Fall Dormancy Effect on Four-cut First-year Alfalfa Quality and Yield

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Abstract

Alfalfa is an important crop for central Oregon. Six varieties, representing fall dormancies (FD) 1-6, were planted in August of 1998 at the Central Oregon Agricultural Research Center, Madras, Oregon. The trial was conducted as a four-cut harvest management trial. There was no total yield difference between the FD's. There were differences in yield and quality (protein, digestibility, and energy) on last cutting.

Introduction

Alfalfa continues to be an important crop for central and eastern Oregon. Over the years, there has been a range of perhaps 35,000 to 50,000 acres of alfalfa grown in the counties of Crook, Deschutes, and Jefferson. The alfalfa is grown in pure stands and grass/alfalfa mixtures for hay. Locally the hay produced is marketed to livestock producers, dairies, and feed stores in Oregon, Washington, and California. Some alfalfa is exported to Pacific Rim countries. Alfalfa is an important rotational crop to help break disease and insect cycles, and adds nitrogen (N) to the soil for subsequent crops, through nitrgoen fixation. Seed companies continue to develop and market numerous varieties.

In past years, varieties with a FD rating of 1-3 have normally been planted in the area. More recently, some producers have begun planting FD-4 varieties, with an occasional FD-5 variety planted. The higher rated fall dormancy varieties need to be tested locally for their adaptability and yield potential. The information generated by these trials is important to producers, fieldmen, seed suppliers, and the seed companies.

"The expression of fall dormancy depends on the combination of shortening day length and cool temperatures. Under short day conditions, differences among dormant and nondormant cultivars are more pronounced at low temperatures. At cool temperatures, dormant cultivars have the greatest dormancy response and nondormant cultivars have the least response. Maximum dormancy seems to be induced at a temperature of 15.5°C and a photoperiod of 12 hours. Accordingly, a decrease in photoperiod and temperature causes a greater decrease in top growth of fall dormant cultivars than in the non fall-dormant cultivars. Under long day conditions there is little difference in regrowth between dormant and nondormant cultivars."

"In general, American alfalfa cultivars trace to nine different distinct sources of germplasm from different regions of the world. These germplasm sources are *Medicago falcate*, Ladak; *M. varia*, Turkistan, and Flemish, Chilean, Peruvian, Indian, and African varieties listed in their approximate descending order of winter hardiness and fall dormancy characteristics. A tenth source of very nondormant germplasm from Saudi Arabia has generally gone unrecognized."

Fall dormancy is classified on the basis of vegetative growth observed in the autumn, particularily in northern latitudes. Dormants are northern types and nonodormants are southern types. (Mckenzie, et al.)

Selecting an alfalfa variety is important. Fall dormancy and winter hardiness genes in alfalfa have been delinked in recent years. There has been more interest in planting alfalfa varieties with higher fall dormancy ratings because of the potential o fhigher on last cutting.

The information generated by this trial is limited, because only one entry represented each fall dormancy rating. However, it will begin to build an information base that is important to producers, fieldmen, seed suppliers, and the seed companies who are involved in central Oregon forage production.

Materials and Methods

'Trical 102' triticale was planted in the field in the fall of 1997, and then was plowed down at late heading as a green manure crop in the early summer. Soil samples were taken in August, 1998 and analyzed by Agri-check, Inc., Umatilla, Oregon (Table 1). Fertilizer was applied prior to planting and disked into the top 6 inches of soil (Table 2). The field was leveled, rolled, and planted on August 21, 1998. Based on soil test results, phosphorus, sulfur, boron and potassium were applied and disked into the soil prior to planting.

Table 1. Soil test analyses from alfalfa variety trial soil samples taken at the Central Oregon Agricultural Research Center, Madras, Oregon.

Date	Depth (inch)	pH	N (lb/acre)	P (ppm)	K (ppm)	Ca (meq /100g)	Mg (meq /100g)	B (ppm)	Zn (ppm)	Total Bases	Na (ppm)
1998	0-10	6.7	27	25	539	10..3	5.4	0.4	0.5	17.4	0.37

* below the minimum detectable level

Table 2. Nutrient applications made to the alfalfa variety trial at the Central Oregon Agricultural Research Center, Madras, Oregon.

Date Applied	N (lb/acre)	P2O5 (lb/acre)	K2O (lb/acre)	Ca (lb/acre)	S (lb/acre)	B (lb/acre)
8/21/1998	33	259	0	0	72	2.6
1999	0	0	0	0	0	0

Six alfalfa varieties, representing FD 1-6, were planted at the Central Oregon Agricultural Research Center (COARC) at the Madras site, on August 25, 1998 (Table 3.). The fall dormancy, disease, insect, and pest ratings are presented in Table 3. The trial site was located about two miles north of Madras at an elevation of 2,440 ft. Eighteen

pounds/acre of inoculated seed were planted with a small plot cone type drill with 9 rows, 6-inch row spacing. The field was rolled after planting. Plot size was 5 ft by 20 ft, while the harvested area was 3.5 ft by 15 ft. The trial was laid out in a randomized complete block design with eight replications.

Table 3. The fall dormancy, winter hardiness, disease, insect, and pest ratings for the 1998 planted alfalfa variety trial conducted at Central Oregon Agricultural Research Center, Madras, Oregon.

Variety	FD[1,2]	BW[3]	VW	FW	AN	PRR	SAA	PA	BAA	SN	APH	SNKN	NRKN	RLN
Spredor III	1	4	1	4	1	1	4	2	1	3	1	1	1	1
5262	2	5	2	3	1	4	4	4	1	3	1	1	1	1
Innovator +Z	3	5	4	5	5	5	3	4	1	4	4	1	1	1
5396	4	4	4	4	5	4	4	4	1	4	1	1	3	1
Archer	5	3	3	5	4	4	5	5	4	4	1	1	4	1
Lobo	6	3	4	5	4	4	4	4	4	4	1	1	1	1

[1]FD = Fall dormancy, BW = Bacterial wilt, VW = Verticillium wilt, FW = Fusarium wilt, AN = Anthracnose race 1, PRR = Phytophthora root rot, SAA = Spotted alfalfa aphid, PA = Pea aphid, BAA = Blue alfalfa aphid, SN = Stem nematode, APH = Aphanomyces, SKN = Southern root knot nematode, NRKN = Northern root knot nematode, RLN = Root lesion nematode.

