royal Giant	10	295	338	15	12	55	400	55
6	Red Top Sugar	9	975	316	15	10	1,450	357	30
7	Vilmorin's Improved	8	1,490	291	30	7	25	233	45
8	Wanzleben	8	830	280	30	9	810	313	30

EXPERIMENTS WITH POTATOES.

Thirty-two varieties were included in this test. The land on which the potatoes were grown was a clay loam which was in clover hay the previous year. The ground was manured early in the fall with stable manure at the rate of 20 one-horse cart-loads per acre, and ploughed under. In the spring this was well worked up with the spade and spring-tooth harrows, ploughed and again worked up. Rows were run 30 inches apart and about 4 inches deep and potato fertilizer at the rate of 400 lbs. per acre scattered along the rows before planting. The sets were dropped one foot apart in the rows and covered with the drill plough. The tubers were cut so as to have from 2 to 3 eyes in each set. The drills were harrowed down once before the plants were above the ground, and again drilled up in a few days and the soil kept loose with the cultivator until the vines were quite large. The plots were sprayed with Bordeaux mixture and Paris green three times, July 18, August 1 and August 22.

There was no blight and no rot, but a little scab, not quite as much as the previous year. The potatoes were planted June 13 and dug October 12. The yield per acre has been calculated from two rows each 66 feet long and 30 inches wide.

POTATOES—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per acre. Total.		Market-able.		Unmarket-able.		Form and Colour.
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
1	Vermont Gold Coin	503	48	420	12	83	36	Oval, white.
2	Sabean's Elephant	426	48	332	12	94	36	Long, "
3	State of Maine	422	24	356	24	66	..	Round, "
4	Dooley	420	72	363	..	57	12	Flat, round, white.
5	Carman No. 3	418	..	358	36	59	24	" "
6	Carman No. 1	396	..	345	24	50	36	" "
7	Ashleaf Kidney	387	12	321	12	66	..	
8	Vick's Extra Early	385	..	319	..	66	..	Long, white.
9	Early Envoy	380	36	286	..	94	36	Oblong, pink.
10	Uncle Sam	369	36	303	36	66	..	" white.
11	Irish Cobler	367	24	279	24	88	..	Round, "
12	Rochester Rose	358	36	235	24	123	12	Oblong, dark pink.
13	Pearce	356	24	275	..	81	24	" white.
14	Money Maker	356	24	259	36	96	48	Long, "
15	Empire State	343	12	257	24	85	48	" "
16	Late Puritan	341	..	231	..	110	..	" "
17	Early Rose	336	36	255	12	81	24	" pink.
18	Canadian Beauty	336	36	242	..	94	36	" "
19	Burnaby Mammoth	334	24	286	..	48	24	" "
20	Country Gentleman	330	..	246	24	83	36	Oblong, pink.
21	Early White Prize	330	..	220	..	110	..	Long, white.
22	American Wonder	323	24	244	12	79	12	" "
23	I. X. L	321	12	246	24	74	48	" pink.
24	Bovee	297	..	220	..	77	..	Oblong, "
25	Morgan Seedling	297	..	198	..	99	..	" "
26	Pingree	297	..	213	24	83	36	Long, white.
27	Everett	286	..	176	..	110	..	Round, flat, white.
28	Dalmeny Beauty	281	36	191	24	90	12	" white.
29	Holborn Abundance	281	36	187	..	94	36	" "
30	Dreer's Standard	266	12	187	..	79	12	" "
31	Reeve's Rose	248	36	138	36	110	..	Dark, pink.
32	Maule's Thoroughbred	242	..	165	..	77	..	Long, pink.

EXPERIMENTS WITH BEANS.

Two varieties of beans were sown with a view to test their relative value as a fodder plant, Common Soja beans and Horse beans (Tick variety). These plots were sown June 29 and cut October 8. The following yields were obtained from plots of one-twentieth acre each.

Variety.	Yield per Acre.	
	Tons.	Lbs.
Soja Beans (green)	6	1,800
Horse Beans (green)	12	1,800

EXPERIMENTS WITH MILLET.

Five varieties of millet were grown in plots of one-fortieth acre each. The land was a heavy clay loam in a poor state of fertility, not having had any manure for some years. The ground was ploughed in the fall and well worked up in the spring and sown June 29. The crop was cut October 9. The following yield was obtained, cut green:—

Variety.	Yield per Acre.	
	Tons.	Lbs.
Algerian	6	1,600
Moha Hungarian	4	200
Italian	3	80
Pearl or Cat-tail	2	1,200
White Round French	2	1,080

CLOVER EXPERIMENTS.

Experiments were again conducted this season to determine the gain, if any, from growing clover with grain crops for the purpose of ploughing under the growth of clover made during the season for the benefit of future crops. The ground was the same land as that on which similar clover experiments were carried on last season. The soil was a clay loam in a fair state of fertility. Three kinds of grain in twelve plots of one-fortieth acre each were grown, and each of these series of plots was treated the same. Six plots were seeded down at the time the grain was sown, June 16, and six plots with grain alone without clover. These plots were sown in a similar manner last season, and those seeded to clover this year had been seeded to clover the previous season also, and those not seeded to clover this year had not been seeded to clover the previous year. No fertilizer has been used for years except the clover turned under. The two previous years had a particularly light crop each year, both seasons being unsuited to clover growing.

CLOVER EXPERIMENTS.

Number.	Name of Variety and how Seeded.	Yield per Acre.	
		Bush.	Lbs.
	Wellman's Fife Wheat—(Sown June 16. Cut Sept. 21).		
1	Without clover	25	20
2	With clover	28	40
3	Without clover	24	20
4	With clover	30	20
	Odessa Barley—(Sown June 16. Cut Sept. 5).		
1	Without clover	15	40
2	With clover	15	0
3	Without clover	16	12
4	With clover	17	24
	Pioneer Oats—(Sown June 16. Cut Sept. 18).		
1	Without clover	23	18
2	With clover	26	16
3	Without clover	26	16
4	With clover	28	8

EXPERIMENTS WITH DOG-FISH SCRAP.

This experiment was carried on with a view to gain information as to the value of Dog-fish scrap as a fertilizer. Eight plots of one-fortieth acre each were used.

The soil was a clay loam in a good state of fertility, well worked up and sown June 27. On account of the delay in getting the Dog-fish scrap, which was received June 27, it was considered best to use barley for this experiment, Common six-rowed being used.

To No. 3, 4 and 5 was added different amounts of commercial fertilizer, while No. 1, 2 and 6, no other fertilizer was used. Nos. 6 and 7 were check plots. The crop was harvested September 17. The following were the results obtained:—

EXPERIMENTS WITH DOG-FISH SCRAP.

Number.	Fertilizer.	Amount per Acre.	Yield per acre.		
			Straw.	Grain.	
		Lbs.	Lbs.	Bush.	Lbs.
1	Dog-fish scrap	200	3,600	45	45
2	Dog-fish scrap	400	4,600	58	16
3	Dog-fish scrap Superphosphate Muriate of potash	400 200 100	4,120	49	08
4	Dog-fish scrap Superphosphate	400 200	4,280	55	40
5	Dog-fish scrap Muriate of potash	400 100	4,080	51	32
6	Dog-fish scrap	800	4,040	56	12
7	Check		4,860	60	00
8	Check		4,400	56	32

EXPERIMENTS WITH LIME AND COMMERCIAL FERTILIZERS ON MARSH AND DYKE LANDS.

The soil on which this experiment was carried on was what is considered sandy marsh, ploughed the previous fall and well worked up at seeding time with the spade, spring-tooth and smoothing harrows. This was sown broadcast, and seeded with clover and timothy. The fertilizer was harrowed in. The lime was air-slaked and sown on the surface.

The clover take was good, particularly on the plots on which lime was sown. The following table shows the fertilizers used and the yields obtained. The plots were $\frac{1}{10}$ acre each and the grain used was Waverley oats.

EXPERIMENTS with Fertilizers on Marsh Land.

Size of Plots, $\frac{1}{10}$ Acre each.	Fertilizers per acre.	Yield per Acre.	
No.		Bush.	lbs.
1	3 casks lime and 800 lbs. Basic Slag	39	06
2	3 " " 400 " Bone meal	37	26
3	3 " only	28	02
4	3 " and 400 lbs. Bowker fertilizer (Square Brand)	30	02
5	No lime, 800 lbs. Basic Slag	31	14
6	" 400 " Bone meal	30	30
7	Check. No fertilizer used	26	28
8	No lime, 400 lbs. Bowker fertilizer (Square Brand)	23	32
9	6 casks lime and 800 lbs. Basic Slag	34	24
10	6 " " 400 " Bone meal	37	14
11	6 " only	33	18
12	6 " and 400 lbs. Bowker fertilizer (Square Brand)	38	28

SPECIAL EXPERIMENTS WITH FERTILIZERS.

Experiments having been carried on for 5 years previous to 1904, without any change of fertilizer per plot for the entire period, it was decided to discontinue the use of fertilizer with a view to determine to what extent the fertilizers already applied would continue to supply plant food for the crop. The field was seeded to grain two series of plots each, oats, barley, wheat, pease, and mixed grain. Each series running across the various plots where different fertilizers had been used. With each kind of grain was sown Mammoth Red clover at the rate of 10 lbs. per acre, on the other series of plots the grains were sown alone without clover. This was the third crop since receiving any fertilizer. The ground was ploughed in the spring and cultivated thoroughly. The plots were one-eighth of an acre each. The following yields were obtained from these plots.

SPECIAL EXPERIMENTS WITH FERTILIZERS.

Number.	Fertilizers used each Year per Acre, previous to 1904.	Waverley Oats with Clover.		Waverley Oats without Clover.		Colorado Wheat with Clover.		Colorado Wheat without Clover.		Newton Barley with Clover.		Newton Barley without Clover		Mixed Grain with Clover.		Mixed Grain without Clover.		Golden Vine Pease with Clover.		Golden Vine Pease without Clover.	
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
1	Manure, 30 tons	35	10	38	8	13	20	16	40	10	20	10	20	22	20	30	0	11	40	13	20
2	Manure, 15 tons, fertilizer 250 lbs.	38	8	44	4	15	0	17	20	12	24	12	24	25	0	31	10	16	40	18	20
3	Complete fertilizer, 1,000 lbs.	21	20	27	32	8	20	11	40	11	22	10	20	20	0	28	30	15	0	13	20
4	" " 500 lbs.	22	2	23	8	9	10	8	20	9	18	14	28	27	20	33	30	12	30	10	50
5	Check, no fertilizer used	29	14	25	0	10	0	10	0	8	41	10	20	25	0	28	30	9	10	6	40
6	Bone meal, 1,000 lbs.	27	32	26	16	8	20	10	50	9	18	9	18	28	30	23	30	9	10	8	20
7	" " 500 lbs.	20	20	29	14	10	50	10	0	7	14	9	18	18	30	18	30	10	0	9	35
8	Ashes, 2,500 lbs.	22	2	23	8	8	45	10	25	14	28	13	26	17	20	20	0	10	0	10	0
9	Manure, rotted, 20 tons	35	10	32	12	12	30	11	40	22	14	14	28	31	10	32	20	11	40	10	25
10	Check, no fertilizer used	14	24	20	20	7	55	6	40	8	16	10	20	15	0	17	20	3	45	3	20
11	Land plaster, 500 lbs.	17	22	23	8	10	0	10	50	8	16	10	20	20	0	20	0	6	40	4	10
12	Salt, 500 lbs.	22	2	26	16	11	15	11	40	9	18	11	22	27	10	30	0	8	20	5	0
13	Marsh mud, 100 tons.	32	12	30	30	16	40	14	10	16	32	12	24	32	20	33	30	10	25	7	30
14	Manure, green, 20 tons	44	4	38	8	18	20	16	50	19	13	16	32	42	20	41	10	13	20	12	5

HAY CROP.

The crop of clover and timothy hay on the upland was fairly good this season. Forty-three acres yielded 70 tons 1,265 lbs.

The hay on the marsh was only a fair crop. Forty-two acres yielded 62 tons 480 lbs.

The total hay crop was 132 tons 1,745 lbs.

SUMMARY OF CROPS GROWN EXCLUSIVE OF UNIFORM TEST PLOTS OF GRAIN AND POTATOES.

Grain.

	Total Yield. Bush.	Lbs.	Total Yield. Lbs.
Mixed grain	559	20	22,380
Oats	370	18	12,598
Barley	106	18	5,106
Buckwheat	30	0	1,440
Wheat	16	56	1,016
			42,540

Turnips.

	Bush.	Lbs.	Tons.	Lbs.
Turnips (field crop)	3,741	56	112	516
Turnips (test plots)	194	..	5	1,640
	3,935	56	118	156

Corn.

	Tons.	Lbs.
Corn (field crop)	47	75
Corn (test plots)	7	897
	54	972

Mangels.

	Bush.	Lbs.	Tons.	Lbs.
Mangels (field crops)	328	20	9	1,700
Mangels (test plots)	100	48	3	48
	429	8	12	1,748

GRAIN AND POTATO DISTRIBUTION.

Some of the most promising varieties of grain and potatoes were again distributed this year, free to farmers who made application. The following number of packages of 3 lbs. each were sent out:—

Oats	212
Barley	43
Wheat	100
Pease	40
Buckwheat	17
Potatoes	263
Total	675

HORSES.

No change in the horses has been made in the past year. The present number being eight, consisting of six heavy team horses, one express horse and one driver. One of the older horses has this winter become lame and should be disposed of and replaced by another.

CATTLE.

It will be remembered that when making my last report, November 30, 1905, all of the cattle then on hand had been recently tested with tuberculin, with the result that quite a large percentage had reacted, or were suspicious, and were then under the care of the Veterinary Department. Forty animals including cows, heifers and steers were kept in a building open on the south and east sides and fed outside until May 25, 1906, when by instruction they were shipped to Ottawa to the Veterinary Director General, Dr. J. G. Rutherford. All came through the winter in good condition and no signs of any development of disease were found.

The buildings were then disinfected by being first cleaned thoroughly by sweeping and brushing, so as to dislodge bacteria, and the sweepings taken into the yard and burned. After this cleaning the interior was gone over with water used in a boiling condition, freely with a broom, to each five gallons of which was added one quart of crude carbolic acid. After this had dried the surface of the woodwork was thoroughly sprayed, and particular attention paid to the crevices, with the following solution:—four ounces of corrosive sublimate, and two ounces of chloride of ammonium, pounded finely and mixed together and dissolved in ten gallons of water, the material being entirely dissolved before using. This spraying was reported after a few days and then when dry the whole of the woodwork, walls and ceilings was whitewashed with lime to every five gallons of which had been added one quart of crude carbolic acid. After treatment the buildings were exposed to the air and sunlight for the balance of the summer, the doors and windows having all been removed for that purpose.

Late in November, 1906, fifty grade Shorthorn 2½ and 3½ year old steers were purchased and put in to feed. Up to December 15 no meal was fed. From this date, commencing with 2 lbs. per day per steer for the first two weeks, and increasing from time to time, the average daily meal ration fed per steer has been 3·80.

The total live weight of fifty steers on December 15 being.	48,715 lbs.
Present live weight on March 15..	57,285 "
Increase..	8,570 "
Average daily gain per steer..	1·71 lbs.

Those steers are expected to be ready for sale about May 15.

From the cows that had not reacted at either of the tests made, two pure-bred Holstein cows were selected and removed from any contact with or proximity to any of the other cattle or buildings in which they had been kept. These two cows are now on hand. Total, 52 head.

SWINE.

The herd at present on the farm consists of:—
One pure bred Yorkshire boar.
Four pure bred Yorkshire sows.

SHEEP.

The flock of sheep at present consists of 25 head as follows:—
1 pure bred Leicester ram.
1 pure bred Leicester ram lamb.
5 pure bred Leicester ewes.
3 pure bred Leicester ewe lambs.
10 pure bred Shropshire ewes.
1 pure bred Shropshire ewe lamb.
3 grade ewes.
1 grade ewe lamb.

POULTRY.

During the year five breeds of poultry were kept: B. P. Rocks, W. Leghorns, W. Wyandottes, Blk. Minorcas and Buff Orpingtons. One hundred and thirty chickens were raised during the year.

A number of young cockerels and pullets have been sold to farmers for breeding purposes and some cockerels fattened and sold. The stock on hand is as follows:—

Breed.	Hens.	Cocks.	Pullets.	Cockerels.
B. P. Rocks..	..	..	16	5
W. Wyandottes..	2	1	7	..
W. Leghorns..	3	2	10	1
Blk. Minorcas..	..	..	5	2
Buff Orpingtons..	..	3	2	1

The number of eggs laid by the different breeds during the year is as follows:—

	Eggs.	Average.
12 B. P. Rocks..	980	81⅔
5 W. Wyandottes..	320	64
5 W. Leghorns..	370	74
4 Blk. Minorcas..	190	47½
4 Buff Orpingtons..	251	62¾
	2,111	

BEES.

April 17. The bees were all taken out of winter quarters and placed on their summer stands at 12 o'clock, noon. The day was bright and sunny with a light north wind blowing. The hives were full of bees and they had a good fly until 5 p.m. The hives were covered with empty bags at night for a while as the temperature of the night was similar to the temperature of their winter quarters. The weights of the different colonies were as follows:—

	Nov. 18, 1905.	April 17, 1906.	Loss.
No. 1	55 lbs.	43½ lbs.	11½ lbs.
No. 2	53 "	40½ "	12½ "
No. 3	54 "	42 "	12 "
No. 4	59 "	46 "	13 "
No. 5	40 "	30 "	10 "
	261 "	202 "	59 "

Average loss per hive, 11⅘ lbs.

April 29. First pollen gathered from willows .

May 5. Bees working well. Dandelions coming in bloom.

May 17. Examined all hives and found from 4 to 5 frames of brood in each hive except No. 5, which had only 3 frames of brood, some dandelion honey stored, and young bees hatched.

June 6. No. 1 and 2 each threw off a swarm.

June 22. No. 4 threw off a swarm.

June 29. No. 5 threw off a swarm.

August 6. No. 6, prime from No. 1, threw off a swarm, seven weeks from time of hiving, making 5 swarms safely hived during the summer.

July 2. Bees began storing honey.

Following are a few of the best days gatherings for single hive.

No. 1 hive gathered July 2, 7 lbs.; July 6, 5½ lbs.; July 7, 4 lbs.

No. 2 hive, gathered July 9, 4 lbs.; July 14, 3 lbs.; July 15, 4 lbs.; July 28, 3 lbs.

No. 4 hive, gathered July 14, 3 lbs.; July 15, 4 lbs.; July 16, 4 lbs.

No. 5 hive, gathered July 18, 5 lbs.; July 19, 3 lbs.; July 21, 3 lbs.

No. 6 hive, gathered July 14, 3 lbs.; July 15, 3 lbs.; July 18, 3 lbs.; July 19, 4 lbs.; July 20, 3 lbs.; July 21, 3 lbs.; July 23, 4 lbs.; July 28, 4 lbs.

No. 7 hive, gathered July 18, 3 lbs.

No. 8 hive, gathered July 3, 3 lbs.; July 20, 3 lbs.; July 23, 3 lbs.; July 26, 4 lbs.

No. 10 hive, gathered July 3, 3 lbs.; July 18, 3 lbs.

July 10. Nos. 1, 2 and 4 colonies being full of bees, fairly well filled with brood and having top of all combs filled with honey capped, and weighing at this date 81, 52 and 49 lbs., had supers put on them. Nos. 5 and 10 had supers put on them also. The early swarms of June 22 and 26 had supers put on them on June 27. Tiering up was done on the last three mentioned colonies and also on No. 1, those colonies having at once started above, the honey coming in at a good rate.

August 11 to September 8. Very little honey was gathered between these dates. Some frames were taken out for extracting and all supers taken off. After September 8, some buckwheat and aster honey was gathered.

November 17, being a clear warm day the bees had a good fly.

November 18. The temperature on this date fell to 38° and the bees were carried into their winter quarters in the cellar of the superintendent's house, the temperature of which was 44°, the variation being from 38° to 44° during the winter. The weights of the various hives were as follows: 53, 63, 59, 50, 57, 58, 66, 50 and 64 lbs.

December 3. The wooden covers and propolis quilts were removed from each hive and the hives covered with empty bags (three bags to each hive) and a three inch block placed in front between the bottom board and the brood chamber, making the full entrance three inches high across the full front.

At the close of the season 120 lbs. of honey were sold, being an average of 24 lbs. per colony. A number of partly filled sections were kept for spring feeding, probably about 25 lbs. At present date, March 15, all are in good condition with very few dead bees.

APPLES.

The winter of 1906 was particularly severe and fruit and ornamental trees suffered considerably from winter-killing. The season was a poor one for fruit throughout this country. Although the apple crop at Nappan was not heavy it was nearer a maximum crop than the average. The apple trees have made good growth.

The new orchard in the shelter enclosure has done remarkably well. Quite a number of young trees have fruited for the first time this season.

PLUMS.

Although the plum crop was not large it was better than usual. Some of the plum trees are in an unhealthy condition, part of this may be due to unsuitable soil. Moore's Arctic, Shipper's Pride, Pond's Seedling, Gueii, Quackenboss, Reine Claude, Italian Prune, Prince's Yellow Gage, Improved Lombard, Imperial Gage and Damson, all bore fruit.

PEARS.

Twenty-nine varieties are now growing in the orchard. Most of these are making very indifferent growth and but few have borne fruit. Clapp's Favourite is the only variety which has fruited well this season.

STRAWBERRIES.

Fourteen varieties of strawberries were grown in plots 16½ x 5. These plots were planted in the spring of 1906, in 2 rows 3 feet apart and one foot apart in the rows, the runners being cut off 1 foot from the outside of every second row and then allowed to fill up the space between, making a matted row 5 feet wide. One foot of space was left between every two rows. These had been covered well with about 2 inches of clean straw in November, after the ground was nicely frozen. In the spring this straw was removed and with the exception of a part of this field where the soil was particularly poor and deficient in humus, there were very few plants killed. The following is a list of some of the best yielding varieties.

STRAWBERRIES.

Variety.	Dates when picked and Yield.			Yield per Plot.	Yield per Acre.
	July 7.	July 9.	July 16.		
	Qts.	Qts.	Qts.	Qts.	Qts.
Clyde	10	11	8	29	15,312
Lovett	8	6	4	18	9,504
Warfield	4	6	4	14	7,392
Ida	6	6	2	14	7,392
Grenville	6	5	3	14	7,392
Excelsior	4	6	3½	13½	7,128
Jessie	5	6	2	13	6,864
Senator Dunlap	3	5	4	12	6,336
Beder Wood	3	5	4	12	6,336
Glen Mary	4	6	2	12	6,336
Brandywine	3	5	2	10	5,280
Williams	3	5	2	10	5,280

GARDEN PEASE.

Eight varieties of garden pease were sown in plots each 33 feet long by 2½ feet wide. The soil was clay loam of a uniform character in a fair state of fertility. The seed was sown in rows 2½ feet apart and the pease were planted 2 inches deep and 2 inches apart in the rows. The pease were picked when fit for market and the quantity of green pease in pod recorded. The yields were as follows:—

GARDEN PEASE.

Variety.	Dates of Picking and Yields.				Total Yield from Plot.	
	July 30.		Aug. 7.			
	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.
American Wonder	7	0	9	8	16	8
Prosperity	16	0	1	8	17	8
Thomas Laxton	11	0	..	..	11	0
Nott's Excelsior	7	0	3	12	10	12
Claudit	..	..	9	0	9	0
Prince Edward	4	0	3	8	7	8
Electric Light	8	8	1	0	9	8
New Surprise	6	8	..	..	3	8

GARDEN BEANS.

Seven varieties of beans were planted on June 8 in rows 36 feet long. The seed was dropped 2 inches apart in the rows. A duplicate plot of each variety was planted and allowed to ripen.

These beans made fair growth and no rust was noticed. The following are the yields from the different plots:—

Variety.	Dates of Picking and Yields.						Total Yield from Plot.	
	August 8.		August 15.		August 22.			
	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.
Dwarf Black Speckled................	8	4	3	0	2	8	13	12
Matchless..........................	8	0	2	8	2	8	13	0
Dwarf Extra Early..................	10	0	4	0	3	8	17	8
Fame of Vitry......................	3	0	7	8	3	0	13	8
Golden Skinless....................	13	0	4	0	1	0	18	0
Emperor of Russia..................	10	8	5	0	0	8	16	0
Dwarf Wax Every Day	7	0	4	8	1	0	12	8

TOMATOES.

Twenty-four varieties of tomatoes were grown last season. The seed of the tomatoes grown this year was sown in hot-beds on April 11. The young plants were pricked out into strawberry boxes on April 25, and planted in the open ground on June 3. They were placed 4 feet apart each way and 10 plants of each variety were used. Following are the yields obtained:—

Tomatoes.

Number.	Variety.	Ripe Fruit.	Green Fruit.	Yield per Plot.
		Lbs.	Lbs.	Lbs.
1	Earliest of All..........................	54	21	75
2	Early Ruby...............................	52	24½	76½
3	Nott's...................................	46½	19	65½
4	Maule's New Imperial	45	48	93
5	Rockford.................................	42½	26	68½
6	Matchless................................	42½	42	84½
7	Early Minnesota	38	41	79
8	Early Hustler............................	37½	25	62½
9	Extra Early Atlantic Prize...............	36½	20	56½
10	Landreth's Earliest.....................	35½	26	61½
11	Fordhook's First	34	39	73
12	First of All............................	33½	21	54½
13	Bright and Early........................	32	34	66
14	May's Favorite..........................	30½	22	52½
15	Early Jewel.............................	29	33	62
16	Radium..................................	28½	16	44½
17	Diadem..................................	28	31	59
18	Dominion Day............................	27½	23	50½
19	Simmers' Early	26	48	74
20	Early Castle............................	25	38	63
21	Extra Early Advance.....................	21	26	47
22	Canada..................................	20½	50	70½
23	New Stone	19	26	45
24	Burpee's Combination	19	42	61

LIST OF THE BEST VEGETABLES TO GROW.

REPEATED FROM REPORT OF 1905.

From several years' experience in testing many of the different varieties of vegetables now advertised by seed merchants in Canada and the United States, the following may be recommended as equal to any of those so far tested here:—

Asparagus.—Conover's Colossal and Argenteuil.

Beans.—Green Pod. Early: Bountiful and Lightning. Late: Refugee or 1,000 to 1.—Golden Pod: Market Wax and Valentine Wax.

Beets.—Extra Early: Egyptian Turnip. Early: Eclipse.

Brussels Sprouts.—Improved Dwarf.

Cabbage.—Extra Early: Paris Market. Early: Jersey Wakefield. Medium: Early Spring and Succession. Late: Late Flat Dutch. Red: Mammoth Rock Red.

Carrots.—Chantenay.

Cauliflower.—Early Erfurt.

Celery.—Paris Golden Yellow Self-blanching, Improved White Plume and Perfection Heartswell.

Corn.—Extra Early: Extra Early Beverly. Early: Extra Early Cory and Premo. Medium: Crosby's Early.

Cucumbers.—White Spine.

Egg Plant.—New York Improved Purple.

Kale.—Dwarf Green Curled.

Lettuce.—Curled: Black Seeded Simpson. Cabbage: Improved Salamander.

Citron Melon.—Colorado Mammoth.

Water Melon.—Cole's Early.

Onions.—Prizetaker and Australian Brown.

Parsley.—Double Curled.

Parsnips.—Hollow Crown and Improved Half Long.

Pease, Tall.—Extra early: Surprise. Early: Thomas Laxton. Medium: Admiral Dewey. Late: Telephone. *Dwarf.*—Extra Early: Early Excelsior. Early: Nott's Excelsior. Medium: Rivenhall Wonder. Late: Juno.

Radishes.—French Breakfast and Icicle. Winter: Scarlet China.

Rhubarb.—Linnæus and Victoria.

Salsify.—Sandwich Island.

Spinach.—Victoria.

Squash.—Autumn: Boston Marrow and Golden Hubbard. Late: Hubbard.

Tomatoes.—Spark's Earliana.

Turnips.—Golden Ball and Selected Purple Top Swede.

CORRESPONDENCE.

During the year 2,675 letters were received at this farm and 2,715 sent out, exclusive of reports and of circulars mailed with samples of grain.

AGRICULTURAL MEETINGS.

During the year I attended and delivered addresses at the following meetings:—Winter Fair, Amherst, N.S., December 4 to 7, 1905. N. B. Farmers' and Dairymen's Associations at Fredericton, Jan. 22 to 26. Short Course Judging, Truro, N.S., February 1 to 10. Waweig, N.B., February 26 to 29. Provincial Dairy School. Sussex, N.B., March 6 to 10; March 16 to 20. Blue Mountain, Pictou county, March 28. Garden of Eden, Pictou county, March 29. Lorneville, Cumb. county, N.S., April 2. Northport, Cumb. county, April 3. Shinimicas, Cumb. county, N.S., April 4. Halifax, N.S., April 9 to 11. Winter Fair, Amherst, N.S., December 3 to 6. Short Course Judging, Truro, N.S., January 21 to 26, 1907. N. S. Farmers' and Dairymens' Association, Middleton, N.S., January 28 to 31. N. B. Farmer's and Dairymen's Association, Fredericton, N.B., February 11 to 15. Prov. Dairy School, Sussex, N.B., March 4 to 14.

EXHIBITIONS.

Together with all the Experimental Farms of the Dominion, an exhibit of the products of this farm was made at the Dominion Exhibition in Halifax, N.S., September 22 to October 5. An exhibit was also made at Charlottetown, P.E.I., October 8 to 12.

VISITORS.

About the usual numbers visited the farm the past year, mostly in small companies of from twenty to forty in a party; the largest gathering being the Maritime Board of Trade, which having met in Amherst, spent an afternoon at the Experimental Farm, a company of about one hundred.

I have the honour to be, sir,

Your obedient servant,

R. ROBERTSON,

Superintendent.

EXPERIMENTAL FARM FOR MANITOBA.

REPORT OF N. WOLVERTON, B.A., SUPERINTENDENT.

BRANDON, MAN., March 31, 1907.

To DR. WM. SAUNDERS, C.M.G.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit, herewith, the nineteenth annual report and details of the work done on the Experimental Farm at Brandon.

The spring and early summer of 1906 were very favourable for seeding and growth. Excepting on the bottom lands, the seeding was finished early and in good condition. Some of the heavy low land was too wet for early working.

There was no late spring frost to injure, and growth was very rapid. The promise of a very heavy crop was bright until the wheat was in the early milk state, when rust appeared pretty generally. Though the rust was almost wholly confined to the leaves of the grain, it certainly reduced the yield somewhat.

When the wheat was maturing we had some days of excessive heat, with dry south wind, causing the grain to ripen too rapidly. These two causes reduced the yield of all grains by several bushels per acre.

Harvest began August 15. The weather was good both for harvesting and threshing and all grains in the province were secured in excellent condition.

The average number of days maturing was less by nearly ten than usual.

The yields for the whole province fell short of the large crop of 1905 by about 15 per centum.

The first slight frost occurred on the morning of August 30, when the mercury fell to 29·3 degrees, but little damage was done. There was no frost on the uplands. The second, a killing frost, occurred September 27, when 26·5 degrees were registered.

EXPERIMENTS WITH SPRING WHEAT.

The wheat was well sown and the ground in good condition. Germination was good and even.

A peculiarity of most kinds of wheat, this year, was that from two to four of the lowest spikelets on each head were abortive.

Again the Preston wheat heads the list in yield. Its stiff straw is a decided advantage. This year the bearded wheats have all taken higher places than usual. Possibly they were able to resist the effects of the hot wind better than the bald wheats.

There was no smut excepting in the smut test plots. The seed was dipped in a formalin solution.

A number of the less promising varieties have been dropped from this test this year. Out of the thirty varieties under test during the past few years sixteen have been retained for further testing.

Each plot was one-twentieth of an acre; the seed was sown April 23 and 24, on light clay loam summer fallowed.

SPRING WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw including Head.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per measured Bushel after cleaning.	Rusted.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs.	
1	Preston	Aug. 15	113	45	Stiff	3½	Bearded	4,060	44	00	63¼	Considerably.
2	Huron	" 16	114	46	Weak	3	"	4,570	43	50	62	Slightly.
3	Pringle's Champlain	" 15	113	44	"	3¼	"	4,390	41	50	62¾	Considerably.
4	Red Fife	" 17	115	43	Medium	3½	Bald	5,300	40	00	63	"
5	White Fife	" 18	116	43	Stiff	3½	"	4,320	36	20	63	Badly.
6	Haynes' Blue Stem	" 20	118	47	Weak	4	"	4,740	36	00	61	Considerably.
7	Hungarian White	" 14	112	44	"	3¼	"	3,790	35	10	62	"
8	Stanley	" 13	111	45	Stiff	3	"	3,790	35	10	61	Badly.
9	Bishop	" 10	108	44	Medium	3½	"	4,100	35	00	63	Considerably.
10	Riga	" 9	108	43	"	3¼	"	4,610	34	50	62½	"
11	Percy	" 13	111	46	Stiff	3	"	3,910	34	50	62½	Badly.
12	Herisson Bearded	" 15	113	46	Weak	2	Bearded	3,630	34	30	63½	Considerably.
13	Colorado	" 14	112	47	"	3¼	"	6,040	34	20	63½	"
14	Red Fern	" 16	115	46	"	3½	"	4,380	32	00	63	"
15	White Russian	" 13	112	46	Medium	4	Bald	4,820	31	20	61½	Badly.
16	Laurel	" 17	116	44	Weak	3¾	"	4,460	25	40	59	"

EXPERIMENTS WITH MACARONI WHEAT.

These wheats, being weak in the straw, were badly lodged. There was no rust and the yields were larger; yet, as there is, here, no market for them they are not recommended. If grown for feed there would be serious danger of mixing the seed. A few grains of these Durum wheats will reduce the grade of Red Fife.

Each plot was one-twentieth of an acre and the seed was sown April 24 on light clay loam, summer fallowed.

DURUM WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw including Head.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per measured Bushel after cleaning.	Rusted.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs.	
1	Goose	Aug. 16	114	49	Weak	2¾	Bearded	4,120	56	20	65½	None.
2	Yellow Gharnovka	" 16	114	46	"	2½	"	4,000	55	00	65	"
3	Roumanian	" 16	114	48	"	2½	"	4,040	54	20	66½	"
4	Mahmondi	" 16	114	43	"	2¼	"	3,220	46	20	64	"

RESIDENCE OF SUPERINTENDENT, EXPERIMENTAL FARM, BRANDON, MAN.

EXPERIMENTS WITH EMMER AND SPELT.

Each plot was one-twentieth of an acre. The seed was sown April 24 on light clay loam, summer fallowed.

EMMER AND SPELT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw including Head.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Grain per Acre.	Rusted.
				In.		In.		Lbs.	Lbs.	
1	Common Emmer.....	Aug. 16	114	41	Weak ..	2	Bearded ..	3,780	3,820	Slightly.
2	Red Spelt...........	" 20	118	44	Stiff....	4¼	" ..	3,220	3,180	Considerably.
3	Red Emmer	" 20	118	42	Weak ..	2½	" ..	4,200	3,000	"
4	White Spelt	" 20	118	43	Medium	4½	" ..	3,260	2,740	"

A TEST OF FERTILIZERS FOR THE GROWING OF WHEAT.

Red Fife wheat was sown May 7, on uniform plots of light loam, and harvested August 20. Each plot was one-fortieth of an acre. All were sown on summer-fallow which has been under cultivation for many years without manure, On all plots the grain stood up well and there was no smut and but little rust.

The cost of these commercial fertilizers, at retail prices in Brandon, owing to high freights, is large. In no case has the value of the increase in the yield been equal to the cost of the fertilizers used. It must, however, be noted that the land of these plots is of good quality and was summer-fallowed.

WHEAT.—TEST OF FERTILIZERS.

Number.	Fertilizer Used per acre.	Length of Straw.	Length of Head.	Straw per Acre.	Grain per Acre.	Weight per Bushel.
		Inches.	Inches.	Lbs.	Bush. Lbs.	Lbs.
1	100 lbs. per acre of nitrate of soda, half sprinkled when the grain was 2 in. high, balance when 6 in. high......	42	3½	3,400	33 20	60½
2	200 lbs. per acre of nitrate of soda, half sprinkled when the grain was 2 in. high, balance when 6 in. high................	42	3½	3,640	32 40	60½
3	No fertilizer used......................	42	3½	4,040	32 40	60½
4	Superphosphate, 400 lbs. per acre, spread just before sowing....	42	3½	4,160	37 20	60½
5	Muriate of potash, 200 lbs. per acre, spread just before sowing.	42	3½	4,440	39 20	60½
6	A mixture of 200 lbs. superphosphate, 100 lbs. of nitrate of soda, 100 lbs. muriate of potash, per acre, half spread before sowing, half when 2 or 3 inches high........	42	3½	3,820	37 40	60½

FIELD PLOTS OF WHEAT.

Variety.	Size of Field.	Yield per Acre.	
	Acres.	Bush.	Lbs.
Preston	6	35	20
Red Fife	19	34	25
Huron	3·25	33	12
Pringle's Champlain	5	31	24
White Fife	5·72	21	..

DIFFERENT preparation for a wheat crop. All on plots one-twentieth of an acre.

Preparation.	Rusted.	Sown.	Ripe.	Weight of Straw.	Yield per Acre.	
				Lbs.	Bush.	Lbs.
Wheat after barley	None	May 10	Aug. 23	3,200	30	..
" peas	"	" 10	" 23	3,600	30	..
" oats	"	" 10	" 23	3,820	31	20
" wheat	"	" 10	" 23	3,620	29	40
Wheat on summer-fallow	Slightly	" 10	" 23	4,120	29	40
" after millet	None	" 10	" 23	3,620	33	..

PREVENTIVES OF SMUT.

The seed sown on these plots was very smutty, such as no farmer should use, hence the test was a very severe one.

The formalin was fresh and of the usual strength.

The bluestone had been held over from two to four years and exposed to the air for that length of time. It was used in order that the effect of long keeping might be seen. The table shows that this old bluestone was not as effective as the fresh had been in former tests.

Yet, the fact that the plots, where formalin was used, were not entirely free from smut, would show that *very smutty seed should not be used even when treated with great care.*

Seed should be handled with great care after being treated. If the seed is placed on a floor where smutty wheat has been, or if infected grain is moved in the barn causing the smut spores to float in the air, or if the treated seed be put into bags which have held smutty grain, it may become infected again.

It seems to be uncertain how long smut spores will retain vitality in the ground. It is well to treat the seed with formalin or bluestone every spring, whether smut has been present or not. A farm may have been free for years and smut appear in quantity without the source being known.

PREVENTIVES OF SMUT IN WHEAT.

How Treated.	Good Heads in 9 sq. ft.	Smutty Heads in 9 sq. ft.	Yield per Acre.	
			Bush.	Lbs.
Smutty wheat sprinkled with 9 oz. formalin to 10 galls. of water.	497	1	34	..
" steeped 5 min. in 4½ oz. formalin to 10 galls. of water	486	2	33	40
" sprinkled with 1 lb. bluestone to 1 pail of water....	491	8	31	40
" steeped 5 min. in ½ lb. bluestone to 1 pail of water..	479	15	31	10
" not treated......	321	128	19	30

ROTATION OF CROPS.

In the spring of 1899 arrangements were made for a series of rotation plots, the principal object being the maintenance of the fertility of the soil by the ploughing under of a leguminous crop every third year instead of the usual summer-fallow.

As the first field selected for this purpose was flooded in 1902 and 1904, it was considered unsuitable, and a new location was selected last year.

The Red Clover was sown at the rate of 12 lbs. per acre and mixed clovers in the proportion of 8 of Alfalfa and 6 lbs. of Alsike per acre. These leguminous plants were ploughed under when they reachd their fullest development.

The grains used in this test were Red Fife wheat, Banner oats, Mensury barley and Gregory pease. The size of the plots was one-twentieth of an acre.

ROTATION TEST.

