My dream come true, pasture for my horses on my own property.

What Questions Should I Ask When Deciding What Grass Species To Plant?

- Amount of available water (when)
- Soil Type (Loam, Clay, Sand)
- Summer Temperatures
- Intended Use

NSC in a cow

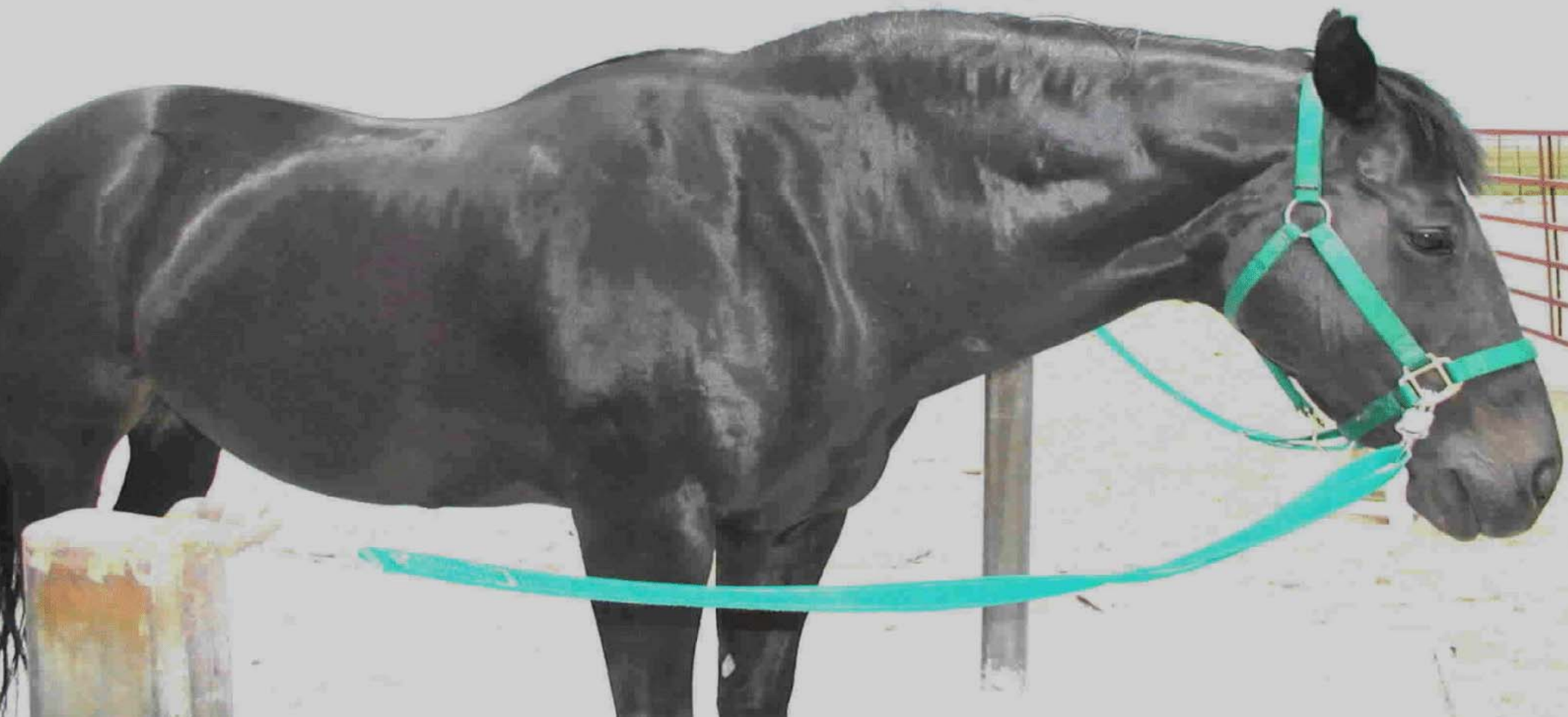
- Cows are foregut fermenters: NSC feed rumen microbes….
- Rumen microbes feed the cow.
- Some NSC are utilized even before it hits the stomach.
- This is good for cows, which have very high demands for readily available energy.