[2]Fall dormancy (FD) ratings: 1 = most dormant, 11 = least dormant.

[3]Resistance ratings: 1 = Susceptible (0-5 percent of plants) or has not been tested, 2 = Low Resistance (5-15 percent), 3 = Moderate Resistance (15-30 percent of plants), 4 = Resistance (30-50 percent of plants), 5 = High Resistance (> 50 percent of plants).

The alfalfa was harvested with a sickle-bar forage plot harvester, and fresh wet yield was weighed directly in the field on June 6, July 13, August 18, and October 14, 1999 for the first through fourth cuttings. Aftermath from the plots was removed from the field the following day with a large tractor (125 hp) and grass seed "vac". Within a day or 2 after harvest, the irrigation water was reapplied.

Moist samples (0.5-1.0 lb) were taken for each plot and dried at 145°F until no further change in weight occurred. Yield data are calculated on an oven-dry basis. The samples were ground with a Wiley mill with a 1.0-mm screen and then reground in an Udy mill with a 0.5-mm screen. The samples were submitted to the NIRS at the Klamath Experiment Station for quality analysis. The NIRS has not been calibrated for every variable predicted. No wet chemistry tests were conducted on any of these alfalfa samples.

An MSTAT statistical software program was used for analyis of variance and results are reported using Protected Least Significant Difference (PLSD) for mean separation at the $P > F = 0.01$, 0.05, and 0.10 levels.

The trial was solid-set, sprinkler irrigated with 30- by 40-ft spacing as needed for establishment and during the season. Nelson rotating head Windfighter 2000, 7/64-inch

size nozzles were used. The nozzles were used by mistake; we typically use a nozzle size of 9/64-inch. The7/64 inch nozzles were changed to 9/64 inch nozzles after the third cutting of the third production year Irrigation was determined by crop water use predicted by the Agrimet weather station program and by probing the soil with a soil probe and using the feel test method. There is an Agrimet weather station located at the COARC, Madras. The trial was usually irrigated twice per week, depending upon time of year.

Pursuit® (1 DG Eco Pak bag), Poast® (0.47 lb ai/acre) and 2 quarts of crop oil were applied for weed control on September 18, 1998 of the establishment year. Poast (2 pints/acre) was also applied on April 7, 1999 to control volunteer triticale

Table 4 presents the present quality classifications for alfalfa hay.

Table 4. USDA alfalfa quality guidelines for domestic livestock use and not more than 10 percent grass.

Quality class	ADF (%)	NDF (%)	RFV[1]	TDN[2] (100% DM)	TDN[2] (90% DM)	Crude protein (%)
Supreme	< 27	< 34	> 185	> 62	> 55.9	> 22
Premium	27 – 29	34 – 36	170 – 185	60.5 – 62	54.5 – 55.9	20 – 22
Good	29 – 32	36 – 40	150 – 170	58 – 60	52.5 – 54.5	18 – 20
Fair	32 – 35	40 – 44	130 – 150	56 – 58	50.5 – 52.5	16 – 18
Low	> 35	> 44	< 130	< 56	< 50.5	< 16

[1]RFV calculated using the Wis./Minn. Formula.

[2] TDN calculated using the western formula. Quantitative factors are approximate and many factors can affect feeding value. Values based on 100 percent dry matter (TDN showing both 100 percent and 90 percent dry matter). Guidelines are to be used with visual appearance and intent of sale (usage).

Term definitions are as follows:

TDN = total digestible nutrients (Penn State calculation)
TDN CA = total digestible nutrients (California calculation)
TDN PNW = total digestible nutrients (Tri state calculation)
RFV = relative feed value
Moist. = moisture percent
DM = dry matter percent
Protein = crude protein percent
AV Protein = available protein percent
DProtein = digestible protein percent
NEL = net energy of lactation (mcal/lb)
ENE = energy estimate (therms per cwt. weight)
ME = metabolizable energy (mcal/lb)
NEM = net energy of maintenance (mcal/lb)
NEG = net energy of gain (mcal/lb)

DDM = digestible dry matter percent
DMI = dry matter intake percent
NDF = neutral detergent fiber percent
ADF = acid detergent fiber percent
ADP = available digestible protein percent
NDFD = 48 hour in vitro NDF digestibility as percent of NDF
NFC = non fibrous carbohydrate (percent of DM)
TDNL total digestible nutrients for alfalfa, clovers, and legume/grass mixtures
RFQ = relative forage quality
Fat = fatty acids as % of DM = ether extract - 1
Ash = % DM residue after burning at 600 degrees for 2 hours
Lignin = undigestible plant compund

Definition of calculation equations:

TDN = 4.898 + (89.796 * NEL)
TDN CA = (82.38- (.7515 * ADF)) * 0.9
TDN TRIST = (54.32 + (0.7387 * protein)) – (0.2915 * ADF)
RFV = (DMI * DDM) / 1.29
Moist. = 100.0 – dry matter
AV Protein = (1.16 * protein) – (1.6 * ADP)
D Protein = 1.44 + (0.68 * protein) – (1.28 * ADP)
NEL = 1.044 – (0.0119 * ADF)
ENE = 82.6 * NEL
ME = 0.01642 * TDN
NEM = -0.508 + (1.37 * ME) – (0.3042 * ME *ME) + (0.051 * ME * ME * ME)
NEG = -0.7484 + (1.42 * ME) - (0.3836 * ME * ME) + (0.0593 * ME * ME *ME)
DDM = 88.90 – (0.779 * ADF)
DMI = 120 / NDF
If (AV Protein > Protein) AV Protein = Protein
If (D Protein > Protein) D Protein = Protein
NDFD = dNDF 48 hour / NDF * 100
NFC = 100 – ((NDF – 2) + Protein + 2.5 + Ash)
TDNL = (NFC * 0.98) + (Protein * 0.93) + (1.5 * 0.97 * 2.25) + ((NDF – 2) * (NDFD / 100)) – 7
DMI1 = [(0.0120 * 1350) / ((NDF / 100) + (NDFD – 45) * 0.374)]/ 1350 * 100
RFQ = (DMI1 * TDNL) / 1.23

Results

There was an irrigation problem with this year of the trial with unequal coverage. Coverage was uneven due to the smaller than ideal nozzle size. There was an irrigation that was missed during the growth interval before second cutting. Weed control was excellent for the trial. The winter was relatively mild.