The order of rotation is as follows:—

Number.	1905.	1906.	1907.
1	Pease	Wheat	Wheat.
2	Tares	Wheat	Oats.
3	Red Clover	Wheat	Wheat.
4	Alfalfa and Alsike	Wheat	Barley.
5	Wheat	Wheat	Pease.
6	Wheat	Oats	Tares.
7	Wheat	Wheat	Red Clover.
8	Wheat	Barley	Alfalfa and Alsike.
9	Wheat	Pease	Wheat.
10	Oats	Tares	Wheat.
11	Wheat	Red Clover	Wheat.
12	Barley	Alfalfa and Alsike	Wheat.
13	Wheat	Wheat	Summer-fallow.
14	Wheat	Oats	Summer-fallow.
15	Wheat	Barley	Summer-fallow.
16	Wheat	Wheat	Oats.
17	Wheat	Barley	Oats.

RESULTS OF FIRST TWO YEARS, 1905-1906.

Number.	Crop. 1905.	Crop. 1906.	Yield per Acre. 1905. Bush.	Yield per Acre. 1905. Lbs.	Yield per Acre. 1906. Bush.	Yield per Acre. 1906. Lbs.
1	Pease	Wheat			33	30
2	Tares	"			33	30
3	Red Clover	"			30	40
4	Alfalfa and Alsike	"			30	10
5	Wheat	"	35	50	30	10
6	"	Oats	36	20	102	22
7	"	Wheat	35	00	27	50
8	"	Barley	33	00	52	04
9	"	Pease	33	30		
10	Oats	Tares	105	00		
11	Wheat	Red Clover	35	20		
12	Barley	Alfalfa and Alsike	40	10		
13	Wheat	Wheat	35	40	28	50
14	"	Oats	35	10	85	00
15	"	Barley	38	10	46	22
16	"	Wheat	35	10	28	40
17	"	Barley	35	50	46	12

EXPERIMENTS WITH OATS.

Forty varieties of oats were tested on uniform plots of one-twentieth of an acre each. The land was a rather heavy clay loam, summer-fallowed. The weaker kinds were lodged badly; there was considerable rust on most of the leaves; and no smut.

The yield was good and the quality excellent. Both last year and this the Daubeney ripened fourteen days earlier than the Banner. Our seed of this oat is not pure. A few heads of a later and taller oat showed. These were hand pulled from the test plot but, from lack of time, were not pulled from the field plot.

All the seed was treated with formalin, and was sown May 9 and 10.

Oats—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.		No. of Days Maturing.	Length of straw including Head.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per measured Bushel after cleaning.	Rusted.
					In.		In.		Lbs.	Bush.	Lbs.	Lbs.	
1	American Beauty...	Aug.	18	100	52	Weak	10	Branching	5,140	116	16	36¼	Consid'ably.
2	Banner............	"	21	104	57	Medium..	9½	"	4,520	114	4	37½	"
3	Improved American.	"	16	99	54	" ..	9	"	5,340	110	20	37½	Slightly.
4	Mennonite.........	"	15	97	46	" ..	8	"	4,840	110	20	34½	Consid'ably.
5	Tartar King.......	"	15	98	54	Stiff......	8	Sided	5,300	110	..	38	Slightly.
6	White Giant.......	"	18	101	52	Medium..	8	Branching	4,960	110	..	39	Consid'ably.
7	Columbus..........	"	20	102	49	Weak	8½	"	4,460	107	2	36½	"
8	Thousand Dollar....	"	20	102	52	"	8	"	5,210	105	20	40½	"
9	Danish Island......	"	20	103	51	Medium..	8½	"	4,420	105	10	39½	"
10	Improved Ligowo...	"	23	106	56	Weak	10	"	5,320	105	10	39¼	Slightly.
11	Bavarian...........	"	20	102	52	Medium..	9	"	4,750	104	14	38	"
12	Sensation.........	"	15	98	48	" ..	8	"	4,590	103	8	38½	"
13	Twentieth Century..	"	22	104	49	Weak	9	"	5,400	102	32	36	Consid'ably.
14	Kendal White......	"	21	103	50	"	8	"	3,680	100	20	40	"
15	American Triumph..	"	22	104	48	"	9	"	4,200	100	..	38	"
16	Siberian..........	"	18	101	52	"	10	"	5,310	99	24	36	"
17	Buckbee's Illinois...	"	20	103	49	"	9	"	4,310	99	24	38	Slightly.
18	Storm King........	"	16	98	54	Stiff....	8½	Sided	5,620	99	14	37	Consid'ably.
19	Golden Giant.......	"	25	107	52	Weak ..	9	"	5,520	99	14	34½	"
20	Golden Fleece ...	"	16	99	50	Medium .	8	Branching	4,540	98	28	35	"
21	Lincoln............	"	16	99	53	Weak ...	8	"	4,570	97	32	41	"
22	Wide Awake.	"	20	102	54	"	8½	"	4,680	97	22	37½	"
23	Goldfinder........	"	18	100	49	Medium..	8½	"	5,000	97	2	32	Slightly.
24	Golden Beauty	"	20	102	48	Weak	9	"	4,220	96	16	37	"
25	Holstein Prolific .	"	20	102	50	"	9½	"	5,530	96	6	35	Consid'ably.
26	Abundance.........	"	22	105	55	"	9	"	4,630	96	6	39	"
27	Waverley...........	"	18	101	56	Medium..	8½	"	4,700	94	4	40	Slightly.
28	Black Beauty. ...	"	16	98	50	Weak	10	"	4,850	92	22	34½	Consid'ably.
29	Olive Black.........	"	21	103	56	Medium..	9½	Sided ..	4,660	92	12	38	"
30	Irish Victor.......	"	21	103	54	Weak	7½	Branching	4,580	91	26	39½	"
31	Virginia White.. ..	"	19	101	50	"	8	"	3,410	87	32	41¼	Slightly.
32	Pioneer........	"	15	97	48	Stiff......	9	"	4,420	87	22	39½	"
33	Joanette...........	"	16	98	43	Weak	7½	"	4,890	85	20	32½	"
34	Kendal Black......	"	20	102	55	Medium..	9	Sided	5,900	82	12	32	Consid'ably.
35	Milford Black......	"	20	102	53	" ..	9	"	3,690	79	24	39	"
36	Swedish Select......	"	16	99	53	" ..	8	Branching	5,220	72	32	41	"
37	Milford White	"	22	105	54	Weak	8½	Sided.....	6,790	70	30	35½	Slightly.
38	Scottish Chief.	"	21	103	50	"	7	Branching	6,300	70	20	37½	"
39	Swedish Milling....	"	21	103	50	"	7½	"	5,720	70	..	38	"
40	*Daubeney.........	"	8	90	41	Stiff.....	6½	"	2,540	69	14	35	"

* It is estimated that blackbirds took 20 bush. per acre from the Daubeney.

Different Preparations for an Oat Crop.

(1-20th Acre plots.)

Preparation.	Rusted.	Sown.	Ripe.	Weight of Straw.	Yield per Acre.	
				Lbs.	Bush.	Lbs.
Oats after wheat.	None......	May 10....	Aug. 16....	3,980	112	12
" " oats....................	"	" 10....	" 16....	4,040	113	18
" " peas....................	"	" 10....	" 16 ...	4,620	120	..
" " barley..................	"	" 10....	" 16...	3,740	101	26
" " millet..................	"	" 10....	" 17....	4,260	115	30
" on summer-fallow...............	Slightly	" 10....	" 18....	4,210	108	18

EXPERIMENTS WITH BARLEY.

Since wild oats have spread so much throughout this province, there is an active demand for an early variety of barley that will ripen before the wild oats shell, and by this means assist in eradicating the weed.

The earlier ripening six-rowed varieties are the best for this purpose. The Champion a beardless variety, is the earliest of all, but this is less productive and inferior in quality.

When barley is used for this purpose it should be cut before maturity, otherwise some of the wild oats will have shelled.

Eighteen varieties of six-rowed and fourteen varieties of two-rowed barley were tested. The falling off from the unusually heavy crop of last year was in about the same ratio as other grains. Mensury, both in the test plot and in the field plot, stood up fairly well, probably better than any other, though it was very flat on the lower land. The Odessa was entirely down. For some unknown reason Mansfield came far down in the list this year.

Each plot was one-twentieth of an acre. The seed was sown May 28, on sandy loam, summer-fallowed.

Six-rowed Barley—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of straw, including head (In.)	Character of Straw.	Length of Head (In.)	Weight of Straw (Lbs.)	Yield per Acre (Bush.)	Yield per Acre (Lbs.)	Weight per measured bushel after cleaning (Lbs.)	Rusted.
1	Blue Long Head....	Aug. 24....	88	38	Weak ...	3½	2,990	66	42	45	Considerably.
2	Nugent...........	" 21....	85	38	"	3	5,040	65	40	50	"
3	Mensury..	" 19....	83	40	Medium..	3½	3,060	61	12	52	Slightly.
4	Odessa.............	" 19....	83	38	Weak....	3	4,180	60	40	51½	Considerably.
5	Yale..........	" 17....	81	41	Medium..	2¾	3,710	60	10	52	"
6	Claude..........	" 22....	86	41	Weak....	2¾	3,740	57	24	49	Slightly.
7	Empire............	" 17....	81	38	"	3	2,790	56	22	51	Considerably.
8	Albert....	" 16....	80	39	Medium..	2¾	2,420	55	40	53	"
9	Trooper............	" 21....	85	39	Weak....	2½	3,550	55	10	51¼	"
10	Champion	" 14....	78	40	Medium..	2½	4,110	53	46	45	"
11	Argyle...........	" 20 ...	84	40	Weak....	3	4,630	51	22	50	"
12	Royal	" 20....	84	39	" ...	3	3,480	50	20	50	Slightly.
13	Summit...........	" 22....	86	41	"	3	3,590	50	10	51	Considerably.
14	Common.	" 18....	82	35	"	3	2,540	49	8	51¼	"
15	Stella..............	" 21....	85	38	"	3	4,850	48	46	50½	Slightly.
16	Oderbruch..........	" 17....	81	36	"	3	2,500	47	44	52½	Considerably.
17	Mansfield.	" 19....	83	38	Medium..	3¼	2,800	47	44	52	Slightly.
18	Brome.....	" 21....	85	39	Weak....	3	1,460	44	28	52½	Considerably.

Two-rowed Barley—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of straw, including head	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per measured bushel after cleaning.	Rusted.
				In.		In.	Lbs.	Bush.	Lbs.	Lbs.	
1	Jarvis	Aug. 20	84	43	Medium	4½	4,410	66	22	53	Slightly.
2	French Chevalier	" 25	89	42	Weak	4	5,170	61	02	51½	Considerably.
3	Clifford	" 20	84	45	Medium	4	3,490	60	30	51	Slightly.
4	Gordon	" 20	84	43	Weak	3	4,750	59	18	49½	Considerably.
5	Swedish Chevalier	" 25	89	40	"	4½	4,020	55	40	49½	"
6	Harvey	" 19	83	44	"	4	4,930	53	26	50	"
7	Danish Chevalier	" 25	89	38	"	4	3,810	51	42	48	"
8	Canadian Thorpe	" 21	85	41	Medium	3	4,450	51	02	51	Slightly.
9	Invincible	" 24	88	40	Weak	3	2,490	50	10	51½	Considerably.
10	Sidney	" 18	82	40	"	4	5,210	49	38	51½	"
11	Dunham	" 20	84	41	"	3	4,310	49	38	50½	"
12	Beaver	" 22	86	41	"	4	4,270	48	26	50	Slightly.
13	Logan	" 20	84	45	"	4	5,610	47	34	50½	Considerably.
14	Standwell	" 25	89	43	"	3	3,930	47	14	47	"

Different Preparations for a Barley Crop.

(1-20th Acre Plots.)

Preparation.	Rusted.	Sown.	Ripe.	Weight of Straw.	Yield per Acre.	
				Lbs.	Bush.	Lbs
Barley after millet	None	May 25	Aug. 15	2,840	70	..
" " wheat	"	" 25	" 15	2,700	66	32
" " oats	"	" 25	" 15	2,960	63	16
" " pease	"	" 25	" 15	2,120	66	12
" " barley	"	" 25	" 15	2,740	65	40
" on summer-fallow	Slightly	" 25	" 15	3,820	64	08

EXPERIMENTS WITH PEASE.

Twenty-four varieties of field pease were tested on light clay loam, in plots of one-twentieth of an acre each. From two to three bushels of seed was sown to the acre, according to the size of the pease.

There were no signs of cutworms, or other insect pests, and the yield was much above the average.

All were sown April 30, with the double disc drill, and germination was rapid and even.

The test plots were cut with the scythe and threshed with the flail. The harvester attachment for the mower did not work well, so the field plots were cut with the mower, a man following to roll the cut vines out of the way. They were threshed with the ordinary separator.

PEASE—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.		Number of Days Maturing.	Character of Growth.	Length of Straw.	Length of Pod.	Size of Pea.	Yield per Acre.		Weight per Bushel.
						Inches.	Inches.		Bush.	Lbs.	Lbs.
1	Black Eyed Marrowfat.	Sept.	3	126	Strong ...	65	2½	Large	58	20	61¼
2	Prince	Aug.	29	121	"	64	2¼	"	53	40	64
3	Duke	"	30	122	"	54	2½	"	53	20	64½
4	Gregory....	"	30	122	"	59	2½	Medium..	53	..	64½
5	White Wonder........	Sept.	1	124	Medium..	48	2¼	" .	51	40	64
6	Chancellor	Aug.	28	120	" ..	40	2	Small	51	40	65
7	White Marrowfat.....	Sept.	3	126	Strong ...	65	2½	Large	51	20	63
8	Prussian Blue	Aug.	27	119	"	70	2¼	Medium..	51	..	65
9	Mackay.............	Sept.	3	126	"	60	2¾	" ..	50	..	64
10	Nelson...............	Aug.	31	123	Medium..	46	2½	" ..	50	..	64
11	Paragon...............	Sept.	5	128	Strong ...	56	2½	....	50	..	64
12	Arthur	Aug.	25	117	Medium..	48	2½	Medium..	48	20	64½
13	Early Britain....	Sept.	7	130	Strong ...	56	2½	" ..	48	20	61½
14	Victoria...........	"	3	126	"	54	2¼	" ..	46	40	64
15	Wisconsin Blue...... .	Aug.	29	121	"	56	2¼	" ..	46	20	65
16	Pearl....	Sept.	10	133	"	60	2¾	Large	45	10	63¾
17	Golden Vine	Aug.	31	123	"	54	2¼	Small.....	44	50	65
18	Archer...............	Sept.	6	129	" ...	60	2¼	Medium..	44	30	64
19	Daniel O'Rourke	"	3	126	"	52	2¼	Small.....	44	20	65
20	Picton	"	7	130	" ..	56	2½	Large	43	40	64½
21	Prince Albert	"	4	127	" ...	62	2¼	Small	41	40	64
22	Agnes....	"	7	130	Medium..	50	2¾	Large	40	..	61
23	Kent.................	"	4	127	Strong ...	60	2¾	"	39	..	62
24	English Grey	"	7	130	" ...	60	2¼	Medium..	38	..	63

EXPERIMENTS WITH FLAX.

All our experimental plots of flax were destroyed. Immediately after sowing a heavy rain covered all the plots with water and washed and floated the seed. All the plots were so badly mixed that they were of no value as experiments, nor was the seed harvested fit for sowing again.

SEED GRAIN.

The following are samples of many letters received from those who have purchased seed grain from this farm:—

TREHERNE, MAN., December 18, 1906.

The Supt. Experimental Farm,
Brandon, Man.

SIR,—I bought from your farm, five bushels of Red Fife wheat last winter. It was sown April 21, one and one-half bushels to the acre; cut August 24, and yielded 48 bushels to the acre.

ANTONE CHABBERT.

RESTON, MAN., September 24, 1906.

The Supt. Experimental Farm,
Brandon, Man.

DEAR SIR,—I got 9 bushels of Red Fife wheat at the farm last spring. I sowed it on six acres of summer-fallow on April 10. It was cut on August 10, threshed on September 28, and yielded 33 bushels to the acre.

DAVID PATTERSON.

RAPID CITY, MAN., October 29, 1906.

N. WOLVERTON,
Supt. Experimental Farm,
Brandon, Man.

DEAR SIR,—We received from your farm last winter, 5 bushels of Red Fife wheat. We sowed this wheat on new land on April 16, the seeder registered not quite 3 acres. It was cut on August 15, and threshed on September 5 from the stook, and yielded 180 bushels of No. 1 hard wheat.

W. R. HEAD.

EXPERIMENTS WITH INDIAN CORN.

Indian corn is grown here for fodder only. The only variety which ripens its grain here is the Squaw Corn. Though the ears of most varieties will not ripen, yet the heavy yield of stalks and leaves gives a large amount of most excellent fodder, averaging over 16 tons of green feed per acre.

The corn stalks are fed partly as ensilage and partly dry. In the latter case they are brought from the field and cut as needed.

The silo was built long ago and is square. That form is wasteful as the material does not settle as well as in the round silo, and much is spoiled in the corners. It extends from two feet below the stable floor to a height of 11 ft. 6 inches above the next floor, and is inside against the west end of the barn. Sometimes a few inches of ensilage, on the west side is frozen. Dimensions, 24 feet by 8½ feet x 9 feet inside, and holds 30 tons of green cut corn stalks. We have two such silos. Ensilage was not fed to milking cows as we feared it might taint the milk.

The corn crop was slightly above the average in weight and the ears were in the early milk stage when cut.

The corn was sown on June 11, in rows 30 inches apart. The crop was cut August 27. Soil a sandy loam, summer-fallowed. Twenty-three varieties were sown and the yield per acre in each case was calculated from two rows, each 66 feet long.

INDIAN CORN—TEST OF VARIETIES.

Number.	Name of Variety.	Height.	Leafiness.	When Tasselled.	In Silk.	Condition when Cut.	Weight per Acre grown in rows.		Weight per Acre grown in hills.	
		Inches.					Tons.	Lbs.	Tons.	Lbs.
1	Thoroughbred White Flint	93	Leafy	Aug. 16	Aug. 24	Silk	21	1,296	23	464
2	Champion White Pearl	105	Fairly leafy	" 16	" 22	"	21	1,560	20	392
3	Longfellow	98	"	" 8	" 20	"	21	768	19	1,336
4	Superior Fodder	89	"	" 16		Tassel	19	1,600	20	1,712
5	Cloud's Early Yellow	102	"	" 20		"	19	1,072	20	656
6	Compton's Early	89	Very leafy	" 10	Aug. 18	Silk	19	808	17	1,640
7	Early Butler	102	Fairly leafy	" 12	" 20	"	19	544	20	1,184
8	Angel of Midnight	82	Very leafy	" 8	" 21	"	19	280	16	1,792
9	North Dakota White	86	"	" 12	" 25	"	19	16	20	392
10	Eureka	96	Fairly leafy	" 27		Tassel	18	960	18	1,488
11	King Philip	91	Very leafy	" 11	Aug. 20	Silk	18	696	18	1,752
12	Red Cob Ensilage	90	Fairly leafy	" 25		Tassel	18	432	20	1,184
13	Salzer's All Gold	91	"	" 15	Aug. 22	Silk	18	960	16	1,528
14	Early Mastodon	98	"	" 22		Tassel	18	168	16	1,000
15	Early Longfellow	84	Very leafy	" 6	Aug. 15	Silk	18	168	15	360
16	Pride of the North	88	"	" 22		Tassel	17	848	18	1,488
17	Giant Prolific Ensilage	86	Fairly leafy	" 15	Aug. 22	Silk	16	1,000	16	1,528
18	Early Leaming	93	"	" 8	" 21	"	16	472	15	1,944
19	Northern Dent	87	"	" 16	" 26	"	15	624	15	452
20	Mammoth Cuban	99	"	" 15	" 22	"	15	624	14	776
21	Selected Leaming	100	"	" 11	" 21	"	14	1304	15	96
22	Evergreen Sugar	74	"	" 21		Tassel	14	248	15	360
23	White Cap Yellow Dent	102	"	" 9	Aug. 20	Silk	13	1984	16	472

INDIAN CORN SOWN AT DIFFERENT DISTANCES APART.

No.	Name of Variety.	Distance Apart.	Height.	Condition when cut.	Weight per acre, cut green.
		Inches.	Inches.		Tons. lbs.
1	Longfellow	24	90	In silk.	25 1,810
2	"	30	90	" "	26 1,592
3	"	36	90	" "	24 1,500
4	"	42	90	" "	25 1,857
1	Selected Leaming	24	96	" "	26 1,460
2	" "	30	96	" "	27 1,176
3	" "	36	96	" "	23 640
4	" "	42	96	" "	26 800
1	Champion White Pearl	24	93	" "	27 1,440
2	" " "	30	93	" "	31 40
3	" " "	36	93	" "	29 300
4	" " "	42	93	" "	25 1,291

It will be noticed that fodder corn planted in rows 30 inches apart and cultivated gives the heaviest yield.

EXPERIMENTS WITH FIELD ROOTS.

This year all kinds of field roots fell below the average in yield, but the quality was excellent.

Two sowings, about two weeks apart, were made, but neither was touched with frost. The yield from the earlier sowing was the better. This seems to have always been the case here.

TURNIPS.

Twenty varieties of turnips were sown on sandy loam, treated with well rotted barnyard manure. Two sowings were made. There was no damage by frost or insects. The yield was below the average of past years.

The average yield, per acre, of Hartley's Bronze for five years has been 31 tons 787 lbs., or 1,046 bushels 27 lbs.

The first plots were sown May 22 and pulled October 11; the second plots were sown June 8 and pulled October 11. The yield from the earlier sowing was much the larger. The estimate of yield per acre was made from two rows, each 66 feet long.

TURNIPS—TEST OF VARIETIES.

Number.	Name of Variety	Yield per acre. 1st Plot. Tons.	Lbs.	Bush.	Lbs.	2nd Plot. Tons.	Lbs.	Bush.	Lbs.
1	Hartley's Bronze	26	1,856	897	36	20	1,184	686	24
2	Sutton's Champion	26	1,592	893	12	19	1,072	651	12
3	Hall's Westbury	25	1,744	862	24	17	1,904	598	24
4	Good Luck	25	952	849	12	19	808	646	48
5	Bangholm Selected	25	424	840	24	15	1,944	532	24
6	Jumbo	24	576	809	36	19	1,600	660	..
7	Carter's Elephant	24	48	800	48	16	736	545	36
8	Magnum Bonum	23	1,784	796	24	18	1,224	620	24
9	Imperial Swede	22	880	748	..	19	808	646	48
10	Emperor Swede	22	88	734	48	16	1,264	554	24
11	Mammoth Clyde	21	1,560	726	..	16	208	536	48
12	Kangaroo	21	1,032	717	12	16	1,792	563	12
13	Perfection Swede	20	1,976	699	36	18	1,752	629	12
14	Elephant's Master	20	1,448	690	48	16	472	541	12
15	Selected Purple Top	20	1,184	686	24	19	280	638	..
16	East Lothian	20	392	673	12	13	1,984	466	24
17	Halewood's Bronze Top	19	544	642	24	17	1,376	589	36
18	New Century	19	16	633	36	19	1,336	655	36
19	Drummond Purple Top	18	1,488	624	48	13	664	444	24
20	Skirvings	18	696	611	36	18	168	602	48

EXPERIMENTS WITH MANGELS.

Mangels are relished by nearly all kinds of farm animals; cattle, swine and even chickens, eat them readily. Unlike turnips, they do not injure the quality of milk and its products.

As mangel seed is large and somewhat slow to germinate, the soil should be mellow and moist, and the seed sown from two to three inches deep.

The roots are susceptible to injury from fall frosts, for which reason the crop should be pulled before the weather becomes severe.

Sixteen varieties of mangels have been on trial at the Experimental Farm this year. The yield was above the average and all were saved without injury.

The soil used for this crop was a black loam fertilized in the fall of 1905, with ten loads per acre of well rotted manure. The first sowing was made on May 23, and the second on June 7. All were pulled on October 8.

The estimate of yield per acre has been made from the product of two rows 66 feet long.

The average yield of Prize Winner Yellow Globe, for five years has been 26 tons, 1,120 lbs., or 885 bushels 20 lbs. per acre.

MANGELS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per acre. 1st Plot. Tons.	Lbs.	Bush.	Lbs.	2nd Plot. Tons.	Lbs.	Bush.	Lbs.
1	Triumph Yellow Globe	38	296	1,271	36	32	152	1,069	12
2	Prize Winner Yellow Globe	33	264	1,104	24	30	984	1,016	24
3	Prize Mammoth Long Red	32	1,472	1,091	12	29	344	972	24
4	Selected Yellow Globe	32	416	1,073	36	32	680	1,078	..
5	Yellow Intermediate	31	1,624	1,060	24	20	1,976	699	36
6	Half Sugar White	31	304	1,038	24	29	1,928	998	48
7	Selected Mammoth Long Red	29	1,400	990	..	27	1,968	932	48
8	Half Sugar Rosy	28	1,288	954	48	25	1,216	853	36
9	Lion Yellow Intermediate	27	1,176	919	36	26	1,856	897	36
10	Mammoth Long Red	27	384	906	24	28	760	946	..
11	Mammoth Yellow Intermediate	26	1,856	897	36	27	120	902	..
12	Giant Sugar Mangel	26	1,856	897	36	24	840	814	..
13	Gate Post	26	1,064	884	24	19	1,864	664	24
14	Leviathan Long Red	26	272	871	12	22	1,144	752	24
15	Giant Yellow Intermediate	25	1,744	862	24	25	1,216	853	36
16	Giant Yellow Globe	24	312	805	12	21	768	712	48

EXPERIMENTS WITH CARROTS.

As in the case of other roots, the yield of carrots was below the average. The average of the New White Intermediate for five years has been 24 tons 576 lbs., or 809 bushels 36 lbs.

Ten varieties were sown on light clay loam, in rows 18 inches apart, May 8 and May 22. They were pulled October 10. The yield per acre has been calculated from two rows each 66 feet long.

CARROTS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per acre. 1st Plot. Tons.	Lbs.	Bush.	Lbs.	2nd Plot. Tons.	Lbs.	Bush.	Lbs.
1	Carter's Orange Giant	21	1,120	718	40	13	840	447	20
2	Giant White Vosges	20	1,360	689	20	19	1,600	660	..
3	Long Yellow Stump Rooted	20	480	674	40	19	1,160	652	40
4	Early Gem	20	40	667	20	19	720	645	20
5	Improved Short White	19	1,160	652	40	18	1,840	630	40
6	Ontario Champion	19	720	645	20	18	520	608	40
7	Half Long Chantenay	18	1,400	623	20	20	40	667	20
8	New White Intermediate	18	960	616	..	19	1,600	660	..
9	Mammoth White Intermediate	18	80	601	20	1	120	535	20
10	White Belgian	14	160	469	20	17	760	579	20

EXPERIMENTS WITH SUGAR BEETS.

Eight varieties of these roots were tested this year. Of these only three are recommended for use in the manufacture of sugar, viz., Vilmorin's Improved, Wanzleben and French Very Rich. All the varieties are, however, particularly useful as food for stock. We find young animals relish them better than either mangels or turnips.

The first plots were sown on May 23 and the second on June 9. The early sown plots gave the largest returns in every instance. All were harvested on October 8.

The estimate of yield per acre has been made from the product of two rows each 66 feet long. The soil was a black sandy loam fertilized with ten loads of well rotted manure per acre. The previous crop was potatoes.

Repeated chemical analyses of sugar beets grown here would indicate that their growth in Manitoba for the profitable manufacture of sugar is doubtful. For full information on this point the inquirer is directed to the reports of Mr. F. T. Shutt, Chemist of the Dominion Experimental Farms, Ottawa.

SUGAR BEETS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per acre.							
		1st Plot.				2nd Plot.			
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Danish Red Top	26	800	880	..	24	1,632	827	12
2	Royal Giant	22	1,672	761	12	21	240	704	..
3	Improved Imperial	21	1,824	730	24	19	1,072	651	12
4	Red Top Sugar	20	1,448	690	48	20	392	673	12
5	Danish Improved	20	920	682	..	20	656	677	36
6	Wanzleben	16	1,792	563	12	15	624	510	24
7	French Very Rich	16	1,264	554	24	18	168	602	48
8	Vilmorin's Improved	15	624	510	24	15	96	501	36

EXPERIMENTS WITH POTATOES.

The uniformly large yields and excellent quality of potatoes grown here prove the remarkable adaptability of Manitoba soil and climate to this valuable tuber.

The sandy loam soil chosen for these plots received about ten loads of well rotted manure to the acre and was ploughed deeply in the fall and spring.

The Colorado Beetle appeared on a few hills, but one application of Paris green destroyed them all.

The yield was not equal to the phenomenal yield of 1905, but was large and the quality was very fine. The following eight varieties have averaged, for five years, over 500 bushels to the acre:—American Wonder, 545; Dreer's Standard, 533; Late Puritan, 533; State of Maine, 529; Uncle Sam 522; Empire State, 517; Money Maker, 516; Maule's Thoroughbred, 504.

The potatoes were planted May 21, in rows three feet apart, with the sets about one foot apart in the rows, and were dug October 2. There were no rotten ones and very little scab.

POTATOES—TEST OF VARIETIES.

Number.	Name of Variety.	Character of Growth	When Matured.	Average Size.	Yield per acre. Total		Marketable.		Unmarketable.		Form and Colour.
					Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
1	Vermont Gold Coin..	Strong....	Oct. 1..	Very large	495	..	473	..	22	..	White, round.
2	Reeve's Rose	"	Sept. 1..	" ..	491	20	473	..	18	20	Lt. pink, oval
3	American Wonder...	"	" 10..	" ..	484	..	469	20	14	40	White, long.
4	State of Maine	"	Oct. 1..	" ..	484	..	458	20	25	40	White, flat oval
5	Uncle Sam......	"	Sept. 29..	" ..	469	20	440	..	29	20	White, flat.
6	Carman No. 1........	"	" 15..	" ..	451	..	421	40	29	20	"
7	Pearce	Medium..	Aug. 28..	Large	447	20	436	20	11	..	Pink, round.
8	Morgan Seedling	Strong....	Not ripe..	Very large	443	40	429	..	14	40	" long.
9	Sabean's Elephant...	" ...	Sept. 1..	" ..	436	20	421	40	14	40	White, long.
10	Dreer's Standard	"	" 25..	" ..	436	20	414	20	22	..	White, flat oval
11	Empire of State......	"	" 12..	Medium..	429	..	414	20	14	40	White, long.
12	Late Puritan	"	" 20..	Large	421	40	407	..	14	40	Wh., round, lg.
13	Money Maker.......	Medium..	" 12..	" ..	418	..	403	20	14	40	White, kidney.
14	I. X. L.............	Strong ...	" 5..	" ..	414	20	392	20	22	..	Pink, long.
15	Bovee..........	Weak	Aug. 20..	" ..	407	..	359	20	47	40	"
16	Maule's Thoro'bred..	Medium..	Sept. 5..	" ..	403	20	388	40	14	40	Pink, long, flat.
17	Burnaby Seedling....	" ..	" 5..	" ..	392	20	377	40	14	40	Pink, oval.
18	Early Envoy	" ..	Aug. 30..	" ..	392	20	370	20	22	..	Pink, round.
19	Irish Cobbler........	" ..	" 30..	M. to L..	385	..	355	40	29	20	White, flat.
20	Holborn Abundance..	Strong....	Not ripe..	Large	374	..	366	40	7	20	" round.
21	Dooley	"	Sept. 15..	Very large	363	..	348	20	14	40	" "
22	Everett..	Medium..	Aug. 20..	" ..	359	20	330	..	29	20	Pink, long.
23	Carman No. 3....	" ..	Sept. 8..	Medium..	344	40	330	..	14	40	White, long.
24	Ashleaf Kidney.....	Strong....	Aug. 30..	....	341	..	330	..	11	..	
25	Canadian Beauty....	Medium..	Sept. 16..	M. to L..	337	20	330	..	7	20	Lt. pink, long.
26	Rochester Rose......	Weak ...	Aug. 30..	Medium..	337	20	300	40	36	40	" "
27	Dalmeny Beauty	Strong....	Sept. 20..	Very large	311	40	297	..	14	40	White, oval.
28	Country Gentleman..	" ..	Aug. 25..	" ..	300	40	300	40	....		Pink, long.
29	Early Rose..........	Weak	" 30..	Medium..	289	40	264	..	25	40	" round.
30	Pingree...........	Medium..	" 29..	" ..	278	40	256	40	22	..	White, oval.
31	Vick's Extra Early..	Strong....	" 25..	Very large	260	20	227	20	33	..	" pink, flat.
32	Early White Prize...	Weak	" 31..	Large	256	40	238	20	18	20	Lt. pink, oval.

EXPERIMENTS WITH GRASSES.

The season of 1906 was not favourable for the growth of grasses. They all suffered from lack of rain during the growing period. The weather was good for curing.

Below will be found the yields of six plots for the past four years. In each case the seed was sown on well prepared land, without a nurse crop.

It will be noted that Alsike mixed with Timothy has done well, giving hay of very superior quality. Alsike in this plot has done better than Red Clover mixed with Timothy.

Brome has done well, but after four crops must be broken.

New plots will be sown in the spring.

GRASSES.

Variety.	Sown.	1903.	1904.	1905.	1906.
		Lbs.	Lbs.	Lbs.	Lbs.
Timothy..........................	1903	....	2,700	4,200	2,100
Timothy and Alsike..................	1903	....	....	5,400	2,940
Awnless Brome *(Bromus inermis)*........	1902	2,300	4,700	5,900	3,080
Hard Fescue *(F. duriuscula)*...............	1900	3,850	3,800	5,000	2,470
Western Rye grass *(A. tenerum)*...........	1902	2,220	4,500	4,100	1,080
Red Top *(A. vulgaris)*	1903	....	1,900	4,600	900

EXPERIMENTS WITH CLOVERS.

The winter of 1905-06 was hard on the clovers. Where there was little snow, they killed quite seriously. The best practice is to have sufficient clover left in the fall to hold the snow.

ONE ACRE PLOTS.

In 1904 three acres were sown, an acre each to Common Red, Alfalfa and Alsike. The field was swept bare of snow during the winter of 1905-06 and the Common Red and Alsike were almost wholly killed, while the Alfalfa was partly killed.

The Alfalfa gave 1,045 lbs. at one cutting. The other plots were ploughed.

SMALLER TEST PLOTS.

The following table shows the returns from the one-twentieth acre plots. The second crop of Alfalfa was left for seed, but no seed matured before frost.

SMALLER TEST PLOTS.

Variety.	Sown.	Height.	Stage when Cut.	Yield of Hay per Acre.	
		Inches.		Tons.	Lbs.
Alfalfa	1903	44	¼ in bloom	1	800
Alfalfa	1902	45	¼ in bloom	1	400
Alsike and Timothy	1903	27—40	Full bloom	1	940
Common Red	1902	29	Full bloom	1	420

ON GRAVELLY UPLAND.

In May, 1905, Alfalfa and Common Red Clover and Western Rye grass were sown on light gravelly upland, both with and without a nurse crop. There was a good catch on all the plots, but the clovers and Rye grass made better growth where there was no nurse crop. The plots were neither mown nor pastured. The situation was exposed to the N.W. wind and but little snow covered them.

The clovers were practically all winter killed. The Western Rye grass yielded in 1906, 1 ton 1,550 and 1,850 lbs. of hay, that sown without a nurse crop doing the better.

RESULTS OF ELEVEN YEARS.

So much interest is now shown in clovers, and so many inquiries are received, that it is thought best to give, as briefly as possible, the conclusions reached after a careful study of all the experiments made here with clovers during the past eleven years.

In 1895 a series of ten experiments in growing clover with a nurse crop showed that the clover does not reduce the yield of grain, but actually increases it in most cases. In these experiments clover was grown with wheat, oats, barley and pease. Unfortunately this clover, Mammoth Red, was killed the next winter.

The results of many experiments with White Dutch and Crimson clover would indicate that they are not suited to this climate.

Mammoth Red Clover has been grown with fair success, but it is too coarse to be desirable.

The many experiments with Alsike have not been very encouraging, excepting in one plot where it was sown with Timothy. This plot has done so well and has given such excellent hay that I would recommend farmers to try it. However, it is not safe to base conclusions on one single experiment, hence only small plots should be risked.

The results of four careful experiments with Common Red clover, extending over three or four years in each case, have been decidedly gratifying. In each case the seed has been sown without a nurse crop and upon spring ploughed stubble. The weeds were mown twice during the summer and left on the ground as a mulch. Care was taken to have enough clover standing in the fall to hold a snow cover. In estimating the average yield, I take into consideration the first year, when no crop was harvested, as well as the following years, when hay was gathered, and these four experiments show an average of 3,060 lbs. per year of excellent feed. This is probably as profitable as any crop we can grow.

The results of four experiments with Alfalfa have been yet more encouraging. With land in good heart, a fine and solid seed bed, about 25 lbs. of seed to the acre, there has not been a failure. One small plot, on light, wind-swept upland, with gravel subsoil, was killed the first winter. No snow lay on this. A bare plot of an acre was partially killed last winter. This will be disced and re-sown in the spring, in the hope that the weak spots may be restored.

The average yield from the four experiments, counting the seeding year as above, has been 3,400 lbs. per year. Analysis shows that nothing makes better feed, for cattle especially. It should be cut when the blossoms first appear If left later it is too woody. In harvesting, handle carefully and as little as possible. The leaves, which are the best feed, are easily broken off. We would strongly advise every farmer to try a small plot.

The value of clovers in adding materially to the fertility of the soil is an element of great importance. Not only do they add much directly to the soil, but they also add value to the manure.

EXPERIMENTS WITH MILLETS.

Six varieties were tested, in one-twentieth acre plots, on black sandy loam, summer-fallowed. They were all sown June 5 and harvested September 5.

The Common and Hungarian make excellent feed for cattle, but should be fed sparingly to horses.

When the head is well formed millet should be cut with the binder, in small sheaves, and cured in the stook.

While the Common and Hungarian make a large quantity of excellent hay, the others are too coarse.

Experiments with Millets.

Variety.	Description.	Height.	Stage when Cut.	Hay per Acre	
		Inches.		Tons.	Lbs.
Hungarian	Fine quality	41	Fully headed	6	1,100
Italian	Coarse	53	1/10 headed	6	130
Common	Fine quality	40	Nearly ripe	4	1,800
White Round French	Coarse	48	Nearly ripe	4	1.700
Algerian	Very coarse	76	3/4 headed	4	1,200
Pearl	Coarse	52	Not headed	3	1,200

CATTLE.

The herd of cattle now on the Experimental Farm consists of twenty-three animals, exclusive of twelve fattening steers, as follows:—

No.	Name of Animal.	Breed.	Age.	Weight.
				Lbs.
1	Christie	Grade—Female	9 years	1,320
2	Gretchen	" "	3 "	1,520
3	Sis	" "	3½ "	1,260
4	Jenny	" "	3 "	1,510
5	Margaret	" "	2 "	1,410
6	Ruben	" "	2 "	1,570
7	Julia	" "	2 "	1,095
8	Louise	" "	12 months	710
9	Buttercup	" "	2 "	150
10	Blanche	" "	2 "	110
11	Rose	Shorthorn—Female	3½ years	1,420
12	Crocus	" "	3 "	1,295
13	Daisy	" "	2½ "	1,275
14	James	" Male	2 "	1,460
15	Jane	" Female	13 months	605
16	Lily	Ayrshire—Female	4½ years	1,295
17	Snowball	" "	2 "	995
18	Westward Ho!	" "	12 months	590
19	Buster Brown	" Male	4 "	260
20	Marie	Guernsey—Female	2 years	930
21	Duke	" Male	2 "	1,290
22	Togo	" "	9 months	510
23	Nemo	Shorthorn—Male	1 month	110

EXPERIMENTS IN FEEDING STEERS.

The eight animals used for this experiment were Shorthorn grades of fair quality, purchased from a farmer near Oak River, Manitoba. They were purchased in November, 1905, and the feeding began December 5. They cost delivered, $3 per hundred pounds live weight and were sold April 27, 1906, for $4.40 live weight.