NSC in a horse

- **Horses are hind gut fermenters.**
- **NSC hits the small intestine first, creating a glycemic response.**
- **Fructan is non digestible- must be fermented by hind gut microorganisms.**
- **Excess sugar, starch and fructan in hind gut = bacterial population upsets =**

laminitis and colic

and my horse’s neck swelled up after 7 days of grazing
for only 30 minutes a day



Determine Feed Requirements!!

(by appropriate analyses)

- Do not feed horses too much high quality forage (sometimes a little straw-filler may be okay)
- Too “much quality” may lead to fat horses with glucose intolerance and laminitis (sometimes a little straw-filler may be okay)
- High quality forage necessitates less intake = hungry horses with empty stomachs and ulcers (sometimes a little straw-filler may be okay)
- Feed more forage of lower quality (sometimes a little straw-filler may be okay)

Suggestions from a horse owner

- Do not base forage purchases on:
  - Emotions, i.e.--love and affection for horses
  - Looks--although the forage is a pretty green, it may not be what your horse needs
- Do base forage purchases on:
  - Need of horses (they differ with breed, activity, etc.)
  - Feed analyses (carbohydrates are an important consideration)
- Consider using equivalent of ‘cow feed waste’ for sedentary animals?

REMEMBER

- **Cool temperatures in spring and fall can result in forages with high carbohydrate content**
- **Do not be afraid to feed hay that is not a pretty bright green**
- **High fiber is good – increases bulk**
- **Mineral content varies with species, soil fertility, plant maturity – few generalities applicable**
- **Cutting number has little meaning – environment and plant growth stage are much more important considerations**
- **Carbohydrate content influenced by environment -- cold = high**
- **Visual observations for judging forage quality not good indicator – forage analyses best!**

Non-structural carbohydrates (NSC)

	NSC % dm
Orchardgrass	13.0
NewHy	14.0
Timothy	14.5 (26.8)
Meadow bromegrass	16.8
Tall fescue	17.5
Meadow foxtail	18.1
Perennial ryegrass	24.6

Highest quality feed

Irrigated Pasture Grasses

- **Major Grasses:**
  - Orchardgrass
  - Timothy
  - Tall Fescue
  - Meadow Bromegrass
  - Perennial ryegrass?
- **Minor Grasses:**
  - Smooth Bromegrass
  - NewHy – RS wheatgrass

Hay Yields of irrigated pasture grasses at the W. Colorado Res. Cent. (Fruita

	Tons/Acre					
	1999	1998	1997	1996	1995	1995-99
NewHy	3.79	3.11	4.69	3.77	7.37	22.73
Meadow brome (Regar)	4.36	3.48	5.20	4.26	7.19	24.49
Smooth brome (Manchar)	3.14	2.38	4.90	3.27	5.62	19.31
Orchardgrass (Potomac)	3.82	2.63	5.48	3.51	6.13	21.57
Orchardgrass (Latar)	3.30	2.48	4.59	3.16	5.91	19.44
Timothy (Climax)	3.72	2.97	4.82	3.39	5.74	20.64
Tall Fescue (Fawn)	5.36	5.05	6.92	4.64	8.40	30.37
Reed canarygrass	2.54	2.26	4.12	2.70	5.24	16.85
Switchgrass (Blackwell)*	5.88	6.48	6.21	5.51	8.63	32.71

Meadow Brome (*Bromus riparius*)

Adaptation

- Moderate rhizome development
- Early spring growth (earlier-smooth brome)
- High forage yields
- Adapted to dryland conditions (15 inches precipitation)
- Recovers quickly after cutting
- Stands are easy to establish

Meadow Brome (*Bromus riparius*)

Limitations

- Highly pubescent
- Very sensitive to spring flooding
- Early maturing

Meadow Brome (*Bromus riparius*)

Pasture Management

- Exceptional source of early spring forage
- Rapid regrowth after grazing
- Reduced mid summer slump
- Allow forage to reach 8 - 12 inches
- Leave a stubble of 3 - 4 inches
- Typical rest period is 21 to 28 days
- Leave a 6 inch stubble going into the fall

