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Can Alfalfa Be Hayed and Grazed

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Summary

A study established at Cottonwood in 1981 is being evaluate to compare 10 grazing alfalfa varieties plus two hay types in three treatment combinations involving grazing and haying.

Through 1984, after 2 years of treatment, dormant season grazing did not reduce hay production. However, dormant season grazing and early spring grazing both reduced alfalfa and grass stands when compared to the haying treatment. These reductions may substantially reduce the length of time that stands can be maintained. Although there are no appreciable differences to date in alfalfa variety performance, it is expected that some will be more persistent than others for grazing and/or haying.

Early stand losses through either poor variety selection or haying/grazing management practices can be predicted to have serious economic consequences.

Introduction

Alfalfa is essentially the only legume used for pasture and hay production in the central and western parts of South Dakota and in the rest of the Northern Great Plains.

In the drier half of South Dakota, Travois (a grazing type of alfalfa) is used for grazing and to a limited extent for single cutting hay. Travois is increasingly difficult for producers to obtain, but newer, untested varieties are available. Also, it is thought that when used for hay production the grazing types of alfalfa (as contrasted to the hay types) may have similar production, better persistence and more flexibility for dual use (haying and grazing). However, direct comparisons previously have not been made and there is no other regional testing of the new varieties.

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Procedure

All 10 available grazing alfalfa varieties and two hay types (Ladak 65 and Vernal)[1/] were planted on a clayey range site at the Cottonwood Station in Haakon County in May 1981. All 12 varieties were strip planted with crested wheatgrass. Each entry is 7' x 60' and is replicated three times. Plots were fenced and three treatments developed to represent these common practices:

Treatment I. Dormant Grazing (fall, late winter, or very early spring) Plus Haying.
Treatment II. Spring Grazing Only.
Treatment III. Haying Only.

The schedule of management practices used through the 1984 growing season follows.

Date	Treatment I	Treatment II	Treatment III
1981 May	Seeded	Seeded	Seeded
July	Mowed Weeds	Mowed Weeds	Mowed Weeds
1982 July	Hayed	Hayed	Hayed
1983 March	Grazed		
May		Grazed	
June	Hayed		Hayed
1984 March	Grazed		
May		Grazed	
June	Hayed		Hayed

Treatment I is the double or dual use treatment with the grazing portion being flexible depending on forage availability. It has been spring grazed very early twice. In May 1983, very little forage residue existed so the grazing heifers were fed baled hay to supplement grazing. Grazing is designed to leave a minimum of residue and to have severe trampling. Grazing use of Treatment II (Spring Grazing Only) is structured to remove 80% of current season production. Grazing in both treatments is time compressed because of the small fenced plots (each about 60' x 280').

In 1982, 1983 and 1984, samples were taken to estimate hay production with alfalfa, grass and weeds separated, dried and weighed. In 1983 and 1984 alfalfa and grass stands were estimated by measuring gaps in the drill rows.

[1/] Alfalfa varieties, sources and date information. DANEB, Univ. of Nebr.-USDA-SDSU advanced lines; D-2, SDSU advanced line; DRYLANDER, Ag Canada 1971; LADAK 65 (a hay type), Mont. Sta. Univ. 1965; MAVERICK, North Amer. Plant Breeders 1981; RAMBLER, Ag Canada 1955; RANGELANDER, Ag Canada 1977; ROAMER, Ag Canada 1966; SPREDOR II, Northrup-King 1981; TETON, SDSU 1985; TRAVOIS, SDSU 1962; VERNAL (a hay type), Univ. of Wisc.-USDA 1953.

Results and Discussion

Production

Dormant season grazing of hay lands is a common practice and is often suspected of reducing hay production in addition to shortening stand life. Also, it is reasonable to expect that alfalfa varieties should perform differently to grazing and haying management practices. However, after 3 years of study, no definitive production differences exist among the major varieties in comparing Treatment I (Dormant Grazing Plus Haying) to Treatment III (Haying Only). For that reason, production from TI and TIII are considered together in table 1. Varieties performed similarly for both TI and TIII. Two experimental lines, Daneb and D-2, had somewhat lower production than Teton and Vernal. Examination of Table 1 reveals that, where alfalfa production is low, grass production tended to be high and vice versa. However, total production was not different in 1984 for any alfalfa variety in Treatment I or Treatment III.