The purpose of the experiment was to compare the value of oat sheaves and fodder corn. For this purpose they were divided into two groups of four each, as equally as possible.

All were tied in stalls and, excepting in their feed, were treated as nearly alike as possible. All were two years coming three.

The daily ration was:—

GROUP 1.

Corn fodder	23 lbs.
Ensilage	17 "
Turnips	10 "
Chop 4 lbs., increased to	9 lbs.

GROUP 2.

Oat sheaves	20 lbs.
Ensilage	17 "
Turnips	10 "
Chop 4 lbs., increased to	9 "

COST OF FEED.

Group 1—			
13,248	lbs.	of fodder corn at $4 per ton..	$ 26 45
9,792	"	ensilage at $2 per ton..	9 79
5,760	"	turnips at 5 cts. per bushel..	4 80
3,744	"	ground grain and screenings at ¾ cent.	28 08
			69 12
4,450	"	at 3 cents..	133 50
			$202 62
5,235	"	at $4.40..	230 34
		Gain..	$ 27 72
		Gain per steer..	$ 6 93
Group 2—			
11,520	lbs.	of oat sheaves at $6 per ton..	$ 34 56
9,792	"	ensilage at $2 per ton..	9 79
5,760	"	turnips at 5 cents per bushel..	4 80
3,744	"	ground grain..	28 08
			77 23
4,485	"	at 3 cents..	134 55
			211 78
5,345	"	at $4.40..	235 18
		Gain..	$ 24 40
		Gain per steer..	$ 6 10

SUMMARY.

—	First cost of each Steer.	Value of feed consumed.	Price per Steer sold.	Gain per day.	Profit per Steer.
	$ cts.	$ cts.	$ cts.	Lbs. ozs.	$ cts.
Corn group....	33 37	17 28	57 58	1 6	6 93
Oat sheaf group....	33 64	19 31	58 79	1 8	6 10

It is thought that the prices charged are the fair values of the feed on the farm. If the manure is equal in value to the labour, then the above represents the profit per steer. It was planned to give each steer the same weight, 23 lbs., of cut oat sheaves or cut corn stalks, but it was found that the oat sheaves had to be reduced to 20 lbs.

MILKING COWS.

For various reasons the number of milking cows has been reduced and several young cattle have taken their places. None of these younger cows has yet completed a full period of lactation, hence we can report upon four only.

The following table gives the length of the milking period, the number of pounds of milk, the average daily yield, and the percentage of butter fat.

Name.	Age.	Breed.	Days.	Pounds of Milk.	Daily Average.	Percentage butter-fat.
Christie..	9 years.	Grade	427	11,243¼	26·6	3·5
Gretchen	8 "	"	271	10,095½	37·2	3·6
Jenny	3 "	"	266	4,269½	16	4·8
Lily	4½ "	Ayrshire	318	4,854½	15·8	5·1

The grade cows Christie and Gretchen are not only valuable milkers, but their calves are of superior quality. A steer, calf of Gretchen, now weighs 1,600 lbs. at just 30 months.

EXPERIMENTS WITH SWINE.

In this line a new experiment, which will extend over a series of years, has been inaugurated. To begin with, a drove of six, of the best pure breds obtainable, has been assembled, viz.: 1 Berkshire male and 1 female; 1 Yorkshire male and two females; 1 Tamworth female. Pure Berkshires, pure Yorkshires and crosses with Berkshire and Yorkshire males and Tamworth females will be bred.

The first cost, the feed, an estimate of the pasture, the labour and repairs to quarters will be charged against the herd; while it will be credited with animals sold, service, manure and stock on hand at the end of each year. The year, for this purpose will begin with December 1. An effort will be made to secure two litters from each sow each year. The financial results will be reported.

EXPERIMENTS WITH POULTRY.

During the year no special experiments with poultry have been conducted. The incubator was not used and the hatching was not very successful.

Barred Plymouth Rocks, White Wyandottes and Rose Comb Minorcas have been kept.

EXPERIMENTS WITH BEES.

Early in April the bees, fourteen hives, were removed from their winter quarters in the cellar to their place in the arboretum. They all came out in good condition and needed no feeding.

Hives in the spring	14
New swarms	15
Absconded	2
Queen died, colony dwindled	1
Found empty in fall	1
Sold	2
Weak colonies united	2
Went into winter quarters in good condition	21

During past years every effort has been made to increase the quantity of honey and to reduce the number of swarms. This plan seems to have reached its limit for this year; nothing could stop swarming. They ran to swarms rather than to honey.

CASH STATEMENT.

255 lbs. honey at 10 cents	$ 25 50
2 hives sold	14 00
7 additional hives	49 00
	88 50
Less 9 hives and frames bought	18 00
Net profit	$ 70 50

Steers were purchased at $33 each, fed and cared for all winter and had a net profit of $6.50.

Our hives of bees costing $7 each with infinitely less care, netted $5 each, and that in a bad year for honey.

The value of these bees in fertilizing the blossoms, especially of fruits and clovers, cannot be estimated.

HORTICULTURE.

The season of 1906 was, taken as a whole, a very favourable one for the horticulturist. The weather permitted an early commencement of operations in the spring, and the absence of late spring frost, coupled with the exceptionally open fall, contributed to the perfect ripening of all late vegetables and fruits. In the vegetable garden, following the precedent established some years ago, a few varieties were given special attention, all the kinds obtainable of each one being tested. Beans and lettuce were the varieties chosen for 1906 and much valuable information was obtained from the notes taken during the season.

In the larger fruits more promising results are being obtained each year. The introduction, by Dr. W. Saunders, of the *Pyrus baccata* has given to the Northwest a stock for apple grafting, the thorough hardiness of which, coupled with the good union it makes with other varieties renders it all that can be desired for this purpose.

Propagation is carried on by means of root grafting, one or two year old roots being used for this purpose. Upon these roots scions of the most hardy and promising trees, such as, Hibernal, Duchess, Transcendent, No. 100, and No. 179, are being grafted. The best results from this method have been accomplished by lifting the roots in the fall and storing them in boxes filled with alternate layers of soil and roots, and bringing them into a cellar about March and gradually thawing them out before using. In past years the scions were also taken in the fall and stored in a similar manner, but the results were not satisfactory and much better result have been attained by cutting the scions just prior to grafting. By the latter plan about 90 per cent will usually take, while with the former method rarely 50 per cent could be obtained. The whole operation is simple and we would suggest that all who have an opportunity, should help in this good work by attempting it, if even in a small way, themselves.

APPLES.

Since this Experimental Farm was established some eighteen years ago many hundreds of trees, of the many varieties of apples in cultivation have been tested, and, in the vast majority of cases, have been killed by the severity of the climate or by sun scald, before they have borne fruit.

HIBERNAL.

Trees of this variety have been many times tested during the past 18 years, but all died prior to 1901, when three specimens of Hibernal grafted on *Pyrus prunifolia* roots were sent here from the Central Experimental Farm. Though in an exposed position only the tips of some of the branches have been slightly killed. In 1905, it bore a crop of apples. These apples were about $3\frac{1}{2}$ inches in diameter, of good flavour and excellent for cooking. In the spring of 1906 this tree was so severely cut for scions that it did not bear fruit.

DUCHESS OF OLDENBURG.

This variety also has been many times tried since the farms were established, but has not been successful. Scions of this apple were top grafted on a Berried Crab, in 1902. In 1905 the grafts bore a good crop of excellent fruit. In 1906 it again bore a crop, but not so many apples, probably on account of being severely cut for scions. These apples were about $2\frac{1}{2}$ inches in diameter, which is under the normal size. They ripened well and were excellent for cooking.

NO. 100.

This tree is in an out of the way position and the fruit is generally stolen before fully ripe. For several years it has borne a fair crop of apples, good for eating or cooking. It is small, only about an inch and a half in diameter, but it is hardy and well worth growing.

NO. 179.

This is supposed to be a cross-bred originated on the Central Experimental Farm, Ottawa, by Dr. Saunders. Unfortunately the records of its parentage have been lost. Since 1904, this tree has borne apples measuring $2\frac{7}{8}$ x $2\frac{5}{8}$ inches, as large as the Duchess and quite as good. It ripened early in September and kept well until January. It is a good cooking apple and also pleasant for eating. The tree seems to be quite hardy. Scions from it have been grafted on Berried crab roots so as to multiply the trees for further trial.

The fact that these trees, having no protection whatever from winter-killing or summer sun scald, are bearing fruit, is very encouraging and should stimulate us to further trial.

CRAB APPLES.

Crab apples of many kinds are now grown on this farm in large quantities. In the early days of the work here almost all the larger named sorts killed considerably, but in time the hardier kinds showed greater hardiness and for the past two or three years several of them have borne fruit.

HYSLOP.

The largest and the handsomest is the Hyslop. The tree now under test seems to be hardy although trees earlier planted have died, the fruit is somewhat larger than the Transcendent. It keeps well and is good for cooking.

MARTHA SEEDLINGS.

Several seedlings of the Martha are proving themselves to be hardy, are heavy bearers, and the fruit in some instances seems to be as large as the original Martha. These trees are somewhat subject to blight.

TRANSCENDENT.

The trees of this variety sent to Brandon in the early history of the farm perished, but of late the trees have become much hardier and bear fruit of excellent quality, and in considerable quantities, especially when grafted on *Pyrus baccata.* Trees of this variety are said to be doing well in many parts of the province.

CROSS-BRED AND SEEDLING APPLES.

While there is a hope that some of the well known varieties of the larger apples will, in time, become acclimatized, yet in all probability the best apples of the future, for Manitoba, will be found among the cross-bred kinds or among new seedlings.

It is worthy of note that many of the best varieties of cultivated apples, such as the Northern Spy, Baldwin, Fameuse, McIntosh Red and others are chance seedlings, probably from the fruit of blossoms, which have been cross-fertilized by insects.

The search for valuable new varieties of seedlings or from crossing is very slow work, yet if but one valuable new apple should result among thousands of failures, it would more than repay all the time and labour spent. By grafting, the new and valuable variety could be multiplied indefinitely.

We would suggest that farmers should sow apple seeds and plum pits freely and plant the seedlings in orchards or as windbreaks, and in time enough fruit would be borne which would determine the quality. One man is as likely as another to hit upon something good.

CROSS-BREDS AND SEEDLINGS.

A large number of cross-bred apples have been produced at the Central Experimental Farm, Ottawa, from year to year and these have been sent to the Brandon Farm. A large number of seedlings from these crosses have also been sent here for trial. In most cases the *Pyrus baccata* has been one parent, chosen to secure hardiness and it has been crossed with many different kinds of esteemed eastern sorts to secure size and quality.

Some few of the cross-breds have fruited and although the fruit of most of them does not exceed 1½ inches in diameter they cook well and some of them are good for eating. They are very useful for domestic purposes and deserving of more extended trial. A few of the seedlings have also fruited, but most of them have been too small to be of value, except for the making of jelly. There are still about 1,000 of seedlings of the cross-bred apples planted on the farm, which have not yet fruited.

RASPBERRIES.

The raspberry plantation, consisting of several varieties, was a total failure this year, no fruit being produced, as a result of the total killing back of the canes last winter. The growth of 1905 was exceptionally luxuriant and continued until frost. As a consequence the wood went into winter quarters in a very green condition and was killed to the ground. For several years the canes have been bent down in the fall and covered with long horse manure. This manure was left between the rows as a mulch. Probably the land became too rich, resulting in abnormal and long continued growth of the canes. This is the first complete winter-killing of raspberries for many years.

STRAWBERRIES.

The Everbearing Alpine strawberry, planted in the spring of 1905, wintered well and bore fruit continuously most of the summer. The plot was small and the birds and boys made it impossible to get a record of the quantity of fruit. The fruit is of good size and flavour.

A new cross-bred seedling was received in the spring of 1906, from Prof. Hansen, of South Dakota. It is a cross between the Jessie and the Manitoba wild strawberry. The growth was vigorous and the few berries allowed to ripen were fine and large.

PLUMS.

During past years many cultivated varieties and seedlings have been tested, but in nearly all cases the fruit is too late in ripening.

The Native Manitoba plum is probably the stock from which our future plums will come. Persistent planting of pits and weeding out the poorer sorts will no doubt, in time, produce excellent plums, which will be early and hardy.

GOOSEBERRIES.

The winter was very hard on this fruit. Of twenty-five varieties under test the majority were winter-killed and there was very little fruit.

CURRANTS.

Thirty-three varieties of red, white and black currants are under test. The crop this year was light. Unfortunately, just at our busiest time, when it was impossible to give them attention, the currant worm did serious damage and reduced the crop to almost nothing.

Of the red currants the following are among the best in yield and quality: Pomona, Large Red, New Red Dutch and Red Dutch.

Of the white, the following: White Cherry, Verriers White and Large White.

Of the black, the following: Sterling, Standard and Star.

THE ARBORETUM.

No additions have been made to the Arboretum during the year. Many trees and shrubs have so increased in size that much thinning must be done before adding many other new varieties for testing.

The Russian poplars on the side hill are still further damaged by the fungus which is weakening the stems. Quite a few have been broken by the wind and have become unsightly.

But few of the cottonwoods are left. The leaf fungus is killing them one by one. On the low lands they do well.

Especial notice is called to the following hardy, handsome and very desirable ornamental trees:

Manitoba Maple (*Acer Negundo*), excellent in all situations; Native Paper or Canoe Birch (*Betula papyrifera*); American Mountain Ash (*Pyrus Americana*); White Spruce (*Picea alba*); Balsam Spruce (*Abies balsamea*); Tartarian Maple (*Acer tataricum*); Ginnalian Maple (*Acer tataricum Ginnala*); Sharp-leaved Willow (*Salix acutifolia*); Laurel-leaved Willow (*Salix pentandra*); Siberian Berried Crab (*Pyrus baccata*); American Elm (*Ulmus Americana*).

The following hardy and attractive flowering shrubs are especially recommended:

Siberian Pea Tree (*Caragana arborescens, C. frutescens pendula, C. pygmaea*); Native Hawthorn (*Crataegus coccinea*); Sharp-leaved Cotoneaster (*Cotoneaster acutifolia*); Common Cotoneaster (*C. integerrima*); Bush Honeysuckle (*Lonicera spinosa* and *L. tatarica*); Neillia (*Neillia opulifolia*); Philadelphus or Mock Orange (*Philadelphus grandiflora*).

The following may be added to this list: Spiraea (*Spiraea Van Houttei*); Lilacs (*Syringa vulgaris Charles X., S. v. alba gradiflora, Madame Casimir Perier,* and *S. Josikaea*).

PHILADELPHUS (MOCK ORANGE).

This beautiful shrub was for many years past considered too tender to be successfully grown in Manitoba, the wood killing back to the ground each winter. An experiment was made a few years ago to endeavour to preserve the wood by laying down and covering with manure. The experiment was successful, and since that time all of the specimens of this variety growing on the farm have been treated in a similar manner with the result that the bushes are covered each summer with their beautiful and extremely fragrant blossoms. There are several varieties growing on the farm, the best of which is the Philadelphus grandiflora.

VEGETABLE GARDEN.

LETTUCE.

This year a special test of all obtainable varieties of lettuce was made.

Forty-nine varieties were sown on May 1 by hand, in rows 2 feet apart. On account of the moist condition of the soil the germination was prompt and all the varieties were well represented. The results of the test are given below in their order of productiveness:—

Name.	Flavour.	Texture.	Weight per head. Lbs.	ozs.	Date went to Seed.	
Cos Trianon	Good	Tough	1	7	July	30
All Year Round	Good	Firm		8	"	20
Wheeler's Tom Thumb	Good	Tender		12	"	20
Neapolitan	Very good	Tender	1	3	"	20
Toronto Globe	Good	Firm	1	6	"	25
Trocadero	Fair	Tender		8	"	20
Red Edged Victoria	Sweet	Tender		11	"	1
Blond Stonehead	Good	Firm	1	5	"	28
White Paris Cos	Good	Firm	1	4	"	29
Paris Green Cos	Very good	Firm	1	2½	"	12
Simmers' Nonpareil	Fair	Loose	1	2	"	26
Giant Glacier	Fair	Tough	1	13	"	23
Early Green Curled	Very good	Tender	1	11	"	30
Early Curled Simpson	Poor	Loose	2	8	"	18
Denver Market	Good	Firm	1	12	"	21
Drumhead	Poor	Tough	1	11½	"	3
Early Hanson	Good	Firm	1	9	"	23
Early Prizehead	Poor	Loose	1	5	"	16
Big Boston	Fair	Loose	1	6	"	20
Toronto Gem	Good	Firm	1	6½	"	23
Grand Rapids	Very bitter	Tough	1	9	"	10
Asparagus	Poor	Tough	1	0	"	9
Maltese Cabbage	Fair	Tough	1	10	"	11
Gardener's Favorite	Sweet	Tender	2	4	"	25
Mignett	Good	Firm	0	12	"	10
Californian Cream Butter	Fair	Loose	1	15	"	22
Wonderful	Fair	Firm	1	15	"	25
Black Simpson	Fair	Firm	1	7	"	24
May King	Very good	Very tender	0	15	"	11
Tennisball White Seeded	Poor	Loose	2	0	"	23
Iceberg	Sweet	Firm	1	8	"	18
Hubbard Market	Sweet	Firm	0	15	"	23
Improved Salamander	Good	Loose	1	3½	"	20
Maximum	Good	Loose	0	12	"	16
Deacon	Fair	Loose	0	9	"	11
New York	Poor	Tough	1	6½	"	30
Buttercup	Sweet	Tender	0	8	"	23
Golden Queen	Good	Tender	1	8	"	8
Green Hammersmith	Poor	Bitter	0	15	"	6
Emperor William	Poor	Firm	1	0	"	23
Large Yellow Butter	Poor	Tough	1	1	"	6
Giant Crystal Head	Very sweet	Tender	1	2½	"	15
Black-seeded Tennisball	Sweet	Tender	1	2	"	20
Cold Frame Cabbage	Good	Loose	1	5	"	8
Continuity	Very good	Tender	1	7	"	18
Large Boston Market	Good	Lo[illegible]	0	6½	"	8

BEANS.

In like manner a special test was made of all obtainable varieties of beans.

Twenty-five varieties were sown on May 31, and all germinated well. All varieties did well, and all ripened their seeds. Below is given, in tabular form, the results of this test, coupled with short notes on those kinds deemed worthy of special mention. Sown by hand in rows 30 inches apart, and afterwards thinned to 3 inches apart in the row.

Name of Variety.	Ready	Number in Pod.	Productive.	Length of Pod.	Colour.	Flavour.
	July.			Inches.		
White Seeded Wax	27	6	Very	6	Light yellow	Very good.
Black Seeded Wax	27	5	"	4	" "	Fair.
Giant Dwarf Bean	28	7	"	7	Dark "	Very good.
Flageolet	27	6	Fairly	5	" "	"
Davis White Wax	26	6	Very	4½	Light "	"
Golden Wax	25	4	Fairly	4½	Dark "	"
Keeney's Wax	29	4	Very	4½	Light "	Good.
Wardwell's Wax	26	5	Fairly	4	Dark "	Fair.
Detroit Wax	23	4	"	4	" "	Good.
Saddleback	24	5	"	5	Light "	Very good.
Early Golden Wax	22	4	"	5¼	Dark "	"
Early Giant Wax	22	4	Very	6¼	" "	"
Improved Prolific	26	4	Fairly	3½	Light "	Good.
Golden Eyed Wax	29	4	"	4¾	" "	"
Currie's Rust Proof	28	5	Very	5	Dark "	"
Thorburn's Stringless	28	4	"	4½	Light "	"
Pencil Pod Wax	29	4	Fairly	5	Dark "	Fair.
Round Pod Kidney	29	5	"	3½	Light "	"
Dwarf Extra Early	21	4	Not very	5	Green	"
Dwarf Golden Stringless	23	4	Fairly	4½	Light yellow	Good.
Gloire de Vitry	21	5	"	5¾	Green	Very good.
Dwarf Black Speckled	22	5	Very	6	"	"
Dwarf Wax Every Day	22	4	"	4	Yellow	Fair.
Emperor of Russia	23	5	"	6	Green	Very good.
Dwf. Matchless	26	4	Fairly	5	"	"

The following varieties are worthy of special mention:—

Gloire de Vitry.—A green bean of fair length and very productive.

Early Giant Wax.—A yellow bean producing a fairly long pod and very productive; a good variety for general purposes.

Dwarf Matchless.—A green podded bean, long and fairly productive.

Emperor of Russia.—This is a very fine bean, of excellent quality. The pods are borne in great profusion and very productive.

GARDEN TURNIPS.

Garden turnips were a very unsatisfactory crop this season, their quality for table use being very poor, doubtless on account of so much dry weather. Four varieties, viz., Early Stone, White Milan, Early White Strapleleaved and Robertson's Golden Ball were sown with a hand drill on May 15 in rows 30 inches apart, Robertson's Golden Ball being by far the best.

BEETS.

Five varieties of beets, viz., Nutting's Dwarf Improved, Long Blood Red, Egyptian Beet, Extra Early and Extra Early Blood Red, were sown with a hand drill in rows 30 inches apart on April 29, and the sample of roots was far below the average. Extra Early Blood Red was the heaviest, yielding at the rate of 520 bushels 32 lbs. per acre.

ONIONS.

The onion crop this year was very satisfactory. Seven varieties were sown on April 11 with Planet Junior hand drill, in rows one foot apart. The seed germinated readily and all varieties ripened well. The yield came well up to the average. In the following table they are arranged in the order of productiveness.

Name of Variety.	Ripe.	Colour.	Harvested.	Yield per Acre.	
				Bush.	Lbs.
Danver's Yellow Globe	Sept. 6	Light yellow	Sept. 15	527	33
Trebon's Yellow	" 6	"	" 15	560	24
Market Favourite Keeping	" 6	Dark yellow	" 15	490	..
Prize-taker Red Globe	" 3	" red	" 15	532	15
Giant Yellow Globe	" 6	Yellow	" 15	521	..
Giant Prize-taker	" 12	"	" 15	426	13
Australian Brown	" 13	Light brown	" 15	315	..

PARSNIPS.

Two varieties of parsnips were tested this year, viz., Hollow Crown and Elcombe's Giant. They were sown in rows one foot apart and thinned to about 6 inches apart. Hollow Crown gave by far the best results both in size and flavour.

SQUASH AND PUMPKINS.

Several varieties of squash and pumpkins were tested this year, including the English vegetable marrow, which is greatly appreciated as a vegetable. It was undoubtedly the best of the varieties tried. Pumpkins failed to ripen, with the exception of one named 'Sweet or Sugar.'

CABBAGES.

Eleven varieties of cabbage were sown under glass April 5, and when large enough to handle were transplanted to boxes and set in a cold frame. They were planted outside on May 22. All the plants survived and did well. In the following table they are arranged in order of their earliness:—

Variety.	Ready for use.	Description.	Average weight.
			Lbs.
Early Paris	June 28	Poor	6½
Fottler's Improved	July 15	Solid	7
Extra Early Express	" 3	Very firm	6¼
Early Winningstadt	" 1	"	5½
Express	" 10	Firm	7
Paris Market	" 10	Good	8½
Late Dutch Drumhead	Sept. 1	Very firm	13
Quintal Drumhead	Aug. 5	Very good	10
Early Jersey Wakefield	July 10	Good	6½
Green Globe Savoy	Sept. 1	Rather loose	9
Dark Red Dutch	Aug. 15	Very small	4

CARROTS.

Two varieties of carrots, viz., Early French Horn and Intermediate were sown on April 20 with hand drill, in rows eighteen inches apart. The crop was below the average yield, the roots being very small and deformed.

CAULIFLOWER.

Three varieties of cauliflowers were tested this season. Earliest Erfurt was the best. The seed was sown under glass, April 5, and when the plants were large enough to handle they were pricked off into boxes and transplanted May 23 to the open ground. The following are the results in order of earliness.

Variety.	Ready for use.	Description.	Average weight.
			Lbs.
Early Paris	June 28	Poor	2½
Early Snowball	" 30	Fairly good	3
Earliest Erfurt	July 20	Very good	4¼

CUCUMBERS.

The cucumber crop was a very satisfactory one, both in yield and quality. Six varieties, viz., Short Green Gerkin, Improved Long Green, Cumberland, Giant Pera, Long Parisian, Short Green, were sown on May 31 in hills six feet apart each way. Some plants of the Telegraph were grown under glass, which kept up a large supply of cucumbers all summer, some measuring 25 inches long.

GARDEN PEASE.

Four varieties of garden pease, viz., American Wonder, Shropshire Hero, Yorkshire Hero and Nott's Excelsior, were sown in the open on May 3rd in double rows 3 feet apart. The germination was good and a splendid crop was gathered. A late variety, Shropshire Hero, was sown on the 15th of June and produced an abundant crop all through September.

TOMATOES.

Two varieties of tomatoes, viz., Earliana and Early Dwarf Stone, were grown. The latter did not do well, only a comparatively few ripening. The former, on the other hand, did remarkably well, giving a continuous and heavy crop of most excellent fruit from August 5 till the first heavy frost late in September.

SWEET CORN.

Three varieties of corn were sown this year, but none of them ripened any seed. The following are the results obtained from this test:—

Varieties.	Sown.	Ready for use.	Flavour.
New Premo	May 15	Aug. 10	Very good.
Extra Early White Cory	" 15	" 10	"
Sweet Peep o'Day	" 15	" 21	Good.

THE FLOWER GARDEN.

The flower garden this year proved a great attraction to visitors, and drew forth much favourable comment. The mixed border was especially admired, the combination of the various colours of annuals and perennials forming a magnificent display.

Owing to the very bright weather experienced during the early spring, large healthy plants were available at planting out time. Thirty-eight varieties were sown in boxes under glass between April 1 and 15, transplanted April 19 to 30, and bedded out June 1 to 5. Some seeds of several varieties, saved from plants grown on the farm the previous year, were sown for comparison with imported seed. The germination was good, while the resulting flowers showed very little deterioration from their originals. Asters were a great success, and produced fully 85 per cent of perfect blossoms.

ANNUALS SOWN OUTSIDE.

A large variety of annuals were sown in the open borders on May 1 Owing to a very favourable spring, they germinated well and made a fine display of bloom which lasted well on to the end of September.

IRIS.

A number of Iris bulbs were received from the Central Experimental Farm in the fall of 1905, and were planted in the perennial border on the hillside, among these were English Iris (*Iris Anglica*) and Spanish Iris (*Iris Hispanica*), but these are too tender for this climate. An experiment was tried to protect them by placing over them a heavy covering of about 4 feet of strawy manure. The covering was taken off in the spring, but on examination, the bulbs were found to be rotted.

TULIPS.

A consignment of Tulip bulbs, received from Ottawa in the fall of 1905, was planted in the flower garden, in beds occupied during the summer by annuals. Nearly all grew and made a fine display of colour during the spring months, which was greatly appreciated at a time when flowers are extremely scarce. As soon as the tulips were over, annuals were planted between the rows, care being taken to avoid injuring the bulbs, and thus an almost constant succession of flowers was kept up during the entire season.

PEONIES.

Nearly all the older varieties under test bloomed well. Several varieties of Japanese peonies were received from the Central Experimental Farm in the fall of 1905, and planted in the collection of perennials. All came through alive last spring, and most of them flowered, making a valuable addition to the stock of perennials.

DAHLIAS.

On May 28, a consignment of Dahlias was received from the Central Farm, consisting of the following varieties, and although they were planted late, some very fair blooms were produced.

Grand Duke Alexis,	Mrs. Beedle,
Prince of Orange,	Louis Hariot,
Mrs. Chas. Turner,	Clifford W. Bruton,
Lady H. Grosvenor,	Prince Imperial,
Capstan,	Cactus Queen,
Empress of India,	Nymphæa,
Mrs. Pearce,	Ernest Glasse,
Wm. Agnew,	Kynerith,
Mrs. Langtry,	Iridescent,
Harry Stredwick,	Cochineal,
Jessie McIntosh,	Cannell's Gem.

CANNAS.

A number of cannas were also received from Ottawa in the spring of 1906. These were potted on arrival and placed in the greenhouse to give them a start. As soon as the weather permitted, they were planted outside, and all flowered well, among them were some very fine specimens. On October 12, all were lifted and removed to the cellar of the Superintendent's house.

NARCISSUS.

This beautiful spring-flowering bulbous plant gets winter-killed unless given exceptionally heavy covering. Last season some bulbs of the varieties known as Sir Watkin, Emperor and Barri Conspicuus, were planted in the fall and came up and flowered beautifully in the spring. This gives us reason to hope that we may yet succeed in growing this extremely beautiful flower.

ROSES.

Fourteen varieties of roses were received from the Central Experimental Farm in the spring of 1906, only seven of which were alive when winter set in. These are named in the following list. They were laid down, and covered with soil for winter protection.

Mercédès,
Belle Poitevine,
Roseraie de l'Hay,
Rugosa Alba,
Souvenir de Philemon Cochet,
Delicata,
Madam Plantier.

DISTRIBUTION OF GRAIN, POTATOES, FOREST TREES, SHRUBS, &c.

Seedling trees and shrubs, packages	350
Potatoes in 3 lb. bags	180
Wheat in 3 lb. bags	162
Oats in 3 lb. bags	80
Barley in 3 lb. bags	50
Pease in 3 lb. bags	18
Maple seed in 1 lb. bags	50
Rhubarb seed in papers	12
Total	902

Number of farmers reporting on their experience on	oats	5
" " " "	wheat	12
" " " "	barley	2
" " " "	potatoes	60

Largest yield from 3 lbs.	wheat (Red Fife)	110 lbs.
" " 3 "	oats (Banner)	68 "
" " 3 "	barley (Mensury)	48 "
" " 3 "	potatoes (Rochester Rose)	210 "
" " 3 "	pease (Macoun)	26 "

METEOROLOGICAL OBSERVATIONS FOR BRANDON, MAN.

Months.	Highest Temperature.		Lowest Temperature.		Total Rainfall.	Total Snowfall.	Total Sunshine.
1905.	Day.	Deg.	Day.	Deg.	Inches.	Inches.	Hours.
December	11	37	3	—24	....	6·0	93·1
1906.							
January	31	38	22	—34	....	....	118·3
February	9	47	10	—36	....	....	127·1
March	29	58	22	—15	....	....	150·1
April	17	83	4	6	0·98	....	197·7
May	11	84	6	15	3·24	0·20	137·2
June	13	84	22	35	4·13	....	191·9
July	10	91	17	38	1·67	....	256·2
August	13	94	31	35	2·10	....	233·3
September	7	100	29	26	0·86	....	220·3
October	2	74	30	10	0·97	0·6	159·1
November	5	47	20	—16	....	20·9	82·5
December	19	26	12	—38	....	41·0	63·7
1907.							
January	2	17	15	—44	....	24·5	124·1
February	17	36	5	—46	....	2·5	151·1
March	24	46·8	13	—17·2	0·15	14·0	193·0

VISITORS.

During the year a very large number of farmers and others, estimated at about 15,000 in all, have visited the farm.

The Women's Press Association of Pennsylvania, to the number of 150, made a careful inspection in June.

The General Press Association of the United States, during their stay in Brandon, paid particular attention to the farm.

Many of the Bankers' Excursion from the United States were especially anxious to learn of the agricultural possibilities of the province, as shown in the crops and records here.

A considerable deputation representing Australian investors spent much time on the farm, gathering information for their report to those who sent them.

Numbers from New Zealand, the Argentine, India, Japan (including the Hon. Tatsugoro Nossé, Consul General) and many of the European countries were all intent upon learning of the possibilities in the Canadian West.

Owing to some misunderstanding between the Farmers' Institutes and the Grain Growers' Association, there were no farmers' excursions to the Brandon Experimental Farm during the year.

EXHIBITION WORK.

Large quantities of samples for exhibition purposes were prepared for the Exhibition Branch and the Immigration Department of the Federal Government. These were sent to the British Isles and foreign countries.

Exhibitions were prepared and placed at the Brandon Summer and Winter Fairs. These received much attention and favourable comment.

CORRESPONDENCE.

Since the issue of the last annual report 4,114 letters were received and 4,089 answered, irrespective of circulars sent out.

MAILING LIST.

Residents of Manitoba who desire to receive copies of the separate annual report for this province, will please write to the Superintendent at Brandon, and their names will be put on the mailing list. Those desiring the full report and bulletins should make application to the Director of Experimental Farms, Ottawa.

I have the honour to be, sir,

Your obedient servant,

N. WOLVERTON,

Superintendent.

16—29

CATTLE AT EXPERIMENTAL FARM, INDIAN HEAD, SASK.

EXPERIMENTAL FARM FOR SASKATCHEWAN

EXPERIMENTAL FARM, INDIAN HEAD, SASK.,
March 30, 1907.

DR. WM. SAUNDERS, C.M.G.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit to you the nineteenth annual report of the operations on the Experimental Farm for the Province of Saskatchewan, at Indian Head, Sask., during the year 1906.

The past season was on the whole favourable for crops of all sorts over this province and Alberta. Spring wheat, oats and barley gave good crops as a rule, in all sections of the country.

Very little snow fell in the winter of 1905-06, and little or no severe weather was experienced anywhere.

Spring opened early in April with seeding under full headway by the 10th. No delay was caused by unfavourable weather, and as the soil was never before in a better condition for the horses and drills, the work was quickly completed.

Grain germinated evenly, and with abundant moisture in nearly all sections of the country, the growth was very satisfactory. At one time it promised a repetition of 1905's immense crop of straw, but fortunately a warm wave passed over the country early in July, checking the excessive growth. A second hot wave on August 13, brought in the harvest with a rush, but at the same time reduced the yield by several bushels per acre.

Harvest was general on August 20, and the weather being ideal for the work, it was early and inexpensively completed.

Threshing started without delay on completion of harvest, and like the harvest was finished the earliest on record.

The crops on the Experimental Farm were not as satisfactory or abundant as in the preceding year, but were much more easily harvested and threshed, and on the whole gave good returns.

The first and only hailstorm that has ever injured crops on the Experimental Farm passed over it on July 24. All crops were injured more or less, but the fields of Red Fife, Stanley, Percy and Huron wheats, and two-rowed barley, on the southeast part of the farm received the greatest damage. This hailstorm passed in a south-easterly direction, and unfortunately did great damage to many fine fields of grain for 10 miles.

EXPERIMENTS WITH WHEAT.

The crop of wheat on experimental plots and field lots was very promising until the hailstorm passed over the farm. In no case was the straw extra heavy or lodged. While it is impossible to say how much, the yields were reduced by the hail, about one-third of the grain when threshed was found to be quite small and shrunken, caused, no doubt, by he straw being broken down and the circulation being stopped, as at the time the grain was only partially filled.

SPRING WHEAT—TEST OF VARIETIES.

Sixteen varieties were sown on April 11, on backsetting, soil clay loam, at the rate of 1½ bushels of seed per acre. Sown by the drill. Size of plots, one-twentieth acre.

WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw including Head.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per measured bushel after cleaning.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs.
1	White Fife	Aug. 21	132	47	Strong....	4	Bald......	5,580	48	40	59½
2	Preston (Ottawa Selected)..	" 16	127	46	"	4	Bearded..	4,280	46	..	61
3	Stanley	" 13	124	46	"	3¾	Bald......	6,280	45	20	60
4	Bishop	" 8	119	46	"	3¼	"	3,380	44	..	61
5	Early Java	" 24	135	43	"	4¼	Bearded..	2,580	44	..	61¾
6	Red Fife	" 22	133	44	"	3¾	Bald......	6,300	43	40	62½
7	Laurel	" 20	131	44	Medium..	4	"	4,100	43	40	62
8	Huron (Ottawa Sel.)	" 18	129	42	Strong....	3¾	Bearded..	6,440	42	40	60
9	Huron	" 10	121	42	"	3½	" ..	4,180	42	20	61
10	Herisson Bearded	" 17	128	46	"	2½	" ..	3,460	42	20	62½
11	Red Fern	" 10	121	50	"	4	" ..	2,980	42	..	62
12	White Hungarian	" 10	121	41	"	4	" ..	4,880	41	20	61¾
13	Percy	" 13	124	44	"	3¼	Bald......	3,820	41	20	61
14	White Russian	" 21	132	46	"	3½	"	4,580	41	..	60½
15	White Fife (Ottawa Sel.)..	" 23	134	48	"	3	"	5,220	41	..	61½
16	Colorado	" 10	121	47	"	4	Bearded..	5,120	39	40	62¾
17	Preston	" 10	121	40	"	3½	" ..	3,800	39	20	61
18	Pringle's Champlain	" 10	121	44	"	3½	" ..	4,700	39	..	61
19	Laurel (Ottawa Sel.)	" 24	135	47	"	4	Bald......	4,860	39	..	59½
20	Percy (Ottawa Sel.)	" 15	126	46	"	3½	" ..	4,500	37	..	60
21	Stanley (Ottawa Sel.)..	" 15	126	48	"	4¼	" ..	5,800	36	40	59½
22	Riga	" 10	121	43	"	3	" ..	3,200	35	20	60½

WHEAT—TEST OF VARIETIES IN FIELD LOTS.

Nine varieties of wheat were sown in field lots, on fallowed land, clay loam, at the rate of 1½ bushels of seed per acre. Huron, Red Fife, Stanley and Percy would have been higher up in the list but for the injury by hail.

WHEAT—TEST OF VARIETIES IN FIELD LOTS.

Name of Variety.	Size of Plot.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Length of Straw including head.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.		Weight per measured bushel after cleaning.
	Acres.				In.		In.		Bush.	Lbs.	Lbs.
Preston	9¾	Apl. 13	Aug. 15	124	44	Strong ...	3½	Bearded..	38	18	
Pringle's Champlain	4¾	" 12	" 17	127	42	Medium..	3½	" ..	36	34	
Bishop	1	" 17	" 13	118	44	" ..	3¼	Bald	34	23	
Huron	3	" 16	" 13	119	43	Strong ...	3½	Bearded..	34	..	
Riga	1½	" 17	" 13	118	43	" ...	3	Bald	29	15	61
Red Fife	16½	" 14	" 22	130	44	" ...	3	"	26	31	
Stanley	3¾	" 13	" 13	122	47	" ...	3½	"	25	8	
Percy	3½	" 13	" 13	122	47	" ...	3¼	"	24	51	
White Fife	2	" 14	" 23	131	49	" ...	3½	"	24	51	

WHEAT CROP AND AVERAGE YIELD.

Variety.	Cultivation.	Acres.	Yield per Acre.		Total Yield.	
			Bush.	Lbs.	Bush.	Lbs.
Preston	Fallow	9¾	38	18	373	26
Pringle's Champlain	"	4¾	36	34	173	42
Bishop	"	1	34	23	34	23
Huron	"	3	34	..	102	..
Riga	"	1½	29	15	43	53
Red Fife	"	16¼	26	31	430	36
Stanley	"	3¾	25	8	94	14
Percy	"	3½	24	51	87	..
White Fife	"	2	24	51	49	42
		45½			1,388	56

An average of 30 bushels 31 pounds per acre.

WHEAT.—FOUR YEARS, COMPARISON OF FIELD LOTS.

Below are shown the average yield per acre and average time to mature of five varieties of wheat, grown under similar conditions for the past four years.

Variety.	Average Days to Mature.	Days earlier than Red Fife.	Average Yield per Acre.	
			Bush.	Lbs.
Huron	128½	11	41	6
Preston	130	9½	40	18
Red Fife	139½		36	..
Stanley	130	9½	32	58
Percy	131	8½	29	51

WHEAT.—TEST OF FERTILIZERS.

Six plots of one-fortieth acre each were sown with Red Fife wheat on April 11, by hoe-drill, at rate of 1½ bushels per acre. Soil clay loam.