Cut by Variety (FD)

The cutting by variety (FD) statistics were run for the trial, but the results are not presented. Comparing cuttings, all yield and quality variables tested were significantly different.

All of the variety variables tested were significantly different with the exception of yield, ash, protein yield, TDN yield, CA TDN yield, PNW TDN yield, and DDM yield, N recovery, Ca uptake, P uptake, K uptake, and Mg uptake. There were many cutting by variety (FD) interactions. None of those interactions or data will be presented or discussed.

Total Yield and Other Total Variables

There was no difference in total yield, N recovery, protein yield, TDN yield, DDM yield, CA TDN yield, PNW TDN yield, Ca uptake, P uptake, K uptake, or Mg uptake among varieties for the first crop year (Table 4).

Table 4. 1999 total yield, N recovery, protein yield, TDN yield, DDM yield, CA TDN yield, PNW TDN yield, Ca uptake, P uptake, K uptake, and Mg uptake data for the 1998 alfalfa fall dormancy trial planted at **Central Oregon Agricultural Research Center**, Madras, Oregon.

Fall dormancy	Total yield (lb/acre)	Total N uptake (lb/acre)	Total protein yield (lb/acre)	Total TDN yield (lb/acre)	Total DDM yield (lb/acre)	Total CA TDN yield (lb/acre)	Total PNW TDN yield (lb/acre)	Total Ca uptake (lb/acre)	Total P uptake (lb/acre)	Total K uptake (lb/acre)	Total Mg uptake (lb/acre)
1	8.47	613.0	3,832	11,682	11,391	9,376	10,418	309.7	60.9	541.9	56.5
2	8.66	614.7	3,842	11,804	11,547	9,499	10,554	302.0	60.3	539.1	56.1
3	8.50	623.4	3,896	11.798	11,488	9,456	10,508	296.8	59.2	521.0	56.3
4	8.75	618.5	3,866	11,974	11,699	9,626	10,695	300.9	58.9	540.2	56.8
5	8.51	616.4	3,852	11,671	11,400	9,380	10,423	298.3	58.8	528.9	57.1
6	8.56	619.4	3,871	11,712	11,447	9,418	10,463	297.4	58.7	526.8	56.3
Mean	8.57	617.6	3,860	11,773	11,495	9,459	10,510	300.8	59.5	533.0	56.5
PLSD 0.01	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*
PLSD 0.05	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*
PLSD 0.10	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*
Prob. > F	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
CV%	5.0	4.6	4.6	4.7	4.7	4.7	4.7	6.2	5.5	4.5	5.5

First Cutting

There were no significant differences among varieties for yield, dry matter, moisture, protein, ADF, NDF, dNDF, NDFD, RFV, or RFQ (Table 5).

Table 5. 1999 first-cut yield, dry matter, moisture, protein, ADF, NDF, dNDF, NDFD, RFV, and RFQ data for the 1998 alfalfa fall dormancy trial at **Central Oregon Agricultural Research Center**, Madras, Oregon.

FD/Variety	Yield (t/acre)	Dry matter (%)	Moist. (%)	Protein (%)	ADF (%)	NDF (%)	dNDF (%)	NDFD (%)	RFV	RFQ
1	3.32	19.4	81.6	21.9	29.1	35.9	18.6	51.7	172	188
2	3.39	18.9	81.1	21.6	30.1	37.2	19.1	51.3	164	181
3	3.32	19.1	80.9	22.5	28.7	35.9	18.9	52.6	173	193
4	3.43	19.7	80.3	21.5	29.7	37.0	18.9	51.1	166	183
5	3.23	19.0	81.0	22.5	28.6	35.3	18.6	52.8	177	196
6	3.18	18.6	81.4	22.5	28.6	35.7	18.7	52.4	175	194
Mean	3.31	19.0	81.0	22.1	29.2	36.2	18.8	52.0	171	189
PLSD 0.01	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*
PLSD 0.05	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*
PLSD 0.10	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*
Prob. > F	-----	-----	-----	0.1683	-----	-----	-----	-----	-----	-----
CV%	9.1	0.8	2.5	4.7	6.6	6.6	5.2	0.1131	8.7	8.7

There were significant differences among the varieties in ash content at the PLSD 0.10 level (Table 6.)

Table 6. 1999 first-cutting TDN, DDM, ash, lignin, fat, DMI, DMI1, NFC, TDNL, CA TDN, and PNW TDN data for the 1998 alfalfa fall dormancy trial planted at **Central Oregon Agricultural Research Center**, Madras, Oregon.

FD/Variety	TDN (%)	DDM (%)	Ash (%)	Lignin (%)	Fat (%)	DMI (%)	DMI1	NFC	TDNL (%)	TDN CA (%)	TDN PNW (%)
1	67.5	66.2	9.68	6.56	1.97	3.35	3.54	32.1	65.6	54.5	60.5
2	66.4	65.4	9.40	6.70	1.89	3.24	3.41	31.3	65.1	53.8	59.7
3	67.9	66.5	8.95	6.41	1.97	3.35	3.56	32.2	66.5	54.7	60.8
4	66.9	65.8	8.79	6.61	1.86	3.25	3.42	32.2	65.8	54.0	60.1
5	68.1	66.7	9.57	6.27	1.87	3.42	3.64	32.1	66.2	54.8	60.9
6	68.0	66.6	9.05	6.30	1.91	3.38	3.59	32.3	66.5	54.8	60.8
Mean	67.5	66.2	9.24	6.47	1.91	3.33	3.53	32.0	65.9	54.4	60.5
PLSD 0.01	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*
PLSD 0.05	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*
PLSD 0.10	*NS*	*NS*	0.59	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*
Prob. > F	-----	-----	0.0853	0.3295	0.1486	-----	0.3595	-----	0.2044	-----	-----
CV%	3.1	2.3	7.6	7.0	5.3	6.5	6.9	4.3	2.0	2.4	2.4

There were no significant differences among varieties for any of the variables in Table 7.