Brome Grasses/Univ. of WY – Powell WY

Variety	6/16	7/14	10/7	Total (T/ac)	% of Ranger
Hakari (AB)		4.37	1.98	6.35	133
Cache (MB)	2.78	___	2.74	5.52	115
Lincoln (SB)		3.79	1.28	5.07	106
Paddock (MB)	2.41	___	2.49	4.90	103
Bigfoot (MB)	2.13	___	2.63	4.76	100
Montana (MB)	2.45	___	2.28	4.71	99
Regar (MB)	2.18	___	2.21	4.39	92
LSD (0.05)	NS	0.74	0.38	0.97	

Irrigated Pasture Grasses

Forage Yield (Tons/Acre)

	Water Level (inches/week)				
Species	2.00	1.66	1.30	1.10	0.60
Meadow brome (1)	8.7	8.4	7.8	7.0	6.1
Orchardgrass (9)	8.9	8.3	7.4	6.3	4.6
Tall fescue (10)	9.7	9.8	9.7	8.9	7.3
Perennial ryegrass (9)	6.2	5.5	5.0	4.0	3.1
Smooth brome (1)	6.2	5.9	6.1	4.9	4.0
RS-Hybrid (1)	6.3	6.2	6.0	5.0	4.4

Meadow Brome (*Bromus riparius*)
Forage Quality (NIRS)

Species	CP	NDF	DMD
Meadow brome (1)	21.1	50.5	69.5
Orchardgrass (9)	20.0	50.6	68.6
Tall fescue (1)	18.6	47.8	68.4
Perennial ryegrass (9)	18.5	44.1	68.7
Smooth brome (1)	24.5	47.2	72.2
RS-Hybrid (1)	22.3	48.8	70.0

*Combined over 3 harvests (1996, June 2, July 31, & Oct 16)

Forage Quality – vegetative (Canada)

Stage	T/Ac	CP %	ADF %	NDF%	IVDMD%
Crested wheatgrass	2.32	12.6	37.8	61.2	62.6
Smooth bromegrass	2.80	20.2	30.7	54.6	66.1
Meadow bromegrass	2.28	19.0	32.4	55.1	74.2

Average Daily Gain (lbs/day)

Crested wheatgrass	1 (3.1)	2 (_)
Smooth bromegrass	1 (2.4)	2 (2.2)
Meadow bromegrass	1 (2.4)	2 (2.1)

Seedling vigor – Utah Meadow Bromegrass

Entry	Seedling Emergence/day	% Change
Cache	1.84	
Fleet	1.60	+13
Regar	1.20	+35

Forage Yield – Drought tolerance

Water Levels

Lbs/Acre

Entry	WL-1	WL-2	WL-3	WL4	WL-5
Cache	2615	2060	1191	663	419
Fleet	2323	1913	1023	530	319
Regar	2313	1728	948	487	294
% increase	+11	+7	+14	+20	+24

Forage Yield – NPA Trials

(Green canyon, Bluecreek, Miles City, and Mandan)

Four Location Average

	Cache	Fleet	Regar	Manchar SB
Lbs/Acre	2,681(18%)	2,184	1,855	1,996
Stand-Freq %	69 (12%)	58	65	49
Plant Vigor	6.5 (3%)	6.3	5.3	4.6

Meadow Brome (Bromus riparius)

Adapted Cultivars

Regar

Fleet

Paddock

Montana

McBeth

Cache

Orchardgrass (*Dactylis glomerata*)

Adaptations

Medium to long-lived, high forage producing bunchgrass adapted to well drained soils.

Widely preferred species for hay, pasture, or silage for livestock and wildlife.

It can be grown under irrigation or dryland where at least 18 inches of annual precipitation are received.