Table 1. Hay Production in 1984. Treatments I and III Averaged Together

Cultivar	Alfalfa	Crested wheatgrass	Weeds	Total
	Pounds per acre (oven dry weights)[1/]			
Daneb	377b[2/]	1443[3/]	105abc[2/]	1925[3/]
Drylander	575ab	1302	52c	1930
D-2	394b	1300	61c	1752
Ladak 65	495ab	1211	135a	1841
Maverick	567ab	1152	113abc	1831
Rambler	572ab	1288	65bc	1925
Rangelander	524ab	1221	56c	1802
Roamer	593ab	1146	82abc	1821
Spredor II	585ab	1138	76abc	1798
Teton	645a	1221	64bc	1930
Travois	576ab	1160	112abc	1846
Vernal	638a	1190	127ab	1956
Average	545	1231	87	1863

1/ To convert to 12% moisture hay, multiply by 1.136.
2/ Numbers not followed by the same letter in a column are significantly different (P<.05) by Waller-Duncan K-ratio T test.
3/ There were no significant differences (P>.05) for these components.

When all varieties were considered collectively (Table 2), production differences in 1983 began to show for alfalfa, TI = 1937 lb/A vs TIII = 1585 lb/A, and for crested wheatgrass, TI = 914 lb/A vs TIII = 1433 lb/A. However, the differences cancelled themselves out so that total production was not different, TI = 2880 lb/A vs TIII = 3026 lb/A. Field observations suggested that the dormant season grazing of TI appeared to suppress grass production, which may have released moisture for increased alfalfa production. This is reflected in the "relative proportion" figures for 1983 in Table 2.

Table 2. Hay Production for All Varieties in 1983 and 1984[1/]

	Treatment I				Treatment III			
	Alfalfa	Grass	Weeds	Total	Alfalfa	Grass	Weeds	Total
	Pounds per acre (oven dry weights)[1/]							
1983	1937*[2/]	914*	27	2880	1585*	1433*	8	3026
1984	482	1014*	130*	1626*	608	1447*	45*	2100*
	Relative proportions (percentages)							
1983	67	32	1	100	52	47	1	100
1984	30	62	8	100	29	69	2	100

[1/] To convert to 12% moisture hay, multiply by 1.136.
[2/] In comparing the same component (alfalfa, grass, weeds or total) in TI versus TIII, numbers followed by an asterisk are significantly different ($P<.05$).

By 1984, which was the second year of full treatments, dormant season grazing of Treatment I had reduced total hay production compared to Treatment II (Table 2). Here total production is TI = 1626 lb/A vs TIII = 2100 lb/A. Also, grazing in TI continued to significantly reduce grass production (TI = 1014 lb/A vs TIII = 1447 lb/A) and increased weed production, TI = 130 lb/A vs TIII = 45 lb/A.

Stands

Estimates of stand for hay lands and pastures are necessary for indicating comparative differences in longevity. When using the basal intercept method of stand evaluation (see Table 3, footnote 1) on a new seeding of alfalfa or grass, it is common to have stands increase before decreasing (becoming weaker). In comparing the average yearly stand values of Table 3, it is apparent that from 1982 through 1984 stands of alfalfa and grass were both continuing to increase or improve, presumably from an increase in size of plant crowns. As of this time, the alfalfa varieties and crested wheatgrass are performing the same for all three treatments and that is why they are presented together in Table 3. The relatively few differences in 1983 alfalfa stands were not present in 1984.

Table 3. Percent Stand in 1983 and 1984 as Determined from Basal Intercept, Treatments I, II and III Considered Together[1/]

	Alfalfa			Grass		
	1982	1983	1984	1982	1983	1984
Daneb	50[2/]	66bc[3/]	66[4/]	56[2/]	63abc[3/]	71ab[3/]
Drylander	43	65c	67	53	69ab	74ab
D-2	26	50d	68	50	62abc	68b
Ladak	63	72ab	74	53	63abc	72ab
Maverick	59	69abc	69	73	58c	71ab
Rambler	43	63c	73	59	66abc	74ab
Rangelander	36	68abc	70	50	71a	72ab
Roamer	23	65bc	72	50	61bc	71ab
Spredor II	53	68bc	70	69	64abc	74ab
Teton	46	69abc	68	53	64abc	71ab
Travois	50	75a	71	50	65abc	76a
Vernal	63	67bc	69	66	62bc	74ab
Average	46	66	70	57	64	72

[1/] Stands evaluated on basis of each 6" gap in a row equaling 0.5% less than a full stand. For example, if a 100' row had 64 6" gaps, that would be a 68% stand (64 x .05 - 32; 100 - 32 = 68).

[2/] No statistical analysis conducted in 1982. Stands evaluated one month after seeding.

[3/] Numbers not followed by same letter in a column are significantly different (P<.05) by Waller-Duncan K-ratio T test.