Fertilizers per Acre.	Date of Ripening.		No. of Days Maturing.	Length of Straw including Head.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per measured bushel after cleaning.
				In.		In.	Lbs.	Bush.	Lbs.	Lbs.
Plot No. 1—Nitrate of soda, 100 lbs. per acre (half sown when grain was 2-in. high, balance when 6-in. high)	Aug.	25	136	44	Strong	4	6,240	38	..	60
Plot No. 2—Nitrate of soda, 200 lbs. per acre (half sown when grain was 2-in. high, balance when 6-in. high)	"	25	136	44	"	4	5,240	38	..	60¾
Plot No. 3—Superphosphate No. 1, 400 lbs. per acre (sown before grain and harrowed)	"	25	136	44	"	4	6,880	38	20	60
Plot No. 4—Check plot, unfertilized	"	25	136	42	"	4	4,800	35	20	61
Plot No. 5—Muriate of potash, 200 lbs. per acre (sown before grain and harrowed)	"	25	136	43	"	4	5,760	48	40	60½
Plot No. 6—Superphosphate No. 1, 200 lbs. per acre; muriate of potash, 100 lbs. per acre; nitrate of soda, 100 lbs. per acre (half sown before grain and harrowed, balance when grain was 2-in. high)	"	25	136	43	"	4	3,520	37	20	59

MACARONI WHEAT.—TEST OF VARIETIES.

Four varieties were sown on April 11, on backsetting, clay loam, at rate of 1½ bushels seed per acre. Plots one-twentieth acre.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw including Head.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per bushel.
			In.		In.		Lbs.	Bush.	Lbs.	Lbs.
Yellow Gharnovka........	Aug. 22	133	52	Medium..	2½	Bearded..	2,040	52	40	64½
Goose..........	" 22	133	50	" ..	2¾	" ..	2,360	51	40	65½
Mahmoudi.....	" 23	134	43	" ..	2¼	" ..	2,100	49	..	64
Roumanian........	" 22	133	48	" ..	2¾	" ..	2,320	47	40	66

EMMER AND SPELT.

Two varieties of Emmer and two of Spelt were sown on April 17, on one-twentieth acre plots of backsetting, clay loam, by hoe-drill. One-half acre of Common Emmer was also sown on April 25.

Name of Variety.	Date of Ripening.	No of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.
			In.		In.		Lbs.	Lbs.
Red Spelt................	Aug. 21	126	38	Strong...	3½	Bald.....	3,800	3,600
Common Emmer.....	" 20	125	33	Medium .	2	Bearded..	3,440	3,220
White Spelt	" 24	129	37	Strong...	5	Bald.....	4,540	3,160
Red Emmer..............	" 24	129	36	" ...	3¼	Bearded..	4,400	2,980
Common Emmer...... ..	" 20	117	43	Weak....	2	" ..	....	2,680

SUMMER FALLOWS.

In view of the great importance of properly preparing land for crops, and of the large number of new settlers coming into the country, I make no excuse for repeating what was said in my last three reports respecting summer-fallows, and breaking up and cultivating new prairie land.

It is very gratifying to know that throughout the Northwest, summer-fallowing is rapidly becoming general. No matter where farming is carried on, the farmers realize that to be sûre of a crop they must prepare a portion of their land the year before the crop is grown, and apart from the value of the stored moisture, there is the inestimable advantage of keeping weeds from overrunning the farm.

The true worth of properly prepared fallows has been clearly demonstrated in past years in every grain-growing district of Saskatchewan.

The work of preparing land for crop by fallowing is carried on in so many ways in different parts of the Northwest, that perhaps a few words on some of the methods employed may be of help to at least some of the new settlers.

It has been observed in Alberta and Saskatchewan that the land to be fallowed is not, as a rule, touched until the weeds are full grown and in many cases, bearing fully matured seed. It is then ploughed.

By this method, which, no doubt, saves work at the time, the very object of a summer-fallow is defeated. In the first place, moisture is not conserved because the land has been pumped dry by the heavy growth of weeds; and, secondly, instead of using the summer-fallow as a means of eradicating weeds, a foundation is laid for years of labour and expense by the myriads of foul seeds turned under.

The endless fields of yellow-flowered weeds, generally Ball Mustard (*Neslia paniculata*), testify to the indifferent work done in many districts, and, while no weed is more easily eradicated by a good system of fallows, there is no weed that is more easily propagated or takes greater advantage of poor work on fallows or of fall or spring cultivation.

As has been pointed out in my previous reports, early and thorough work on fallows is absolutely necessary to success, and I here repeat the methods and results of tests carried on for some years past.

First Method.—Ploughed deep (6 to 8 inches) before last of June; surface cultivated during the growing season, and just before or immediately after harvest ploughed 5 or 6 inches deep.

Result.—Too much late growth if season was at all wet; grain late in ripening, and a large crop of weeds if the grain was in any way injured by winds.

Second Method.—Ploughed shallow (3 inches deep) before the last of June; surface cultivated during the growing season, and ploughed shallow (3 to 4 inches deep) in the autumn.

Result.—Poor crop in a dry year; medium crop in a wet year. Not sufficiently stirred to enable soil to retain the moisture.

Third Method.—Ploughed shallow (3 inches) before the last of June; surface cultivated during the growing season, and ploughed deep (7 to 8 inches) in the autumn.

Result.—Soil too loose and does not retain moisture. Crop light and weedy in a dry year.

Fourth Method.—Ploughed deep (7 to 8 inches) before the last of June; surface cultivated during the growing season.

Result.—Sufficient moisture conserved for a dry year, and not too much for a wet one. Few or no weeds, as all the seeds near the surface have germinated and been killed. Surface soil apt to blow more readily than when either of the other methods is followed. For the past fourteen years, the best, safest and cleanest grain has been grown on fallow worked in this way, and the method is therefore recommended.

Fallows that have been ploughed for the first time after the first of July, and especially after July 15, have never given good results; and the plan too frequently followed of waiting till weeds are full grown, and often ripe, and ploughing under with the idea of enriching the soil, is a method that cannot be too earnestly advised against.

In the first place, after the rains are over in June or early in July, as they usually are, no amount of work, whether deep or shallow ploughing, or surface cultivation, can put moisture in the soil. The rain must fall on the first ploughing and be conserved by surface cultivation.

Weeds, when allowed to attain their full growth, take from the soil all the moisture put there by the June rains, and ploughing under weeds with their seeds ripe or nearly so, is adding a thousand-fold to the myriads already in the soil, and does not materially enrich the land.

METHODS OF PREPARING NEW GROUND.

In view of the fact that every year brings to the Northwest many new settlers who are unacquainted with the methods of breaking up and preparing new land for crop, a few suggestions with regard to this very important work may not be amiss.

In all sections where the sod is thick and tough, breaking and back-setting should be done; while in districts where scrub abounds and the sod is thin, deep breaking is all that is necessary.

The former is generally applicable to the southern parts of Saskatchewan and the latter to Alberta and the northern parts of Saskatchewan, where the land is more or less scrubby.

SHALLOW-BREAKING AND BACK-SETTING.

The sod should be turned over as thin as possible, and for this purpose a walking plough with a 12 or 14-inch share, is the best. When the breaking is completed (which should not be later than the second week in July), rolling will hasten the rotting process and permit back-setting to commence early in August.

Back-setting is merely turning the sod back to its original place, and at the same time bringing up two or three inches of fresh soil to cover it. The ploughing should be done in the same direction as the breaking and the same width of furrow turned. Two inches below the breaking is considered deep enough, but three to four inches will give better results.

After back-setting, the soil cannot be made too fine, and the use of disc or Randall harrow to cut up every piece of unrotted sod, will complete the work.

DEEP BREAKING.

Deep breaking, which in many sections of the country is the only practicable way of preparing new land, and which is, unfortunately, done in some instances where breaking and back-setting would give more satisfactory results, consists in the turning over of the sod as deeply as possible, usually from four to five inches.

When the sod has rotted, the top soil should be worked and made as fine as possible. The use of harrow and disc will fill up all irregularities on the surface, and make a fine, even seed-bed.

Whether the land is broken shallow or deep, it is necessary to have the work completed early, so as to take advantage of the rains which usually come during June or early in July. These rains cause the sod to rot, and without them, or if the ploughing is done after they are over, the sod remains in the same condition as when turned, and no amount of work will make up for the loss.

To some districts near the foot-hills of the mountains and in districts where scrub abounds and the sod is thin, these remarks may not apply; but as a rule, throughout the Northwest early breaking, whether deep or shallow, is advisable.

WORKING LAND AFTER FIRST CROP.

Inquiries are often made as to what should be done after taking off the first crop on new land, the question being as to whether the land should be ploughed, or cultivated, or sown without any cultivation whatever.

This, however, can only be determined by circumstances. In districts with heavy clay soil, a satisfactory crop may be expected from burning the stubble of the former crop and sowing with or without cultivation, although a shallow cultivation after the stubble is burnt usually gives the best results.

In districts with light soils and especially with gravelly subsoil, cultivation before seeding is necessary.

After taking the second crop from breaking or back-setting, there can be no doubt that the land should be well fallowed to put it in proper condition for succeeding crops. If the fallow is well made and the process repeated every third year, the settler will have started on the right road to future success.

EXPERIMENTS WITH OATS.

The oat crop, except in the small plots, was disappointing. The hail on July 24, and the excessive heat on August 13, the first coming just when the grain was forming and the latter before it had matured, were a combination against large yields.

The uniform plots were sown on Western Rye Grass sod, broken up the previous year. The field lots were on fallowed land.

OATS—TEST OF VARIETIES.

Thirty-nine varieties were sown on April 23, on one-twentieth acre plots of back-setting. Soil, clay loam. Sown by hoe drill, at rate of 2 bushels of seed per acre.

OATS—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw includ'g Head.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per measured bush. after cleaning.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs.
1	Banner	Aug. 22	121	46	Medium	9	Branching	3,220	128	28	40
2	Bavarian	" 22	121	45	"	8	"	2,980	124	4	38
3	Improved Ligowo	" 20	119	48	"	9	"	4,020	122	32	37
4	Goldfinder	" 24	123	46	"	9	"	2,820	119	14	38
5	White Giant	" 13	112	48	Strong	9	"	3,060	117	2	37½
6	Golden Fleece	" 20	119	44	"	9	"	3,980	115	30	38½
7	Kendal Black	" 22	121	47	"	10	Sided	5,800	115	10	41
8	Mennonite	" 17	116	44	Medium	8	Branching	5,120	114	24	39
9	Golden Beauty	" 21	120	47	"	10	"	4,260	114	4	39
10	Thousand Dollar	" 18	117	47	"	8	"	3,840	112	12	38
11	Irish Victor	" 20	119	48	"	9	"	3,740	112	12	38½
12	Golden Giant	" 24	123	44	Strong	10	Sided	3,780	112	12	38
13	Columbus	" 22	121	47	Medium	9	Branching	2,500	111	26	38
14	Improved American	" 20	119	45	"	9	"	5,000	111	26	39
15	Holstein Prolific	" 20	119	50	Strong	9	"	3,080	111	6	38
16	Sensation	" 22	121	47	Medium	10	"	4,020	109	14	40
17	American Triumph	" 20	119	46	"	8	"	4,120	108	8	38
18	Joanette	" 18	117	42	Strong	8	"	3,340	107	22	37
19	Kendal White	" 23	122	45	Medium	9	"	4,100	107	2	39
20	Milford White	" 23	122	50	"	9	Sided	2,960	105	30	40½
21	Twentieth Century	" 21	120	48	"	9	Branching	3,860	103	18	38½
22	Tartar King	" 20	119	49	"	11	Sided	2,880	103	18	39½
23	Danish Island	" 18	117	38	Strong	9	Branching	3,260	102	32	38
24	Lincoln	" 20	119	46	Medium	9	"	3,340	102	32	39
25	Welcome	" 20	119	48	"	9	"	4,300	102	32	40
26	Waverley	" 22	121	49	"	10	"	2,140	102	12	40
27	Pioneer	" 16	115	48	Strong	8	"	5,780	100	..	40
28	American Beauty	" 20	119	45	Medinm	10	"	2,240	98	28	36
29	Siberian	" 23	122	47	"	9	"	2,940	97	2	36
30	Swedish Selected	" 17	116	48	"	8	"	4,760	95	10	38½
31	Wide Awake	" 16	115	38	Strong	8	" "	2,780	94	24	38
32	Black Beauty	" 20	119	44	Weak	8	"	3,540	94	24	39
33	Olive Black	" 16	115	50	Medium	10	Sided	5,140	93	18	..
34	Abundance	" 14	113	43	Strong	9	Branching	3,280	92	32	38
35	Storm King	" 22	121	52	Medium	11	Sided	3,940	90	20	39
36	Virginia White	" 21	120	48	"	9	Branching	2,340	87	22	41½
37	Milford Black	" 20	119	47	Strong	10	Sided	4,020	87	22	39
38	Buckbee's Illinois	" 14	113	48	"	10	Branching	4,560	87	2	38½
39	Baxter's July	" 2	101	50	Weak	6	"	2,380	78	8	34

Oats—Field Lots.

Eleven varieties were sown in field lots, on clay loam, fallowed, at rate of two bushels seed per acre.

Name of Variety.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw including head.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	
	Acres.				In.		In.		Bush.	Lbs.
Banner	11¼	April 20	Aug. 16	118	48	Strong..	9	Branching	87	21
Black Beauty	2¼	" 23	" 11	110	44	" ..	9	" .	81	6
Wide Awake	4¾	" 21	" 16	117	44	" ..	9	" .	80	20
White Giant	4	" 20	" 11	113	47	" ..	9	" .	79	26
Abundance	2½	" 23	" 16	115	46	" ..	8	" .	77	28
Goldfinder	1¾	" 23	" 13	112	48	" ..	8	" .	77	2
Danish Island	5¼	" 20	" 13	115	40	" ..	9	" .	73	30
Tartar King	4¼	" 23	" 10	109	52	" ..	8	Sided.....	73	12
Thousand Dollar	5	" 21	" 10	111	38	" ..	8	Branching	63	10
Improved Ligowo	5¼	" 21	" 10	111	46	" ..	8	" .	63	9
Welcome	2¾	" 21	" 11	112	37	" ..	8	" .	59	25

Average and Total Yield.	Acres.	Yield per Acre.		Total Yield.	
		Bush.	Lbs.	Bush.	Lbs.
Banner	11¼	87	21	985	24
Black Beauty	2¼	81	6	182	22
Wide Awake	4¾	80	20	382	27
White Giant	4	79	26	319	2
Abundance	2½	77	28	194	9
Goldfinder	1¾	77	2	134	38
Danish Island	5¼	73	30	387	30
Tartar King	4¼	73	12	311	26
Thousand Dollar	5	63	10	316	16
Improved Ligowo	5¼	63	9	332	6
Welcome	2¾	59	25	164	9
	49	....	....	3,712	5

An average yield of 75 bushels 25 pounds per acre.

OATS.—FOUR YEARS COMPARISON OF FIELD LOTS.

Below are shown the average yield per acre and time to mature of eight varieties of oats, grown under similar conditions for the l--t four years.

Variety.	Average Days to Mature.	Average Yield per Acre.	
		Bush.	Lbs.
Banner	116¾	99	32
Wide Awake	116½	88	14
Abundance	118¼	87	17
Black Beauty	115¼	86	31
Goldfinder	116½	84	3
Thousand Dollar	114¼	79	10
Tartar King	112½	78	27
Improved Ligowo	115¼	78	9

EXPERIMENTS WITH BARLEY.

The yield of barley was satisfactory except from five varieties grown on the south part of the farm, where hail did the greatest damage. These were Invincible, Standwell, Sidney and Canadian Thorpe, in two-rowed and Royal in six-rowed varieties. While the other lots, as well as the uniform test plots, were struck with the hail, the injury was comparatively small.

The uniform plots of barley, like the oat and wheat plots, were grown on Western Rye Grass sod, and the field lots on fallowed land.

BARLEY—TEST OF VARIETIES.

Fourteen varieties of two-rowed barley were sown in one-twentieth acre plots on backsetting, on May 1, by the hoe drill at rate of 2 bushels per acre. Soil, clay loam.

Eighteen varieties of six-rowed barley were sown on same date and under similar conditions.

TWO-ROWED BARLEY—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw including head.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per measured bushel after cleaning.
				In.		In.	Lbs.	Bush.	Lbs.	Lbs.
1	Danish Chevalier	Aug. 11	102	38	Medium	4	4,240	60	..	50
2	Sidney	" 6	97	36	"	3	3,000	54	2	53
3	Jarvis	" 8	99	38	Weak	3½	2,860	52	44	52
4	Clifford	" 6	97	42	"	4	2,080	52	24	51½
5	Gordon	" 7	98	44	Strong	2¾	3,000	52	24	51½
6	Invincible	" 9	100	35	Medium	3	3,720	52	24	50
7	Standwell	" 9	100	34	"	9¾	4,120	52	24	51
8	Canadian Thorpe	" 11	102	37	Strong	3	3,800	48	16	51½
9	Swedish Chevalier	" 11	102	33	Weak	4	3,200	47	24	52
10	Harvey	" 6	97	40	Medium	4	3,520	46	32	51½
11	Logan	" 8	99	43	Weak	3¼	2,580	46	12	50½
12	French Chevalier	" 12	103	33	"	3½	2,520	41	12	51
13	Beaver	" 11	102	34	Strong	3½	3,900	40	20	52
14	Dunham	" 6	97	36	"	3	3,180	39	8	53¼

SIX-ROWED BARLEY—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of straw including head.	Character of Straw.	Length of Head.	Weight per Acre.	Yield per Acre. Bush.	Yield per Acre. Lbs.	Weight per measured bushel after cleaning.
				In.		In.	Lbs.	Bush.	Lbs.	Lbs.
1	Odessa	Aug. 5	96	35	Medium..	2¾	3,440	65	40	50½
2	Blue Longhead	" 6	97	32	" ..	2¾	3,600	64	8	44
3	Common	" 3	94	38	Weak....	2	3,480	60	40	52
4	Mensury	" 8	99	42	"	3	2,800	57	24	51
5	Oderbruch	" 3	94	38	"	2	3,600	55	..	52½
6	Empire	" 6	97	34	Medium..	2½	2,760	55	..	51
7	Trooper	" 3	94	38	Strong....	2½	2,240	53	36	50
8	Mansfield	" 8	99	38	Weak....	2¾	2,140	52	44	51½
9	Yale	" 7	98	37	"	3	2,300	52	4	50½
10	Royal	" 2	93	37	Medium..	2½	2,500	50	40	50½
11	Nugent	" 9	100	38	Weak....	2½	2,909	49	28	51
12	Summit	" 5	96	33	"	2	3,820	48	36	49½
13	Argyle	" 3	94	41	Medium..	2¾	2,640	47	44	50½
14	Stella	" 9	100	36	Weak....	3	2,760	47	44	52
15	Claude	" 9	100	36	Medium..	2¼	2,380	46	12	50
16	Brome	" 8	99	33	" ..	3¼	3,860	44	28	52
17	Albert	" 6	97	37	Strong....	2½	3,040	42	24	51
18	Champion	" 1	92	40	Weak....	2¼	2,320	41	32	45

BARLEY—TEST OF VARIETIES IN FIELD LOTS.

Ten varieties of barley were sown on fallowed land, clay loam, at rate of two bushels seed per acre.

Name of Variety.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw, incl'di'g head.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre. Bush.	Yield per Acre. Lbs.
	Acres.				In.		In.		Bush.	Lbs.
Claude	4¾	April 30..	Aug. 7..	99	46	Weak....	2½	Six-rowed ..	58	28
Odessa	5	" 30..	" 8..	100	40	"	2½	" ...	57	7
Mensury	2	May 1..	" 4..	95	43	"	2½	" ...	54	20
Mansfield	4¾	" 1..	" 8..	99	46	"	2¼	" ...	46	8
Mensury	9	April 30..	" 8..	100	46	Medium. .	2½	" ...	43	4
Standwell	2½	May 2..	" 16..	106	34	" ..	3	Two-rowed .	30	3
Sidney	3	" 2..	" 14..	104	30	" ..	4	" ..	25	40
Invincible	2	" 2..	" 16..	106	38	" ..	3	" ..	23	44
Canadian Thorpe	2½	" 2..	" 13..	103	46	Strong....	2½	" ..	21	26
Royal	2½	" 1..	" 4..	95	30	Weak	2	Six-rowed .	20	20

BARLEY.—AVERAGE AND TOTAL YIELDS.

Variety.	Acres.	Yield per acre.		Total yield.	
		Bush.	Lbs.	Bush.	Lbs.
Claude	4¾	58	28	278	13
Odessa	5	57	7	285	35
Mensury	2	54	20	108	40
Mansfield	4¾	46	8	219	14
Mensury	9	43	4	387	36
Standwell	2½	30	3	75	8
Sidney	3	25	40	77	24
Invincible	2	23	44	47	40
Canadian Thorpe	2½	21	26	53	41
Royal	2½	20	20	51	2
	38			1585	13

An average yield of 41 bushels 34 pounds per acre.

FOUR YEARS' COMPARISON OF FIELD LOTS OF BARLEY.

Below will be found the average yield and time to mature of nine varieties of barley, grown under similar conditions for the last four years.

Variety.	Average days to mature.	Average yield per acre.	
		Bush.	Lbs.
Claude	107½	62	30
Odessa	103	58	40
Mansfield	106¾	55	45
Mensury	102¼	54	19
Royal	101¼	50	34
Invincible	113½	48	45
Standwell	110¾	46	5
Sidney	106½	45	5
Canadian Thorpe	107¼	39	33

SMUT.

As smut was very prevalent in many crops in 1905, and very serious loss resulted in nearly all districts, special pains were taken before sowing the wheat, oats and barley last spring to effectually overcome all danger from this fungus.

The seed used was free from smut; the bluestone and formalin were pure so far as could be determined; and the treatment was by dipping for 5 minutes.

The results in the wheat tests go to show that treating seed with either bluestone or formalin is not always effectual, and that much has yet to be learned in connection with this serious problem.

Although all the seed wheat, whether in small or large plots, was carefully treated, yet smutty heads were found in every variety sown. In no case, outside the regular smut tests, were there many bad heads, yet with careful search they could be found in all the fields.

It will be observed in the case of the formalin application, that it was not so effectual as bluestone, which is the same result as obtained in former tests on this farm.

With respect to smut in oats and barley, it may be said that while no smutty heads could be found in either the treated or untreated plots, or in any of the uniform tests or field lots, this may be taken as evidence that either the season was not suitable for smut in these grains, or the treatment was effectual.

In the treatment with formalin, the 1 lb. to 15 gallons of water solution killed one-third to one-half of the seed, while the 1 lb. to 30 gallons of water had no injurious effect on the germination.

TEST OF SMUT PREVENTIVES

Treatment.	Date ripe.	Days to Mature.	Smutty heads on 64 sq. ft.
Red Fife Wheat—(Sown April 11).			
Untreated	Aug. 22	133	44
Bluestone, 1 lb. to 5 galls. water	" 23	134	7
" " 10 "	" 23	134	10
Formalin, " 15 "	" 26	137	20
" " 30 "	" 24	135	34
Banner Oats—(Sown April 23).			
Untreated	" 18	117	None.
Bluestone, 1 lb. to 10 galls. water	" 23	122	"
Formalin, " 15 "	" 25	124	"
" " 30 "	" 23	122	"
Canadian Thorpe Barley—(Sown May 1).			
Untreated	" 16	107	"
Bluestone, 1 lb. to 10 galls. water	" 20	111	"
Formalin, " 15 "	" 25	116	"
" " 30 "	" 18	109	"

EXPERIMENTS WITH FIELD PEASE.

Both field and uniform plots were sown on land that had grown roots the preceding year. After the root crop was harvested, the land was ploughed and harrowed. In the spring the seed was sown, and the land harrowed and rolled.

Twenty-four varieties of pease were sown on one-twentieth acre plots on May 2, on clay loam. Three varieties were also sown in field lots.

PEASE—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Character of Growth.	Length of Straw.	Length of Pod.	Size of Pea.	Yield per Acre.		Weight per bushel.
					In.	In.		Bush.	Lbs.	Lbs.
1	Golden Vine	August 20	108	Strong	58	2	Small	45	40	65
2	Prince Albert	" 22	112	"	55	2	"	45	40	65½
3	Early Britain	" 20	110	"	50	2	Medium	45	20	63
4	Duke	" 22	112	"	60	2½	Large	41	20	63½
5	Prussian Blue	" 20	110	"	65	3	Medium	41	..	65½
6	Daniel O'Rourke	" 15	105	"	45	2	Small	41	..	64½
7	Kent	" 21	111	"	50	3	Large	39	..	64
8	Paragon	" 20	110	"	65	3	Medium	39	..	64
9	Chancellor	" 15	105	"	55	2	Small	39	..	63
10	White Wonder	" 18	108	"	60	2½	Medium	38	40	65
11	Nelson	" 18	108	"	50	3	"	38	40	63½
12	Mackay	" 20	110	"	53	3	"	38	..	64½
13	English Gray	" 20	110	"	58	3	"	37	40	62
14	Picton	" 21	111	"	74	2½	Large	36	20	61½
15	Wisconsin Blue	" 22	112	"	58	2	Medium	36	..	65
16	Black Eyed Marrowfat	" 22	112	"	60	3	Small	36	..	64
17	Large White Marrowfat	" 22	112	"	60	3	Large	36	..	64
18	Arthur	" 18	108	"	48	2½	Medium	36	..	64
19	Pearl	" 20	110	"	62	3	Large	36	..	65
20	Gregory	" 20	110	"	60	2½	Medium	34	40	64½
21	Archer	" 22	112	"	70	2	"	34	40	64½
22	Victoria	" 21	111	"	50	3	"	33	20	65
23	Prince	" 20	110	"	58	2½	Large	33	20	64½
24	Agnes	" 20	110	"	55	2	"	30	..	63

PEASE—FIELD LOTS.

Name of Variety.	Character of Soil.	Size of Plot.	Date of Sowing.	Date of Ripening	No. of Days Maturing.	Character of Growth.	Yield per Acre.	
		Acres.					Bush.	Lbs.
Arthur	Clay loam.	2¼	May 2	Aug. 22	112	Strong	42	..
Golden Vine	"	1	" 3	" 20	109	"	39	20
White Wonder	"	½	" 3	" 22	111	"	38	..

GARDEN PEASE ON ONE-TWENTIETH ACRE PLOTS.

Eight varieties of Garden Pease were sown on $\frac{1}{20}$ acre plots beside the other test plots of pease, on May 2, on clay loam and under the same conditions.

Name of Variety.	Date of Ripening	No. of Days Maturing.	Length of Straw.	Length of Pod.	Yield per Acre.		Weight per bushel.
			In.	In.	Bush.	Lbs.	Lbs.
Champion of England	Aug. 20	110	50	2½	42	40	59½
American Wonder	" 13	103	48	2½	36	40	58
Shropshire Hero	" 15	105	42	1½	36	40	58
Premium Gem	" 16	106	52	3	35	20	57½
Stratagem	" 15	105	45	2½	35	20	58
Laxton's Charmer	" 14	104	54	2	34	40	57
Alaska	" 2	92	50	2½	32	..	62
Horsford's Market Garden	" 13	103	44	..	32	..	60

ROTATION OF CROPS.

These tests were commenced in 1899, and below are given the order of rotation for the last three years, and also particulars of yields, &c., for 1906. Each plot is one-half acre in extent, and the soil, clay loam

All these tests were more or less injured by hail. On plot No. 1, the yield was 3½ times larger than on plot No. 13, which was nearly destroyed.

Number.	1904.	1905.	1906.
1	Soja Beans	Wheat	Oats
2	Pease	"	Wheat
3	Tares	"	Oats
4	Red Clover	"	Wheat
5	Alsike and Alfalfa	"	Barley
6	Wheat	Pease	Wheat
7	Oats	Tares	"
8	"	Soja Beans	"
9	Wheat	Red Clover	"
10	Barley	Alsike and Alfalfa	"
11	Summer-fallow	Timothy	"
12	"	Wheat	"
13	"	"	Oats
14	"	"	Barley
15	Oats	"	Wheat
16	"	"	Barley
17	Wheat	Oats	Alsike
18	"	Wheat	Pease
19	"	Oats	Tares
20	"	Wheat	Red Clover
21	"	Barley	Alfalfa
22	"	Common Emmer	Summer-fallow

ROTATION TEST.—SEASON 1906.

Number.	Name of Variety.	Date of Sowing.		Date of Ripening.		No. of Days Maturing.	Length of Straw, including Head.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.		Weight per measured bushel after cleaning.
							In.		In.		Bush.	Lbs.	Lbs.
1	Oats, Banner	Apl.	24	Aug.	14	112	43	Strong	8	Branching	55	30	40
2	Wheat, Red Fife	"	16	"	17	123	42	"	3	Bald	15	46	60
3	Oats, Banner	"	24	"	14	112	44	"	8	Branching	49	12	39½
4	Wheat, Red Fife	"	16	"	14	120	38	"	2½	Bald	19	4	60¼
5	Barley, Mensury	"	24	"	4	102	43	"	2½	6-rowed	25	2	46
6	Wheat, Red Fife	"	16	"	23	129	40	"	3	Bald	21	36	57
7	"	"	16	"	25	131	47	"	3	"	20	36	57
8	"	"	16	"	24	130	45	"	3	"	19	14	59½
9	"	"	16	"	24	130	45	"	3	"	20	22	57
10	"	"	16	"	24	130	44	"	3	"	21	46	57
11	"	"	16	"	15	121	34	"	2¾	"	19	20	60½
12	"	"	16	"	15	121	38	"	3	"	18	16	60
13	Oats, Banner	"	24	"	14	112	37	"	8	Branching	34	4	38
14	Barley, Mensury	"	24	"	4	102	38	"	2	6-rowed	15	24	48½
15	Wheat, Red Fife	"	17	"	17	122	35	"	2½	Bald	13	20	59¼
16	Barley, Mensury	"	24	"	4	102	38	"	2	6-rowed	18	10	47
17	Alsike	May	17	*		....	....	....	....	....	....	....	....
18	Pease	"	4	*		....	....	....	....	....	....	....	....
19	Tares	"	4	*		....	....	....	....	....	....	....	....
20	Red Clover	"	17	*		....	....	....	....	....	....	....	....
21	Alfalfa	"	17	*		....	....	....	....	....	....	....	....
22	Summer-fallow	....		....		....	....	....	....	....	....	....	....

* Ploughed under.

CROP OF MIXED GRAIN.

A test was made of growing oats and pease together on a half-acre lot of fallowed land. Soil, clay loam. This was seeded on May 8, at the rate of 2 bushels of pease and ½ bushel oats per acre. It was cut August 20, and on being threshed, gave a yield of 1,718 lbs. grain per acre.

EXPERIMENT WITH FALL RYE.

Over half an acre of fallowed land was sown with fall rye on September 13, 1905. Ripe August 7. Straw 65 inches long including head, and of medium strength. Length of head, 5 inches. Yield per acre, 44 bushels. Weight per bushel, 58 lbs.

For several years winter rye has been sown each fall early in September, and has never failed to stand perfectly and give a good yield of straw and grain. For early spring fodder, either for pasture or cutting green, it surpasses all other grains so far tested.

EXPERIMENT WITH SPRING RYE.

One-twentieth acre of fallowed land was sown with spring rye on April 11. Ripe August 16; time to mature, 127 days. Straw strong, 45 inches long. Head 3¾ inches long. Weight of straw per acre, 2,500 lbs. Yield of grain per acre, 35 bushels, 20 lbs.; weight per bushel, 59 lbs.

EXPERIMENT WITH TARES.

Sown on one-twentieth acre plot of fallowed land, May 2. Ripe August 17; days to mature, 107. Straw strong, 40 inches long. Pod, 2 inches long. Yield per acre, 24 bu-hels 44 lbs., at 54 lbs. per bushel.

EXPERIMENT WITH CANARY GRASS.

(Phalaris Canariensis).

Sown on one-twentieth acre of fallowed land on May 8. Ripe August 15; time to mature, 99 days. Straw strong, length 34 inches. Heads 1½ inches long. Weight of straw, 3,820 lbs. per acre. Yield of grain, 37 bushels (of 48 lbs.) per acre.

EXPERIMENTS WITH MILLETS.

Five varieties of millet were sown May 9, but were completely destroyed by cutworms.

EXPERIMENT WITH HORSE BEANS.

Sown May 9, in rows 21, 28, 35 and 42 inches apart. Cut September 17.

	Height.	Green fodder. Yield per acre.	
Rows 21 inches apart........	36 inches.	11 tons	1,850 lbs.
" 28 "	36 "	8 "	550 "
" 35 "	36 "	8 "	480 "
" 42 "	36 "	7 "	1,070 "

EXPERIMENTS WITH SOJA BEANS.

Sown May 9, in rows 21, 28, 35 and 42 inches apart. Cut September 17.

	Height.	Green fodder. Yield per acre.	
Rows 21 inches apart........	30 inches.	4 tons	250 lbs.
" 28 "	30 "	3 "	900 "
" 35 "	30 "	2 "	950 "
" 42 "	30 "	2 "	110 "

EXPERIMENTS WITH FLAX.

The flax test was made on Western Rye Grass sod, broken in June of the preceding year. A considerable number of the plants in all the plots were destroyed by cutworms, but as soon as observed, the eaten spots were resown, and eventually the crop ripened before frost came.

Poisoned bran—1 lb. Paris green to 100 parts moistened bran—was scattered on the plots where the worms were working. This remedy, which is cheap and easily applied, stopped further loss.

Flax—Test of Varieties.

Number.	Name of Variety.	Character of Soil.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Length of Straw including Head.	Weight of Straw.	Yield per Acre.		Weight per Measured Bushel after Cleaning.
						Inches.		Bush.	Lbs.	Lbs.
1	Common	Clay loam.	May 9	Aug. 20	103	32	1,860	20	20	49½
2	Riga	"	" 9	" 18	101	27	2,480	17	48	55
3	Improved Russian.	"	" 9	" 20	103	30	1,820	16	44	57
4	White Flowering..	"	" 9	" 20	103	22	2,780	14	36	55
5	Yellow Seeded....	"	" 9	" 18	101	30	1,760	11	24	54½

Flax—Test of Sowing Different Quantities of Seed per Acre.

Quantity of Seed per Acre.									
20 lbs	....	May 8	Aug. 20	104	32	1,480	20	..	49¼
30 "	....	" 8	" 20	104	30	1,000	20	40	53½
40 "	....	" 8	" 20	104	32	1,680	18	52	50
50 "	....	" 8	" 20	104	30	1,660	17	28	49

ALFALFA TESTS.

In these tests it will be observed that Turkestan Alfalfa sown in 1904, stood two winters and gave over 1½ tons of hay in the two cuttings, while the Common variety sown at the same time was greatly injured.

Of the two plots of Common Alfalfa clover sown in 1905, one was so badly injured that it had to be cut over to check the weeds, while the other gave good returns.

In the spring of 1905, Alfalfa seed was sent by the Department of Agriculture, Washington, D.C., which had been secured from the following sources: Northern Montana, Southern Montana, Nebraska, Samarkand (Turkestan), New York, Peru, Minnesota (Grimm), Utah and First Quality Commercial Seed.

All the seed, as stated in my last report, germinated well, and made a good growth during the season. Early in April all the plots made a start, but by May four were quite dead, three were very uneven, and only one looked at all promising.

Early in July the clover on the four plots was cut. One gave a good yield, while the others had little or nothing except a promising crop of weeds. These plots were cut again in August with much better results.

Hay Crop.

Variety.	Year Sown.	Acres.	Yield per Acre.	
			Tons.	Lbs.
Western Rye Grass	1901..	2	2	1,400
" "	1905..	12	1	1,840
Awnless Brome Grass	1900..	5½	0	1,745
"	1900..	4½	0	1,100
"	*1899..	½	1	1,000
Timothy	1905..	½	1	1,500
Meadow	1904..	½	1	940

*Renewed by shallow ploughing in 1904.

TESTS OF ALFALFA.

Variety.	Year Sown.	First Cutting. Date Cut.	First Cutting. Yield per Acre. Tons.	First Cutting. Yield per Acre. Lbs.	Second Cutting. Date Cut.	Second Cutting. Yield per Acre. Tons.	Second Cutting. Yield per Acre. Lbs.
Turkestan	1904	July 11	0	1,800	Sept. 7	0	1,940
Common	1904	" 11	0	960	" 7	0	1,020
"	1905	" 11	Cut for weeds.		Aug. 7	0	1,370
"	1905	" 4	0	1,620	" 7	1	756
Inoculated seed	1905	" 4	0	1,000	" 7	1	112
Untreated seed	1905	" 4	0	1,430	" 7	1	1,378
Received from Dept. of Agriculture, Washington—							
Minnesota (Grimm)	1905	July 11	2	180	Sept. 6	1	930
New York	1905	" 4	Cut for weeds.		Aug. 7	1	500
Samarkand	1905	" 4	"		" 7	1	560
Nebraska	1905	" 4	"		" 7	1	450

EXPERIMENTS WITH INDIAN CORN.

Twenty-three varieties were sown on May 19, on backsetting, in rows 36 inches apart, and also in hills three feet apart each way. Three varieties were also sown in rows at four different distances apart. The corn was cut on September 13, the yield of green fodder per acre being computed from the weight of two rows, each 66 feet long.

Cutworms did considerable injury to the corn when coming above ground, but by applying poisoned bran along the rows, and re-seeding at once, no loss resulted in the end.

CORN—TEST OF VARIETIES.

Number.	Name of Variety.	Character of Soil.	Date of Sowing.	Height. Inches.	Condition when Cut.	Weight per Acre grown in Rows. Tons.	Weight per Acre grown in Rows. Lbs.	Weight per Acre grown in Hills. Tons.	Weight per Acre grown in Hills. Lbs.
1	Eureka	Clay loam.	May 19	80	Tasselled	16	1,000	17	980
2	Thoroughbred White Flint	"	" 19	81	"	15	1,570	14	600
3	Pride of the North	"	" 19	80	"	15	1,020	12	1,630
4	Angel of Midnight	"	" 19	75	In silk	15	800	15	800
5	Champion White Pearl	"	" 19	86	"	15	800	14	50
6	Early Mastodon	"	" 19	85	"	14	1,920	13	1,500
7	Giant Prolific Ensilage	"	" 19	80	Tasselled	14	1,700	14	1,150
8	Red Cob Ensilage	"	" 19	92	"	14	1,150	14	1,370
9	Selected Leaming	"	" 19	80	In silk	14	710	*8	1,490
10	Longfellow	"	" 19	75	"	14	160	14	270
11	Evergreen Sugar	"	" 19	75	Tasselled	14	50	14	160
12	Early Longfellow	"	" 19	75	Early milk	14	50	13	1,500
13	North Dakota White	"	" 19	75	"	13	1,500	14	1,150
14	Cloud's Early Yellow	"	" 19	94	In silk	13	1,500	14	50
15	Early Butler	"	" 19	90	"	13	620	13	1,500
16	Compton's Early	"	" 19	82	Early milk	12	1,850	14	600
17	King Philip	"	" 19	80	In silk	12	1,630	14	600
18	Early Leaming	"	" 19	80	"	11	1,870	13	400
19	Salzer's All Gold	"	" 19	85	"	11	1,650	13	400
20	White Cap Yellow Dent	"	" 19	90	Early milk	11	550	11	1,100
21	Superior Fodder	"	" 19	75	Tasselled.	11	..	13	1,500
22	Mammoth Cuban	"	" 19	80	In silk	11	..	11	1,870
23	Wood's Northern Dent	"	" 19	82	"	10	1,240	11	1,760

* This was the outside row.

INDIAN CORN.—TEST OF SEEDING AT DIFFERENT DISTANCES.

Sown in rows by grain seeder May 21; cut September 13; cultivation of land same as for preceding test.

Name of Variety.	Distance between Rows.	Height.	Weight per Acre grown in Rows.	
	Inches.	Inches.	Tons.	Lbs.
Longfellow	21	65	16	1,950
"	28	70	14	1,290
"	35	70	14	1,210
"	42	75	14	760
Champion White Pearl	21	75	20	1,120
" "	28	75	16	1,540
" "	35	80	18	1,110
" "	42	80	13	400
Selected Leaming	21	80	14	1,800
"	28	80	19	1,680
"	35	80	13	1,170
"	42	80	9	860

ROOT CROPS.