Orchardgrass (*Dactylis glomerata*)

Limitations

- For optimum production, requires increased irrigation
- Less drought tolerant then tall fescue and smooth brome
- Moderately winder hardy -- usually needs snow cover
- Of the pasture grasses, the most susceptible to diseases
- Must have well drained soils

Orchardgrass (*Dactylis glomerata*)

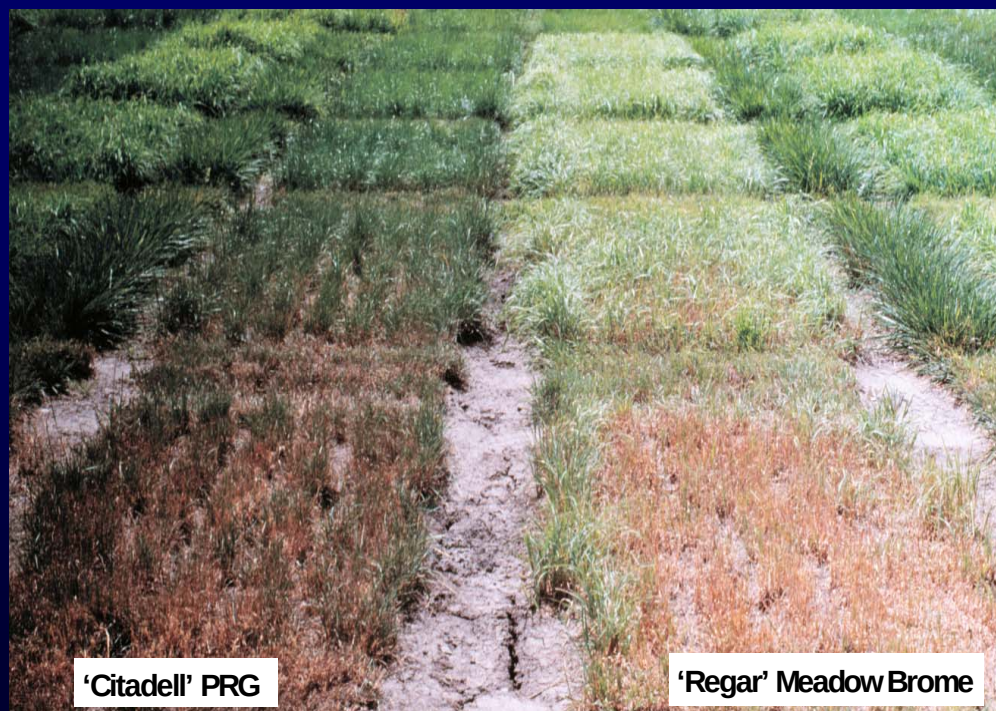
Pasture Management

- At high levels of nitrogen and adequate water, orchardgrass is among the most productive cool-season grasses in the Great Basin
- Fertilizer: 50-100 lbs/acre in the spring, then 40-60 lbs/acre after each harvest event
- Under hay management, cut before heading -- if harvested after heading, stands become bunchy

Orchardgrass/Univ. of WY – Powell WY

Variety	7/14	10/7	Total (T/ac)	% of Ranger
Haymate	3.65	2.36	6.01	126
Icon	2.93	2.64	5.57	117
Paiute	3.13	2.40	5.53	116
Stampede	2.89	2.42	5.30	111
Barexcel	2.88	2.40	5.28	110
Century	3.10	2.19	5.28	110
Intensiv	2.93	2.30	5.23	109
Baridana	2.92	2.31	5.22	109
Renegade	2.86	2.35	5.21	109
Benchmark	2.83	2.30	5.12	107
Potomac	2.69	2.37	5.06	106
Pizza	2.79	2.25	5.04	105
Baroula	2.31	2.42	4.73	99
LSD (0.05)	0.74	0.38	0.97	

Forage Harvesting



Grasses

Forage Yield (Tons/Acre)

Species	Water Level (inches/week) 2.00	1.66	1.30	1.10	0.60
Meadow brome (1)	8.7	8.4	7.8	7.0	6.1
Orchardgrass (9)	8.9	8.3	7.4	6.3	4.6
Tall fescue (10)	9.7	9.8	9.7	8.9	7.3
Perennial ryegrass (9)	6.2	5.5	5.0	4.0	3.1
Smooth brome (1)	6.2	5.9	6.1	4.9	4.0
RS-Hybrid (1)	6.3	6.2	6.0	5.0	4.4