[4/] There were no significant differences (P<.05) for these components.

Although stands for individual varieties were not affected by the three treatments in 1984, there are some stand differences due to treatment when all varieties are considered together (Figure 1). The trends evident in Figure 1, especially for alfalfa, may be pointing toward eventual differences in length of stand life due to treatments. In 1983, alfalfa stands in TI were poorest (61%) and best in TII (72%), but stands for TIII (66%) were not different from the other two treatments. By 1984, alfalfa stands in both grazing treatments (TI = 66% and TII = 67%) were substantially less than in TIII (76%). It is too early to know whether grazing will result in early stand loss of alfalfa, but the 1984 differences are of concern and are probably reflected in 1984 hay production differences seen earlier in Table 2.

In this region, crested wheatgrass is strongly competitive with alfalfa. In mixed alfalfa-grass stands, grass typically remains for many years after alfalfa abundance decreases to minimal amounts. Figure 1 reveals stands of crested wheatgrass are being greatly affected by the three management practices (treatments). The differences in 1983 among treatments were amplified in 1984. In 1984, TI grass stands were 64%, TII were 75% and TIII

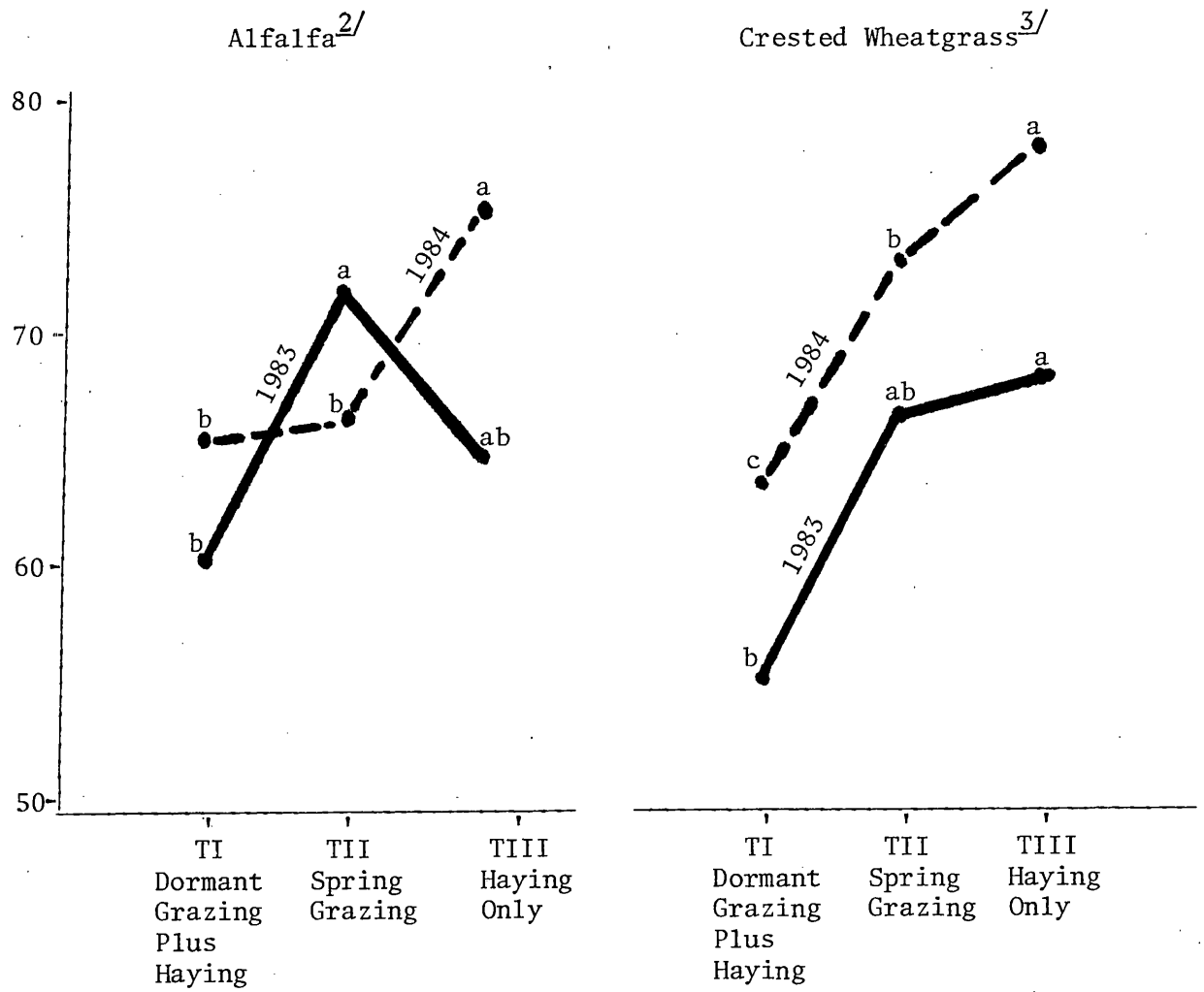

Figure 1. Percent stand in 1983 and 1984 from basal intercept for alfalfa and grass.1/

1/For discussion of stand determination, see Table 3, Footnote 1.