The roots of all sorts were sown on land that was in Western Rye Grass the preceding years. This had been ploughed in June, 1905, and again in the fall, and after frost set in it was manured with from 10 to 12 loads of rotted manure to the acre. In May the manure was ploughed in with gang ploughs, about three inches deep, harrowed, and the seeds sown.

Excepting the carrots, a good catch was secured of all the varieties sown. Unfortunately a very heavy rain came on, soaking the soil so much that it was impossible to attend to the cutworms, which were working in all parts of the field. With the exception of two small plots, the entire first seeding of carrots, turnips, mangels and sugar beets was destroyed. Many plants in the second seeding were also destroyed, and had to be sown for the third time.

The yields of roots were computed from the weight of two rows, each 66 feet long, and 30 inches apart.

Turnips.—Test of Varieties.

Twenty varieties were sown on May 11 and 18 and June 14. The first two seedings were destroyed by cutworms. The crop from the third seeding was pulled on October 10, and the yield is given below.

Name of Variety.	Character of Soil.	Yield per Acre. 2nd Plot.			
		Tons.	Lbs.	Bush.	Lbs.
Hartley's Bronze	Clay loam	22	1,408	756	48
Perfection	"	21	900	715	..
Bangholm Selected	"	21	636	710	36
Hall's Westbury	"	20	1,052	684	12
Magnum Bonum	"	19	1,864	668	48
Mammoth Clyde	"	17	320	572	..
Imperial Swede	"	16	1,924	565	24
Elephant's Master	"	16	1,924	565	24
Carter's Elephant	"	16	1,660	561	..
Good Luck	"	16	1,396	556	36
Kangaroo	"	16	472	541	12
Halewood's Bronze Top	"	16	208	536	48
Skirving's	"	16	208	536	48
New Century	"	15	1,944	532	24
East Lothian	"	15	1,020	517	..
Selected Purple Top	"	15	756	512	36
Sutton's Champion	"	15	228	503	48
Dickson's Emperor	"	14	1,172	486	12
Drummond Purple Top	"	13	1,984	466	24
Jumbo	"	13	1,588	459	48

Mangels—Test of Varieties.

Fifteen varieties were sown on May 11 and 19 and June 13. The first seeding was destroyed by cutworms. Crop from other two seedings was pulled on October 8.

Name of Variety.	Character of Soil.	Yield per Acre. 2nd Plot.				Yield per Acre. 3rd Plot.			
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Triumph Yellow Globe	Clay loam	22	748	745	48	28	232	937	12
Yellow Globe Selected	"	21	1,428	723	48	22	1,804	763	24
Lion Yellow Intermediate	"	21	108	701	48	21	636	710	36
Prize-winner Yellow Globe	"	20	524	675	24	27	252	904	12
Yellow Intermediate	"	19	1,996	666	36	23	728	778	48
Half Sugar White	"	18	1,488	624	48	23	596	776	36
Giant Yellow Globe	"	18	1,356	622	36	24	180	803	..
Giant Yellow Intermediate	"	18	960	616	..	24	972	816	12
Giant Sugar	"	18	696	611	36	20	1,844	697	24
Leviathan Long Red	"	18	168	602	48	21	636	710	36
Prize Mammoth Long Red	"	18	36	600	36	19	544	679	24
Half Sugar Rosy	"	17	1,772	596	12	21	1,296	699	36
Mammoth Long Red	"	17	584	576	24	21	900	715	..
Gate Post	"	17	56	567	36	18	1,092	618	12
Selected Mammoth Long Red	"	13	1,456	457	36	19	1,336	655	36

Sugar Beets—Test of Varieties.

Sown May 11 and 18 and June 13. First two seedings destroyed by cutworms. Crop from last seeding taken up on October 9.

Name of Variety.	Character of Soil.	Yield per Acre.			
		Tons.	Lbs.	Bush.	Lbs.
Royal Giant	Clay loam	19	148	635	48
Danish Red Top	"	16	1,000	550	..
Danish Improved	"	16	472	541	12
Improved Imperial	"	15	888	514	48
Red Top Sugar	"	14	1,568	492	48
Wanzleben	"	11	308	371	48
Vilmorin's Improved	"	10	856	347	36
French Very Rich	"	9	480	308	..

EXPERIMENTS WITH POTATOES.

Thirty-two varieties have been under trial during the past year. They were all planted on May 12, in clay loam, in rows two and a half feet apart, with the sets about a foot apart in the rows. They were all dug on October 3 and the yield per acre has been calculated from the weight of crop obtained from two rows each 66 feet long. There was no rot this year.

Potatoes—Test of Varieties.

No.	Name of Variety.	Average Size.	Yield per Acre.						Form and Colour.
			Total.		Marketable.		Unmarketable		
			Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
1	Money Maker	Large	433	24	415	48	17	36	Oval, white.
2	Dalmeny Beauty	"	406	30	406	30	...	...	Oval, white.
3	Carman No. 3	"	402	36	391	36	11	..	Oval, white.
4	Country Gentleman	"	387	12	365	12	22	..	Oval, pink.
5	Canadian Beauty	"	380	36	363	..	17	36	Long, pink.
6	Ashleaf Kidney	"	371	20	371	20	...	...	Long, white.
7	Vick's Extra Early	Medium	369	36	352	..	17	36	Oval, pink.
8	Sabean's Elephant	Large	367	24	352	..	15	24	Long, white.
9	Late Puritan	Medium	360	48	360	48	...	...	Oval, white.
10	Vermont Gold Coin	Large	360	48	360	48	...	...	Oval, white.
11	Dreer's Standard	"	358	36	330	..	28	36	Round, white.
12	State of Maine	"	352	..	336	36	15	24	Oval, white.
13	Empire State	"	347	36	310	12	37	24	Oval, white.
14	Burnaby Mammoth	"	345	24	332	12	13	12	Long, red.
15	I. X. L	Medium	334	24	321	12	13	12	Long, pink.
16	American Wonder	"	332	12	321	12	11	..	Oval, white.
17	Irish Cobbler	Large	332	12	319	..	13	12	Round, white.
18	Rochester Rose	"	332	12	327	48	4	24	Long, red.
19	Maule's Thoro'bred	Medium	323	24	305	48	17	36	Oval, red.
20	Reeve's Rose	"	321	12	297	..	24	12	Oval, red.
21	Early Envoy	"	321	12	294	48	26	24	Oval, red.
22	Pearce	Large	316	48	305	48	11	..	Oval, red.
23	Everett	Medium	308	..	290	24	17	36	Long, pink.
24	Early White Prize	"	305	48	305	48	...	...	Oval, white.
25	Uncle Sam	Large	299	12	292	36	6	36	Oval, white.
26	Early Rose	Medium	294	48	255	12	39	36	Oval, red.
27	Holborn Abundance	"	292	36	275	..	17	36	Oval, white.
28	Morgan's Seedling	Large	290	24	272	48	17	36	Long, red.
29	Dooley	"	277	12	270	36	6	36	Oval, white.
30	Bovee	Medium	259	36	242	..	17	36	Oval, pink.
31	Carman No. 1	Large	228	48	217	48	11	..	Oval, white.
32	Pingree	Medium	224	24	224	24	...	...	Oval, white.

SUMMARY OF CROPS, 1906.

	Bush.	Lbs.
Wheat:		
9 varieties, 45½ acres	1,389	
10 half acres, rotation test	89	
39 uniform test plots	70	
	1,548	
Oats:		
11 varieties, 49 acres	3,712	
3 half acre plots, rotation test	70	
43 uniform test plots	202	
	3,984	
Barley:		
9 varieties, 38 acres	1,585	
3 half acres, rotation test	29	
36 uniform test plots	71	
	1,685	
Pease:		
3 varieties, 4 acres	157	
32 uniform test plots	60	
	217	
Flax	7	
Rye	30	
Roots	4,000	
Potatoes	130	
Emmer and Spelt	..	2,000
	Tons.	
Corn ensilage	85	
Hay:		
Rye Grass	25	800
Brome Grass	14	1,500
Sundry grasses	1	1,080
Alfalfa	5	1,630
Hay cut in coulees	28	
	75	1,010

VEGETABLE GARDEN.

All vegetables gave a satisfactory crop. The spring and summer were favourable to all tender plants, such as beans, cucumbers, tomatoes, &c. Cutworms did some injury, but when noticed, the poisoned bran, used for the grain and root crop, proved an effectual remedy.

Asparagus.

A good crop from the old beds of Barr's Mammoth, Barr's Elmira and Conover's Colossal. In use May 12 to July 6.

Beans.

Sown June 2.

Variety.	Seed from.	In use.	Remarks.
German Golden Pole	Steele, Briggs	August 14	Long wax, good crop.
White Wax	"	" 1	Heavy crop, good quality.
New Round Pod	Rennie	" 5	Wax, light crop.
Kidney Wax	"	" 1	Heavy crop, good, large.
Golden Wax	"	" 1	Fair crop, fine quality.
Emperor of Russia	Ottawa	" 3	Green, short.
Fame of Vitry	"	" 3	Long green, good crop.
Dwarf Wax	Vilmorin	" 4	Round pods, fair.
Extra Early	"	" 1	Green, very heavy crop.
Matchless	"	" 6	Green, good crop.
Golden Stringless	"	" 2	Wax, short.
Black Speckled	"	" 8	Green, fair crop.
Black Speckled	Indian Head	July 28	Green, light crop.
Currie's Rust-proof	"	" 31	Wax, long pods.
Challenge Black	"	" 28	Wax, short.
Dwarf Kidney	"	" 24	Wax, fair crop.
Emperor of Russia	"	" 26	Green, fair crop.
Extra Early	"	" 25	Green, good crop.
Early Six Weeks	"	" 23	Green, fair.
Golden Stringless	"	" 30	Short, fair crop.
Haricot Matchless	"	" 23	Good crop.
Galatian	George Fernie	August 4	Short green, fair crop.

Beets.

Sown April 20; pulled October 1.

Variety.	Seed Obtained from.	In use.	Yield per Acre.
			Bushels.
Cardinal	Rennie	July 12	654
Intermediate	"	" 15	543
Eclipse	"	" 15	523
Crimson Globe	Steele, Briggs	" 12	497
Downing Blood Turnip	"	" 15	445
Extra Early Egyptian	"	" 12	419
Long Blood Red	Vilmorin	" 31	399
Early Blood Red	"	" 7	307
Egyptian	"	" 12	301
Nutting's Dwarf Imported	"	" 15	268
* Spinach Beet	Rennie		Good yield; not weighed.

* This variety is used in the same way as Spinach.

Broccoli.

Extra Early White. Seed from Vilmorin; sown April 11; set out May 22. Fair quality.

Brussels Sprouts.

Dwarf Improved. Seed from Vilmorin; sown April 11; set out May 22; in use August 30. Small sprouts, good quality.

Cabbage.

Sown in hot-house April 2; set out May 22. Taken up October 12.

Variety.	Seed from.	In use.	Average Weight.	Remarks.
			Lbs.	
Paris Market	Vilmorin	July 20	10	Fair.
Express	"	" 20	4½	"
Midsummer Savoy	"	" 26	4½	Rather loose.
Winningstadt	"	Aug. 2	7	Very fine.
Jersey Wakefield	"	July 16	5	Fair, solid.
Flat Dutch Drumhead	"	Aug. 20	8	Good.
Fottler's Improved	"	" 20	7½	"
Green Globe Savoy	"	" 15	4	"
Early Etampes	Steele, Briggs	" 28	5½	Very good.
" Winningstadt	"	" 24	8	Good.
" Summer	"	" 20	7	Large, flat, solid.
Vandergaw	"	" 18	12	Very good.
Early Favourite	"	....	....	Did not germinate.
Chester Savoy	"	Aug. 12	5	Fair.
Autumn King	"	" 20	9½	Good.
Large Drumhead	"	" 20	11	Very fine.
Dark Red Early Dutch	"	" 6	4	Fair.
Red Drumhead	"	....	7½	Very good.

Carrots.

Sown April 18; pulled October 8.

Variety.	Seed from.	In use.	Yield per Acre.
			Bushels.
Half-long Luc	Steele, Briggs	July 12	528
Ox Heart	"	" 12	495
Early Gem	Vilmorin	" 12	495
Half-long Danvers	Steele, Briggs	" 12	468
Market Garden	Rennie	" 12	396
Chantenay	"	" 6	382
Half-long Scarlet Nantes	Steele, Briggs	" 12	336
Long Blood Red	Vilmorin	" 24	336
French Horn	"	" 4	191

CAULIFLOWERS.

Sown i . hot-house April 2 ; set out May 22.

Variety.	Seed from.	In use.	Average Weight.	Remarks.
			Lbs.	
Early Snowball	Steele, Briggs	July 7	2½	Very fair.
Early Paris	"	" 7	2½	"
Extra Early Whitehead	"	" 15	3½	Good heads.
Autumn Giant	"	Aug. 12	3½	Fair.
Dwarf Erfurt	Rennie	" 9	2½	"
Autumn Giant	"	" 15	3½	"
Early Snowball	"	July 7	3	Good.
Extra Early Erfurt	"	" 9	2½	Fair.
Early Paris	"	" 15	2½	"
Early Snowball	Vilmorin	" 7	4½	Very fine.
Extra Selected Earliest Erfurt	"	" 7	4½	"
Early Paris	"	" 15	3	Good heads.

CELERY.

Variety.	Seed from.	Sown in Hot-house.	Trans-planted.	Set out.
Giant Pascal	Steele, Briggs	April 2	May 7	June 2
Dwarf White	" "	" 2	" 7	" 2
Evans' Triumph	" "	" 2	" 7	" 2
Paris Golden	Rennie	" 10	" 7	" 2
Giant White	"	" 10	" 7	" 2
White Plume	"	" 10	" 7	" 2
Paris Golden Yellow	Vilmorin	" 2	" 7	" 2
Giant Pascal	"	" 2	" 7	" 2
Rose-ribbed Paris	"	" 2	" 7	" 2

Crop of good quality. White Plume in use August 25; other sorts in use about September 5.

CITRONS.

Preserving Citron, seed from Rennie, sown in hot-house April 13; set out May 17. A good crop; average circumference, 19 inches.

CORN.

Sown May 21.

Variety.	Seed from.	In use.	Ripe.
New Premo	Steele, Briggs	Aug. 28	Did not mature.
First of All	" "	" 26	" "
Early Windsor	Rennie	" 24	" "
Red Squaw	Indian Head	" 9	Sept. 13.
White Squaw	"	" 9	" 13.
White Squaw	Swan River	" 9	Did not mature.
Early Regina	Thorndike	" 20	" "
Golden Bantam	"	" 31	" "
Cross-bred from Sifton		" 30	Sept. 13. Only a little ripened.

Cucumbers.

Sown in hot-house April 13; set out May 17.

Variety.	Seed from.	In use.	Ripe.	Length.	Remarks.
				In.	
Improved Long Green.	Steele, Briggs	July 20	Aug. 15	10	Fair crop.
Short Green	" "	" 18	" 15	8	Good crop.
White Spine	" "	" 18	" 20	6	" "
Giant Pera	" "	" 8	" 12	8	" "
Perfection	Rennie	" 20	" 15	8	Fair crop.
Chicago Pickling	"	" 12	" 10	6	" "

Lettuce.

First sowing April 19; in use June 5. Second sowing May 17; in use July 1. Third sowing June 2; in use July 18.

Variety.	Seed from.	Remarks.
Cos, Trianon	Vilmorin	Good crop.
" Green Paris	"	"
Cabbage, Trocadero	"	Fair.
" Blonde Stonehead	"	Very fine.
" Red-edged Victoria	"	Ran to seed three weeks before other varieties.
" All the Year Round	"	Fair.
" Neapolitan	"	Fine solid heads.
" Wheeler's Tom Thumb	"	Small, extra solid.

Melons.

Sown April 2; set out May 17.

Variety.	Seed from.	Circumference.	Remarks.
		Inches.	
Musk, Earliest of All	Rennie	15	Good crop.
" Early Hackensack	"	10	"
Water: Early Canada	"	..	Did not nature.
Cole's Early	"	19	Good crop.

Melons were not ripe when frost came on September 11, but ripened under cover, after being pulled.

ONIONS.

Sown in open April 18.

Variety.	Seed from.	Yield per Acre.
		Bushels.
Extra Early Red	Rennie	58
Australian Brown	"	51
Giant Gibraltar	"	72
Prize Taker	"	115
Red Wethersfield	"	36
Red Globe	"	112
Yellow Globe Danvers	"	39
White Barletta	"	58

Sown in hot-house April 2; set out April 23.

Silverskin	Vilmorin	36
Market Favorite	"	43
Trebon's	"	120
Yellow Globe Danvers	"	51
Silver Giant	Rennie	39

ONION SETS.

Planted April 29.

New White Multiplier	Steele, Briggs	31
Shallots	"	31

PARSLEY.

Moss-curled, from Rennie, sown May 10; in use June 29. Good crop.

PARSNIPS.

Sown April 19.

Variety.	Seed from.	In use.	Yield per Acre.
			Bushels.
Short Round	Steele, Briggs	Aug. 15	430
Student	"	" 25	355
New Intermediate	"	" 25	215
Guernsey	"	" 25	154

Pease.

Extra Early, First of All, First and Best, Nott's Excelsior, Rural New Yorker, Surprise and Wm. Hurst were sown April 23, and were in use July 10. The following varieties were sown on May 9.

Variety.	Seed from.	In use.	Ripe.	Remarks.
New Dwarf Telephone	Rennie	July 28	Aug. 12	Very heavy crop.
Sutton's Excelsior	"	" 28	" 5	Good crop.
Perfection	"	" 30	" 12	Heavy crop.
Queen	"	Aug. 4	" 20	Light crop.
Admiral	Indian Head	July 21	" 2	Good crop.
Alaska	"	" 18	July 31	
American Wonder	"	" 24	Aug. 10	Fair.
Anticipation	"	" 31	" 10	Fair crop.
Burpee's Profusion	"	" 28	" 9	Large crop.
Champion of England	"	" 28	" 10	Good crop.
Extra Early	"	" 16	July 30	Fair crop.
Everbearing	"	" 28	Aug. 6	Good crop.
First of All	"	" 16	July 30	"
First and Best	"	" 21	" 31	"
Harrison's Glory	"	" 27	Aug. 14	"
Horsford's Market Garden	"	" 26	" 8	Fair crop.
Laxton's Charmer	"	" 27	" 8	"
Nott's Excelsior	"	" 21	" 1	Very good quality.
Premium Gem	"	" 27	" 9	Fair.
Rural New Yorker	"	" 20	" 1	Good crop.
Surprise	"	" 23	July 30	Good early pea.
Stratagem	"	" 30	Aug. 9	Very large, good crop.
Shropshire Hero	"	" 26	" 5	Fair.
Yorkshire Hero	"	" 24	" 9	Large, fine quality.
Wm. Hurst	"	" 21	" 1	Very good.

Radish.

Variety.	Seed from.	Sown April 18. In use.	Sown May 17. In use.	Sown June 4. In use.
Forcing Turnip	Vilmorin	June 2	June 18	*
Early Scarlet Turnip	"	" 2	*	June 29
Early Scarlet White-tipped	"	" 2	*	" 29
Earliest Scarlet Forcing	"	" 2	June 18	" 29
Olive Shaped	"	" 5	*	" 29
French Breakfast	"	" 5	June 18	*

* Not sown.

Rhubarb.

Old beds in use May 12. Following is list of the varieties.

Victoria,
Prince Albert,
Royal Albert,
Prince of Wales,
Royal Linnæus,
Magnum Bonum,
Strawberry,
Early Crimson,
Early Scarlet,
Toblesk,
Myatt's Linnæus,
Fottler's Improved,
Scarlet Nonpareil,
Salt's Perfection,
Monarch,
Brabant's Colossal,

Sage and Summer Savory.

Sown May 10; in use July 6. A good crop of each.

Spinach.

Victoria, sown May 10; in use June 25. Good crop.
Round, " 10; " 25.

Squash and Marrows.

Sown in hot-house April 16; set out May 17.

Variety.	Ripe.	Remarks.
Squash—		
Crookneck	Aug. 10	Good crop; average length 10 inches.
Early White Scallop	...	Did not mature.
Marrow—		
Boston	Aug. 2	Good crop; 2½ feet circumference.
Early White	July 30	Good crop; average 12 inches long.

Tomatoes.

Sown in hot-house April 10; set out May 22. The yield is given from 20 plants, set 2½ by 3 feet.

Variety.	Seed from.	In flower.	First ripe.	Yield from 20 plants.
				Bushels.
First of All	Rennie	July 1	Aug. 19	1¼
Earliana	"	" 1	" 16	1¾
Cherry Red	"	June 24	" 19	1
Hustler	"	" 18	" 22	1½
Early Tree	Anamoose, N.D.	" 18	" 20	1
*Earliana	"	...	...	

* Did not germinate.

Frames with glass covers were placed about some of the plants before frost came in September, thus saving the fruit from injury and hastening its ripening.

Table Turnips.

Sown May 21.

Variety.	Seed from.	In use.	Pulled.	Yield per Acre.
				Bushels.
Yellow Golden Ball	Vilmorin	July 25	Oct. 11	559
Early Stone	"	" 25	" 11	483
Early White Strap-leaf	"	" 25	" 11	430
White Milan	"	" 22	" 11	390
Dickson's Abundance	J. Watson	Aug. 25	" 11	256

THE FLOWER GARDEN.

The Annuals were not so successful as in many former seasons. The dry, hot weather in July, and again in August was against them. The Perennials, especially Pæonies, were never more beautiful.

ANNUALS—Propagated in hot-house. Sown April 2 and 3.

Variety.	Set out.	In Bloom. From.	In Bloom. To.	Remarks.
Abronia umbellata	June 1	July 26		
Ageratum, Dwarf Imp'l Blue	" 1	" 8		
Agrostemma	" 3			
Alyssum	" 1	May 20	Oct. 9	Good border. Bloomed before setting out.
Amaranthus salicifolius	" 2	July 28		Very handsome.
Antirrhinum, Tom Thumb	" 2	" 12	Oct. 9	Good border.
" Majus nanum	" 2	" 8		
Arctotis grandis	" 2			Woolly leaf, pretty.
Asters, 7 varieties	May 23	Aug. 1		
Balsam, Camelia-flowered	" 31	July 8		Very fine.
Bartonia aurea	June 2	June 16		Bloomed freely.
Brachycome iberidifolia	" 2	July 16	Oct. 9	Bloomed well.
Calendula officinalis Trianon	" 1	June 24	" 9	Did well.
Candytuft, Empress	" 2	" 14	" 9	Good.
Celosia, 4 varieties	" 2	" 26		Very fine.
Centaurea alba	" 1	July 6		Bloomed freely.
Chrysanthemum coronarium	May 18	June 25	Oct. 6	Profusion of bloom.
" dwarf double white	" 18	" 25	" 6	" "
Clarkia, 3 varieties	June 1	" 24		Did well.
Coleus	" 1			Eaten by cutworms.
Coreopsis	" 2	July 1		Bloomed freely.
Dianthus, 7 varieties	" 1	" 8	Oct. 9	Fair.
Eschscholtzia	" 1	" 1	" 9	Better sown in open.
Gaillardia	" 2	" 8	Sept. 29	Very fine.
Godetia	" 1		Oct. 2	Grand show.
Gourd, Hercules Club	" 4			Gourds 18-in. long.
Gypsophila elegans	" 2	June 10	Oct. 9	Small white flower.
Helichrysum	" 2	July 7	" 2	Did well.
Hemp	May 18	" 20		8-ft. high.
Iberis Gibraltarica	June 1	" 31		Fair.
Ice Plant	" 1	Aug. 12	Oct. 9	Very good.
Larkspur	May 25	June 29	Sept. 29	Very fine.
Lavatera rosea splendens	" 25	" 29	" 25	Great show of bloom.
Lobelia	June 2	" 27	" 29	Very pretty.
Marvel of Peru	" 2	July 20	" 29	Bloomed well.
Mignonette	" 2	June 20	Oct. 9	Good.
Nasturtium, 5 varieties	May 31	" 14	Sept. 29	Did very well.
Nicotiana affinis	June 1	July 5	" 29	Very fine, white.
" Sanderae	" 1	" 20	" 29	Very handsome, crimson.
Petunia, 4 varieties	May 31	" 2	" 29	Extra fine.
Phacelia grandiflora	" 2	" 24	" 29	Bloomed well.
Phlox Drummondii, 4 varieties	June 1	" 4	Oct. 9	Rather poor.
Poppy, 8 varieties	" 1	June 26		Injured by cutworms.
Portulaca				Did not germinate.
Pyrethrum	June 1	July 18		Fair.
Salpiglossis	" 2	" 8		Very handsome.
Scabiosa, 3 varieties	" 2	" 24	Sept. 29	Did well.
Scarlet Flax	" 2	" 8	Oct. 9	Very pretty.
Stocks	May 25	June 22	" 9	Did well.
Tagetes	June 1	" 22	Sept. 29	Very good.
Verbena	May 25	July 8	Oct. 9	Splendid show.
Zinnia	June 1	June 25		Fair.

ANNUALS—Sown in open.

The following annuals were sown in the open on the dates shown. In most cases they did as well as those started in hot-house, but were somewhat later in commencing to bloom. Dianthus (Pinks) and Eschscholtzia, were better sown in open than in hot-house.

Variety.	Sown.	Variety.	Sown.
Ageratum	April 22	Ice plant	May 11.
Alyssum	May 11.	Lobelia	" 11.
Amaranthus	" 11.	Mignonette	April 23.
Antirrhinum	" 11.	Nasturtium	May 11.
Brachycome iberidifolia	" 11.	Phacelia	" 11.
Candytuft	April 23.	Phlox Drummondii	" 11.
Celosia	May 11.	Poppy	" 11.
Centaurea alba	" 11.	Salpiglossis	" 11.
Chrysanthemum	" 11.	Scabiosa	" 11.
Clarkia	" 11.	Scarlet Flax	" 11.
Dianthus	" 11.	Sweet Pease, 28 varieties	April 22.
Eschscholtzia	April 23.	Sweet Pease, dwarf Cupid	" 22.
Gaillardia	May 11.	Tagetes, Patula dwarf	May 11.
Godetia	" 11.	Zea, Japonica variety	June 5.

PERENNIALS.

Carnations were sown in hot-house April 2; set out May 25; bloomed from August 17 to October 1.

Hollyhocks—sown in hot-house April 3; set out May 25; bloomed from August 12 to September 29. Did very well.

Pansies, 10 varieties—sown in hot-house April 2; came up rather poorly. Set out May 25; bloomed from June 19 till November.

Violets (English White and Blue), were sown in hot-house April 3, but did not germinate.

CANNAS.

The following Canna roots were sent from the Central Experimental Farm, Ottawa, and planted in hot-house May 8. They were set out in garden June 18; in bloom August 6.

R. Pearson,
Queen Charlotte,
Pennsylvania,
Rubin,
America,
Allemania.

DAHLIAS.

Planted in hot-house May 12; set out June 16; in bloom July 18. Following are the varieties:—

Cochineal,
Snowflake,
Kynerith,
Mrs. Chas. Turner,
Cannell's Gem,
Wm. Pearce,
Lady H. Grosvenor,
Cactus Queen,
Nymphaea,
Prince of Orange,
Ernest Glasse,
Prince Imperial,
Wm. Agnew,
Empress of India,
Capstan,
Clifford Bruton.

Bulbs.

In October, 1905, a large collection of bulbs were sent from the Central Experimental Farm, Ottawa, and were set out before the ground froze. The list comprised Tulips, Narcissus, Crocus, Snowdrops, Siberian Squills and Glory of the Snow (Chionodoxa). These gave a fine succession of bloom in the early part of the season, the Tulips doing the best.

Perennials.

The following perennials were sent from the Central Experimental Farm, Ottawa, on April 12, 1906, and were planted out in the garden. The majority of them made weak growth, but such of them as survive the winter will likely make better progress in 1907.

Aconitum Napellus bicolor,
Barbarea vulgaris fl. pl.,
Centaurea ruthenica,
Cimicifuga racemosa,
Campanula macrantha,
Campanula persicifolia,
Delphinium Cashmerianum,
Delphinium Cashmerianum album,
Delphinium Belladonna,
Epimedium Muschianum,
Iberis corifolia,
Œnothera fruticosa,
Œnothera Youngii,
Papaver Orientalis Duke of Teck,
Papaver Orientalis Mahony,
Papaver Orientalis Salmon Queen,
Polemonium Richardsoni,
Ranunculus aconitifolius fl. pl.,
Spiraea aruncus,
Spiraea filipendula fl. pl.,
Trollius Japonica plena,
Adonis vernalis,
Adenophora Polamina,
Erica vagans alba,

and 23 varieties of Primula Sieboldi.

Dates of Blooming of Sundry Perennials, planted prior to 1906.

Snowdrops, April 16.
Squills, April 19.
Crocus, Yellow, April 24.
Crocus, Purple, April 29.
Crocus, White, May 10.
Chionodoxa luciliae, May 8.
Tulips, May 9.
Narcissus, May 18.
Pansies, April 22.
Viola, May 12.
Irises, May 31.
Everlasting Pea, June 3
Columbine, June 3.
Pæonies, June 20.
Pæonia tenuifolia, June 4.
Centaurea, June 13.
Grass Pink, June 13.
Hemerocallis, June 18.
Dielytra, June 24.
Lychnis, June 26.
Spiraea filipendula, June 27.
Sweet William, June 27.
Lupinus, July 1.
Achillaea, July 1.
Clematis recta, July 1.
Lilium, July 2.
Œnothera fruticosa, July 5.
Epimedium muschianum, July 17.
Delphinium, July 8.
Campanula Macrantha, June 30.
Veronica, July 15.
Helianthus, July 22.
Platycodon album, July 30.
Hollyhock, August 2.

TREES AND SHRUBS.

THE ARBORETUM.

The varieties of trees and shrubs under observation made a good growth during the season. Those added in the spring of 1905, referred to in my report for that year, made a strong growth, with the following exceptions, which were winter-killed:— Viburnum lentago, Acer dasycarpum (seed from Winnipeg), Austrian Pine and Red Pine.

Last spring (1906) a number of specially hardy Rose trees were sent from the Central Experimental Farm, Ottawa, and set out in the Arboretum. These, with one exception—Frau Karl Drushki,—did very well, making strong growth, and in most cases blooming till late in the season.

There were two each of the following varieties:—

Souv. de Philemon Cochet,	Belle Poitevine,
Mercedes,	Persian Yellow,
Copper Austrian,	Heterophylla,
Delicata,	Calocarpa,
Mrs. Anthony Waterer,	Roseraie de l'Hay,
Rugosa Alba,	Frau Karl Drushki,
Yellow Capucine,	Madame Plantier,

Five hundred plants of Sea Buckthorn were received from the Central Experimental Farm, and planted for a hedge, and from the South Dakota Experiment Station at Brookings, were sent 300 plants of Siberian Sandthorn, and 100 cuttings of Niobe Willow.

TREE SEEDS.

Owing to frost killing the blossoms last spring, no seeds of the Native Maple matured in 1906, and the usual distribution of these seeds cannot be made in 1907.

As it is hoped that the 1907 crop will be good, providing a supply for the distribution of 1908, instructions for planting are repeated from my last report.

PLANTING TREE SEEDS.

Many inquiries are made during the year as to the best way to grow tree seeds in the Northwest, where usually at the time they are sown, the soil is very dry. For several seasons, little or no trouble has been experienced from this cause on the Experimental Farm, while in some districts the weather has been very dry.

Maple seeds can be sown late in October, or early in May. It is not safe to sow all the supply of maple seed in the fall, as very often germination takes place too early in the spring, and frost kills the entire crop.

Ash seed should be sown in October. Elm seed should be sown as soon as gathered in June, though it sometimes succeeds if sown the following spring.

Elm seed requires a very light covering of fine moist soil, not over ½-inch in thickness, while maple and ash should be covered 1 or 1½ inches.

Tree and shrub seeds should be sown in rows about 30 inches apart to permit horse cultivation when considerable quantities are grown. In all cases the land should be prepared the year preceding sowing, so as to have the soil as fine as possible. Breaking and backsetting new land, and summer-fallowing old, make the best and safest preparation.

Trees should be transplanted when seedlings are 2 years old. When left until 3 or 4 years old, the trouble and expense are greatly increased.

FRUIT TREES.

PLANTING.

Last spring the Central Experimental Farm sent up a number of Russian Seedling Apples, which were planted in Orchard No. 7, also over 200 Seedlings of Cross-bred Apples, which were set out in a new orchard east of the barn. 2 trees each of Golden and Silvia, cross-bred apples were also received.

A list is given of the varieties comprised in the above mentioned lots.

Russian Seedlings.

1 Carman.	1 Sanford.	1 Morden.
1 Snelling.	1 Wesley.	1 Rupert.
1 Arcola.	1 Bolton.	1 Roslin.
1 Solina.	1 Pingree.	1 Morley.
1 Selkirk.	1 Birtle.	1 Lang.
1 Ponoka.	1 Grenfell.	1 Virden.
1 Ramona.	1 Bowie.	1 Excelsior Crab.
1 Souris.	1 Hanley.	1 Simbirsk No. 9.

Seedlings of Cross-bred Apples.

7	Seedlings of	No. 449.	20	Seedlings of	Romney.
20	"	Golden.	6	"	Dawn.
15	"	Columbia.	12	"	Silvia.
12	"	Madge.	25	"	Jewel.
8	"	Elsa.	25	"	Alberta.
22	"	Banks.	25	"	Tony.
12	"	Lizzie.	5	"	Robin.

PLUMS.

Five trees of Aitkin Plum were received from the Central Experimental Farm, and planted out.

STRAWBERRIES.

The South Dakota Experiment Station, Brookings, S.D., kindly sent 50 plants of S. D. No. 1 Strawberry (seedling of Jessie, fertilized with pollen of Manitoba Wild Strawberry), which were set out near those they sent in 1905.

One hundred plants of Dunlap Strawberry were received from Mr. W. H. Fairfield, Lethbridge, Alta., and planted.

FRUIT CROP.

SIBERIAN CRAB APPLES (*P. baccata*).

There was a medium crop of this fruit, the quality being good, except for the fact that some of the crabs had been brused slightly by hailstones in the storm of July 24.

CROSS-BRED APPLES.

A good many of these varieties fruited for the first time in 1906. The fruit was in general somewhat smaller than that of the same varieties grown at Ottawa, but this may perhaps be accounted for by the very dry weather during August, at the time the fruit was filling.

Derby, Northern Queen, and seedlings of Pauline, Dean and Aurora, bore fruit of fair size, and of quality much superior to the Pyrus baccata.

PLUMS.

The Manitoba Native plums yielded a good crop, which would have been heavier had not the hailstorm of July 24 knocked off a large number of the fruits. As there was no killing frost till well on in September, almost the whole crop ripened.

RASPBERRIES.

The crop of raspberries was, as usual, good. The best varieties now under test are Turner, Miller, Marlboro, Dr. Reider, Caroline and Garfield.

CURRANTS.

The currant crop was a complete failure owing to the attack of the Currant Maggot (Epochra canadensis). Almost every berry was infested by one of the pests.

GOOSEBERRIES.

The crop of Gooseberries was light, but some of the fruit was quite large. Smith's Improved and Houghton are the varieties longest under test. Young plants of a number of cross-bred sorts made vigorous growth, and the following varieties fruited lightly:—Pale Red, Red Jacket, Rideau, Edna, Mabel and Gibb.

STRAWBERRIES.

The Strawberry crop, while light, was of good quality, and worthy of note as the tests of this fruit have met with such poor success in most previous years.

The varieties fruiting were:—Grenville, Enhance, Crescent, Daisy, Johnson's Early, Bisel, Daniel Boone, Williams, 3 varieties of Alpine Strawberry (Jean d'Arc, St. Joseph and St. Antoine de Parker) and S. D. No. 1.

CATTLE.

The herd at present consists of 19 pure-bred Shorthorn cows, 3 bulls, and 19 grade animals.

In December, 1906, the whole herd was tested for tuberculosis, and all were pronounced free from the disease.

FEEDING TESTS.

During the winter of 1905-06, a test was made of feeding steers of different ages, to determine the influence of age on beef production.

A number of grade animals raised on the farm were selected, and divided into two lots, as follows:—

Lot 1.—3 yearling steers.

Lot 2.—2 two-year-old steers.

The test was for 16 weeks, from December 15 to April 6, during which period the animals were fed the following ration daily:—

Lot 1.—Ensilage, 10 lbs.; straw, 8 lbs.; roots, 12 lbs.; meal 1½ lbs. for first month (of 4 weeks), and 3, 4 and 6 lbs. respectively, during the other three months of the test, ground linseed ½ lb. per day for first two months, ¼ lb. for third month, and none in fourth month.

Lot 2.—Ensilage, 15 lbs.; straw, 8 lbs.; roots, 15 lbs.; meal, 2 lbs. during first month, and increased by two pounds each month. Ground linseed ½ lb. per day for two months and 1 lb. for two months.

The meal used consisted of two parts of barley to one part of wheat.

The straw was cut and the required quantity mixed fresh each day with the ensilage.

Following will be found statements of the total and average gains made during the test, and of the amount of feed consumed.

WEIGHTS AND GAINS DURING TEST.

—	Lot 1.	Lot 2.
	Lbs.	Lbs.
Weight at start	1,870	1,740
End of 1st 4 weeks—Weight	1,910	1,890
" " Gain	40	150
" 2nd 4 weeks—Weight	2,030	2,040
" " Gain	120	150
" 3rd 4 weeks—Weight	2,155	2,105
" " Gain	125	65
" 4th 4 weeks—Weight	2,320	2,230
" " Gain	165	125
Total gain	450	490
Average gain per head	150	245

TOTAL AMOUNT OF FEED CONSUMED.

—	Lot 1.	Lot 2.
	Lbs.	Lbs.
Ensilage	3,360	3,360
Straw	2,688	1,792
Roots	4,032	3,360
Meal	1,218	1,120
Ground linseed	84	112

FEEDING TEST, 1906-07.

The purpose of this test was similar to that of the preceding winter, namely, to ascertain the most profitable age at which beef cattle may be fattened.

There were two lots of cattle in the test, lot 1 being composed of 5 head of two-year-old steers raised on the farm, and lot 2 of 7 three-year-old steers purchased for this test.

The following ration was fed daily during a 16 weeks' test:—

Lot 1.—Ensilage, 8½ lbs.; hay, 3 lbs.; straw, 6 lbs.; meal, 3 lbs. for first month, and increased by two pounds each month of test. Ground linseed ½ lb.

Lot 2.—Ensilage, 11 lbs.; hay, 4 lbs.; straw, 8 lbs.; meal, 4 lbs. for first month, and increased by two pounds each month. Ground linseed, ½ lb.

The meal was composed of two parts barley to one part wheat.

The hay and straw were cut up and mixed with the ensilage each day in quantity required.

Following will be found particulars of weights and gains of each lot, quantity and value of feed consumed, and financial result of the transaction. The steers in lot 1 were not bought, but for the purpose of comparison, they were valued at the same price as lot 2.

Weights and Gains during Test.

—	Lot 1.	Lot 2.
	Lbs.	Lbs.
Weight at start of test	4,680	7,660
End of 1st 4 weeks—Weight	4,900	7,810
" " " Gain	220	150
" 2nd " Weight	5,090	7,960
" " " Gain	190	150
" 3rd " Weight	5,200	8,290
" " " Gain	110	330
" 4th " Weight	5,735	8,820
" " " Gain	535	530
Total gain during test	1,055	1,160
Average gain per head	211	166

Total Weight and Estimated Value of Feed Consumed During 112 Days of Test.

Feed.	Value.	Lot 1.		Lot 2.	
		Lbs.	Cost.	Lbs.	Cost.
			$ cts.		$ cts.
Ensilage	$2 per ton	4,620	4 62	8,624	8 62
Hay	$8 "	1,680	6 72	3,136	12 54
Straw	$1 "	3,360	1 68	6,272	3 14
Meal	⅔c. per lb.	3,360	22 40	5,488	36 59
Ground linseed	3c. "	280	8 40	392	11 76
Total cost			43 82		72 65
Cost per head			8 76		10 38

SUMMARY OF FINANCIAL RESULT OF THE TRANSACTION.