Table 7. 1999 first-cut protein yield, TDN yield, CA TDN yield, PNW TDN yield, DDM yield, NEL, ENE, ME, NEM, NEG, and pounds of N/ton of DM for the 1998 planted alfalfa fall dormancy trial at **Central Oregon Agricultural Research Center**, Madras, Oregon.

FD/Variety	Protein yield (lb/acre)	TDN yield (lb/acre)	TDN CA yield (lb/acre)	TDN PNW yield (lb/acre)	DDM yield (lb/acre)	NEL (mcal/lb)	ENE (mcal/lb)	ME (mcal/lb)	NEM (mcal/lb)	NEG (mcal/lb)	Lb N/ ton DM
1	1,449	4,480	3,614	4,014	4,392	0.697	57.60	1.106	0.708	0.435	69.9
2	1,464	4,503	3,644	4,047	4,434	0.685	56.61	1.091	0.689	0.420	69.1
3	1,491	4,514	3,633	4,038	4,418	0.701	57.96	1.115	0.712	0.440	71.9
4	1,475	4,586	3,705	4,117	4,508	0.690	57.04	1.100	0.698	0.426	68.8
5	1,438	4,380	3,528	3,921	4,291	0.705	58.16	1.117	0.715	0.441	71.8
6	1,433	4,329	3,485	3,871	4,237	0.704	58.08	1.116	0.713	0.441	72.1
Mean	1,458	4,465	3,601	4,002	4,380	0.697	57.58	1.108	0.706	0.434	70.6
PLSD 0.01	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*
PLSD 0.05	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*
PLSD 0.10	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*
Prob. > F	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.1663
CV%	8.9	8.9	8.8	8.8	8.8	3.4	3.3	3.0	4.3	6.1	4.7

There were significant differences for percent Ca and percent K between the varieties (FD) (Table 8).

Table 8. 1999 first-cut percent N, N fixed, percent Ca, Ca uptake, percent P, P uptake, percent K, K uptake, percent Mg, and Mg uptake for the 1998 fall dormancy alfalfa trial planted at Central Oregon Agricultural Research Center, Madras, Oregon.

FD/Variety	N (%)	N uptake (lb/acre)	Ca (%)	Ca uptake (lb/acre)	P (%)	P uptake (lb/acre)	K (%)	K uptake (lb/acre)	Mg (%)	Mg uptake (lb/acre)
1	3.50	231.9	1.86	123.8	0.371	24.7	3.10	205.5	0.314	20.8
2	3.46	234.3	1.71	116.1	0.355	24.1	2.99	202.5	0.299	20.3
3	3.60	238.6	1.70	112.8	0.354	23.4	2.87	190.1	0.301	20.0
4	3.44	236.0	1.68	115.2	0.366	23.1	2.88	197.2	0.294	20.1
5	3.59	230.1	1.75	111.9	0.354	22.7	2.99	191.8	0.324	20.8
6	3.61	229.2	1.73	109.7	0.353	22.4	2.92	185.9	0.309	19.6
Mean	3.53	233.3	1.74	115.0	0.354	23.4	2.96	195.5	0.0307	20.3
PLSD 0.01	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	0.17	*NS*	*NS*	*NS*
PLSD 0.05	*NS*	*NS*	0.11	*NS*	*NS*	*NS*	0.13	*NS*	*NS*	*NS*
PLSD 0.10	*NS*	*NS*	0.09	*NS*	*NS*	*NS*	0.11	*NS*	*NS*	*NS*
Prob. > F	0.1682	-----	0.0326	0.2998	0.1408	0.3603	0.0094	0.1586	0.1462	-----
CV%	4.7	8.9	6.3	10.7	6.6	9.8	4.3	8.4	7.6	10.9

Second Cutting

There were significant differences among varieties for dry matter, moisture, dNDF, and RFV (Table 9). It is interesting that the RFV was significantly different, but the RFQ was not. RFQ is a better quality indicator than RFV. RFV and FD 2, 3, and 4 were significantly higher than FD 1, 5, and 6. There were significant differences among FD for percent NDF and dNDF, and RFV.

Table 9. 1999 second-cut yield, dry matter, moisture, protein, ADF, NDF, dNDF, NDFD, RFV and RFQ data for the 1998 alfalfa fall dormancy trial at Central Oregon Agricultural Research Center, Madras, Oregon.

FD/Variety	Yield (t/acre)	Dry matter (%)	Moist. (%)	Protein (%)	ADF (%)	NDF (%)	dNDF (%)	NDFD (%)	RFV	RFQ
1	2.02	19.4	80.6	22.8	29.1	36.3	19.4	53.5	171	191
2	2.06	22.2	77.8	22.8	29.2	36.7	19.7	53.6	169	191
3	2.01	23.7	76.3	23.4	27.6	34.4	18.2	53.1	184	203
4	2.04	23.4	76.6	23.0	27.8	35.2	18.7	53.2	178	199
5	1.98	22.9	77.1	23.5	27.6	34.5	18.5	53.7	182	203
6	2.08	20.6	79.4	23.4	29.1	36.3	19.3	53.1	170	191
Mean	2.03	22.0	78.0	23.2	28.4	35.6	19.0	53.4	176	196
PLSD 0.01	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	1.1	*NS*	*NS*	*NS*
PLSD 0.05	*NS*	3.0	3.0	*NS*	*NS*	*NS*	0.8	*NS*	*NS*	*NS*
PLSD 0.10	*NS*	2.5	2.5	*NS*	*NS*	1.6	0.7	*NS*		*NS*
Prob. > F	-----	0.0421	0.0421	0.2743	0.1063	0.0724	0.0085	-----	0.0865	0.3128
CV%	9.3	13.6	3.8	3.44	5.8	5.4	4.4	3.4	7.1	7.5

Ash content, DMI, and NFC were significantly different among varieties (Table 10). FD 1, 3, and 5 had higher ash contents than did FD 2, 4, and 6. FD 2, 3, and 4 had higher NFC than did FD 1, 5, and 6. FD 2, 3, and 4 had higher DMI than did FD 1, 5, and 6.

