Volume 012
Article 147

IDAHO PRODUCTION DIET TESTS, 1963

by

Paul Cuplin

Supervisor of Fish Hatcheries

Introduction

The Idaho Fish and Game Department began using an "open formula" fish feed during February, 1963. This report summarizes diet tests carried on to evaluate and improve the fish feed.

Diet formulation was developed through the cooperation of Dr. A. M. Dollar, University of Washington, College of Fisheries, and personnel of the Department.

Diet Ingredients

The production fry diet is listed as Diet I in Table I and the product on grower diet is Diet II in Table I. A vitamin concentrate is purchased separately and added at the rate of ten pounds per too of finished feed. The vitamin concentrate specifications appear in Table 11,

Minor changes were made in the vitamin concentrate and fish feed formula on July 1, 1963. These changes are listed for reference below.

Vitamin Concentrate

1. Removed Vitamin A, added in feed formula as A and D feeding oil.
2. Removed Vitamin D, added in feed formula.
3. D=Biotin increased to 600 mg/ton.
4. Ascorbic Acid reduced to 200,000 mg/ton.
5. Folic Acid increased to 3,000 mg/ton.

Feed Formula

1. Vitamin concentrate from 4 lbs/ton to 10 lbs.ton (filler adjustment).
2. Two percent 2250A and 300D feeding oil substituted for animal fat.
3. Salt 3.8 to 3.3 percent.
4. Condensed fish solubles 0.2 percent added.

Methods

Diet tests began with approximately 15,000 fish on each test with the exception for Hagerman Fish Hatchery with 60,000 and Twin Falls Fish Hatchery with 48,000. Numbers and pounds of fish were reduced in each lot by random selection.

Pouadage was maintained at .81 lbs/cu. Ft. except at Mackay where .4 lbs/cu. ft. was used as a standard weight.

The amount of fish fed was on the basis of body weight and water temperature according to the Devel. Haskell, and Tunnison fish feeding chart.

If a disease was encountered, all lots of fish were treated whether or not they were infected.

Discussion

Results of feeding tests are summarized in Tables III and IV.

Growth response and mortality were similar for all diets at any particular hatchery.

Diet IV, indicated no eneficial effects of feeding 150 percent of the vitamin concentrate.

Diet VIII with 1200 g/ton of inositol indicated a growth depressing effect except at American Falls Fish Hatchery.

Diets I and VII gave the best results except at Ashton where Diet VI was best. Diet VI with the increased amount of liver meal may furnish more suitable protein which will better accommodate fish at reduced water temperatures.

Diet III, the meat scrap meal diet suggested by Frank Gaver was the lowest in cost both in purchase and cost per pound of fish gained, accompanied with low mortality. Further testing on this diet will be carried on next season.

Fish feed costs and calculated percent protein are listed in Table V.

Conclusions

It is concluded that Diet I gave equal or better results both in cost and food conversion at the majority of the stations where it was tested. It is therefore recommended that this diet continue in use with minor changes both as a fry and grower diet.

The most expensive feed is often the least expensive feed in cost per pound of fish produce.

Acknowledgement

We wish to thank B. D, Ainsworth, Harvey Albrethsen, E. O. Bailey, Walt Bethke, Burl Bowden, Norman Floyd and their respective hatchery crews for a job well done in these diet experiments.

TABLE 1

COMPOSITION OP DIETS

Idaho Production Diet Tests, 1963

Diet	Fish Meat	Meat Scrap Meal	Liver Meal	Soybean Meal Flour	Whey	Wheat Mids	Yeast	Kelp Meal	Dit., Sol	Beet Pulp	Animal Fat	A&D Oil	Salt	Vit. Conc.
	31	I0	5	$1_1$0	10	20	5	3			2		3.8	.2
II	27	10	5	10	10	24	5	3			2		3.8	.2
1		94										2	3.8	.2
1V					Diet II	150% Vitamin Concentrate								
VI	31		15	10	10	20	5	3			2		3.8	.2
VII	28	6	10	16	5	16	5	3	6	1.5		2	1.0	.5
VIII					Diet VII plus 1,200 g/ton Inositol.									

Formula Adjustments, July 1, 1963

1. 2 percent 2250A and 300D feeding oil substituted for animal fat.
2. Vitamin concentrate 4 lb/ton to 10 lbs/ton (filler adjustment).
3. Salt 3.8 to 3.3 percent.
4. Condensed fish solubles 0.2 percent added.

TABLE 11

VITAMIN CONCENTRATE, FOR ONE-TON FEED MIX

Vitamin A [1/]	2,000 USP Units
Vitamin D_3 [2/]	360 IC
Vitamin E	60,000 IU
Riboflavin	90,000 milligrams
D = Calcium Pantothenate	50,000 milligrams
Niacin	100,000 milligrams
Choline Chloride	250,000 milligrams
Vitamin B_{12}	20 milligrams
D Biotin [3/]	400 milligrams
Ascorbic. Acid [4/]	400,000 milligrams
Thiamine Hydrochloride	90,000 milligrams
Pyridoxine Hydrochloride	20,000 milligrams
Folic Acid [5/]	2,000 milligrams

Weight of Vitamin Concentrate, plus carrier--4 pounds

Adjustments, July 1, 1963

1. Removed.
2. Removed.
3. E-Biotin increased to 600 mg/ton
4. Ascorbic Acid reduced to 200,000 mg/ton.
5. Folic Acid increased to 3,000 mg/ton.

TABLE III

RESULTS OF FEEDING RAINBOW TROUT TESTS,
S1X-MONTH PERIOD

Idaho Production Diets, 1963

Hatchery	Diet	Lbs. Food/ Lb. Fish	Cost/ Lb. Gain	Total Mortality In Percent	Average Hematocrit	Water Temperature
American Falls	I	1,9	0.166	8.9	44.2	56°F.
	II	2.1	0.176	8.0	37.2	
	IV	2.0	0.201	10.1	35.0	
	V11	2.2	0.221	7.9	31.3	
	V111	1.9	0.191	5.5	33.3	
Ashton	I	1.8	0.151	26.6		47-53°F
	11	1.7	0.141	29.8		
	VI	1.3	0.129	18.7		
Eagle	III	1.5	0.082	4.7	42.8	56°F.
Twin Falls	I	1.4	0.12	0.1	37.5	55°F.
	II	1.4	0.12	0.2	38.4	
	IV	1 .6	0.16	0.1	42.1	

TABLE IV

RESULTS OF RAINBOW TROUT FEEDING TESTS,
SIX MONTH PERIOD

Idaho Production Diets, 1963

Hatchery	Diet	Lbs. Food/ Lb. Fish	Cost/Lb Gain	Total Mortality In Percent	Average Hematocrit	Water Temperature
Hagerman	I	1.3	0.106	3.1	40.5	58°F.
	II	1.8	0.147	3.2	41.5	
	VI	1.7	0.165	2.9	41.5	
	VII	1.4	0.144	3.1	41.3	
	VIII	1.6	0.161	3.3	38.7	
Mackay	I	1.3	0.111	5.0	42.8	52°F.
	II	1.4	0.086	3.2	43.5	
	VI	1.4	0.144	4.6	43.3	
	VII	1.3	0.132	4.8	44.4	
	VIII	1.4	0.144	4.6	40.1	

TABLE V

MAXIMUM PERCENT PROTEIN AND COST

Idaho Production and Experimental Diets, 1963

Diets	Cost/Lb.	Percent Protein
I	.089 .0845	43.6
II	.084, .082	41.2
III	.056	52.8
IV	.10	41.2
VI	.10	44.8
VII	.10	44.9
VIII	.10	44.9