—	Lot 1.	Lot 2.
Weight at start	4,680 lbs.	7,660 lbs.
Value at 3c. per lb	$140 40	$229 80
Cost of feed	43 82	72 65
Total	184 22	302 45
" per head	36 84	43 21
Weight when sold	5,735 lbs.	8,820 lbs.
Less 5% shrinkage	287 "	441 "
Net weight sold	5,448 "	8,379 "
At	4 cents.	4 cents.
Amount received	$217 92	$335 16
" per head	43 58	47 88
Net profit	33 70	32 71
" per head	6 74	4 67

HORSES.

There are at present 13 horses on the farm. Since sending in my last report, one old mare has died, and one horse has been purchased.

SWINE.

There are now two breeds of swine kept on the farm, Berkshires and Large Yorkshires. There are at present 14 pigs, 5 Berkshires and 9 Yorkshires.

Since November 30, 1905, there have been sold for breeding purposes, 4 Berkshire boars and 4 sows, 7 Yorkshire boars and 14 sows, and 1 Tamworth boar and 1 sow.

POULTRY.

Four breeds of fowls are kept, Black Minorca, Barred Plymouth Rock, Light Brahma and Buff Orpington.

Settings of eggs and young fowls are sold to applicants as far as they are available.

SEED SELECTION SPECIAL.

During the winter of 1906, from January 5 to March 2, it was my privilege to be present on the Seed Special Train the greater part of the time, and address the farmers of 97 districts out of 143 through which the Seed Special passed.

The object of sending the Seed Special over such a large portion of the three prairie provinces, was to overcome, if possible, the serious injury caused by smut and weeds.

The train consisted of two, and at times three, passenger cars, in which the speaking was done, and special cars for the speakers were provided by the Department of Agriculture, Ottawa, the Canadian Pacific and Canadian Northern Railways.

Usually 6 speakers were available for all points, each speaking 20 minutes where the attendance required the use of two cars. At overflow meetings, or where three cars were occupied, each speaker took from 25 to 30 minutes.

The lectures were confined almost entirely to:—

Smut and its eradication,

The destruction of weeds, and

The necessity of sowing clean and good seed grain.

Two hundred meetings were advertised. Of these 107 were in Manitoba, 71 in Saskatchewan and 22 in Alberta. Three extra meetings were held in Alberta; two of the Manitoba points could not be reached in time through snowdrifts, and three points on account of the train being derailed.

EXCURSION TO EXPERIMENTAL FARM.

On July 19 and 20 last, excursion trains were run from all stations from Moosomin on the east to Caron on the west, from Prince Albert on the north, and from all points on the Arcola and Regina, and Soo and Estevan Railways.

The excursion was under the auspices of the Department of Agriculture at Regina, and the various agricultural societies of districts in the province adjacent to the railways.

Over 4,000 visited the farm from the outside districts, and about 1,000 from Indian Head and vicinity. A free lunch was provided on both days by the provincial government, and served by the Indian Head hospital directors. In addition to the free lunch, the department had speakers present from a distance, who addressed the people on Stock Judging, Domestic Cooking, and Weeds.

Fifteen teams, in addition to the farm's force, conveyed the visitors over the farm during the two days. The farmers in the vicinity of the town, as well as many residents of Indian Head supplied conveyances, a kindness which was greatly appreciated.

Six large tents were erected in front of the barn in which the lunch was served and meetings held, and in addition the large barn was continually crowded.

A VISIT TO THE NORTHERN PART OF THE PROVINCE.

It was my privilege in company with yourself to visit a considerable portion of Northern Saskatchewan early in September last. The districts of Saskatoon, Melfort, Humboldt and Yorkton were specially visited. Everywhere, harvest was over and threshing about commencing or already under way. In many sections the crops were very fine, and the favourable weather enabled all to be harvested in good condition.

DISTRIBUTION OF SAMPLES.

Last spring the customary distribution of the products of the farm was made to residents in the provinces of Saskatchewan and Alberta.

The number of applications was considerably in excess of those of any previous year, and the supplies available were inadequate to provide for more than about half those applying.

Following is a list of the samples sent out:—

Wheat	520	bags,	3 lb.
Oats	420	"	3 "
Barley	116	"	3 "
Pease	96	"	3 "
Sundries (flax, rye, spelt)	53	"	3 "
Potatoes	753	"	3 "
Tree seeds (Maple)	780	"	½ "
Tree seeds (Ash)	285	"	½ "
Shrub seeds	108	"	1 "
Grass seed, Brome	46	"	1 "
Grass seed, Western Rye	15	"	1 "
Small seeds, 650 bags containing 9,750 packages of shrub, flower, root and garden seeds, and corn.			
Rhubarb roots	150	packages.	
Fruit bushes and cuttings	422	"	
Tree and shrub seedlings	878	"	
Express parcels of trees and shrubs	92	parcels.	

The sample distribution for the spring of 1907 is now in progress, and will be detailed in the report for 1907.

CORRESPONDENCE.

In the five months from November 1, 1905, to March 31, 1906, 6,522 letters were received and 6,386 mailed.

During the twelve months ending March 31, 1907, 8,469 letters were received and 8,365 mailed from this office.

In letters received reports on samples are not included, and in letters mailed circulars of instruction sent out with samples are not counted.

METEOROLOGICAL RECORD.

Month.	Temperature, Maximum.		Temperature, Minimum.		Rainfall.		Snow-fall.	Hours of Bright Sunshine.
1905.	Date.	Degrees	Date.	Degrees	Days.	Inches.	Inches.	
November	12	59	29	—23	2	·20	6·5	65·
December	6	40	3	—22	......	......	8·	77·
					2	·20		142·0
1906.								
January	4	40	22	—33	......	......	9·5	77·6
February	19	40	13	—38	......	......	1·	99·6
March	29 & 31	57	14	—15	1	·09	·5	153·4
April	23	84	4	13	5	1·01	6·	152·3
May	10	87	5	20	15	2·08	2·5	147·1
June	12	82	2	37	16	4·30	34·0	180·2
July	9	92	13	42	10	2·35	......	296·1
August	13	99	25	36	6	·44	......	232·5
September	6 & 7	91	28	25	3	2·22	......	202·8
October	11	75	19	13	6	·30	·5	123·8
November	6	49	30	—15	3	·42	15·	53·8
December	2	33	6 & 8	—26	......	......	9·	49·8
					65	13·21		1769·0
1907.								
January	9 & 10	20	14	—42	......	......	4·	98·2
February	11	41	3 & 4	—42	......	......	2·	129·1
March	20	44	1	—10	1	·10	8·	152·
					1	·10	38·5	379·3

I have the honour to be, sir,

Your obedient servant,

ANGUS MACKAY,

Superintendent.

Experimental Farm, Agassiz, B.C., as seen from first orchard bench on mountain at rear end of farm.

EXPERIMENTAL FARM FOR BRITISH COLUMBIA.

REPORT OF THOMAS A. SHARPE, SUPERINTENDENT.

AGASSIZ, B.C., March 30, 1907.

To Dr. WM. SAUNDERS, C.M.G.,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit the following report of the work done on the Experimental Farm at Agassiz during the year 1906.

This year has been, on the whole, a fairly good one for most farm crops. The first three months of the year were very mild and pleasant, the lowest temperature in January being six degrees of frost on the 20th, with a rainfall of four and a quarter inches, and twenty-one inches of snow; this, however, did not all come in one storm and did not lie long and no drifts formed. February was equally mild and pleasant, the lowest temperature showing three degrees of frost on the 9th. Rainfall for the month nearly four and three quarter inches, and no snow. March was, on the whole, cooler, with a lighter rainfall and a little sharper frost than either January or February, the lowest temperature being nine degrees of frost on the 13th and a rainfall for the month of very little over two inches and no snow. Snowdrops, Narcissus and Hyacinths bloomed freely in the open garden from the first of the month, and Apricot and Japanese plum trees bloomed in the third week. Grass made a strong growth during the month and clover was six inches high by the end of March. April was mostly fair and clear, but the nights were cool and there were several sharp frosts, 30 degrees being the lowest on the 12th. The prevailing winds were north and northwest, and cold, vegetation not coming forward as rapidly as promised in the last few days of March, and the cold winds with showers and light frosts were very injurions to early blooming fruit trees and plants, a light frost with a good many cool rain showers in May, injured the fruit crop, but the rains were helpful to the hay and grass crops. The showery weather with considerable windy weather in April and May rendered spraying very difficult and frequently made the work ineffective. June was very favourable for the growth of most grain and root crops except corn, which did not grow well until the end of the month, owing to the rain and cool winds. There was rain on nineteen days and a cool breeze almost continuously, which prevented the corn from making much progress. July was a comparatively dry and warm month, the rainfall being only a little over 2¼ inches as compared with nearly 7½ inches for May and 6½ inches in June. The frequent showers in June rendered the curing of the first crop of clover almost impossible and it certainly was not practicable to make a really good hay of it, and as it could be made into a very fine quality of ensilage, all of the first crop was put into the silo.

The weather during August was dry and warm, the rainfall being only a little over one inch, and corn grew finely and the clear days of bright sunshine ripened the plums with very little rot, and enabled farmers to harvest the grain and second crop of clover in fine condition. September was rather showery, the rainfall was over six and a quarter inches, and the damp weather was favourable for root crops and late grass.

FRUIT CROPS.

The unfavourable weather in April and May caused some varieties of fruits to drop when forming and many varieties of apples, pears and plums, which showed a full bloom did not have any fruit, or had a very light crop, but many other varieties bore full crops and the fruit was very free from blemishes and disease.

MOUNTAIN ORCHARDS.

The plum, apple, and pear trees on the different benches on the mountains were generally well loaded with fruit. Unfortunately the crop of wild fruit was poor and the bears made free with the early apples and plums and took all the fruit, much of it before it was fully grown.

ORNAMENTAL TREES AND SHRUBS.

The ornamental flowering shrubs, and forest trees have all made a fine strong growth and are becoming very handsome.

NUT TREES.

The nut trees and filbert bushes have done very well; the English, Japanese and American black walnuts all bore fruit, and some of the Spanish and Japanese chestnuts had a few nuts.

The filberts bore better this year than ever before, but it is almost impossible to save them, as the blue jays commence to take them before they are matured. The walnut and chestnut trees planted on the mountain are making fair progress, but receiving no cultivation, they do not grow as rapidly as those on the level land. All the nuts that were saved were distributed to planters in different parts of the province and good reports of the progress of young trees grown from nuts sent out in previous years continue to be received.

DITCHING.

About 200 yards of new ditch have been dug this year, and the old ditches were cleaned out.

NEW BREAKING.

No new breaking has been done this year, but about three acres have been got ready and will be ploughed as soon as possible in spring and put in condition for a crop next season.

CATTLE.

The herd of registered Shorthorn cattle now numbers thirty-five head, as follows: twelve cows, four heifers, five heifer calves, 1 stud bull, 1 yearling bull, ten bull calves and two steers. Since my last report three bulls have been sold to head herds and two cows for beef.

SHEEP.

The flock of sheep numbers seventeen ewes, 1 stud ram and three ram lambs. During the year three ram lanbs were sold as breeders, and seven animals to the butcher.

PIGS.

The stock of pigs consists of seven pure-bred Berkshires and eight pure-bred Yorkshires. A number of both breeds have been sold as breeders and the surplus to the butcher.

HORSES.

Since my last report another of the old horses has died. Of the original lot brought here in 1889, three geldings remain; as they are all over twenty years old and have done a great deal of very hard work, they are nearly worn out. Two very fine teams of young horses, a driving mare and the three old horses are our present horse force.

BEES.

The past season has for some reason been a poor one for bees, several swarms not having stored enough honey to carry them to the end of the year. There are seven swarms now, all well supplied with stores to carry them through to another honey season.

POULTRY.

There are on the farm this year White Wyandottes, Buff Orpingtons, Barred Plymouth Rocks, Black Minorcas and Rose Comb Brown Leghorns.

The R. C. B. Leghorns have been the best layers, but their eggs are rather small. Black Minorcas come next in number of eggs—which are large. Neither of these breeds make good table birds, but they make pretty good broilers at from ten to twelve weeks old, if well fed.

Of the heavier breeds, this year the Buff Orpingtons laid best, the B. P. Rocks and White Wyandottes being about equal.

The White Wyandotte chickens matured a little the earliest, but the Buff Orpington and B. P. Rocks make larger birds at maturity, and the Buff Orpingtons with us, put on more breast meat than the other two breeds.

A good strain of any one of these three breeds of fowls make good layers, also good table birds. Our hens are kept in breeding pens—with yards attached—from January 1 to July 1, and they are at large during the rest of the year.

They are fed mixed grain, about $\frac{1}{4}$ wheat, $\frac{1}{2}$ oats, and $\frac{1}{4}$ pease, and in the antumn they get some sunflower seed, also a few ears of corn occasionally during the winter. While they are confined we give them as much variety of food as possible with what we have on hand. In the coldest weather in winter they get a mash of boiled roots mixed with chop of any kind which we have. A cabbage head or other vegetable is always before them, also grit or finely crushed clam shells, and a box of sifted coal ashes to dust in.

We have not had any disease among the poultry this year, except a few cases of rheumatism, which was probably caused by the wet weather in the autumn, but as in previous years, crows, hawks and skunks have been very troublesome, carrying off a great many chickens, even after they were well grown. The chickens were hatched and reared by hens. The percentage hatched and raised has been about the same as was had with an incubator and brooder. The only advantage in using an incubator and brooder is that a large number of chickens can be hatched and raised early and at one time. The henhouse is sprayed with whitewash in which is mixed some carbolic acid, and the yards are dug about once a month.

EXPERIMENTS WITH OATS.

Thirty-seven varieties of oats were sown in the test plots this year, the size of the plots were one-fortieth of an acre each. The soil was a sandy loam that had produced a crop of roots in 1905, and these had been grown on a heavy aftermath of clover that had also been heavily dressed with stable manure in the previous autumn and thoroughly worked into the soil with spade harrow and drag, and was in good condition, but the dry, hot season hastened the ripening and somewhat lessened the yield.

The grain is plump, bright-coloured and a very good sample. The plots were all sown on April 12.

OATS—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.		No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.	Rusted.
					In.		In.		Lbs.	Bush.	Lbs.	Lbs	
1	Olive Black.	Aug.	1	111	45	Strong......	9	Sided	3,520	72	32	37	No rust.
2	Lincoln.	"	2	112	46	"	10	Branching	3,900	72	12	33	"
3	Goldfinder	"	4	114	46	Medium....	9	Sided ...	3,460	71	26	33	"
4	Virginia White.........	July	31	110	50	Strong.....	9½	Branching	3,080	71	26	35	"
5	Black Beauty..........	Aug.	1	111	46	"	10	" ..	3,580	71	16	36	"
6	American Beauty.......	"	1	111	47	"	11	" ..	2,960	70	20	33	"
7	Bavarian,..............	"	7	117	47	"	11	" ..	4,480	68	8	32	Slightly.
8	White Giant...........	"	2	112	41	"	9	" ..	3,160	65	30	34½	"
9	Golden Fleece	"	3	113	47	"	10	" ..	4,160	65	30	30½	No rust.
10	Buckbee's Illinois.......	"	1	111	46	"	9	" ..	4,280	64	24	33½	"
11	Golden Giant.....	"	7	117	45	Stiff........	9	Sided	5,040	63	18	31	"
12	Swedish Select..........	"	2	112	47	"	10	Branching	4,000	63	18	32	"
13	Improved American	"	3	113	47	"	9	" ..	4,480	62	12	33¼	"
14	Milford White.......	"	3	113	42	Soft, weak..	9	Sided	4,280	62	12	35	"
15	Improved Ligowo.......	"	5	115	42	Strong......	9	Branching	3,448	62	12	32	"
16	Siberian....	"	3	113	47	"	10	" ..	3,320	61	26	34	"
17	Pioneer	"	1	111	41	"	10	" ..	2,920	61	16	38¼	"
18	Thousand Dollar.......	"	5	115	41	Medium....	9	" ..	3,460	60	20	34¼	Slightly.
19	Holstein Prolific.......	"	1	111	46	Strong......	9	" ..	3,320	60	6	32½	No rust.
20	Waverley.	"	7	117	48	"	11	" ..	3,360	60	..	31½	Slightly.
21	Milford Black	"	1	111	42	"	9	Sided	4,140	59	24	37	"
22	Irish Victor	"	1	111	48	"	10	Branching	4,820	59	14	34½	No rust.
23	Danish Island	"	7	117	46	"	11	" ..	3,760	58	28	34	Slightly.
24	Banner	"	4	114	42	Stiff	9	" ..	4,410	58	28	32¼	"
25	Abundance.	"	1	111	48	"	11	" ..	4,200	58	18	34	No rust.
26	Joanette..............	"	1	111	40	Medium....	10	" ..	3,040	57	22	34	"
27	Kendal Black....	"	2	112	41	Strong......	10	Sided	4,440	57	22	38	"
28	Kendal White........ .	"	5	115	46	"	10	" ...	4,400	56	16	32	"
29	Tartar King............	July	31	110	44	"	11	"	4,060	54	24	34	"
30	American Triumph......	Aug.	2	112	47	"	10	Branching	4,120	52	32	32	"
31	Wide Awake............	"	5	115	44	Medium....	9	" ..	4,080	51	26	32	"
32	Columbus	"	5	115	42	Strong.....	10	" ..	3,280	50	30	34	"
33	Sensation.......... ...	"	3	113	40	Medium....	9	" ..	3,960	50	20	32¼	"
34	Twentieth Century......	"	1	111	42	"	10	" ..	3,140	48	28	28	Slightly.
35	Storm King......	July	31	110	48	Stiff........	11	Sided	2,880	47	2	32¼	No rust.
36	Mennonite.	Aug.	1	111	45	Strong......	11	Branching	4,120	45	30	34	"
37	Golden Beauty....... ...	"	3	113	42	Medium....	9	" ..	4,520	43	18	32	Slightly.

EXPERIMENTS WITH BARLEY.

The soil chosen for the test plots of oats and barley was a sandy loam which had a heavy clover aftermath turned under in the autumn of 1904, was thoroughly cut with the spade harrow and dressed with about 12 tons per acre of barnyard manure, which was then worked into the soil by spade harrow and drag, in preparation for a crop of roots which grew on it in 1905. It was ploughed early in March of this year. and worked with disk and drag every few days to clean it of weeds, and fit it for the experimental plots. The barley was all sown April 16 in plots of one-fortieth of an acre and promised to be an extra heavy crop, but the very hot weather during the latter part of July ripened it a little too hurriedly, so that although fine and bright in colour, the berry is not as plump as was expected.

Fourteen varieties of two-rowed, and eighteen varieties of six-rowed barley were tested. There was no smut or rust on any of the barley plots.

Six-rowed Barley—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	Number of Days Maturing.	Character of Growth.	Length of Straw.	Weight of Straw.	Length of Head.	Yield per Acre.		Weight per Bushel.
					In.	Lbs.	In.	Bush.	Lbs.	Lbs.
1	Mensury	July 25	100	Strong	46	3,620	3	49	28	48
2	Odessa	" 25	100	"	45	3,040	3	47	4	49
3	Empire	" 27	102	"	46	2,860	4	46	32	50
4	Blue Long Head	" 27	102	"	42	3,120	2½	43	16	44½
5	Claude	" 24	99	"	40	2,960	2½	42	24	51
6	Nugent	" 26	101	"	40	2,310	2½	39	18	49
7	Yale	" 27	102	"	43	3,120	3	39	8	49
8	Trooper	" 30	105	"	47	3,760	3	39	8	49½
9	Stella	" 28	103	"	42	3,340	3	37	24	48½
10	Common	" 26	101	"	44	3,100	3½	36	32	48
11	Argyle	" 28	103	"	44	3,640	3½	36	22	49¼
12	Brome	" 28	103	"	43	3,860	4	36	12	50
13	Champion	" 23	98	"	46	3,280	3	35	40	44
14	Oderbruch	" 26	101	"	45	3,520	3	35	..	51½
15	Albert	" 25	100	"	44	4,560	2½	34	8	50
16	Summit	" 30	105	"	48	3,800	3	33	16	51¼
17	Mansfield	" 28	103	"	47	3,640	3	32	24	49
18	Royal	" 26	101	"	44	3,480	3	31	32	49½

Two rowed Barley—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	Number of Days Maturing.	Character of Growth.	Length of Straw.	Weight of Straw.	Length of Head.	Yield per Acre.		Weight per Bushel.
					In.	Lbs.	In.	Bush.	Lbs.	Lbs.
1	Clifford	July 28	103	Strong	48	3,320	3	46	32	51
2	Swedish Chevalier	" 30	105	"	48	2,950	4½	42	14	52
3	French Chevalier	" 31	106	"	41	3,400	4	41	42	52
4	Dunham	" 31	106	"	46	2,400	3	41	32	49½
5	Danish Chevalier	" 31	106	"	42	3,420	4	41	12	52
6	Sidney	" 30	105	"	40	4,040	4	41	2	51½
7	Harvey	" 31	106	"	48	3,240	4	40	40	50
8	Standwell	Aug. 1	107	"	41	3,000	3	40	..	53
9	Beaver	July 30	105	"	46	3,400	3½	37	24	52
10	Invincible	" 31	106	"	40	2,840	3½	36	32	49
11	Gordon	" 31	106	Medium	42	2,980	4	34	36	52
12	Jarvis	Aug. 1	107	Strong	45	3,760	4	34	8	48
13	Canadian Thorpe	July 30	105	"	42	2,600	3	32	44	51½
14	Logan	" 30	105	"	42	4,000	4	27	4	49

WHEAT.

Owing to the prevalence of the wheat midge *Diplosis tritici* in the Agassiz valley, the plots of spring wheat, also those of durum wheat and of emmer and spelt, have all been so much injured as to make the tests for 1906, as to the relative productiveness of the varieties of no value, hence the yields for 1906 are not given. It is proposed to discontinue the wheat plots at Agassiz for a year with the hope of thus getting rid of this insect pest.

EXPERIMENTS WITH PEASE.

Of field pease, 26 varieties were sown in the test plots this year on clover sod. The soil was a sandy loam. The land was ploughed late in the fall, and as early as the work could be done, it was thoroughly cut up with the spade harrow and fined with the spike-tooth drag. There were some large apple trees in the field, and wherever a plot was sown between rows of these, the yield was somewhat lessened. The plots were one-fortieth of an acre each, and all were sown on April 17.

PEASE—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	Number of Days Maturing.	Character of Growth.	Length of Straw.	Weight of Straw.	Length of Pod.	Size of Pea.	Yield per Acre.		Weight per Bushel.
					In.	Lbs.	In.		Bush.	Lbs.	Lbs.
1	English Grey	Aug. 11	111	Strong	48	2,400	3	Medium	50	..	63½
2	White Marrowfat	″ 8	109	″	52	2,860	3	Large	49	..	63½
3	Early Britain	″ 4	105	″	50	3,080	3	Medium	48	40	62½
4	Picton	″ 10	111	″	54	3,000	3	″	46	40	64
5	Kent	″ 7	108	″	52	2,820	2½	Large	46	20	64
6	Mummy	″ 10	111	″	48	2,680	3	Medium	45	20	64
7	Mackay	″ 4	105	″	48	3,020	3	″	43	..	63
8	Golden Vine	″ 8	109	″	52	3,260	2½	Small	42	40	65
9	Prince Albert	″ 7	108	Medium	48	2,820	3	″	41	20	65
10	Archer	″ 4	105	Strong	52	2,500	3	Medium	39	..	64
11	Prince	″ 11	112	″	42	3,600	3	Large	38	40	63½
12	Arthur	″ 7	108	″	48	3,250	2½	″	38	10	65
13	Wisconsin Blue	″ 8	109	″	50	2,920	3	Small	38	..	65½
14	Daniel O'Rourke	″ 1	102	″	56	3,540	2	″	37	40	63
15	Crown	″ 8	109	″	50	2,860	3	″	37	20	65
16	White Wonder	″ 5	106	″	62	3,080	3	Medium	36	40	63
17	Gregory	″ 5	106	″	50	3,620	2½	″	36	20	64½
18	Nelson	″ 9	110	″	50	3,440	3	″	36	..	64
19	Prussian Blue	″ 3	104	″	48	3,280	2½	″	35	20	65
20	Chancellor	″ 3	104	Medium	50	3,320	2½	Small	34	40	65
21	Pearl	″ 6	107	″	72	3,570	3	Large	32	30	63¼
22	Duke	″ 12	113	″	54	3,320	3	″	29	40	64½
23	Agnes	″ 10	111	Strong	56	4,000	3	″	28	..	66
24	Paragon	″ 10	111	″	63	3,660	3½	Medium	27	20	64
25	Black Eye Marrowfat	″ 10	111	″	62	3,240	3½	Large	26	..	65

EXPERIMENTS WITH CORN.

There were twenty-three varieties of corn planted in the variety test this year. All were planted May 4 except one variety, the Red Cob Ensilage; that was planted May 25. The soil is a gravelly loam which had been heavily manured with barnyard manure in the winter of 1904, and fitted for a crop of wheat which was grown on it in 1905.

The corn was sown earlier this year than usual and had the season been favourable, we should have had a better yield of more matured corn. The months of May and most of June were generally wet, cold and unfavourable for corn. In July and August it was dry and hot, and the soil being gravelly, soon dried out and the crop suffered for lack of moisture. The yield per acre is calculated from sixty-six feet of two rows both in hills and drills. The drills were three feet apart and the corn thinned to six inches apart in the drill, and the hills were three feet apart each way and three or four stalks left in each hill.

Corn—Test of Varieties.

Number.	Name of Variety.	Character of Growth.	Height.	Leafiness.	When Cut.	Condition when Cut.	Weight per Acre grown in rows.		Weight per Acre grown in hills.	
			Inches.				Tons.	Lbs.	Tons.	Lbs.
1	Pride of the North	Strong	112	Very leafy	Oct. 2.	Early milk	24	1,280	23	1,300
2	Red Cob Ensilage	Very strong.	126	″	″ 2.	″	20	1,580	19	390
3	Giant Prolific Ensilage	″	120	″	″ 2.	Ears formed.	20	40	18	960
4	Superior Fodder	″	116	″	″ 2.	″	19	1,490	17	1,420
5	White Cap Yellow Dent	″	131	″	″ 2.	Early milk	19	280	19	1,490
6	Thoroughbred White Flint	Strong	98	″	″ 2.	In silk	18	1,620	18	740
7	Champion White Pearl	″	113	″	″ 2.	Late milk	17	1,860	18	411
8	Compton's Early	″	114	″	″ 2.	Early milk	17	1,805	15	1,460
9	Mammoth Cuban,	Very strong.	118	″	″ 2.	″	17	1,530	18	410
10	Salzer's All Gold	Strong	108	″	″ 2.	In silk	17	1,310	16	1,220
11	Early Butler	″	90	″	″ 2.	Early milk	17	980	17	320
12	Wood's Northern Dent	Very strong	104	″	″ 2.	″	16	1,600	16	1,820
13	North Dakota White	″	106	″	″ 2.	″	16	560	15	140
14	King Philip	Strong	109	″	″ 2.	Late milk	14	1,260	13	510
15	Angel of Midnight	″	92	″	″ 2.	Early milk	14	1,040	15	30
16	Early Mastodon	Very strong.	116	″	″ 2.	″	14	710	15	140
17	Longfellow	″	106	″	″ 2.	Roasting	13	1,280	12	1,190
18	Eureka	Strong	118	″	″ 2.	In silk	13	620	13	1,060
19	Early Longfellow	″	100	″	″ 2.	Roasting	12	310	13	180
20	Cloud's Early Yellow	″	98	″	″ 2.	Early milk	12	90	11	1,880
21	Evergreen Sugar	″	108	″	″ 2	″	11	1,760	11	440
22	Early Leaming	″	108	″	″ 2.	Late milk	11	1,430	13	620
23	Selected Leaming	Very strong.	118	″	″ 2.	Early milk	11	220	11	990

CORN SOWN AT DIFFERENT DISTANCES APART.

The same varieties were used in this test as in previous years, and as in the past the widest rows gave the most matured corn. These plots were planted alongside of the varietal tests and under the same conditions. The growth appears to be as mature, the ears as large and as plentiful at 35 inches in the drill as at 42 inches, and there does not seem to be any advantage to compensate for the extra ground taken up by the wider rows.

CORN SOWN AT DIFFERENT DISTANCES APART.

Name of Variety.	Date of Sowing.	Character of Growth.	Distance in rows.	Distance in hills.	Condition when cut.	Weight per Acre grown in rows.		Weight per Acre grown in hills.	
			In.	In.		Tons.	Lbs.	Tons.	Lbs.
Champion White Pearl	May 4	Strong	21	21	Early milk	25	1,480	24	1,594
" "	" 4	"	28	28	"	20	1,480	20	392
" "	" 4	"	35	35	Late milk	17	1,300	17	160
" "	" 4	"	42	42	"	15	926	14	1,983
Longfellow	" 4	"	21	21	Early milk	19	1,847	20	1,108
"	" 4	"	28	28	"	16	80	15	843
"	" 4	"	35	35	Late milk	16	1,264	15	885
"	" 4	"	42	42	Glazing	14	380	14	1,417
Selected Leaming	" 4	"	21	21	Early milk	19	280	19	1,222
"	" 4	"	28	28	"	15	266	14	1,131
"	" 4	"	35	35	Late milk	12	1,796	13	475
"	" 4	"	42	42	"	10	365	10	835

EXPERIMENTS WITH FIELD ROOTS.

All the experiments with field roots were alongside each other on sandy loam that had a heavy clover stubble turned under in the autumn of 1904, and a crop of field pease the summer of 1905, followed by a heavy dressing of stable manure in the winter of 1905, which was well worked into the soil with drag and spade harrow and the soil kept open and mellow until the roots were sown in 1906. Two sowings of each variety were made fourteen days apart in drills thirty inches apart. Twenty varieties of turnips, sixteen of mangels, ten of carrots and eight of sugar beets were sown. The first sowing of turnips was on May 7, the second sowing on May 21; with all the other roots the first sowing was made April 21, and the second May 5. Four rows each 100 feet long were sown and the yield per acre was found by weighing the crop from 66 feet of the two centre rows of each sowing of every variety. They were all harvested October 30 and 31, excepting the turnips. These were taken up from both sowings on November 1. The spring was so cold and showery that the seed did not germinate freely and the summer and early autumn so dry that the root crops were unusually light.

TURNIPS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre. 1st Plot.				2nd Plot.			
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Good Luck	23	200	770	..	15	1,150	519	12
2	Kangaroo	21	1,032	717	12	18	1,488	624	48
3	Jumbo	21	600	710	..	17	1,640	594	..
4	Halewood's Bronze Top	21	240	704	..	17	848	580	48
5	Perfection Swede	20	1,760	696	..	17	584	576	24
6	Emperor	18	960	616	..	17	584	576	24
7	Imperial	18	432	607	12	16	1,792	563	12
8	Magnum Bonum	17	1,376	589	36	13	928	448	48
9	Elephant's Master	16	208	536	48	14	1,568	492	48
10	New Century	16	142	535	42	16	1,192	553	12
11	Sutton's Champion	15	1,944	532	24	16	184	536	24
12	Carter's Elephant	15	1,680	528	..	21	240	704	..
13	Drummond Purple Top	15	1,152	519	12	15	360	506	..
14	East Lothian	14	1,172	486	12	16	840	539	..
15	Bangholm Selected	14	488	474	48	10	136	335	36
16	Hall's Westbury	13	928	448	48	15	96	501	36
17	Skirving's	13	664	444	24	7	1,078	250	48
18	Hartley's Bronze	12	552	409	12	8	368	272	48
19	Selected Purple Top	11	1,760	396	..	10	1,120	352	..
20	Mammoth Clyde	10	1,120	352	..	7	784	246	24

Mangels—Test of Varieties.

Number.	Name of Variety.	Yield per Acre. 1st Plot. Tons.	Lbs.	Bush.	Lbs.	2nd Plot. Tons.	Lbs.	Bush.	Lbs.
1	Yellow Intermediate	27	852	914	12	17	512	575	12
2	Mammoth Yellow Intermediate	20	1,712	695	12	13	928	448	48
3	Triumph Yellow Globe	20	1,184	686	24	14	248	470	48
4	Leviathan Long Red	19	544	642	24	13	1,720	462	..
5	Giant Sugar Mangel	18	960	616	..	8	368	272	48
6	Half Sugar Rosy	18	168	602	48	6	1,200	220	..
7	Half Sugar White	16	868	547	48	13	136	435	36
8	Lion Yellow Intermediate	15	1,680	528	..	10	1,120	352	..
9	Selected Mammoth Long Red	14	1,040	484	..	10	1,252	354	12
10	Mammoth Long Red	14	644	477	24	13	532	442	12
11	Giant Yellow Intermediate	13	1,720	462	..	6	1,728	228	48
12	Prize Mammoth Long Red	11	1,892	398	12	7	652	244	12
13	Selected Yellow Globe	11	1,826	397	6	6	1,332	222	12
14	Giant Yellow Globe	11	1,760	396	..	5	1,748	195	48
15	Prize-winner Yellow Globe	11	176	369	36	8	236	270	36
16	Gate Post	10	1,856	364	16	6	1,464	224	24

Carrots—Test of Varieties.

Number.	Name of Variety.	Yield per Acre. 1st Plot. Tons.	Lbs.	Bush.	Lbs.	2nd Plot. Tons.	Lbs.	Bush.	Lbs.
1	Giant White Vosges	37	1,340	1,089	..	19	1,540	659	..
2	Carter's Orange Giant	31	1,756	1,062	36	25	160	836	..
3	Improved Short White	31	964	1,049	24	21	1,524	752	24
4	New White Intermediate	28	1,948	965	48	25	1,612	860	12
5	White Belgian	28	232	937	12	25	688	844	48
6	Mammoth White Intermediate	26	1,592	893	12	20	1,448	690	48
7	Half Long Chantenay	26	404	873	24	18	960	616	..
8	Early Gem	24	576	809	36	17	1,904	598	24
9	Ontario Champion	23	1,784	796	24	16	736	545	36
10	Long Yellow Stump-rooted	22	1,672	761	12	19	1,804	663	24

Sugar Beets—Test of Varieties.

Number.	Name of Variety.	Yield per Acre. 1st Plot. Tons.	Lbs.	Bush.	Lbs.	2nd Plot. Tons.	Lbs.	Bush.	Lbs.
1	Improved Imperial	22	1,540	759	..	12	1,344	422	24
2	Danish Red Top	21	1,032	717	12	17	452	574	12
3	Red Top Sugar	20	1,712	695	12	10	64	334	24
4	Danish Improved	19	1,072	651	12	9	744	312	24
5	Wanzleben	18	1,356	622	36	13	532	442	12
6	Royal Giant	15	1,680	528	..	7	1,546	259	6
7	French Very Rich	12	1,080	418	..	6	672	211	12
8	Vilmorin's Improved	10	64	334	24	6	1,068	217	48

POTATOES.

Thirty-two varieties of potatoes were planted in the experimental plots. Four rows of one hundred feet long were planted with the rows two and a half feet apart, and the sets about one foot apart in the rows. The yield has been computed from the crop obtained from sixty-six feet of the two middle rows.

All were planted May 1, on sandy loam, which had received a heavy dressing of manure in the spring of 1905 and was in good condition, but the very dry July and August lessened the yield.

The tubers were smooth, of very fine quality and with very little rot, only four of the varieties being so affected. They were all dug on October 17.

Potatoes—Test of Varieties.

Number.	Name of Variety.	Yield per Acre.										Form and Colour.
		Total.		Sound.		Rotten.		Marketable.		Unmarketable.		
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
1	Late Puritan	611	36	581	36	30	..	583	..	58	36	Long, white.
2	Dreer's Standard	589	36	589	36	....		501	..	88	36	"
3	Vermont Gold Coin	514	48	509	..	5	48	443	..	66	..	"
4	American Wonder	508	12	508	12	....		407	12	101	..	Long, flat, white
5	Ashleaf Kidney	495	..	495	..	....		347	..	148	..	Round, white.
6	State of Maine	466	24	466	24	....		397	24	69	..	Long, pink.
7	Everett	453	12	453	12	....		363	..	90	..	Long, rose.
8	Rochester Rose	452	..	430	..	22	..	363	..	67	..	Oblong, red.
9	Sabean's Elephant	435	36	435	36	....		370	36	65	..	Long, white.
10	Carman No. 1	404	48	404	48	....		343	48	61	..	"
11	Maule's Thoroughbred	402	36	402	36	....		324	36	78	..	Long, rose.
12	I.X.L.	396	..	396	..	....		339	..	57	..	Long, flat, pink.
13	Morgan Seedling	363	..	363	..	....		311	..	52	..	Long, pink.
14	Uncle Sam	360	48	360	48	....		306	40	54	..	Round, white.
15	Empire State	356	24	356	24	....		281	..	71	24	Long, flat, white.
16	Holborn Abundance	336	36	336	36	....		270	36	66	..	Round, white.
17	Carman No. 3	330	..	330	..	....		290	..	40	..	"
18	Early White Prize	330	..	330	..	....		281	..	49	..	Long, white.
19	Burnaby Mammoth	323	24	323	24	....		275	..	48	24	Oblong, rose.
20	Pearce	297	..	297	..	....		254	..	43	..	Long, red.
21	Vick's Extra Early	281	36	281	36	....		225	36	56	..	Round, rose.
22	Dalmeny Beauty	277	12	277	12	....		250	12	47	..	Round, white.
23	Country Gentleman	272	48	272	48	....		189	48	83	..	Oblong, pink.
24	Dooley	268	24	268	24	....		229	..	39	24	Oblong, white.
25	Early Rose	264	..	264	..	....		211	..	53	..	Oblong, rose.
26	Bovee	264	..	264	..	....		215	..	49	..	Long, rose.
27	Irish Cobbler	248	36	248	36	....		204	..	44	36	Round, white.
28	Reeve's Rose	218	56	218	56	....		187	..	31	56	Long, rose.
29	Early Envoy	218	56	218	56	....		176	..	42	56	Oblong, pink and white.
30	Money Maker	211	12	199	..	12	12	160	12	51	..	Long, white.
31	Pingree	200	12	200	12	....		133	12	67	..	"
32	Canadian Beauty	171	36	171	36	....		120	..	51	36	Oblong, flat, white.

POTATOES.—EARLY AND LATE PLANTING.

Two varieties were chosen for this test. They were planted alongside of the other test plots and the conditions of soil and treatment were the same. The Early St. George, being an early potato, does not yield so well when planted late. The Enormous, being a late potato, not only increases in yield, but the per cent of marketable potatoes is larger in the late planted plots than in the earlier.

Name of Variety.	Planted.	Yield per Acre.									
		Acre.		Sound.		Rotten.		Marketable.		Un-marketable.	
		Bush.	Lbs.	Bush.	Lbs.	Bush	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Early St. George	April 5	523	36	523	36	None		445	..	78	36
″	″ 12	545	36	545	36	″		462	36	83	..
″	″ 19	466	24	466	24	″		382	30	83	54
″	″ 26	400	24	400	24	″		320	24	80	..
″	May 3	365	12	365	12	″		292	12	73	..
″	″ 10	352	..	352	..	″		281	36	70	30
Enormous	April 5	426	48	426	48	″		375	48	51	..
″	″ 12	462	..	462	..	″		415	..	47	..
″	″ 19	488	24	488	24	″		439	34	48	50
″	″ 26	516	38	516	38	″		463	20	53	18
″	May 3	554	24	554	24	″		499	54	54	30
″	″ 10	592	20	592	20	″		545	20	47	20

CLOVER EXPERIMENTS.

These are in continuation of those for last year on clover and alfalfa seed treated with the special culture, and a similar area alongside sown with a similar quantity of untreated seed. The growth of clover on both plots, treated and untreated, was very good and two crops of clover were cut and made into hay. The alfalfa did not amount to much and the only growth worth cutting, on either treated or untreated plot, was where a red clover plant had come in as a volunteer. The alfalfa was gone over with the mower June 23, and again July 21, but there was not enough to rake up.