Table 10. 1999 second-cutting TDN, DDM, ash, lignin, fat, DMI, DMI1, NFC, TDNL, CA TDN, and PNW TDN data for the 1998 alfalfa fall dormancy trial planted at Central Oregon Agricultural Research Center, Madras, Oregon.

FD/Variety	TDN (%)	DDM (%)	Ash (%)	Lignin (%)	Fat (%)	DMI (%)	DMI1 (%)	NFC (%)	TDNL (%)	TDN CA (%)	TDN PNW (%)
1	67.6	66.2	9.47	5.26	1.85	3.32	3.55	30.9	66.1	54.5	60.5
2	67.5	66.2	8.91	5.33	1.94	3.29	3.53	31.1	66.6	54.4	60.5
3	69.2	67.4	9.44	5.28	1.87	3.51	3.73	32.3	66.9	55.5	61.7
4	68.9	67.2	8.86	5.15	1.87	3.42	3.65	32.5	67.1	55.3	61.5
5	69.2	67.4	9.36	5.01	1.83	3.48	3.72	32.1	67.1	55.5	61.6
6	67.5	66.2	9.02	5.17	1.78	3.32	3.54	30.9	66.4	54.4	60.5
Mean	68.3	66.8	9.18	5.20	1.86	3.39	3.62	31.6	66.7	54.9	61.0
PLSD 0.01	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*
PLSD 0.05	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*
PLSD 0.10	*NS*	*NS*	0.46	*NS*	*NS*	0.15	*NS*	1.1	*NS*	*NS*	*NS*
Prob. > F	0.1057	0.1079	0.0952	-----	-----	0.0746	0.2115	0.0563	-----	0.1037	0.1127
CV%	2.6	1.9	6.0	7.0	8.6	5.2	5.8	4.3	1.9	2.0	2.0

There were no significant differences among varieties (FD) for the variables in Table 11.

Table 11. 1999 second-cut protein yield, TDN yield, CA TDN yield, PNW TDN yield, DDM yield, NEL, ENE, ME, NEM, NEG, and pounds of N/ton of DM for the 1998 planted alfalfa fall dormancy trial at Central Oregon Agricultural Research Center, Madras, Oregon.

FD/Variety	Protein yield (lb/acre)	TDN yield (lb/acre)	TDN CA yield (lb/acre)	TDN PNW yield (lb/acre)	DDM yield (lb/acre)	NEL (mcal/lb)	ENE (mcal/lb)	ME (mcal/lb)	NEM (mcal/lb)	NEG (mcal/lb)	Lb N/ ton DM
1	914	2,711	2,189	2,431	2,661	0.698	57.63	1.110	0.707	0.436	72.8
2	941	2,776	2,240	2,490	2,725	0.698	57.58	1.109	0.708	0.435	73.0
3	937	2,765	2,221	2,467	2,698	0.715	59.14	1.136	0.731	0.455	74.9
4	938	2,807	2,254	2,504	2,738	0.711	58.89	1.131	0.726	0.453	73.7
5	933	2,738	2,197	2,440	2,669	0.715	59.11	1.136	0.730	0.457	75.3
6	971	2,803	2,262	2,514	2,750	0.697	57.59	1.109	0.706	0.436	74.8
Mean	939	2,767	2,227	2,474	2707	0.706	58.32	1.122	0.718	0.445	74.1
PLSD 0.01	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*
PLSD 0.05	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*
PLSD 0.10	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*
Prob. > F	-----	-----	-----	-----	-----	0.1392	0.1070	0.1171	0.1449	0.1580	0.2812
CV%	7.8	8.1	8.4	8.3	8.4	2.7	2.8	2.6	3.6	5.2	3.4

There were significant differences among varieties (FD) for percent K and percent Mg (Table 12

Table 12. 1999 second-cut percent N, N uptake, percent Ca, Ca uptake, percent P, P uptake, percent K, K uptake, percent Mg, and Mg uptake for the 1998 fall dormancy alfalfa trial planted at Central Oregon Agricultural Research Center, Madras, Oregon.

FD/Variety	N (%)	N Uptake (lb/acre)	Ca (%)	Ca uptake (lb/acre)	P (%)	P uptake (lb/acre)	K (%)	K uptake (lb/acre)	Mg (%)	Mg uptake (lb/acre)
1	3.64	146.3	1.74	69.7	0.366	14.7	3.35	135.0	0.328	13.1
2	3.65	150.5	1.69	69.5	0.352	14.6	3.14	130.0	0.318	13.1
3	3.74	149.3	1.77	70.6	0.349	14.0	3.14	126.5	0.336	13.5
4	3.68	150.1	1.70	69.3	0.344	14.1	3.16	129.1	0.330	13.5
5	3.76	149.3	1.77	70.1	0.355	14.1	3.16	125.4	0.340	13.5
6	3.74	155.3	1.71	71.0	0.350	14.5	3.15	130.9	0.324	13.5
Mean	3.70	150.2	1.73	70.0	0.353	14.3	3.18	129.5	0.329	13.3
PLSD 0.01	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	0.17	*NS*	*NS*	*NS*
PLSD 0.05	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	0.12	*NS*	*	*NS*
PLSD 0.10	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	0.10	*NS*	*	*NS*
Prob. > F	0.2773	------	0.1130	-----	-----	-----	0.0070	------	0.0356	-----
CV%	3.4	7.8	4.2	9.2	7.2	9.5	3.8	9.0	4.3	8.2

* error mean square was too small (<0.000) to determine PLSD's.