Orchardgrass (Dactylis glomerata)

Forage Quality (NIRS)

Species	CP	NDF	DMD
Orchardgrass (9)	20.0	50.6	68.6
Smooth brome (1)	24.5	47.2	72.2
Tall fescue (1)	18.6	47.8	68.4
Perennial ryegrass (9)	18.5	44.1	68.7
Meadow brome (1)	21.1	50.5	69.5
RS-Hybrid (1)	22.3	48.8	70.0

*Combined over 3 harvests (1996, June 2, July 31, & Oct 16)

Effect of Nitrogen Fertilizer on Orchardgrass Hay Production

Fertilizer Level Split application	Orchardgrass (Boone) Lbs/Acre (3 Harvests)
0	~ 3000
80	~ 5300
160	~ 6900
240	~ 8800

SOURCE – University of Kentucky – AGR-58

Orchardgrass (*Dactylis glomerata*)

Commonly Used Cultivars: **Orchardgrass cultivars are classified according to maturity (late, medium, and early) -- Late maturing cultivars are recommended for mixtures with alfalfa**

- **Later -- late maturing type -- has higher digestibility and protein than early maturing types**
- **Paiute -- medium type -- most drought tolerant**
- **Ambassador, Dawn, and Potomic -- early type -- known for improved seedling vigor, high yielding, and rapid recovery after grazing**

Timothy (*Phleum pratense*)

Adaptation

- Cool moist climates at high elevations with an annual precipitation of 18 inches or more
- Remains productive on clay, silt, and sandy soils provided adequate moisture is present
- Rapid seedling establishment
- Very winter hardy

Timothy (*Phleum pratense*)

Adaptation Cont.

- Latest of the pasture grasses to reach maturity
- Tolerant of low soil acidity, moderately water logged soils, and can with stand a limited amount of spring flooding
- Forage quality is the highest of the pasture grasses when vegetative

Timothy (*Phleum pratense*)

Limitations

- Will not tolerate dry or hot periods throughout the growing season
- Rapid decline if forage quality as the plant matures
- Perhaps the slowest of the pasture grasses to recover after cutting
- Only 2 harvests per year

Timothy/Univ. of WY – Powell WY

Variety	7/14	10/7	Total (T/ac)	% of Ranger
Express	4.56	2.58	7.14	149
Treasure	3.92	2.44	6.36	133
Richmond	3.78	2.48	6.26	131
Talon	4.10	2.15	6.25	131
Summit	3.74	2.34	6.08	127
Erecta	4.67	1.29	5.96	125
Climax	4.15	1.74	5.89	123
Clair	3.48	2.25	5.73	120
Barmidi	4.33	1.27	5.60	117
Barliza	4.06	1.45	5.51	115
LSD (0.05)	0.74	0.38	0.97	

Effect of Plant Maturity on Timothy Hay Quality

Stage	CP %	ADF %	NDF%	TDN %
Late Vegetative	17.0	29	55	66
Early Bloom	15.0	32	61	61
Mid Bloom	9.1	36	67	58
Late Bloom	7.8	40	70	54

SOURCE – Nutrient Requirements of Dairy Cattle, 6th Edition. 1989

Total Seasonal Yield of CP in Forage as a Function of Date of First Cutting

	Date & lbs of N / Acre				
	June 20	June 26	July 5	July 18	Aug. 1
Meadow foxtail	12.4	10.6	9.8	9.5	6.8
Smooth bromegrass	12.4	10.0	9.2	8.0	6.2
Intermediate wg	12.2	9.9	8.4	7.6	5.6
Timothy	9.0	7.8	6.5	6.0	5.0

From the two charts, the optimum time to harvest for yield is not the optimum for CP.