The red clover plots were cut June 20 and again on July 19, and the cured weights were as follows, the plots being each half an acre.

Plot 1.—Red Clover, Treated Seed.

	Lbs.
First crop cured hay	1,985
Second cutting	1,385

Plot 2.—Red Clover, Untreated Seed.

First crop cured hay	1,945
Second cutting	1,370

There was evidently no advantage derived from the treatment of the seed.

A third cutting might have been made in early September, but the land was broken up and prepared for orchard planting.

FODDER PLANTS.

The following forage plants were sown in plots of one-fortieth of an acre each on May 3. The land was a sandy loam which had been manured with about ten tons of fresh farmyard manure the previous fall, which was well worked into the soil with disk and spike-tooth harrow.

Plot 1.—Soja Beans.—Sown in drills 21 inches apart, cut October 2. Length of stalk 30 inches; length of pod 1 to 1½ inches; weight of crop 298 lbs. Per acre 5 tons 1,920 lbs.

Plot 2.—Soja Beans.—Drills 28 inches apart, cut October 2. Length of stalk 30 inches; length of pod 1 to 2 inches; weight of crop 274 lbs. Per acre 5 tons 1,060 lbs., better furnished with pods than plot 1.

Plot 3.—Soja Beans.—Drills 35 inches apart, cut October 2. Length of stalk 30 inches; pods 1 to 2 inches and well filled with beans; weight of crop 283 lbs. Per acre, 5 tons 1,920 lbs. Stalk very branching, leafy and better furnished with pods than those in the narrower drills.

Plot 4.—Horse Beans.—Drills 21 inches apart, cut October 2. Length of stalk 26 inches; pods 2 to 2½ inches long. Did not germinate well and the stand was very uneven. Weight, 214 lbs. Per acre, 4 tons 560 lbs.

Plot 5.—Horse Beans.—Drills 28 inches apart, cut October 2. Length of stalk 28 inches; pods 2 to 2½ inches long; weight of crop 201 lbs. Per acre 4 tons 40 lbs.

Plot 6.—Horse Beans.—Drills 35 inches apart, cut October 2. Length of stalk 26 to 30 inches; pod 2½ to 3 inches long and fairly well filled out with beans. Weight of crop 211 lbs. Per acre 4 tons 440 lbs.

Plot 7.—Hungarian Millet.—Sown June 1, alongside of the other plots and on similar soil, cut September 20. Stalks 26 to 28 inches long; heads 3 to 4½ inches long. Weight of crop 212 lbs. Per acre 4 tons, 480 lbs.

Plot 8.—Pearl Millet.—Seed did not germinate well. Stalks 28 inches long; heads 2 inches long; weight of crop 128 lbs. Per acre 2 tons 1,120 lbs. A poor stand.

Plot 9.—Algerian Millet.—Did not germinate freely and produced a very uneven stand. Stalks 24 to 30 inches long; heads 3 to 4 inches. Weight of crop 134 lbs. Per acre 2 tons 1,360 lbs.

Plot 9.—Italian Millet.—Stalks 34 to 38 inches long; heads 6 inches; weight of crop 328 lbs. Per acre 6 tons 1,120 lbs. A fair even stand.

Plot 10.—White Round French Millet.—Stalks 20 to 24 inches long; heads 2 to 2½ inches; weight of crop 214 lbs. Per acre 4 tons 560 lbs. A very uneven stand and a weak growth.

SUNFLOWERS.

An eighth of an acre of sunflowers was sown in drills three feet apart and thinned to six inches in the drill. The seed germinated well and the plants made fine heads on stalks from four to seven feet long. The heads ripened very unevenly and the birds began to eat the seed as soon as it was in the dough stage and destroyed a large per cent of the earliest ripened heads. A small plot is well worth raising as it furnishes a very fine food for the poultry in the autumn when they are moulting.

SUMMARY OF CROPS.

			Tons.	Lbs.
Hay			39	1,700
Ensilage—				
Clover	70	....		
Corn	28	....		
	—	——	98	....
Roots—				
Turnips	47	1,000		
Carrots	7	1,200		
Mangels	6	1,700		
Potatoes	5	200		
	—	——	61	1,900

	Bush.	Lbs.	Tons.	Lbs.
Fall Wheat	16	55	..	1,075
Rye	22	08	..	1,240
Barley	35	45	..	1,725
Pease	85	10	2	1,110
Oats	92	32	1	1,600
Mixed grains, oats and pease	1,152			

SAMPLES DISTRIBUTED.

Scions and cuttings	packages	193
3 lb. samples seed potatoes	"	217
3 lb. samples oats	"	197
3 lb. samples pease	"	203
3 lb. samples barley	"	98
Nuts, tree seeds and bulbs	"	396
		1,304

CORRESPONDENCE.

Letters received	3,328
Letters despatched	3,051

GARDEN VEGETABLES.

Beets.—Sown April 14.

Early Blood Turnip. Fit for table July 10. Crisp and sweet, very good.

Egyptian. Fit for table July 14. Very smooth roots, very crisp, dark blood red, sweet.

Nuttings Dwarf Improved. Fit for table July 18. A fine flavoured, sweet, good beet.

Long Smooth Blood Red. Fit for table September. A little stringy owing to the very dry August, not of first quality.

Table Turnips.—Sown April 14.

Extra Early White Milan. A very rapid grower and very sweet, fine flavoured, one of the best for summer use. Fit for table June 2.

Early Stone. Fit for table June 4. Sweet, crisp and good, very even in size.

Early White Strap-leaved. Fit for table June 6 Crisp, of fine flavour, roots very smooth.

Robertson's Golden Ball. Fit for table July 8. Flavour pleasant, solid, good.

Radishes.—Sown April 2.

Earliest Deep Scarlet Turnip. Fit for table May 9. Small, round, crisp, sweet.

Rosy Gem. Fit for table May 9. Very round, smooth, crisp, sweet, fine flavour, good.

Early Scarlet Turnip. White tip. Fit for table May 12. Crisp and sweet.

LETTUCE.—Sown April 7.

Paris White Cos. Fit for table July 16. Very fine flavour. Crisp and sweet.

Cabbage, Big Boston. Fit for table May 18. Sweet, crisp and of fine flavour.

Toronto Gem. Fit for table May 18. Forms a fine solid, crisp, white head of very superior quality.

GARDEN PEASE.—Sown April 16.

Rennie's Best Extra Early. Fit for table June 17. Pod of medium length, averaging six to eight fair size pease of fine quality. Straw 20 to 24 inches long and well loaded.

Thos. Laxton. Fit for table June 22. Pod of medium length, well filled with medium size pease of very superior flavour and quality. Straw 24 to 26 inches long and well loaded with pease.

Rennie's Queen. Fit for table June 28. Pods long and fairly well filled, pea large and very sweet and rich flavoured. Straw 24 to 30 inches and well loaded.

Gradus. Fit for table June 29. Pods long and well filled. Pea large and of the best quality, rich and good. Straw 24 to 32 inches and fairly well loaded.

Dwarf Champion. Fit for table July 8. Pods of medium length and filled out to tip with medium to large pease of very fine quality. Straw 24 to 30 inches long and well loaded with pods.

Horsford's Market Garden. Fit for table July 8. Pods of medium length, pea large and of very fine quality. Straw 24 to 28 inches long and very well loaded with pods.

BEANS.—Planted April 16.

Extra Early Valentine. Fit for table June 18. Pods about 5 inches long, round and plump, of very fine quality. Very productive.

Dwarf Black Speckled. Fit for table June 24. Pods 2 to 4 inches long and rather slender. Plants small and not productive. Ripens very soon after becoming fit for table.

Dwarf Golden Skinless. Fit for table July 6. Plant vigorous and moderately productive, pods 3 to 4 inches, very crisp and of fine quality.

Dwarf Emperor of Russia. Fit for table July 8. A vigorous grower and productive. Pods 4 to 5 inches, plump, crisp and good.

New Round Red Kidney. Fit for table July 8. Plant fairly vigorous and productive. Pods 3 to 5 inches long, round, plump, crisp, remains fit for table a long time, of good flavour.

Prolific Golden Wax. Fit for table July 12. Plants vigorous and moderately productive. Pods 2½ to 5 inches long, plump, crisp and of very fine flavour.

Saddle Back Wax.—Fit for table July 14. Plants vigorous, moderately productive. Pods 3 to 6 inches long, plump, crisp and of very fine quality.

Fame of Vitry. Fit for table July 20. Plants vigorous and productive. Pods 3½ to 6 inches long, crisp with a mild, pleasant flavour.

Dwarf Matchless. Fit for table July 20. Plants, dwarf, but fairly productive. Pods 3 to 6 inches long, crisp and of fine flavour, but ripen very soon after becoming fit for table.

Dwarf Wax Every Day. Fit for table July 23. Plants very dwarf and not very productive. Pods 2 to 4 inches long, crisp and of very pleasant flavour.

Stringless Green Pod. Fit for table July 23. Plants vigorous and productive. Pods 4 to 6 inches long, plump, crisp, and of very fine quality.

PARSNIPS.—Sown April 26.

Hollow Crown. Very strong grower and large, very sweet and of fine flavour in winter.

Sutton's Student. Short medium size roots. Fit for table in August. When partly grown, have a very pleasant flavour.

Cabbage.

Seed sown in beds in open garden on April 10, and plants transplanted May 25.

Express. Fit for table July 7. Heads small, solid, crisp, sweet with a pleasant flavour. Plants very regular headers.

Early Jersey Wakefield. Fit for table July 7. Heads of medium size, very solid and hard, crisp, of very fine flavour, and an even, regular header.

Paris Market. Fit for table July 8. Heads of fair size, firm and solid, very crisp with a delicate flavour.

Extra Early Midsummer Savoy. Fit for table July 14. Heads round, of medium size, rather soft, but the quality is very good.

Early Winningstadt. Fit for table August 8. Heads solid, firm, crisp, and of very fine quality.

Fottler's Improved Brunswick. Fit for table September 3. Heads large, solid, very uniform, a splendid cropper, crisp, very sweet with a mild, pleasant flavour.

Green Globe Savoy. Fit for table September 3. Heads of medium size, round, very firm and solid, with a very fine flavour.

Large Late Flat Drumhead. Heads very uniformly large, flat, firm and solid, a splendid cropper, and a superior winter cabbage.

Cauliflower.

Seed sown in open ground April 10, and transplanted May 20.

Selected Extra Early Dwarf Erfurt. Fit for table July 14. Heads small, compact, snow white, very crisp, sweet, pleasant, very good.

Early Snowball. Fit for table July 18. Heads fine size, very close and compact, very white, crisp, sweet, with a delicate, fine flavour; very good.

Early Paris. Fit for table July 22. Heads small, close, fairly compact, and of very good flavour.

Brussels Sprouts.

Sown in the open April 10, transplanted May 20.

Giant. A tall vigorous grower and very productive, of fine quality.

Broccoli.

Walcheren. Fit for table July 29. Heads large, compact, very white, crisp, with a very fine flavour.

Corn.

Planted in hills 36 inches apart each way May 10, on a warm sandy loam.

Premo. A strong grower and productive; ears 4 to 6 inches long and closely filled out to tip. Fit for table August 16. Corn sweet, tender, of very fine quality, and remains fit for table a long time.

Ringleader. Fit for use August 16. Ears 4 to 6 inches long and well filled out over the tip; kernels large, very tender and sweet, a strong grower and productive.

Early Windsor. Fit for table August 22. Ears 3 to 6 inches long and well filled to tip. Very sweet and tender; stalks fairly vigorous and productive.

Extra Early White Cory. Fit for use August 22. Ears 3 to 5 inches long, well filled, grains deep, tender, very sweet and good; stalks productive and of vigorous growth.

TABLE CARROTS.—Sown April 2.

French Horn. Fit for table June 8. Small, crisp, sweet, very good.

Luc Half Long. Fit for table June 28. Crisp, very sweet and pleasant.

Early Scarlet Horn. Fit for table June 28. Crisp, short, plump; roots of very pleasant flavour.

ONIONS.—Sown April 14.

Large Red Wethersfield. Large, very solid and close-grained, even in size, and productive; of very fine quality and a good keeper.

Trebon's Large Yellow. Medium to large, solid, very mild, sweet; does not bottom and ripens unevenly in this climate.

Market Favourite. Medium or below in size, even and a good regular stand, solid, mild and sweet; a very good keeper.

Danver's Yellow Globe. Large globe shape and very uniform in size; a fine cropper, and of very good quality; a good keeper.

PUMPKINS.—Planted May 12.

Quaker Pie. Vines strong growers and productive. Pumpkin of medium size and oval shape, with a yellow skin and flesh which is thick.

Japanese Pie. Vines of medium growth, not productive. Fruit medium or below in size; flesh very thick, not valuable.

Jumbo. Vines very strong growers, and productive.

Mammoth. Vines very strong growers; pumpkins very large and coarse.

Large Field. Vines vigorous and productive; pumpkins large, oval, with a yellow skin; a good keeper.

Large Cheese. Vines strong growers and productive; pumpkin of fine size, yellow skin; good quality.

Golden Oblong. Vines moderately vigorous and moderately productive; fruit of medium size, oval, with golden skin; a good keeper.

Sugar. Vines fairly vigorous; pumpkin small, but of fine quality for table use.

SQUASH.

White Bush Scalloped. Vines bushy and very productive; squash 4 to 6 inches in diameter and of very good quality. Fit for use August 4.

Giant Crookneck. Vines vigorous and productive; squash fit for use August 4; of very fine flavour and good quality.

Long White Bush Marrow. Vines bushy and productive; fruits large, 12 to 14 inches long; creamy yellow with thick flesh and very fair flavour and quality. Fit for table August 26.

Perfect Gem. Vines very long and productive; squash globular; flesh thick and of very fine flavour; a good keeper.

Essex Hybrid. Vines strong growers and moderately productive; squash thick fleshed and of fair quality.

Early Yellow Bush Scalloped. The only difference between this and the white variety of same name is the colour of the skin.

Fordhook. Vines strong growers and productive; squash 9 to 12 inches long; flesh thick and very sweet and dry; an excellent keeper.

Faxon. A strong grower and moderately productive; squash medium in size, very thick fleshed; cooks dry and sweet.

Crookneck. Vines bushy and productive.

English Vegetable Marrow. Vines vigorous and productive; fruit from 12 to 18 inches long, greenish yellow, and of fair quality.

Boston Marrow. Vines vigorous growers and moderately productive; fruit 14 to 18 inches long, of fair quality and a fair winter keeper.

Orange Marrow. Vines strong growers and productive; squash of medium size, thick fleshed and of fine flavour.

Mammoth Green. Vines very strong growers and squash very large.

Hubbard, Golden Hubbard, and Warted Hubbard are pretty much the same in character of growth and are all excellent table squash, being dry and very sweet. They are good winter keepers.

Golden Bronze. Vines vigorous and productive; squash of medium size, very thick fleshed, and when cooked the flesh is dry, sweet and of very fine flavour.

Delicious. Vine very productive; squash of medium size, very thick fleshed, and when cooked, of very superior table quality. This also is a good keeper.

APPLES.

The spring was unfavourable in this district for the apples, as well as all the other large fruits which blossom about the same time, as there were continued cold, showery days and on several occasions the temperature went down very nearly to, and on one occasion did reach the freezing point. Fortunately these weather conditions were not very general, and the frost only struck patches here and there.

The following varieties fruited this year, and there are among them several winter varieties which give promise of being valuable.

1. *William Gladstone.*—Tree a strong grower. Fruit of medium size, oval, somewhat conical; stem of medium length; cavity deep and narrow; calyx small, open, basin narrow, shallow and somewhat ribbed; skin clear yellow, almost covered with dull deep red. Flesh whitish, not juicy, mildly sub-acid with a pleasant flavour. Season last of July.

2. *Throne.*—Tree a strong vigorous grower. Fruit large, oblong, conical, ribbed; stem short; cavity narrow and deep; calyx moderately large, closed, basin narrow, deep, and ribbed; skin dull yellow; flesh whitish, juicy, firm, mildly acid. Watercores on the tree before it is ripe. Season August.

3. *Summer Golden Pippin.*—Tree a slow grower. Fruit small, roundish, flattened; stem long, slender; cavity narrow and moderately deep; calyx small, closed; basin wide and shallow; skin clear golden yellow, with sometimes a little orange red in the sun; flesh yellowish, firm, crisp, juicy, with a very pleasant flavour, mildly acid; very good, but too small. Season all of August.

4. *Anisette.*—Very similar in character of tree growth and fruit, to Duchess of Oldenburgh.

5. *Dwyer.*—Tree a poor grower and a very moderate producer. Fruit only medium in size, roundish; stem of medium length; cavity medium in depth, round; calyx small, closed; basin moderately deep and wide, wrinkled; skin greenish yellow with a few dark specks; flesh whitish, tender, juicy, a mild pleasant acid, with a fine flavour. Season September.

6. *Schabach Alma.*—Tree a moderate grower. Fruit large, oblong conical, tapering sharply to the eye; stem short; cavity narrow, moderately deep, round, russeted about the stem; skin yellow, nearly overspread with light pale red; flesh whitish, firm, fine-grained, juicy, a mild, pleasant acid. Season October and first half of November.

7. *Rolland.*—Tree a medium grower. Fruit large, roundish, flattened at stem and eye; stem of medium length; cavity wide and deep; calyx large, closed; basin moderately large, and wide; skin yellow with a few splashes of red on the sunny side; flesh white, firm, crisp, juicy, with a mild pleasant flavour; sub-acid. Season October to December.

8. *Nelson Codlin.*—Tree a fair grower. Fruit of medium size, roundish oblong; stem short and stout; cavity small; calyx small, closed; basin wide and shallow; skin pale greenish-yellow, with russet dots; flesh yellowish white, juicy, fine-grained, tender, briskly acid, with a pleasant flavour; a good cooking apple. Season October.

9. *Fox Whelp.*—Tree a poor grower. Fruit of medium size or below, roundish; stem long and slender; cavity narrow and shallow; calyx small, closed; basin narrow, shallow, and ribbed; skin yellow, streaked with red on the sunny side; flesh firm, juicy, mildly sub-acid. Season October to November.

10. *Mosher Sweet.*—Tree only a moderate grower. Fruit of medium size, conical, angular and often ribbed; stem medium in length, stout; cavity wide and deep; calyx large, closed; basin narrow, deep, and ribbed; skin greenish-yellow; flesh white, fine-grained, moderately juicy, sweet with a rich aromatic flavour. Season October.

11. *Princess Louise.*—Tree a fair grower. Fruit below medium size, roundish; stem medium in length, slender; cavity wide and shallow; calyx of medium size, closed; basin of medium width, wrinkled; skin pale yellow with sometimes a reddish blush; flesh white, tender, fine-grained, crisp, very juicy, mildly sub-acid, with a fine flavour. Season October and November.

12. *Ananas Rouge.*—Tree a strong grower. Fruit medium in size or above, roundish; stem long; cavity deep and wide; calyx medium to large, open; basin small and narrow; skin yellow, with a few streaks and splashes of bright red; flesh white, fine-grained, tender, juicy, mild, sub-acid, with a very pleasant flavour. Season October.

13. *Coles Quince.*—Tree a vigorous grower. Fruit medium in size or above medium, oblate, roundish; stem short; cavity deep and wide; calyx of medium size, closed; basin deep, wide, and furrowed; skin dull yellow, with sometimes a small blush; flesh yellowish, juicy, rather coarse-grained, crisp, sub-acid, with a very pleasant flavour. Season October and November.

14. *Emperor William.*—Tree a feeble grower. Fruit of medium size or below, oblate, roundish; stem short; cavity deep and wide; calyx large, open; basin wide and shallow; skin russet yellow with a bright red cheek; flesh yellowish, moderately juicy, plump at first, but inclined to wither, of a mild, pleasant sub-acid character. Season November and December.

15. *Mannington Pearmain.*—Tree a vigorous grower. Fruit small, roundish, oblong, conical; stem long, slender; cavity of medium depth, and wide; calyx small, closed; basin wide and shallow; skin clear yellow, with a little red on the sunny side, a little russet in patches and a few gray dots; flesh yellowish, crisp, fine-grained, fairly juicy, pleasantly sub-acid with a fine flavour. October and November.

16. *Anne Elizabeth.*—Tree a moderate grower. Fruit large, globular; stem short, slender; cavity narrow and deep; calyx large, open; basin deep, narrow and corrugated; skin russet green with a dull red cheek; flesh greenish white, a little coarse, juicy, firm, mildly acid, not of high quality. Season November.

17. *Cusset.*—Tree a feeble grower. Fruit medium in size, roundish, conical; stem short; cavity deep, pointed; calyx of medium size, closed; basin small and corrugated; skin dull greenish-yellow; flesh white, fine-grained, not juicy, mildly sub-acid; not valuable. Season November and December.

18. *Etoilee.*—Tree a moderately strong grower. Fruit below medium size, globular, conical; stem long, slender; cavity deep and narrow, with traces of green and red in cavity; calyx large, partly open; basin wide, shallow and corrugated; skin yellow, marbled with green; flesh yellowish, firm, crisp, moderately juicy, mild and pleasantly acid, nearly sweet. Season November and December.

19. *De La Rouarie.*—Tree a strong grower. Fruit medium in size, oblate, ribbed; stem short; cavity narrow and deep; calyx large, closed; basin narrow and shallow; skin a bright handsome russet; flesh yellowish, fine-grained, crisp, moderately juicy, mildly sub-acid, with fine flavour. Season November and December.

20. *Lyman's Pumpkin Sweet.*—Tree a strong and upright grower. Fruit large, roundish, inclined to conical; stem short, stout; cavity moderately deep and wide; calyx large, open; basin narrow and moderately deep, wrinkled; skin greenish yellow, with sometimes a little dull colour on the sunny side, and many whitish dots; flesh whitish, firm, not fine-grained, not very crisp or juicy, very sweet. Season November and December.

21. *Harts Seedling.* Tree a strong grower. Fruit above medium in size, roundish, oblate; stem of medium length, slender; cavity, narrow and deep; calyx small, partly open; basin wide and deep; skin dull greenish-yellow, with a little russet about the stem, and a few gray dots, and sometimes an orange yellow blush on the sunny side; flesh greenish-white, firm, crisp, moderately juicy, mildly acid with a pleasant flavour. Season November and December.

22. *Frazer's No. 1.*—Tree only a moderate grower. Fruit medium to large, oblate, flattened; stem long and slender; cavity deep and wide; calyx of medium size, open, shallow and small, skin yellow, freely splashed and shaded with two shades of red; flesh white, breaking firm, not very juicy, nearly sweet. Season November and December.

23. *Marion County Red.*—Tree a strong grower. Fruit above medium size, roundish, conical; stem long; cavity small and shallow; calyx large and open; basin wide and shallow; skin dull yellowish-green, with a brownish-red blush; flesh greenish-white, firm, not juicy, mildly acid, not of much value. Season November and December.

24. *Rome Beauty.*—Tree a strong grower. Fruit above medium size, roundish, slightly conical; stem long; cavity wide and deep; calyx partly open; basin moderately narrow and deep; skin yellow, splashed with bright red, and a few light dots with sometimes russet about the stem; flesh yellowish, crisp, tender, juicy, mildly acid. Season November and December.

25. *Christie's Pippin.*- Tree a moderate grower. Fruit medium in size or below, oblate; stem of medium length; cavity small; calyx small; basin narrow and shallow; skin fine, clear yellow, with sometimes a small blush and a few russet dots; flesh yellowish, crisp, moderately juicy, mildly sub-acid, with a rich fine flavour. Season November to March.

26. *Banana.*—Tree a fair grower. Fruit above medium size, oblate, conical, sometimes ribbed; stem of medium length; cavity wide and deep; calyx small, closed; basin narrow and shallow, wrinkled; skin clear, pale yellow, nearly covered with light red; flesh whitish, firm, a little coarse grained, crisp, tender, juicy, of a mild, pleasant sub-acid character with an aromatic flavour. Season November to January.

27. *Marshall Red.*—Tree a strong grower. Fruit of medium size, conical; stem short; cavity shallow; calyx small, closed; basin narrow and shallow, and plaited; skin yellow, nearly overspread with dull red; flesh whitish, crisp, moderately juicy, a little coarse, with a mild and pleasant sprightly acid character. Season November to January.

28. *Fremy.*—Tree a moderate grower. Fruit of medium size, oblate, globular, a little conical; stem medium in length; cavity deep and narrow; calyx small, closed, basin fairly large and deep; skin a yellowish-green; flesh greenish-white, firm, crisp, not juicy, mildly acid with a sweetish after taste. Season December and January.

29. *Forest No. 5.*—Tree a moderately strong grower. Fruit about medium size, conical; stem short; cavity narrow and deep; calyx small, partly open; basin narrow and shallow; skin greenish russet, with a brownish blush on the sunny side; flesh greenish-white, fine-grained, moderately juicy, rich, sweet, inclined to wither. Season December to March.

30. *Kossuth.*—Tree a strong grower. Fruit below medium size, roundish, oblate; stem of medium length; cavity wide and shallow; calyx small, closed; basin wide and

shallow; skin greenish-yellow, nearly overspread with pale, dull red, and sprinkled with yellow dots; flesh white, firm, fine-grained, juicy, pleasant, nearly sweet. Season December to February.

31. *Inkerman Greening.*—Tree a moderately strong grower. Fruit medium to large, conical; stem short; cavity narrow and deep; calyx small, open; basin narrow and deep; skin greenish-yellow sprinkled with light dots; flesh white, crisp, juicy, tender, fine-grained, mild and pleasantly acid. Season December and January.

32. *Hagloe Crab.*—Tree a poor grower. Fruit below medium size, irregularly oblate, conical; stem of medium length; cavity very narrow and shallow; calyx small, partly open; basin narrow and shallow; skin dull russet green, with many light dots; flesh greenish-white, moderately juicy, firm, crisp. Season December.

33. *New France.*—Tree a fair grower. Fruit medium or below in size, roundish oblate; stem short; cavity narrow and deep; calyx of medium size, open; basin wide and shallow; skin golden yellow with a bright red blush; flesh white, crisp, tender, fine-grained, mild and pleasantly acid. Season December and January.

34. *Jewell No. 39.*—Tree a free grower. Fruit of medium size, conical; stem of medium length; cavity medium in depth and width; calyx small, closed; basin narrow and deep; skin yellowish with a handsome red blush; flesh white, tender, crisp, juicy, pleasantly sub-acid. Season December.

35. *Pride of Washington.*—Tree a strong grower. Fruit below medium size, conical; stem long; cavity acute, deep and wide; calyx of medium width, closed; basin very shallow, and very small; skin dull yellow; flesh white, firm, not juicy, nearly sweet; of no value. Season December to March.

36. *Baron de Trautenburgh.*—Tree a strong grower. Fruit large, conical, somewhat ribbed and irregular; stem long; cavity deep and round; calyx small, closed; basin narrow and shallow, somewhat ribbed; skin greenish, with sometimes a russet-brown blush, and a few gray dots; flesh white, firm, fine-grained, moderately juicy, brisk and pleasantly acid. Season December to March.

37. *Coffelt Beauty.*—Tree a fair grower. Fruit below medium size, oblate, conical; stem long; cavity narrow and deep; calyx small, closed; basin small and shallow; skin russet-green, with a dull red cheek; flesh white, crisp, juicy, mildly sub-acid; not valuable. Season January and February.

38. *Galloway Pippin.*—Tree a strong grower. Fruit below medium size, roundish, somewhat ribbed; stem long; cavity narrow and deep, somewhat russeted; calyx small, closed; basin wide and shallow; skin dull yellowish-green, with a few grayish dots; flesh greenish-white, not juicy, mildly acid, a little tough or leathery. Season January to March. Not of value.

39. *Black Oxford.*—Tree a moderate grower. Fruit below medium size, roundish, slightly conical; stem long, slender; cavity narrow and deep; calyx small, closed; basin narrow and shallow; skin yellow, nearly overspread with red, and a few grayish dots; flesh whitish, firm, not juicy, mildly sub-acid. December to February. Not valuable.

40. *Balmer.*—Tree a strong spreading grower. Fruit small, oblong, conical; stem short; cavity narrow and deep; calyx small, closed; basin narrow and shallow; skin greenish-yellow, nearly overspread with dull red; flesh white, firm, crisp, not juicy, nearly sweet. Season December to February; of no value.

41. *Benton.*—Tree a strong and vigorous grower. Fruit below medium size, roundish, conical; stem short; cavity narrow and deep; calyx large, closed; basin narrow, moderately deep, and corrugated; skin greenish-yellow, with a small blush on the sunny side; flesh white, crisp, fairly juicy, mildly sub-acid. Season December and January. Too small to be of value.

42. *Burlington.*—Tree a strong grower. Fruit below medium in size, oblong, tapering slightly to the eye; stem long and slender; cavity deep, acute, wide, some-

times russeted; calyx small, closed; basin very deep and wide, ribbed; skin yellow, with splashes and dots of light red; flesh whitish, firm, juicy, mildly acid, or nearly sweet, not tender or fine-grained. Season December to January.

43. *Brownlee's Russet.*—Tree a strong grower. Fruit large, roundish, sometimes slightly conical: stem stout, short, often with a fleshy knob at the insertion; cavity narrow and deep; calyx closed, small and shallow; skin dull russet, with sometimes a dull red blush, and a few yellowish dots; flesh greenish, coarse, moderately juicy, aromatic sweet, very pleasant, but inclined to wither. Season December to February.

44. *Byford Wonder.*—Tree a strong grower. Fruit above medium, to large, roundish, oblate, conical; stem short; cavity narrow and deep; calyx small, closed; basin narrow and shallow; skin greenish-yellow with patches of bright red on the sunny side; flesh white, juicy, firm, sprightly with a pleasant flavour. Season December to February.

45. *Belle de Avrille.*—Tree a feeble grower. Fruit of medium size, oblate, slightly conical; stem slender, long; cavity narrow and deep; calyx large and open; basin wide and shallow; skin greenish-yellow, with a faint blush on the sunny side; flesh yellowish-white, fine-grained, crisp, juicy, pleasantly acid with a good flavour. Season December and January.

46. *American Blush.*—Tree a free grower. Fruit large, roundish, oblate; stem long; cavity of medium depth and width; calyx small, open; basin small and deep; skin dull greenish-russet, with sometimes a dull red blush; flesh greenish-white, juicy, firm, fine-grained, mild, nearly sweet. Season January to March.

47. *Delicious.*—Tree a free grower. Fruit of medium size, conical; stem rather long, cavity deep and wide; calyx large, closed; basin narrow, moderately deep, corrugated; skin greenish-yellow, with stripes of red; flesh whitish, juicy, firm, rather coarse-grained, mildly acid. Season January and February.

48. *Christmas Pearmain.*—Tree a strong grower. Fruit of medium size or below, oblate, conical; stem short; cavity narrow and shallow; calyx of medium size, closed; basin shallow and small; skin yellow, sometimes a few small stripes of pale red; flesh yellowish, fine-grained, firm, moderately juicy, mildly sub-acid, with a fine flavour. Season December to February.

49. *De Chataignier.*—Tree a strong grower. Fruit of medium size, roundish, oblate; stem of medium length; cavity fairly deep, and moderately wide; calyx small, closed; basin small and shallow; skin greenish-yellow, almost overspread with deep red; flesh white, tender, fine-grained, moderately firm, mild, pleasantly sub-acid, very good. Season December to March.

50. *Winter Fameuse.*—Tree a strong grower. Fruit medium or below medium in size, roundish conical; stem of medium length, and stout; cavity narrow and deep; calyx small, closed; basin narrow and shallow; skin greenish-yellow, with a blush in two shades of red; flesh white, tender, crisp, fine-grained, mildly sub-acid with a pleasant flavour. Season December to February.

51. *Withington Fillbasket.*—Tree a strong grower. Fruit of medium size, roundish slightly flattened; stem short, cavity shallow and wide; calyx small, closed; basin wide and shallow; skin green with many light dots; flesh greenish-white, fine-grained, crisp, pleasant and sprightly, with a good flavour. Season January to March.

52. *Souvenir d'Etichove.*—Tree a strong grower. Fruit below medium size, roundish, globular; stem of medium length, slender; cavity deep, wide and acute; calyx large, open; basin deep and wide; skin dull yellow, with a dull blush in the sun; flesh greenish-white, fine-grained, fairly juicy, a mild pleasant sub-acid, with a good flavour; apt to wither. Season December to February.

53. *Reinette de Lucas.*—Tree a strong grower. Fruit below medium size, oblate, slightly conical; stem short; cavity wide and shallow; calyx small, partly open; basin moderately deep and moderately wide, somewhat corrugated; skin greenish-

yellow, almost entirely overspread with deep red; flesh greenish-white, fine-grained, crisp, fairly juicy, mildly acid with a fine pleasant flavour. Season December to March.

54. *Shockley.*—Tree only a moderate grower. Fruit below medium size, roundish; stem long, slender; cavity deep and narrow; calyx small, open; basin, wide and shallow; skin greenish-yellow, with occasionally a dull red cheek; flesh yellowish-white, moderately juicy, not fine-grained, mildly acid. Season January to March.

55. *La Ligne Devillers.*—Tree a moderately strong grower. Fruit of medium size, roundish, conical; stem medium in length; cavity deep and wide and russeted; calyx large and long, open; basin narrow and small; skin yellow, freely splashed and striped with red in two shades; flesh white, fine-grained, juicy, crisp, mildly and pleasantly acid. Season January to March.

56. *Pigeon de Jerusalem.*—Tree a moderate grower. Fruit medium or below in size, conical; stem medium in length, slender; cavity deep and fairly wide, acute and sometimes russeted; calyx small, partly open; basin narrow and shallow; skin dull russet-yellow, with a dull reddish blush and many yellow dots; flesh greenish-white, tender, fine-grained, mild and pleasantly acid, not juicy. Season January.

57. *Tobias Black.*—Tree a slow grower and very tardy in coming into bearing. Fruit of medium size, oblong, sometimes conical, ribbed; stem of medium length; cavity wide, deep, acute; calyx medium in size, closed; basin deep and wide; skin greenish, with a dull red blush and a few gray dots; flesh yellowish, fine-grained, crisp, firm, moderately juicy, nearly sweet. Season December to February.

58. *Virginia Greening.*—Tree a moderate grower. Fruit large, oblate; stem long; cavity wide and deep; calyx large, open; basin deep and medium wide; skin yellowish-green, with many brown dots; flesh yellowish, firm, fine-grained, pleasantly sub-acid. Season December to February.

59.—*Whinnery's Red.*—Tree a fair grower. Fruit of medium size, roundish, conical; stem medium in length; cavity of medium width and shallow; calyx small, closed; basin wide and shallow; skin yellowish, nearly covered with crimson; flesh white, firm, only moderately juicy, mildly sub-acid. Season January to March.

60. *May Queen.*—Tree a strong grower. Fruit small, roundish conical; stem long and slender; cavity narrow and deep; calyx of medium width, partly open; basin very shallow and narrow; skin dull yellow, with a little russet about the stem, and sometimes a dull orange blush; flesh whitish, not juicy, not tender, nearly sweet, not of any value. Season January to March.

PEARS.

The same causes which injured the crop of other fruits affected the pears, and some varieties which blossomed very freely, bore either no crop, or very few specimens, but as in the case of other fruits, the bright dry summer weather lessened the injury from fundous pests and gave a handsomer finish to the fruit. The following varieties fruited for the first time this season, and are listed in the order of their ripening.

Beurre Leon Rey.—Tree a feeble grower. Fruit of medium size, roundish pyriform; stem of medium length, slender; calyx large; basin broad, shallow; skin yellowish russet with sometimes a bronze reddish blush; flesh yellowish, juicy, very fine-grained, tender, pleasant, almost sweet. Season last of August.

Marie Louise.—Tree a strong straggling grower. Fruit above medium size, oblong, pyriform, irregular in shape; stem of medium length, set obliquely; skin a clear golden yellow, with patches of russet; flesh white, very juicy, buttery, with a rich sweet flavour. Season September and October.

Bronze Duchess.—Tree a moderate grower. Fruit of medium size, oblong, pear shape; stem long, slender, curved; cavity wide and shallow; basin small; skin russet with a dull red russet cheek; flesh yellowish, juicy, vinous, slightly astringent. Season September.

Brockworth Park.—Tree a strong grower. Fruit medium to large, obtuse pyriform; stem short, stout; calyx small, closed; basin shallow; skin smooth, yellow with a faint blush, sometimes red streaks on sunny side; flesh white, buttery, melting, juicy, with a fine rich flavour. Season late September and October.

Bon Vicaire.—Tree a strong and upright grower. Fruit large, oblong, pyriform; stem one inch long and set obliquely, often with a fleshy protuberance at one side; calyx medium to small, closed; basin narrow and moderately deep; skin clear yellowish green, with patches of russet, and a bright red cheek in the sun, and many grayish dots; flesh whitish, buttery, melting, juicy, sweet, with a rich flavour. Season first half of October.

Two Sisters.—Tree a vigorous grower. Fruit of medium size or below, oblong, irregular in shape; stem short; cavity small and shallow; calyx large and open; skin greenish yellow, with a few brown dots; flesh yellowish-white, a little coarse, juicy, sweet, not buttery, nor of high quality. Season October.

Sarah.—Tree a moderately strong, upright grower. Fruit below medium size, roundish, pyriform; stem of medium length, in a slight depression, with a ring; calyx small, closed; basin shallow; skin greenish-yellow, patched with russet and many brown dots; flesh white, fine-grained, juicy, melting, sweet, and aromatic. Season October.

Onondaga.—Tree a strong grower. Fruit large, obovate, obtuse, pyriform; stem of medium length, stout; cavity small; stem set at an angle; calyx small, closed; skin somewhat rough, with many russet dots of a fine yellow colour, sometimes with a red cheek; flesh yellowish, buttery, juicy, with a fine flavour. Season October and November.

Anna Audisson.—Tree a fair grower. Fruit of medium size, roundish, obtuse, pyriform; stem short and stout; cavity small; calyx medium and open; skin greenish-yellow, with a reddish blush; flesh whitish, juicy, melting, sweet, with a pleasant flavour. Season October.

Ellis.—Tree a strong grower. Fruit large, obtuse pyriform; stem medium length and stout; cavity small; calyx moderately large, open; basin shallow and uneven; skin greenish-yellow, patched with russet and many russet dots, and sometimes a slight blush; flesh whitish, juicy, melting, sweet and aromatic. Season last of September and October.

Angelique Leclerc.—Tree a fair grower. Fruit of medium size, oblong, pyriform; stem short and stout; calyx small, open; skin greenish-yellow, with a little red in the sun; flesh white, fine-grained, juicy, sweet, a little gritty at the core. Season October and November.

Louise Bon Sannier.—Tree a strong grower. Fruit small, obtuse, pyriform, stem of medium length, slender; cavity small; calyx moderately open; basin narrow and shallow; skin russet yellow; flesh yellowish, fairly juicy, with a pleasant vinous flavour. Season November and December.

St. Joachim.—Tree a strong and upright grower. Fruit of medium size, or above, obtuse, pyriform; stem short and stout, with a fleshy protuberance at one side; calyx small and closed; basin wide and moderately deep; skin russet-yellow, sprinkled with many gray dots; flesh not tender nor juicy; not desirable. November and December.

Alexandrine Doullard.—Tree a vigorous grower. Fruit above medium size, obovate, obtuse, pyriform; stem of medium length; cavity small; calyx of medium size and partly closed; skin whitish-yellow, with veins and patches of russet; flesh white, juicy, melting, vinous. Season October and November.

Lewis (Dix).—Tree a vigorous grower. Fruit large, long, pyriform; stem short and stout, set obliquely; calyx small; basin narrow and flat; skin golden-yellow, with russet dots, and small patches of russet near the stem; flesh a little coarse, juicy, sweet, with a very fine flavour, perfumed. Season November.