Third Cutting

There were significant differences among varieties for percent protein, ADF, NDF, dNDF, NDFD, RFV, and RFQ. The values for RFQ, which places greater value on the forage, were almost all 20 points over compared to RFV feed value. All of the entries then would be considered "supreme" quality.

Table 13. 1999 third-cut yield, dry matter, moisture, protein, ADF, NDF, dNDF, NDFD, RFV, and RFQ data for the 1998 alfalfa fall dormancy trial at Central Oregon Agricultural Research Center, Madras, Oregon.

FD/Variety	Yield (t/acre)	Dry matter (%)	Moist. (%)	Protein (%)	ADF (%)	NDF (%)	dNDF (%)	NDFD (%)	RFV	RFQ
1	1.66	17.6	82.4	24.0	27.7	34.0	18.1	53.1	185	203
2	1.65	18.2	81.8	23.2	29.0	35.6	18.7	52.6	174	191
3	1.73	18.2	81.8	23.7	28.2	34.7	18.6	53.7	180	200
4	1.67	18.4	81.6	22.8	29.1	35.9	18.9	52.7	172	190
5	1.66	18.3	81.7	23.2	30.1	36.9	19.4	52.6	166	185
6	1.68	18.6	81.4	23.3	28.7	35.5	19.1	53.8	175	196
Mean	1.67	18.2	81.8	23.3	28.8	35.4	18.8	53.1	175	194
PLSD 0.01	*NS*	*NS*	*NS*	0.8	1.6	1.8	*NS*	*NS*	12	12
PLSD 0.05	*NS*	*NS*	*NS*	0.6	1.2	1.4	0.7	*NS*	9	9
PLSD 0.10	*NS*	*NS*	*NS*	0.5	1.0	1.1	0.6	0.6	7	8
Prob. > F	0.3911	0.1953	0.1894	0.0030	0.0048	0.0037	0.0135	0.0643	0.0034	0.0028
CV%	5.2	4.2	0.9	2.5	4.0	3.8	3.7	1.8	5.0	4.6

Varieties significantly differed from one another for TDN, DDM, fat, DMI, DMI 1, NFC, TDNL, CA TDN, and PNW TDN (Table 14).

Table 14. 1999 third-cutting TDN, DDM, ash, lignin, fat, DMI, DMI1, NFC, TDNL, CA TDN, and PNW TDN data for the 1998 alfalfa fall dormancy trial planted at Central Oregon Agricultural Research Center, Madras, Oregon.

FD/Variety	TDN (%)	DDM (%)	Ash (%)	Lignin (%)	Fat (%)	DMI (%)	DMI1 (%)	NFC (%)	TDNL (%)	TDN CA (%)	TDN PNW (%)
1	69.0	67.3	10.03	4.91	1.72	3.53	3.76	31.5	66.5	55.4	61.6
2	67.7	66.3	9.95	5.14	1.74	3.38	3.59	30.8	65.7	54.5	60.6
3	68.5	67.0	9.88	4.90	1.75	3.47	3.71	31.3	66.5	55.1	61.2
4	67.5	66.2	9.80	5.10	1.63	3.35	3.56	31.1	65.7	54.5	60.5
5	66.5	65.5	9.58	5.09	1.60	3.27	3.48	30.0	65.4	53.8	59.8
6	68.0	66.6	9.55	4.87	1.77	3.39	3.63	31.2	66.5	54.7	60.8
Mean	67.9	66.5	9.80	5.00	1.70	3.40	3.62	31.0	66.0	54.7	60.7
PLSD 0.01	1.7	1.2	*NS*	*NS*	0.12	0.17	0.19	1.3	NS	1.0	1.2
PLSD 0.05	1.2	0.9	*NS*	*NS*	0.09	0.13	0.14	0.9	0.8	0.8	0.9
PLSD 0.10	1.0	0.7	*NS*	*NS*	0.08	0.12	0.11	0.8	0.6	0.6	0.7
Prob. >F	0.0052	0.0046	0.2835	0.1261	0.0025	0.0033	0.0030	0.0326	0.0136	0.0055	0.0052
CV%	1.8	1.3	4.9	5.0	5.4	3.7	3.8	3.0	1.1	1.4	1.4

All of the energy variables NEL, ENE, ME, NEM, and NEG were significantly different among varieties (Table 15). The protein yield and pounds of N needed to produce a ton of dry matter were also significantly different.

Table 15. 1999 third-cut protein yield, TDN yield, CA TDN yield, PNW TDN yield, DDM yield, NEL, ENE, ME, NEM, NEG, and pounds of N/ton of DM for the 1998 planted alfalfa fall dormancy trial at Central Oregon Agricultural Research Center, Madras, Oregon.

FD/Variety	Protein yield (lb/acre)	TDN yield (lb/acre)	TDN CA yield (lb/acre)	TDN PNW yield (lb/acre)	DDM yield (lb/acre)	NEL (mcal/lb)	ENE (mcal/lb)	ME (mcal/lb)	NEM (mcal/lb)	NEG (mcal/lb)	Lb N/ ton DM
1	792	2,284	1,833	2,037	2,228	0.715	59.01	1.134	0.728	0.455	76.7
2	762	2,228	1,795	1,994	2,182	0.700	57.75	1.111	0.709	0.439	74.1
3	821	2,376	1,909	2,122	2,321	0.709	58.56	1.124	0.720	0.449	75.8
4	758	2,250	1,814	2,015	2,206	0.697	57.61	1.110	0.705	0.436	72.8
5	770	2,213	1,790	1,989	2,178	0.686	56.69	1.093	0.691	0.422	74.1
6	782	2,283	1,838	2,042	2,235	0.702	58.01	1.116	0.714	0.440	74.5
Mean	781	2,272	1,830	2,033	2,225	0.702	57.9	1.115	0.711	0.440	74.7
PLSD 0.01	*NS*	*NS*	*NS*	*NS*	*NS*	*	1.55	*	*	*	2.5
PLSD 0.05	*NS*	*NS*	*NS*	*NS*	*NS*	*	1.15	*	*	*	1.9
PLSD 0.10	36	*NS*	*NS*	*NS*	*NS*	*	0.96	*	*	*	1.5
Prob. > F	0.0575	0.1544	0.2001	0.1954	0.2045	0.0058	0.0053	0.0093	0.0043	0.0072	0.0030
CV%	5.5	5.5	5.4	5.4	5.4	2.0	2.0	1.9	2.5	3.7	2.5

* error mean square too small (<0.000) to determine PLSD's.