Total Seasonal Forage Yield as a Function of Date of First Cutting (Colorado)

	Date & Yield (Tons/Acre)				
	June 20	July 5	July 18	Aug. 1	Aug. 15
Meadow foxtail	3.1	3.3	3.5	2.7	2.9
Smooth bromegrass	2.6	3.2	3.2	3.1	3.5
Intermediate wg	2.4	2.6	3.1	3.3	4.1

Timothy (*Phleum pratense*)

Adapted Cultivars: Timothy cultivars are classified as early, medium, and late maturing varieties -- Typically, early maturing varieties have higher digestibility than later maturing varieties

Tall Fescue

Adaptations

- Best adapted to moist soils rich in humus or clays but can produce satisfactory forage yields on strongly acidic (pH 4.7) to alkaline (pH 9.5) soils.
- It is one of the most drought tolerant pasture grasses.
- Of all the pasture grasses, it is perhaps the most widely adapted across many different environments.

Tall Fescue

Limitations

- **Not adapted to sandy soils that are associated with long periods of drought.**
- **The presence of the fungal endophyte (reduced weight gain/or milk production, rapid breathing, and increased body temperatures) - Use endophyte free cultivars.**

Endophyte in the Intermountain West

Asay et al., 2001 - Suggested that the presence of the endophyte (*Neotyphodium*) may have a beneficial effect on the productivity of tall fescue in the Intermountain Region, particularly as water becomes limiting.

Crop Science 41:350-357

Tall Fescue/Univ. of WY – Powell WY

Variety	7/14	10/7	Total (T/ac)	% of Ranger
Maximize	3.02	2.40	5.42	113
Fawn	2.69	2.16	4.85	97
Barolex	2.50	1.93	4.43	93
LSD (0.05)	0.74	0.38	0.97	

Seasonal Trends in Tall Fescue

	%IVDMD	
	Spring	Fall
Kentucky-31 (-)	58	56
Orchardgrass (Hallmark)	55	60

Caution – Hay produced from endophyte infected tall fescue is toxic to cattle (Goetsch et al., 1987); however, alkaloid concentrations can decline 50% during curing. Recommended to use endophyte free cultivars or cultivars with the friendly endophyte (MaxQ)

Seasonal Trends in Tall Fescue

	Spring	Summer	Fall
Sugars, %	9.5	8.5	19
Crude Protein %	22	18	19
DDM %	69	66	74

Effect of stage of harvest of Fescue Hay on Quality and Animal Gain.

Stage of Harvest	Dry Matter Intake lb./day	Percent Digestibility	Percent Protein	lb. of Hay Fed per lb. Gain	lb. of Hay per Acre 1st Cutting	lb. of Gain per Day
Late boot to head	13.0	68	13.8	10.1	1334	1.39
Early bloom stage	11.7	66	10.2	13.5	1838	0.97
Early milk stage	8.6	56	7.6	22.5	2823	0.42

Univ. of Kentucky Ext. AGR-62

Irrigated Pasture Grasses

Forage Yield (Tons/Acre)

	Water Level (inches/week)				
Species	2.00	1.66	1.30	1.10	0.60
Meadow brome (1)	8.7	8.4	7.8	7.0	6.1
Orchardgrass (9)	8.9	8.3	7.4	6.3	4.6
Tall fescue (10)	9.7	9.8	9.7	8.9	7.3
Perennial ryegrass (9)	6.2	5.5	5.0	4.0	3.1
Smooth brome (1)	6.2	5.9	6.1	4.9	4.0
RS-Hybrid (1)	6.3	6.2	6.0	5.0	4.4

Irrigated Pasture Grasses

Forage Quality (NIRS)

Species	CP	NDF	DMD
Meadow brome (1)	21.1	50.5	
Orchardgrass (9)	19.5	45.8	87.7
Tall fescue (9)	16.9	46.8	86.0
Perennial ryegrass (9)	20.1	40.7	90.9
Smooth brome (1)	24.5	47.2	
RS-Hybrid (1)	22.3	48.8	

Tall Fescue

Adapted Cultivars

- Most forage type tall fescue cultivars were developed for hay and/or pasture production under continuous to short-rotation grazing
- Newer forage type cultivars have soft laxer leaves.
- Friendly endophyte cultivars
- Commonly grow cultivars include Alta, Fawn, and Forager
- Contact company of available cultivars

Perennial Ryegrass (*Lolium perenne*)