Out of all the pears which have fruited at Agassiz for a number of years past, the following are the most productive and valuable from a commercial point of view: Dearborn Seedling, Marguerite, Dr. Jules Guyot, Bartlett, Emile de Heyst, La France, Beurre Bosc, Durondeau, Clairgeau, Howell, Vicar of Winkfield, and for a very late winter pear, the Monarch.

PLUMS.

The spring was unfavourable for the plum crop as it was cold and rainy during most of the blossoming period, and a light frost did a good deal of harm in some localities. Later on the weather improved, as also did the prospects of a crop, and the almost entire absence of rot this season, and bright warm weather during the ripening period contributed to the development of a very fine sample. The following sorts fruited this year for the first time in the farm orchards.

Grosse Tardive.—Tree a moderate grower. Fruit small, roundish, oval; stem 1¼ inch long, in a slight basin; apex a very small dent; skin deep purple red; flesh pale straw-yellow, juicy, tender, pleasant, sprightly. Ripe July 18.

Rupert.—Tree a moderate spreading grower. Fruit smooth, round, small; stem one inch long, in a small round basin; suture very shallow, almost indistinct, terminating in a dent; skin dull purple-red; flesh yellowish, juicy, sprightly, acid. Ripens unevenly from first to third week in July.

Mirabelle de Flotu.—Tree a strong grower. Fruit below medium size, oval; stem ¾ inch long, set in a shallow cavity; suture only a line, terminating in a slight depression, one side a little enlarged; skin a handsome yellow; flesh pale yellow, firm, juicy, sprightly, pleasant; stone small, roundish, free. Ripe July 21.

Red June.—Tree a strong grower. Fruit of medium size, roundish, pointed or heart-shaped; stem short; cavity small; suture shallow; skin orange, nearly covered with red; flesh yellow, tender, moderately juicy, mildly acid with a pleasant flavour. Ripens first half of August; ripening unevenly from August 6 to August 18. Much of the fruit fell off before attaining full size.

Dry's Seedling.—Tree a fair grower. Fruit above medium in size, roundish; stem of medium length; cavity of medium size; suture well marked, terminating in a slight basin; skin greenish-yellow; flesh yellowish, tender, juicy, sweet, with a very pleasant flavour. Season second week in August.

Prince's Red Gage.—Tree a strong upright grower. Fruit medium to large, round, flattened at both ends; stem ¾ inch long; cavity small, round; suture distinct, ending in a small basin; skin of a clear, handsome red; flesh yellowish, sweet, moderately juicy, with a very pleasant flavour; stone of medium size, a cling. Season second week in August.

Catherine (Blue).—Tree a moderate grower. Fruit of medium size, oval, tapering towards the stem, which is ¾ of an inch long; no cavity; suture indistinct; skin purple, with a bluish bloom; Flesh tender, juicy, greenish, sweet; stone a cling, which is large for the size of the plum. Season second week in August.

Furst's Early Damson.—Tree a slow grower. Fruit of medium size for a damson, oval; stem short; cavity small; skin dark purple, with a heavy blue bloom; flesh yellowish, moderately juicy, pleasantly sweet; stone small and free. Season second week in August.

Late Muscatelle.—Tree a moderate grower; fruit small, round, flattened at both ends; stem ¾ of an inch long; cavity small; suture shallow, ending in a dent; skin light purple, with a bluish bloom; flesh greenish-yellow, juicy, sweet, fine-grained, with a pleasant flavour. Season third week in August.

Meroldt's Reine Claude.—Tree a strong grower. Fruit below medium size, roundish, flattened at both ends; stem ¾ of an inch long; cavity small; suture a line terminating in a dent; skin yellowish-green, with a thin whitish bloom; flesh yellowish white, juicy, sweet, with a very fine flavour. Ripe third week in August.

Giant Prune.—Tree a strong grower. Fruit above medium size, oval; stem short; cavity small; suture well marked; skin yellow, nearly covered with red, and sprinkled with large purple dots; flesh yellowish, not sweet, rather dry and insipid. Season third week in August.

Precoce de Cullengen Prune.—Tree a feeble grower. Fruit small, oval, tapering a little towards the stem and apex; stem short; suture only a line; skin dark purple with a bluish bloom; flesh greenish, not juicy, sweet, with a fine flavour. Season middle to last of August.

Rivers' Tardive.—Tree a strong grower. Fruit below medium size, roundish; stem short, about half an inch long; cavity shallow; suture shallow, one side enlarged; skin reddish-purple, with a light bluish bloom; flesh yellow, firm, not very juicy, but of a pleasant flavour; stone small, nearly free. Season middle of August.

Baker Prune.—Tree a slow grower. Fruit below medium size, oval, tapering to the stem; stem three-quarters of an inch long; cavity shallow; suture very shallow, one side enlarged a little; skin dark purple, with a thick blue bloom; flesh yellowish, moderately juicy, sweet, with a pleasant flavour; stone below medium in size and free. Season August 16 to 24.

St. Lawrence.—Tree a strong grower. Fruit above medium size, almost heart-shape; stem short; cavity small, round; suture well defined, one side enlarged; skin bright purple, with a thin blue bloom; flesh yellowish, tender, juicy and sweet, with a fine flavour. Season third week in August.

Jaune Tardive.—Tree only a moderate grower. Fruit small, tapering to apex; stem of medium length; cavity shallow and small; suture only a line ending in a small basin; skin dull yellow; flesh yellow, juicy, sweet, tender. Season middle of August.

The Seigneur.—Tree a vigorous grower. Fruit small, round; stem short; cavity small; suture well marked, ending in a small round basin; skin nearly black with a thin bluish bloom; flesh yellowish, moderately juicy, not very sweet, with a pleasant flavour. Season middle of August.

Prune de Delices.—Tree a strong grower. Fruit of medium size, roundish, oval; stem short; cavity small; suture yellow; skin greenish-yellow splashed with red on sunny side; flesh greenish-yellow, juicy, sweet, with a very pleasant flavour. Season middle to latter part of August.

Boddaert's Reine Claude.—Tree a moderate grower. Fruit medium to large, roundish, oval; stem medium in length; cavity small; suture indistinct or nearly so, terminating in a dot; skin pale greenish-yellow, with a thin white bloom; flesh yellow, tender, juicy, sweet, with a fine rich flavour. Season third week in August.

Belle de Schoemberg.—Tree a strong grower. Fruit of medium size, roundish, oval; stem short; suture well marked; skin yellowish with a handsome blush; flesh yellow, sweet; not juicy but of a pleasant flavour; stone small and free. Season middle of August.

Pacific Prune.—Tree a strong grower. Fruit medium to large, oval; stem short; cavity small; suture distinct, one side enlarged; skin deep purple, with a bluish bloom; flesh yellowish, moderately juicy, sweet, with a fine flavour. Season middle of August.

Bingham.—Tree a strong grower. Fruit large, oblong, tapering from stalk to apex; stem short; cavity small; suture indistinct; skin clear yellow, mottled with clear red on the sunny side; flesh yellowish, juicy, with a fine rich flavour, stone large and a cling. Season middle of August.

Precoce de Lucas.—Tree a strong grower. Fruit small, oval, tapering to a point; stem of medium length; cavity small; suture indistinct; skin blue with a whitish bloom; flesh greenish-yellow, sweet, juicy, with a fine rich flavour. Season middle of August.

Monsieur.—Tree a strong grower. Fruit medium to large, oblong, oval; stem of medium length; cavity medium; suture well marked, one side enlarged; skin reddish purple, with a bluish bloom; flesh greenish-yellow, firm, juicy, moderately sweet, with a pleasant flavour. Season middle of August.

Virginale Blanche.—Tree a strong grower. Fruit of medium size, or below, roundish; stem short; no cavity; suture a line; skin greenish-white, with a white bloom, flesh greenish, juicy, moderately sweet, with a pleasant flavour; stone small and a cling. Season middle of August.

Eugene Furst.—Tree a strong grower. Fruit small, oval; stem short; suture a line; skin purple black, with a heavy bluish bloom; flesh greenish-yellow, juicy, sweet, with a fine rich flavour; stone large and adheres at one edge. Season middle of August.

Reine Claude.—Tree a strong grower. Fruit of medium size, roundish; stem of medium length; cavity small; suture a line ending in a small round basin; skin greenish-yellow, sometimes a reddish-blush; flesh yellowish, juicy, sweet, tender, with a fine rich flavour. Season middle to last of August.

De Gondin.—Tree a strong grower. Fruit of medium size, globular; stem short; cavity medium; suture a line; skin greenish-yellow, nearly overspread with light purple, with a thin bluish bloom; flesh yellowish, juicy, tender, sweet with a fine flavour. Season last of August.

Monsieur Von Tardif.—Tree a strong grower. Fruit below medium size, roundish, oval; stem short; cavity small; suture very slight; skin greenish-purple, sprinkled with gray dots; flesh greenish-yellow, juicy, sprightly, not of high quality; stone small and a cling. Season last of August.

Admiral de Rigny.—Tree a strong grower. Fruit shows that in this case the above name is a synonym for Imperial Gage.

Golden Transparent.—Tree a strong grower. Fruit of medium size, globular; stem short; suture a line ending in small basin; skin greenish-yellow, streaked with orange; flesh yellowish, juicy, sweet, not high flavoured. Season late August.

Goutte d'Or Violette.—Tree a strong grower. Fruit medium to large; oval, with a slight neck; stem medium in length; suture well marked and extending three-quarters around the fruit, one side enlarged; skin a light reddish purple, freely sprinkled with brown dots, with a thin light blue bloom; flesh yellowish, juicy, sweet; stone large and a cling. Season late August.

Masu.—Tree a fair grower. Fruit below medium size, globular; suture a line ending in a dot; stem short; cavity very slight; skin dull red; flesh yellowish, juicy, sweet with a pleasant flavour; stone medium to large, adheres at one edge. Season middle of August. Like all the plums of its class, it blooms very freely, but brings a very small crop to maturity.

Defresne.—Tree a strong grower. Fruit below medium size, oval; stem short; cavity small, round; suture a line ending in a slight depression; skin nearly black, with a thin blue bloom; flesh yellowish, not juicy, sweet; stone long, slender and thin, a cling. Season early September; not desirable.

Coe's Violet.—Tree a strong grower. Fruit large, oblong, oval, tapering to the stem; stem of medium length; cavity small; suture well marked, extending past the apex with one side enlarged; skin pale, dull purple, with a whitish bloom; flesh yellowish, firm, and moderately juicy, fairly sweet, with a pleasant flavour; stone large, adheres a little at one edge. Season early September. A fine shipper and a good producer.

St. Martin.—Tree a strong grower. Fruit small, roundish; stem moderately short and stout; cavity small; suture distinct; skin light purplish-red, with a thin white bloom; flesh yellowish, firm, sprightly with a fine rich flavour; stone long, slender, nearly free. Season early October.

Of the very large number of plums which have been fruited here for a number of years the following varieties have proved to be freest from rot, good shippers, and the trees are vigorous growers and regularly productive.

Diamond.—Large, dark purple, late August.
Mallard.—Large, purple, early August.
Curlew.—Large, blue, early August.
Belgian Purple.—Large, purple, middle of August.
Coe's Golden Drop.—Large, yellow, September.
Washington.—Large, yellow, early August.
Sultan.—Large, deep red, early August.
Monarch.—Large, dark purple, September.
Prince of Wales.—Medium to large, purple, September.
Damas de Coue.—Large, yellow with red, late July.
Reine Claude d'Ecully.—Large, greenish yellow, late August.
Kirke.—Medium to large, purple, late August.
Italian Prune.—Medium to large, dark blue, late September.
Duane's Purple.—Large, purple, middle of August.

CHERRIES.

The cherry crop was a poor one this year owing to unfavourable weather in spring, when the trees were in bloom and again when the fruit was maturing and ripening, frequent showers with sunshine, causing the fruit to split and decay. The following varieties fruited for the first time this year:

Montmorency Brettoneau.—Tree a free grower. Fruit below medium size, roundish, oblate; stem long; cavity shallow, with a shallow basin at apex; skin light red; flesh yellowish, pleasant, juicy, tender, mildly acid, rather soft for shipping. Season middle of June.

Montmorency Pleureur.—Tree a feeble pendulous grower. Fruit of medium size, oval; stem very long, a very shallow cavity and a dot at apex; skin yellowish-red with bright red in small dots or spots on the sunny side; flesh yellowish, mildly acid, tender, juicy, with a pleasant flavour. Season third week in June.

Suesse Fruhe Weichsel.—Tree a slow grower. Fruit small, round, dark red; stem of medium length, inserted in a small cavity; flesh reddish, juice red, juicy, sprightly, pleasantly acid; too small for a commercial cherry. Season middle of June.

Plymouth Rock.—Tree a slow grower. Fruit above medium size, flattened, blunt, heart-shape; stem medium in length; skin yellowish-red with deep red dots; flesh yellowish-white, tender, juicy, mildly sweet with a pleasant flavour. Season early July.

Abbesse.—Tree a fairly good grower. Fruit of medium size, round; stem long; skin yellowish-red; flesh yellowish, juicy, tender, with a pleasant, sprightly flavour; stone very small. Season middle of July.

Orel No. 25.—Tree a free grower. Fruit below medium size, roundish; stem of medium length; cavity small, with a small depression at apex; colour yellowish-red; flesh yellowish, juicy, tender, sprightly, pleasantly acid when fully ripe. Season middle of July.

Nouvelle Royale.—Tree a moderate grower. Fruit large, roundish; stem of medium length; cavity shallow and flat; skin dark glossy red; flesh tender, juicy, mildly acid, almost sweet with a pleasant flavour. Season middle of July.

Bedford Prolific.—Tree a strong grower. Fruit above medium size, blunt, heart-shape; stem long; cavity wide and shallow; skin glossy black; flesh red, juice red, tender, juicy with a pleasant, sprightly flavour, sweet, good. Season middle of July.

COMMERCIAL ORCHARDS.

The varieties added to the commercial apple orchard this year are the Cox Orange Pippin and the Winter Banana. All the trees have made a very satisfactory growth and two of the Mother trees bore three very fine specimens each.

A beginning in a commercial pear and plum orchard will be made this spring; the trees are ordered and the land is prepared to begin planting just as soon as spring opens.

SMALL FRUITS, 1906.

This has not been a favourable year with us for small fruits. The long, hot, dry time at and before ripening, lessened the crop considerably. The blackberries, however, suffered the least and there was a good crop of fine berries of this class.

Red and Yellow Raspberries.

We have 75 varieties of Red and Yellow Raspberries under test. The following are the most desirable.

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
Phoenix	June 18	Vigorous	Large	Firm, good quality	Productive.
Pauline	" 22	"	"	Firm, good quality, continues long in bearing.	"
New Fastolf	" 23	"	"	Firm, good quality	"
Northumberland Fill Basket.	" 23	"	Very large	Firm, good quality, continues long in bearing.	"
Duke of Brabant	" 25	"	Large	Firm, good quality	"
All Summer	" 26	"	Large medium	Firm, good quality, continues long in bearing.	"
Lord Beaconsfield	" 27	"	"	Firm, good quality	"
Sarah	" 27	"	"	Firm, sweet, very good quality. The best flavoured berry we have.	"
Cuthbert	" 28	"	Large	Firm, good quality	"
R. B. White	" 28	"	Large medium	" "	"
French Vice President	" 28	"	Very Large	Firm, good quality, continues long in bearing.	"
Golden Queen	" 24	"	Large	Firm, sweet, good quality	"
Large Yellow	" 28	"	"	" good quality	"

Besides the above, we have the following varieties, all of which, here, are lacking in one or more desirable qualities:—Battler's Giant, Paragon, Charles, Hornet, Carter's Prolific, Belle de Fontenay, Baumforth's Seedling, Muskingum, Turner, Franconia, Hudson River Antwerp, Thompson, White Antwerp, Columbia, Arnold's Hybrid, Red Herrenhauser, Sugar of Metz, Carleton, Empire, Sharpe, Muriel, Craig, Autumn Surprise, Knevit's Giant, La Mercier, Guinea, Garnet, Mary, Percy, Fastolf, Marlboro, Clarke, Heebner, Norwich Wonder, King, Chili, Garfield, Shaffer's Colossal, Queen Victoria, Sir John, Cariboo, Wild, Col. Wilder, Brinckle's Orange, Goliath, Lizzie, Millar, Minnie, Beehive, Spineless Yellow, Yellow Antwerp, Malta, Barnet, Lady Anne, Nonpareil, Billard's Perpetual, Prince of Wales, Champion, Crimson Beauty, and Hansel.

Black Cap Raspberries.

There are nineteen varieties of Black Cap Raspberries under test. They suffered perhaps more than any other of the small fruits from the hot dry weather, as they require moisture as well as sunshine to do well. This year they dried up on the vine to a considerable extent.

The following are the best:—

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
Nemaha	July 1.	Vigorous...	Large	Good quality.	Productive.
Older	" 3.	"	Large medium	"	"
Palmer	" 3.	"	"	"	"
Mammoth Cluster.	" 3.	"	Large	"	"
Kansas	" 3.	"	Large medium	"	"
Gregg	" 5.	"	Large	"	"
Ada	" 5.	"	Medium...	"	"
Progress	" 5.	"	"	"	"
Conrath	" 7.	"	"	"	"
Hopkins	" 7.	"	"	"	"

Other varieties under trial are:—Carman, Smith's Prolific, Cromwell, Lovett, American Yellow Cap, Jackson's May King, Progress, Early Ohio, Oregon Late.

Blackberries.

Of the 27 varieties of Blackberries under test, the following are the best here:—

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
Early King.	July 10	Vigorous...	Large	Good quality	Productive.
Hansel	" 17	"	Large medium	"	"
Eldorado.	" 17	"	Very large	Very good quality...	Very productive.
Snyder	" 18	"	Large medium	Good quality	Productive.
Stone's Hardy	" 18	"	Large	"	"
Agawam	" 18	"	Large medium	"	"
Taylor	" 18	"	"	"	"
Erie	" 18	"	Large	"	"
Early Cluster	" 18	"	"	"	Very productive.
Maxwell	" 18	"	"	"	Productive.
Ohmer	" 19	"	"	"	"
Taylor's Prolific	" 20	"	Medium	"	"
Lawton	" 22	"	Large	"	"
Oregon Everbearing	Aug. 1 to Oct. 1	"	Large medium	Fairly good quality.	Very productive.

Besides the above the following are also under trial:—Wilson's Early, Tecumseh, Kittatinny, Wilson Jr., Early Harvest, Crystal White, Gainor, Thompson's Mammoth, Lovett's Best, Child's Tree, Dallas and Brunton.

Red and White Currants.

There are 41 varieties of Red and White currants under test. Of these the following are the best here:—

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
Red Cherry	June 20	Vigorous	Large medium	Good quality	Productive.
London Red	20	"	"	"	"
Raby Castle	21	"	"	"	"
White Grape	21	"	Medium	"	"
La Fertile	21	"	Large medium	"	"
La Conde	22	"	"	"	"
Prince Albert	25	"	"	"	"
La Turinese	25	"	Medium	"	"
Eyatt's New	25	"	"	"	"
White Cherry	25	"	"	"	"
Gondoin Red	26	"	Large medium	"	"
Large White Brandenburg	27	"	Large	"	"
White Pearl	28	"	Medium	"	"
Victoria	28	"	"	"	"

Besides the above varieties, the following have been tested, but found less valuable:—White Transparent, White Gondoin, Red Dutch, Knights Early Red, North Star, New Red Dutch, White Dutch, Fay's Prolific, Moore's Ruby, Versailles, No. 51 (L.S.) Langstraubige, White Esperen, Rankin's Red, Large White Frauendorfer, Verrier's White, Chenonceau, De la Rochepoze, Ringens, Beauty of St. Giles, Champaigner, English Red, Rouge Admirable, Large Red, White Kaiser, White Imperial.

Black Currants.

There are 44 varieties of Black Currants under test. Of these, the following have been found the best here:—

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
Dominion	July 1	Vigorous	Large medium	Mild, good quality	Productive.
Merveille de la Gironde	1	"	"	Slightly acid, good quality	"
Middlesex	1	"	"	Mild, good quality	"
Prince of Wales	2	"	Large	Sweet, very good quality	"
Boskoop Giant	2	"	Very large	" " "	"
Black Naples	2	"	Large	Sweet, good quality	"
London	2	"	Medium	" "	"
Lee's Prolific	2	"	Large medium	Mild, good quality	"
Pearce	5	"	Medium	" "	"
Victoria	5	"	Large	Sweet, good quality	"
Climax	5	"	Medium	Mild, good quality	"

Besides the above, the following varieties have been tried, but they are not so desirable:—Lennox, Bang-up, Gewohnliche, Eclipse, Sterling, Kerry Perry, Ruler, Madoc, Kentish Hero, Ambrafarbige, Charmer, Beaudry, Ontario, Eagle, Lanark, Baldwin, Wood, Louise, Stuart, Kentville, Success, Star, Champion, Ethel, Parker, Monarch, Bella, Norton, Oxford, Climax, Orton, Henry.

METEOROLOGICAL RECORD.

Date of Highest Temperature.	Temperature.	Date of Lowest Temperature.	Temperature.	Rainfall.	Snowfall.	Sunshine.	
1905.				Inches.	Inches.	Hours.	Minutes.
December 27........	57	December 20, 26..	30	4·26	....	17	12
1906.							
January 31.........	56	January 20.	26	4·25	21	38	48
February 7, 11.....	68	February 9.......	29	4·68	....	102	..
March 27.	69	March 13.........	23	2·04	....	125	30
April 29...........	81	April 12..........	30	2·04	....	167	42
May 2..............	82	May 7..........	32	7·40	....	134	42
June 2, 24..........	84	June 29	38	6·40	....	165	06
July 3.............	98	July 25.........	45	2·36	....	294	42
August 16, 21......	86	August 16, 27....	40	1·04	....	228	..
September 14.	74	September 26.....	37	6·32	....	117	18
October 8	74	October 19.......	32	9·18	....	78	36
November 4, 9......	53	November 15.....	24	10·30	2	51	..
December 4	51	December 31.....	17	5·29	13	21	36
1907.		Total........	....	63·30	36	1,525	..
January 21.........	50	January 15......	4	0·61	37	90	..
February 24........	53	February 3......	8	5·30	6	74	54
March 26.	58	March 18........	24	7·26	2	95	12
		Total........	....	13·17	45	260	06

I have the honour to be, sir,

Your obedient servant,

THOS. A. SHARPE.

STATEMENT OF EXPENDITURE ON THE DOMINION EXPERIMENTAL FARMS, FROM JULY 1, 1906, TO MARCH 31, 1907.

CENTRAL EXPERIMENTAL FARM.

Live stock			$ 542 37
Feed for stock		$ 2,961 32	
Supplies from cereal division		270 77	
Grain screenings from grain distribution		535 12	
		$ 3,767 21	
LESS—Supplies to poultry division		326 08	3,441 13
Veterinary services and drugs			121 98
Seed, grain, trees, &c			373 92
Implements, tools, hardware and supplies			617 69
Drainage and drain tiles			16 50
Manure and fertilizers for experimental plots and horticultural and cereal divisions			236 10
Travelling expenses			1,216 27
Exhibition expenses			809 20
Blacksmithing, harness supplies and repairs			813 80
Bee division			145 32
Wages: farm work, including salaries of officers in charge			3,541 76
Wages: care of stock, including salary of herdsman			2,930 83
Horticultural division, including salaries of officers in charge, also forestry			4,809 59
Poultry division, including salaries of officers in charge		$ 2,654 36	
Value of grain, &c., supplied by farm		326 08	2,980 44
Cereal division, including experimental plots, also salaries of officers in charge		$ 3,200 35	
LESS—Value of material supplied for feed	$270 77		
" potatoes supplied for seed distribution	398 30		
		669 07	
			2,531 28
Care of ornamental trees and grounds, avenues, hedges, &c			1,071 49
Office assistance, including English and French correspondence and messenger service			4,483 40
Printing of office supplies and stationery			709 14
Arboretum			1,188 25
Distribution of trees and tree seeds			69 78
Care of green-houses, seed testing, &c., &c			1,118 76
Dairy branch, including salary of dairyman			851 01
Contingencies, including $243.74 for roads			332 60
Telegrams and telephones			186 82
Steers, purchased for feeding experiments			1,109 89
Books and newspapers			132 26
Cleaning land (removal of stone, &c.)			59 66
			$ 36,441 24

EXPERIMENTAL FARM, NAPPAN, N.S.—EXPENDITURE, 1906-07.

Feed for stock	$	875 75
Veterinary services and drugs		25
Seed grain, seeds, trees, &c.		237 51
Implements, tools, hardware and supplies		94 81
Manure and fertilizers		43 16
Travelling expenses		52 70
Exhibition expenses		300 63
Blacksmithing, harness supplies and repairs		170 79
Salary of Superintendent		1,200 00
Wages, farm work, including experimental work with farm crops		1,277 25
Wages, care of stock		748 90
Poultry branch		163 85
Horticultural division, including experimental work with vegetables, fruits, forest and ornamental trees and flowers; also care of grounds and salary of officer in charge		645 29
Distribution of seed grain, potatoes, &c.		76 00
Contingencies, including postage, $84.45; repairs to dykes, $45		166 20
Printing and stationery		16 63
Books and newspapers		24 42
Telegrams and telephones		22 32
Steers purchased for feeding experiments		2,188 37
Bee supplies		15 90
Draining		15 00
Office help and messenger service including delivery of mail, $90		180 00
	$	8,515 73

EXPERIMENTAL FARM, BRANDON, MAN.—EXPENDITURE 1906-07.

Live stock	$	264 50
Feed for stock		10 30
Veterinary services and drugs		51 25
Seed grain, trees, seeds, &c.		39 94
Implements, tools, hardware and supplies		212 68
Travelling expenses		11 15
Exhibition expenses		71 95
Blacksmithing, harness supplies and repairs		180 55
Bee supplies		23 06
Salary of Superintendent		1,200 00
Wages, farm work, including experimental work, with farm crops, &c.		3,063 97
Wages, care of stock		548 25
Horticultural branch, including experiments with vegetables, fruits and flowers; also care of Arboretum and grounds		313 05
Forestry branch, including care of hedges		273 25
Poultry branch		87 15
Office help, including delivery of mail, $229.75		729 50
Distribution of seed grain, potatoes, &c.		316 00
Distribution of trees and tree seeds		9 52
Contingencies, including postage, $95.80		103 60
Printing and stationery		39 94
Books and newspapers		22 45
Telegrams and telephones		60 85
Carried forward	$	7,632 91

Brought forward		$ 7,632 91
Drainage and drain tiles		6 00
Manure and fertilizers		159 50
Steers purchased for feeding experiments		400 23
		$ 8,198 64
Less—Value of grain supplied for grain distribution at Ottawa		1,042 30
		$ 7,156 34

Experimental Farm, Indian Head, Sask.—Expenditure, 1906-07.

Live stock		$ 16 25
Feed for stock		31 67
Veterinary services and drugs		58 60
Seed grain, seeds, trees, &c		15 89
Implements, tools, hardware and supplies		490 97
Travelling expenses		11 85
Blacksmithing, harness supplies and repairs		94 15
Salary of superintendent		1,200 00
Wages, farm work, including experimental work with farm crops		2,654 52
Wages, care of stock		620 65
Horticultural branch		180 00
Poultry branch		51 66
Forestry branch, including hedges		68 25
Office help, including delivery of mail, $90		652 50
Distribution of seed grain, potatoes, &c		139 66
Distribution of trees and tree seed		8 75
Contingencies, including postage, $372.33		407 63
Printing and stationery		47 19
Telegrams and telephones		29 85
Books and newspapers		3 50
Steers purchased for feeding experiments		292 85
Bee supplies		4 34
		$ 7,080 73
Less—Proceeds of sale of steers purchased for feeding experiments	$ 780 00	
Value of grain supplied for grain distribution at Ottawa.	1,871 65	
		2,651 65
		$ 4,429 08

Experimental Farm, Agassiz, B.C.—Expenditure, 1906-07.

Live stock	$ 1 00
Feed for stock	55 90
Veterinary services and drugs	8 15
Seed grain, seeds, trees, &c	67 52
Implements, tools, hardware and supplies	251 70
Manure and fertilizers	143 35
Travelling expenses	33 25
Exhibition expenses	296 70
Blacksmithing, harness supplies and repairs	140 83
Salary of superintendent	1,200 00
Carried forward	$ 2,198 40

Brought forward	$ 2,198 40
Wages, farm work, including experimental work with farm crops, vegetables, fruit trees, vines, &c	2,150 80
Wages, care of stock	404 50
Poultry branch	60 76
Forestry branch, including care of hedges	65 15
Office help	90 00
Distribution of seed grain, potatoes, &c	83 00
Clearing land	17 50
Contingencies, including postage, $68	84 52
Printing and stationery	15 98
Books and newspapers	14 50
Drainage and drain tiles	69 12
Telegrams and telephones	2 60
	$ 5,256 83

EXPERIMENTAL FARM, LACOMBE, ALTA.—EXPENDITURE, 1906-07.

Purchase of land	$ 5,000 00
Horses	1,828 60
Implements, tools, hardware, &c	2,428 99
Harness	229 40
Feed for stock	107 77
Travelling expenses	592 08
Salary of superintendent, 8 mos	800 00
Printing and stationery	5 90
Contingencies, including rent of house for superintendent, $160	186 35
	$ 11,179 09

EXPERIMENTAL FARM, LETHBRIDGE, ALTA.—EXPENDITURE, 1906-07.

Horses	$ 2,475 00
Harness	584 60
Fencing	590 25
Implements, tools, hardware, &c	2,775 80
Feed for stock	97 21
House and stable rent	218 16
Salary of superintendent, 8 mos	1,000 00
Printing and stationery	73 30
Travelling expenses	223 45
Wages, breaking land, &c., &c	55 80
Fuel for house for superintendent	52 75
Lighting for house for superintendent	27 27
Water for house for superintendent	11 26
Telegrams and telephones	14 00
Seed grain	14 76
	$ 8,213 61

NEW FARMS GENERALLY.—EXPENDITURE 1906-07.

Travelling expenses, &c., &c., of Director and Angus Mackay inspecting lands	$ 603 66

SUMMARY OF EXPENDITURE, 1906-07.

Central Experimental Farm	$	36,441 24
Nappan Experimental Farm		8,515 73
Brandon Experimental Farm		7,156 34
Indian Head Experimental Farm		4,429 08
Agassiz Experimental Farm		5,256 83
Lacombe Experimental Farm		11,179 09
Lethbridge Experimental Farm		8,213 61
New Farms, General		603 66
	$	81,795 58

*General Expenditure.**

Distribution of seed grain, potatoes, &c., from Central Experimental Farm, including labour, bags, printing, &c.	$ 5,286 23	
Value of grain from Brandon	1,042 30	
" grain from Indian Head	1,871 65	
" potatoes from Cereal Division, C.E.F.	398 30	
	$ 8,598 48	
LESS—Value of screenings charged feed for stock, C.E.F.	535 12	
		8,063 36
Entomological and Botanical Division, including salaries of officers in charge		3,566 67
Chemical Division, including salaries of officers in charge		4,104 55
Salaries general, including— Director, Accountant, director's secretary and assistant accountant		5,024 96
		$ 102,555 12
Printing bulletins and distribution of bulletins and reports	5,250 00	
LESS—Special sum in estimates for this item	5,250 00	
		$ 102,555 12

* These items are put under 'General Expenditure' for the reason that they are incurred for general purposes.

SUMMARY OF STOCK, MACHINERY, IMPLEMENTS, &c., ON HAND APRIL 1, 1907.

CENTRAL EXPERIMENTAL FARM, OTTAWA, ONT.

19 Horses	$	3,985 00
18 Ayrshire cattle		2,105 00
17 Guernsey cattle		2,100 00
18 Durham cattle (Shorthorns)		4,095 00
18 Canadian cattle		1,540 00
19 Grade cattle		720 00
138 Yorkshire swine		1,568 00
31 Berkshire swine		420 00
33 Tamworth swine		393 00
16 Shropshire sheep		300 00
10 Leicester sheep		190 00
Farm machinery and implements		3,375 40
Vehicles, including farm wagons and sleighs		1,158 00
Hand tools, hardware and sundries		1,203 05
Harness		605 30
Dairy department, machinery, &c		550 25
Horticultural and forestry departments, implements, tools, &c		871 35
Botanical department, implements, tools, &c		7 35
Poultry department, 329 fowls		694 75
Poultry department, implements, furnishings, &c		213 50
Bees and apiarian supplies		434 81
Chemical department, apparatus and chemicals		2,000 96
Books in several departments		875 53
Greenhouse plants, supplies, &c		2,449 00
Furniture at Director's house		1,000 00
Office furniture and stationery		1,543 25
Experimental flour mill and electric motor		450 00
	$	34,848 50

EXPERIMENTAL FARM, NAPPAN, N.S.

8 Horses	$	950 00
2 Holstein cattle		205 00
4 Yorkshire swine		120 00
25 Sheep		306 00
67 Fowls		73 75
Bees and apiarian supplies		42 15
Vehicles, including farm wagons and sleighs		400 75
Farm machinery		663 50
Farm implements		275 00
Hand tools, hardware and sundries		356 50
Harness		237 00
Furniture for reception room and bedroom for visiting officials		159 50
Furniture supplies and books for office		243 75
	$	4,032 90

Experimental Farm, Brandon, Man.

12 Horses	$ 1,580 00
4 Ayrshire cattle	180 00
6 Durham cattle	400 00
3 Guernsey cattle	135 00
11 Grade cattle	330 00
1 Tamworth pig	30 00
2 Berkshire pigs	45 00
2 Yorkshire swine	50 00
57 Fowls	57 00
Bees and apiarian supplies	183 70
Vehicles, including farm wagons and sleighs	575 00
Farm machinery	2,032 33
Farm implements	570 00
Hand tools; hardware and sundries	567 75
Harness	213 25
Furniture for reception room and bedroom for visiting officials	159 55
Furniture supplies and books for office	391 65
	$ 7,500 23

Experimental Farm, Indian Head, Sask.

13 Horses	$ 2,015 00
22 Durham cattle	1,575 00
19 Grade cattle	530 00
5 Berkshire swine	121 00
9 Yorkshire White swine	140 00
50 Fowls	54 00
Bees and apiarian supplies	55 00
Vehicles, including farm wagons and sleighs	498 00
Farm machinery	3,061 00
Farm implements	662 00
Hand tools, hardware and sundries	369 40
Harness	199 00
Furniture for reception room and bedroom for visiting officials	476 50
Furniture supplies and books for office	348 00
	$ 10,103 90

Experimental Farm, Agassiz, B.C.

7 Horses	$ 1,210 00
29 Durham cattle	1,635 00
15 Dorset horned sheep	153 00
3 Berkshire swine	105 00
3 Yorkshire White swine	90 00
35 Fowls	35 00
Bees and apiarian supplies	31 75
Vehicles, including farm wagons	161 00
Farm machinery	559 00
Farm implements	119 75
Hand tools, hardware and sundries	144 50
Harness	88 75
Furniture for reception room and bedroom for visiting officials	116 00
Furniture supplies and books for office	254 50
	$ 4,703 25

EXPERIMENTAL FARM, LACOMBE, ALTA.

6 Horses	$	1,828 60
Implements, tools, vehicles, hardware, &c.		2,429 00
Harness		229 40
	$	4,487 00

EXPERIMENTAL FARM, LETHBRIDGE, ALTA.

10 Horses	$	2,475 00
Implements, tools, vehicles, hardware, office furniture, &c.		2,775 00
Harness		584 60
	$	5,834 60

THOS. M. CRAMP,
Accountant.

METEOROLOGICAL OBSERVATIONS IN 1906 AT THE CENTRAL EXPERIMENTAL FARM, OTTAWA.

TABLE of Meteorological Observations taken at the Central Experimental Farm, Ottawa, 1906; maximum, minimum, and mean temperature for each month, with date of occurrence, also, rainfall, snowfall, and total precipitation.

Month.	Maximum.	Minimum.	Range.	Mean.	Highest.	Date.	Lowest.	Date.	Rainfall.	Snowfall.	Total Precipitation.	Number of days Precipitation.	Heaviest in 24 hours.	Date.
	°	°	°	°	°		°		in.	in.	in.		in.	
January...	28·68	10·17	18·51	19·92	48·0	23rd	—14·4	10th	0·26	9·25	1·18	14	0·35	18th
February..	25·18	3·26	21·92	14·22	46·0	21st	—21·8	2nd	0·66	7·75	1·43	12	0·50	14th & 25th
March....	30·83	12·87	17·96	21·85	47·0	29th	— 3·2	24th	0·98	7·50	1·72	10	0·92	27th
April.....	54·20	34·85	22·68	46·19	71·6	19th	17·0	7th	0·78	1·75	0·95	12	0·29	10th
May......	64·94	40·14	24·80	52·54	89·8	18th	28·8	11th	1·88	......	1·88	15	0·45	25th
June.....	77·83	53·96	23·87	65·89	89·0	15th & 20th	36·6	12th	4·85	......	4·85	18	1·05	8th
July.....	82·34	56·04	26·29	69·18	93·6	22nd	44·2	5th	1·58	......	1·58	8	0·62	30th
August....	84·04	57·07	26·96	70·55	96·6	19th	43·5	15th	2·43	......	2·43	9	0·74	20th
September.	75·86	47·86	28·00	61·86	92·0	12th	32·2	25th	2·53	......	2·53	7	1·56	29th
October...	56·42	35·86	20·55	46·13	75·8	4th	24·5	12th	3·56	......	3·56	10	1·22	6th
November.	38·28	23·87	14·40	31·07	50·0	2nd	7·4	15th	1·01	7·75	1·78	11	0·61	26th
December.	20·70	3·23	17·46	11·96	38·0	15th	—25·2	8th	0·84	21·75	3·01	19	0·55	6th
	...	......	......	......	....	....	.....	....	21·36	55·75	26·90	145	....	....

Rain or snow fell on 145 days during the 12 months.
Heaviest rainfall in 24 hours, 1·56 inches on September 29th.
Heaviest snowfall in 24 hours, 5·50 inches on December 6th.
The highest temperature during the 12 months, was 96°6 on August 19th.
The lowest temperature during the 12 months, was—25°2 on December 8th.
During the growing season rain fell on 12 days in April, 15 days in May, 18 days in June, 8 days in July, 9 days in August, and 7 days in September.
September shows the lowest number of days on which rain fell, viz: 7.
Total precipitation during the 12 months, 26·90 inches, as compared with 32·42 inches during 1905.

RAINFALL, Snowfall, and Total Precipitation from 1890 to 1906, also the average annual amount that has fallen.

Year.	Rainfall.	Snowfall.	Total Precipitation.
	in.	in.	in.
1890	24·73	64·85	31·22
1891	30·19	73·50	37·54
1892	23·78	105·00	34·28
1893	31·79	72·50	39·04
1894	23·05	71·50	30·20
1895	27·01	87·50	35·76
1896	21·53	99·75	31·50
1897	24·18	89·00	33·08
1898	24·75	112·25	35·97
1899	33·86	77·25	41·63
1900	29·48	108·00	40·27
1901	29·21	97·25	38·91
1902	25·94	101·75	36·10
1903	26·43	85·00	34·92
1904	25·95	108·75	36·79
1905	23·71	87·25	32·42
1906	21·36	55·75	26·90
Total for 17 years	446·95	1496·85	596·53
Yearly average for 17 years	26·29	88·05	35·09

RECORD OF SUNSHINE at the Central Experimental Farm, Ottawa, for the year 1906.

MONTHS.	1906.			
	Number of days with Sunshine.	Number of days without Sunshine.	Total hours Sunshine.	Average Sunshine per day.
January	20	11	87·5	2·82
February	21	7	132·3	4·72
March	22	9	163·7	5·28
April	27	3	206·8	6·89
May	26	5	201·8	6·50
June	28	2	224·0	7·46
July	31	0	272·4	8 80
August	31	0	273·7	8·82
September	29	1	215·8	7·19
October	25	6	138·6	4·47
November	19	11	95·8	3·19
December	20	11	72·6	2·34

(Signed),

WILLIAM T. ELLIS,
Observer.

INDEX