The variables percent N, N fixed, and percent K were all significantly different among the varieties (FD) (Table 16

Table 16.1999 third-cut percent N, N uptake, percent Ca, Ca uptake, percent P, P uptake, percent K, K uptake, percent Mg, and Mg uptake for the 1998 fall dormancy alfalfa trial planted at Central Oregon Agricultural Research Center, Madras, Oregon.

FD/Variety	N (%)	N Uptake (lb/acre)	Ca (%)	Ca uptake (lb/acre)	P (%)	P uptake (lb/acre)	K (%)	K uptake (lb/acre)	Mg (%)	Mg uptake (lb/acre)
1	3.83	126.8	1.78	58.9	0.370	12.3	3.55	117.6	0.359	11.9
2	3.70	121.9	1.71	56.4	0.365	12.0	3.53	116.0	0.349	11.5
3	3.79	131.4	1.71	59.3	0.369	12.8	3.47	120.3	0.352	12.2
4	3.64	121.3	1.70	56.6	0.355	11.8	3.52	117.3	0.349	11.6
5	3.71	123.2	1.68	55.7	0.361	12.0	3.45	114.7	0.340	11.3
6	3.72	125.1	1.72	57.9	0.360	12.1	3.39	113.8	0.354	11.9
Mean	3.73	124.9	1.72	57.4	0.363	12.2	3.49	116.6	0.350	11.7
PLSD 0.01	0.12	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*
PLSD 0.05	0.09	*NS*	*NS*	*NS*	*NS*	*NS*	0.10	*NS*	*NS*	*NS*
PLSD 0.10	0.08	5.8	*NS*	*NS*	*NS*	*NS*	0.08	*NS*	*NS*	*NS*
Prob. > F	0.0026	0.0587	0.1688	0.3724	0.4300	0.2157	0.0124	-----	0.2431	0.3439
CV%	2.5	5.5	4.4	6.7	4.4	6.3	2.7	6.1	4.3	7.0

Fourth Cutting

The varieties (FD) differed significantly for yield, protein, ADF, NDF, dNDF, NDFD, RFV, and RFQ (Table 17). The highest yielding varieties were FD 5, 6, 4, and 2. In general, the higher nondormants had decreased protein, higher ADF, NDF, dNDF, decreased NDFD, lower RFV, and lower RFQ.

Table 17. 1999 fourth-cut yield, dry matter, moisture, protein, ADF, NDF, dNDF, NDFD, RFV and RFQ data for the 1998 alfalfa fall dormancy trial at Central Oregon Agricultural Research Center, Madras, Oregon.

FD/Variety	Yield (t/acre)	Dry matter (%)	Moist. (%)	Protein (%)	ADF (%)	NDF (%)	dNDF (%)	NDFD (%)	RFV	RFQ
1	1.48	22.3	77.7	22.9	22.3	28.9	16.5	57.1	231	259
2	1.56	22.6	77.4	21.6	23.6	30.7	17.3	56.3	214	240
3	1.44	22.3	77.7	22.5	22.6	29.2	16.7	57.1	228	256
4	1.61	23.2	76.8	21.6	24.6	31.7	17.5	55.2	205	229
5	1.64	23.0	77.0	21.7	25.5	32.5	17.7	54.6	198	221
6	1.62	23.8	76.2	21.2	26.0	33.3	18.3	54.8	192	215
Mean	1.56	22.9	77.1	21.9	24.1	31.1	17.3	55.8	211	237
PLSD 0.01	*NS*	*NS*	*NS*	0.9	1.5	1.8	0.8	1.6	16	17
PLSD 0.05	0.13	*NS*	*NS*	0.7	1.1	1.3	0.6	1.2	12	13
PLSD 0.10	0.11	*NS*	*NS*	0.6	0.9	1.0	0.5	1.0	10	11
Prob. > F	0.0141	0.1054	0.1054	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000
CV%	8.3	5.1	1.5	3.0	4.5	4.3	3.5	2.0	5.4	5.3

The varieties (FD) differed significantly for TDN, DDM, lignin, fat, DMI, DMI1, TDNL CA TDN, and PNW TDN (Table 18). The higher nondormants had lower TDN, DDM, fat, DMI, DMI1, TDNL, CA TDN, and PNW TDN. The higher nondormants had higher lignin with the exception of FD 2.

Table 18. 1999 fourth-cutting TDN, DDM, ash, lignin, fat, DMI, DMI1, NFC, TDNL, CA TDN, and PNW TDN data for the 1998 alfalfa fall dormancy trial planted at Central Oregon Agricultural Research Center, Madras, Oregon.