Adaptations

- Best adapted to regions with 30- 50 inches of rainfall
- Adapted to a wide range of soils (pH between 5-8)
- Easy to establish
- Rapid establishment during first year (45-60 days)
- Excellent forage quality

Perennial Ryegrass (*Lolium perenne*)

Limitations

- Lack of winter persistence
- Due to a shallow root system, not adapted to periods of heat or drought
- Very visible mid summer slump - due to increased temperatures (above 80 F)
- Ryegrass staggers (*Acremonium lolii*) -- Oregon and California
- Within the Great Basin, PRG is much less persistent than orchardgrass, tall fescue, meadow and smooth brome, and Kentucky bluegrass

Perennial Ryegrass (*Lolium perenne*)

Forage Yield (Tons/Acre)

	Water Level (inches/week)				
Species	**2.00**	**1.66**	**1.30**	**1.10**	**0.60**
Perennial ryegrass (9)	6.2	5.5	5.0	4.0	3.1
Orchardgrass (9)	8.9	8.3	7.4	6.3	4.6
Tall fescue (1)	9.7	9.8	9.7	8.9	7.3
Meadow brome (1)	8.5	8.2	7.8	7.0	6.1
Smooth brome (1)	6.2	5.9	6.1	4.9	4.0
RS-Hybrid (1)	6.3	6.2	6.0	5.0	4.4

Perennial Ryegrass (*Lolium perenne*)

Forage Quality (NIRS)

Species	CP	NDF	DMD
Perennial ryegrass (9)	18.5	44.1	68.7
Orchardgrass (9)	20.0	50.6	68.6
Tall fescue (1)	18.6	47.8	68.4
Meadow brome (1)	21.1	50.5	69.5
Smooth brome (1)	24.5	47.2	72.2
RS-Hybrid (1)	22.3	48.8	70.0

*Combined over 3 harvests (1996, June 2, July 31, & Oct 16)

Smooth bromegrass (*Bromus inermis*)

Adaptations

- Best adapted to moist, well drained soils, but will grow under a wide range of soil and moisture conditions.
- Smooth bromegrass is utilized on both irrigated and dryland sites.
- It is fairly tolerant of alkaline and less tolerant of saline and acid soils.

Smooth bromegrass (*Bromus inermis*)

Limitations

- Seed size – difficult to run through typical seeder
- Aggressive rhizomes – frequently becomes the dominant species in a mix
- Recovers slowly after cutting
- Experiences mid summer slump
- Will establish in dryland areas receiving 12 to 14 in. percip., but needs 16 – 18 to be productive

Smooth Bromegrass

Forage Yield (Tons/Acre)

	Water Level (inches/week)				
Species	2.00	1.66	1.30	1.10	0.60
Perennial ryegrass (9)	6.2	5.5	5.0	4.0	3.1
Orchardgrass (9)	8.9	8.3	7.4	6.3	4.6
Tall fescue (1)	9.7	9.8	9.7	8.9	7.3
Meadow brome (1)	8.5	8.2	7.8	7.0	6.1
Smooth brome (1)	6.2	5.9	6.1	4.9	4.0
RS-Hybrid (1)	6.3	6.2	6.0	5.0	4.4

Smooth Bromegrass

Forage Quality (NIRS)

Species	CP	NDF	DMD
Perennial ryegrass (9)	18.5	44.1	68.7
Orchardgrass (9)	20.0	50.6	68.6
Tall fescue (1)	18.6	47.8	68.4
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Smooth brome (1)	24.5	47.2	72.2
RS-Hybrid (1)	22.3	48.8	70.0

*Combined over 3 harvests (1996, June 2, July 31, & Oct 16)

Total Seasonal Forage Yield as a Function of Date of First Cutting (Colorado)

	Date & Yield (Tons/Acre)				
	June 20	July 5	July 18	Aug. 1	Aug. 15
Meadow foxtail	3.1	3.3	3.5	2.7	2.9
Smooth bromegrass	2.6	3.2	3.2	3.1	3.5
Intermediate wg	2.4	2.6	3.1	3.3	4.1