2/Alfalfa stands did not significantly change ($P>0.05$) between 1983 and 1984.

3/Grass stands in each treatment significantly increased ($P<0.05$) from 1983 to 1984.

were 79%, all of which are significantly different from each other. Again, it is too early to assign importance to these stand differences; although by 1984, stands for both alfalfa and crested wheatgrass were "best" for Treatment III which has never been grazed.

Direct Comparisons

Acknowledging the fact that the jury is still out on some questions regarding variety selection and stand longevity, some production comparisons can be made for the grazing and haying treatments. Table 4 is designed to directly compare productivity from among the three treatments. As seen in the first row of numbers, all treatments were uniformly hayed in 1983, thus, no differences. Treatments were imposed in 1983 and 1984.

Table 4. Hay Production, Grazing Available and Feed Equivalent for All Years and Treatments

	Treatment I Grazing plus haying		Treatment II Spring grazing		Treatment III Haying only	
	Hay lb/A	Grazed/ feed AUM's/A	Hay lb/A	Grazed/ feed AUM's/A	Hay lb/A	Grazed/ feed AUM's/A
1982	4,644	0.00	4,644	0.00	4,644	0.00
1983	2,880	0.73	0	1.90	3,026	0.00
1984	1,626	0.15[1/]	0	1.08	2,010	0.00
Total hay	9,150		4,644		9,680	
If converted to AUM's[2/]		10.17		5.16		10.76
Total AUM's (Converted plus actual)		11.05		8.14		10.76
1982-84 Aug.		3.68		2.71		3.59
1983-84 Aug.		2.94		1.49		2.80
Hay and AUM's as used						
1982-84 Aug.	3,050	0.29	1,548	0.66	3,277	0.00
1983-84 Aug.	2,253	0.44	0	1.49	2,518	0.00

[1/] This value is extremely low because hay was fed to supplement grazing.
[2/] Equivalent AUM's if hay is fed based on 900 lb hay/AUM.

No direct comparisons can be made between Treatment II (Spring Grazing) and the other treatments. Therefore, production estimates are specific for spring grazing practices only. AUM's harvested averaged 1.49 for 1983 and 1984. The range in AUM's used (1.90 in 1983 and 1.08 in 1984) should be expected in a spring pasture setting. The 2-year average of 1.49 AUM's may not hold up if stands begin to weaken.

Hay production in Treatment I versus Treatment III is similar with the spread in production being greater in 1984 than in 1983. Although the difference is relatively small, it may be magnified in coming years. The dormant season AUM's of grazing increased the "Total AUM's (converted plus actual)" to TI = 11.05 compared to TIII = 10.76. The "Total AUM's (converted plus actual)" for TI and TIII compare very favorably for 1982-84 and for 1983-84 as well. In considering the 1983-84 figures, both TI and TIII are substantially higher (2.94 and 2.89, respectively) than AUM's from haying versus grazing. The last two rows in Table 4 provide direct comparisons of hay production and grazed AUM's for 1982-84 and for 1983-84. Hay production between TI and TIII was not significantly different for 1983-84. However, it was different for 1984 alone. For 1983-84, dormant season grazing of TI did not reduce hay production when compared to TIII. Through 1984, the .44 AUM's of grazing provided by TI give a slight production edge to dormant season grazing of hay lands.

Conclusions/Implications

1. In the first two years of treatment, dormant season grazing of hay grounds did not reduce production when compared to hay ground that was not grazed. In fact, the AUM's provided as dormant season grazing represents additional production from that practice.

2. Based on early trends in alfalfa and grass stands, grazing may shorten productive life of hay grounds.

3. The major alfalfa varieties are performing similarly in all treatments. So, other grazing varieties appear to be as satisfactory as Travois.

4. Grazing alfalfa varieties grown with crested wheatgrass have produced as much hay as the two hay types (Ladak 65 and Vernal) and, if they are equally persistent, they can be successfully used for hay production in a single cutting environment.