FD/Variety	TDN (%)	DDM (%)	Ash (%)	Lignin (%)	Fat (%)	DMI (%)	DMI1 (%)	NFC (%)	TDNL (%)	TDN CA (%)	TDN PNW (%)
1	74.8	71.5	8.89	5.53	2.01	4.16	4.50	38.8	71.0	59.0	65.6
2	73.4	70.5	9.20	5.84	2.00	3.91	4.23	38.0	69.8	58.2	64.7
3	74.6	71.3	9.08	5.39	1.98	4.12	4.45	38.7	70.6	58.9	65.4
4	72.4	69.8	9.10	5.79	1.88	3.79	4.08	37.1	69.1	57.5	63.9
5	71.4	69.0	8.98	5.72	1.79	3.70	3.96	36.3	68.7	56.9	63.3
6	70.9	68.7	9.27	5.75	1.72	3.61	3.88	35.8	68.2	56.6	62.8
Mean	72.9	70.1	9.08	5.57	1.90	3.88	4.18	37.5	69.5	57.8	64.3
PLSD 0.01	1.6	1.1	*NS*	0.35	0.16	0.23	0.25	1.6	1.1	1.0	1.1
PLSD 0.05	1.2	0.9	*NS*	0.26	0.12	0.17	0.19	1.2	0.8	0.7	0.8
PLSD 0.10	1.0	0.7	*NS*	0.22	0.10	0.14	0.16	1.0	0.7	0.6	0.7
Prob. > F	0.0000	0.0000	-----	0.0082	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CV%	1.6	1.2	6.2	4.5	6.0	4.3	4.5	2.2	1.1	1.3	1.3

Among varieties (FD), there were significant differences for NEL, ENE, ME, NEM, NEG, and lb of N/ton of dry matter (Table 19.). In general, as the FD increased, all of these values decreased. Pounds of N/ton DM was not affected the same way, although FD 1 and 3 had higher N rates.

Table 19. 1999 fourth-cut protein yield, TDN yield, CA TDN yield, PNW TDN yield, DDM yield, NEL, ENE, ME, NEM, NEG, and pounds of N/ton of DM for the 1998 planted alfalfa fall dormancy trial at Central Oregon Agricultural Research Center, Madras, Oregon.

FD/Variety	Protein yield (lb/acre)	TDN yield (lb/acre)	TDN CA yield (lb/acre)	TDN PNW yield (lb/acre)	DDM yield (lb/acre)	NEL (mcal/lb)	ENE (mcal/lb)	ME (mcal/lb)	NEM (mcal/lb)	NEG (mcal/lb)	Lb N/ ton DM
1	676	2,207	1,741	1,935	2,110	0.779	64.29	1.228	0.809	0.529	73.3
2	675	2,297	1,820	2,022	2,205	0.762	63.01	1.206	0.790	0.509	69.0
3	647	2,144	1,693	1,881	2,051	0.774	64.06	1.225	0.807	0.524	72.0
4	695	2,331	1,853	2,059	2,247	0.751	62.11	1.189	0.776	0.496	69.1
5	711	2,341	1,865	2,073	2,263	0.740	61.19	1.172	0.762	0.485	69.4
6	685	2,296	1,833	2,036	2,225	0.734	60.69	1.165	0.756	0.479	67.7
Mean	681.5	2,269	1,811	2,001	2,183	0.757	62.6	1.198	0.784	0.504	70.1
PLSD 0.01	*NS*	*NS*	*NS*	*NS*	*NS*	*	1.4	*	*	*	*
PLSD 0.05	*NS*	*NS*	*NS*	*NS*	*NS*	*	1.1	*	*	*	*
PLSD 0.10	*NS*	*NS*	*NS*	*NS*	*NS*	*	0.9	*	*	*	*
Prob. > F	0.2906	0.2334	0.1437	0.1474	0.1338	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CV%	7.9	8.1	8.1	8.1	8.1	1.7	1.7	1.6	2.2	2.7	3.0

* error mean square too small (<0.000) to determine PLSD's.

Among varieties (FD), there were significant differences for percent N, percent Ca, and K uptake (Table 20).

Table 20. 1999 fourth-cut percent N, N fixed, percent Ca, Ca uptake, percent P, P uptake, percent K, K uptake, percent Mg, and Mg uptake for the 1998 fall dormancy alfalfa trial planted at Central Oregon Agricultural Research Center, Madras, Oregon.

FD/Variety	N (%)	N uptake (lb/acre)	Ca (%)	Ca uptake (lb/acre)	P (%)	P uptake (lb/acre)	K (%)	K uptake (lb/acre)	Mg (%)	Mg uptake (lb/acre)
1	3.66	108.1	1.94	57.4	0.316	9.3	2.84	83.9	0.364	10.7
2	3.45	108.0	1.92	60.0	0.306	9.6	2.90	90.7	0.361	11.3
3	3.60	103.5	1.89	54.1	0.313	9.0	2.93	84.1	0.367	10.6
4	3.45	111.2	1.86	59.8	0.310	10.0	3.00	96.5	0.361	11.7
5	3.47	113.8	1.85	60.6	0.304	10.0	2.96	97.1	0.354	11.6
6	3.39	109.7	1.82	58.8	0.299	9.7	2.98	96.4	0.351	11.4
Mean	3.51	109.1	1.88	58.4	0.308	9.6	2.93	91.4	0.360	11.2
PLSD 0.01	0.14	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	11.8	*NS*	*NS*
PLSD 0.05	0.11	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	8.8	*NS*	*NS*
PLSD 0.10	0.09	*NS*	0.08	*NS*	*NS*	*NS*	*NS*	7.3	*NS*	*NS*
Prob. > F	0.0000	0.2892	0.0535	0.1217	0.1844	0.2092	0.1362	0.0047	0.3208	0.1481
CV%	3.0	7.9	4.7	8.5	4.6	9.2	4.1	9.5	4.4	8.8

Discussion

Yield increased, quality and energy variable values decreased as FD increased, in general, on fourth cutting. There were no significant differences for quality variables on first cutting. There were a few quality variables that were significantly different on second cutting and third cutting, but these did not follow a pattern related to FD rating in any obvious way.

Percent nutrients (P, Ca, K, and Mg) and nutrient uptake (P, Ca, K, and Mg) data were presented, for purposes of comparison. The values are within the range of previously published values.

The quality and nutrient tests were performed by NIRS. The current calibrations are more robust than just a few years ago, but none of the samples were tested by chemical; analyses for comparison. While the predicted numbers may not be completely accurate, we believe that NIRS is able tp discern differences among the samples.

Selection of an alfalfa variety is based on yield and quality potential, FD, and pest resistance ratings. This 1 year of data allowed a glimpse at the quality of some alfalfa varieties with different FD's. It is unwise to base selection of a variety on 1 year's data.

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