Total Seasonal Yield of CP in Forage as a Function of Date of First Cutting

	Date & lbs of N / Acre				
	June 20	June 26	July 5	July 18	Aug. 1
Meadow foxtail	12.4	10.6	9.8	9.5	6.8
Smooth bromegrass	12.4	10.0	9.2	8.0	6.2
Intermediate wg	12.2	9.9	8.4	7.6	5.6
Timothy	9.0	7.8	6.5	6.0	5.0

Smooth bromegrass (*Bromus inermis*)

Adapted Cultivars

- The intermediate type ‘Manchar’ is the best adapted to higher elevation mountain rangelands. Manchar is recommended for forage plantings in the Intermountain Region.
- The southern type variety ‘Lincoln’ is best adapted to mountain brush and faviorable sites in the sagebrush and pinyon-juniper zone. Lincoln is recommended for use in erosion control.

NewHy (*Elymus hoffmannii*)

Adaptation

- Recommended for range sites and pastures with moderate salinity problems that receive 13-15 inches of annual precipitation
- Excellent salt tolerance
- High forage quality throughout the growing season
- Drought resistant
- Begins growth early in the spring

NewHy (*Elymus hoffmannii*)

Adaptation

- Under optimum fertility and ample irrigation, forage yields are lower than other pasture grasses
- Regrowth is slow compared to orchardgrass, tall fescue and meadow brome
- Seed dormancy -- increase seeding rate

NewHy (*Elymus hoffmannii*)
Pasture Management

- Responsive to applications of nitrogen
- Tolerates moderate defoliation after establishment
- During the spring growth a resting period of 20 days is needed, however, during hotter portions of the growing season the rest period is increased to 25-35 days
- Leave a 3-4 inch stubble

NewHy (*Elymus hoffmannii*)
Pasture Management Cont.

- **Under saline conditions, nutritional quality better than tall wheatgrass**
- **Enhance forage production by planting NewHy in a mixture with a legume**

NewHy (*Elymus hoffmannii*)

Forage Yield (Tons/Acre)

	Water Level (inches/week)				
Species	**2.00**	**1.66**	**1.30**	**1.10**	**0.60**
RS-Hybrid (1)	6.3	6.2	6.0	5.0	4.4
Orchardgrass (9)	8.9	8.3	7.4	6.3	4.6
Smooth brome (1)	6.2	5.9	6.1	4.9	4.0
Tall fescue (1)	9.7	9.8	9.7	8.9	7.3
Perennial ryegrass (9)	6.2	5.5	5.0	4.0	3.1
Meadow brome (1)	8.5	8.2	7.8	7.0	6.1

NewHy (*Elymus hoffmannii*)

Forage Quality (NIRS)

Species	CP	NDF	DMD
RS-Hybrid (1)	22.3	48.8	70.0
Orchardgrass (9)	20.0	50.6	68.6
Smooth brome (1)	24.5	47.2	72.2
Tall fescue (1)	18.6	47.8	68.4
Perennial ryegrass (9)	18.5	44.1	68.7
Meadow brome (1)	21.1	50.5	69.5

*Combined over 3 harvests (1996, June 2, July 31, & Oct 16)

Pasture Grasses

(Adequate Water)

Grasses	Legumes
Perennial ryegrass	Ladino clover
Tall fescue	Red clover
Orchardgrass	Alfalfa
Meadow brome	
Timothy	

Pasture Grasses

(Inadequate Water)

Grasses	Legumes
Intermediate Wheatgrass	Alfalfa
Pubescent Wheatgrass	Sanfoin
Dryland - Orchardgrass	
Russian Wildrye	
Smooth brome	
Tall Wheatgrass	

Pasture Grasses

(Saline Conditions)

Grasses

- Tall wheatgrass (High)
- NewHy (Mod-High)
- Tall fescue (Mod-High)
- Creeping foxtail (Mod)

Legumes

- Strawberry clover (High)
- Alsike clover (Mod)
- Birdsfoot trefoil (Mod)

Pasture Grasses

(High Water Table)

Grasses

- Reed canarygrass
- Creeping foxtail
- Timothy
- Tall fescue

Legumes & Forbs

- Alsike clover
- Birdsfoot trefoil