Influence of Alfalfa Harvesting and Storing Methods on Steer Performance

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Summary

Three alfalfa treatments were evaluated in a steer performance trial: (1) direct-cut and ensiled with dry milo, (2) field-wilted and ensiled, with milo added at feeding and (3) baled, with milo added at feeding. The rations contained 45.4, 50.9 and 48.1 percent milo, respectively. During the 84-day trial, yearling steers made similar gains on the three rations. Direct-cut and ensiled alfalfa produced the most efficient gain; hay the least efficient. Potential beef gain per acre of alfalfa was lowest from baled hay.

Introduction

Alfalfa's importance for beef production is increasing in Kansas. It can be an economical and efficient source of energy, protein, minerals (especially calcium) and vitamin A in both maintenance and growing rations. Alfalfa commonly is fed as baled hay. Haying has high labor requirements and often results in excessive nutrient losses from either field drying or weathering. Ensiling alfalfa as silage (50 to 65 percent moisture) or as haylage (30 to 50 percent moisture) usually decreases nutrient losses during harvest but increases nutrient losses during storage. Alfalfa cut and ensiled with more than 75 percent moisture usually produces a poor quality silage. Lowering the moisture content by either field-wilting or adding a dry grain or roughage has improved silage quality and reduced nutrient losses during storage.

Results from other experiment stations comparing nutritive values of alfalfa hay and alfalfa silage (or haylage) have not been consistent.

The objective of this trial was to compare feeding values of three alfalfa harvesting and storing methods in growing rations for yearling steers: (1) direct-cut and ensiled with dry milo, (2) field-wilted and ensiled and (3) baled.

Experimental Procedure

First-cutting alfalfa used in this trial was harvested from a single field at about one-fourth bloom (May 24, 25, and 26, 1973). Direct-cut alfalfa (approximately 77 percent moisture) was harvested with a field-chopper[1] following a mower-swather. Each load was weighed and sampled

[1]Forage harvester was provided by Field Queen Corporation (a division of Hesston Corporation), Maize, Kansas.

and dry rolled milo was added to lower the moisture content of the alfalfa-milo mixture to 60 to 65 percent. The mixture was 53.4 percent alfalfa and 46.7 percent milo on a dry matter basis. Field-wilted alfalfa (approximately 60 percent moisture) was harvested after drying 24 hours. Both direct-cut and field-wilted materials were stored in 10 ft. X 50 ft. concrete stave silos. The forage chopper was equipped with a three-inch recutter screen. Hay was baled (60 to 70 lb. bales) after field drying 48 hours.

Fifty-four yearling mixed breed steers averaging 476 lb. were randomly allotted to nine pens of six steers each. Three pens of steers were assigned to one of the three alfalfa treatments. Dry rolled milo was added to the field-wilted silage and hay rations at feeding time in an attempt to equalize the grain content in the three rations. Final ration compositions are shown in table 11.1. Ration 1 (direct-cut silage) contained the lowest percent milo (45.4%); ration 2 (field-wilted silage) the highest percent milo (50.9%). All rations were mixed and fed twice daily; hay was chopped before being fed. A supplement (footnote, table 11.1) fed at 0.5 lb. per steer per day supplied salt, trace minerals, phosphorus and an antibiotic. Initial and final weights of the steers were taken after 15 hours without feed or water. The trial began June 27, 1973 and ended September 19, 1973 (84 days).

Results and Discussion

Seepage losses occurred in the silage that was direct-cut and ensiled with dry milo; but except for the usual top spoilage, no additional mold or deterioration was observed in either of the two alfalfa silage treatments.

Steer performance is presented in table 11.2. Rates and efficiencies of gains were excellent for all cattle. This seemed to be due to the thin condition of the steers at the start of the trial and an unusually high dry matter consumption (2.89 to 3.43 percent of body weight). Average daily gain was nearly identical for all steers regardless of alfalfa treatment. Those fed alfalfa hay consumed more dry matter but were less efficient than those fed either of the alfalfa silage rations. Steers fed direct-cut silage consumed less feed yet were more efficient than steers fed field-wilted silage.

Feed consumption decreased as moisture content of the alfalfa (and total ration) increased; which agrees with results from other stations.

Although the direct-cut alfalfa ration had the highest alfalfa to milo ratio, it produced the most efficient gains, which was opposite from expected results but several explanations are possible. First, fermentation in the silo may have increased digestibility of the alfalfa, milo or both; second, nutrients absorbed may have been used more efficiently; third, direct-cutting may have preserved more of the nutrients available in the alfalfa.

Average harvest and storage losses reported at other stations are combined (table 11.3) with our steer performance data (table 11.2). The somewhat arbitrary loss figures are influenced by such factors as: stage of maturity, moisture content, fineness of chop, type and size of silo and weather at harvest. Based on potential gain per acre of alfalfa,

direct-cut and field-wilted silages produced 16 and 20 percent more gain, respectively, than baled hay. Direct-cut silage also required 18 percent less milo per lb. of gain than either field-wilted silage or baled hay.

Table 11.1. Compositions and Analyses (%, Dry Matter Basis) of Alfalfa Rations

	Ration		
	1	2	3
	Alfalfa treatment		
Ingredient	Direct-cut silage	Field-wilted silage	Baled hay
Alfalfa	52.0	46.7	49.7
Milo, rolled	45.4[a]	50.9[b]	48.1[b]
Supplement[c]	2.6	2.4	2.2
Dry matter, %	36.9	62.8	87.0
Crude protein, %	14.4	13.7	14.4
Alfalfa:milo ratio	1.15:1	0.92:1	1.04:1

[a]Added at ensiling.

[b]Added at feeding.

[c]lbs./ton: rolled milo, 1408.0; dicalcium phosphate, 347.0; salt, 167.0; fat, 20.0; aureomycin, 28.0; trace mineral premix, 30.0.

Table 11.2. Steer Performance, June 27, 1973 to September 19, 1973 (84 days)

	Ration		
	1	2	3
	Alfalfa treatment		
Item	Direct-cut silage	Field-wilted silage	Baled hay
No. of steers	18	18	18
Initial wt., lb.	482	478	477
Final wt., lb.	731	726	726
Avg. daily gain, lb.	2.96	2.96	2.97
Avg. daily feed, lb.[a]			
alfalfa	9.04	8.89	10.27
milo	7.89	9.69	9.92
supplement	0.45	0.45	0.45
Total[b]	17.38[c] (2.89)	19.03[d] (3.16)	20.64[e] (3.43)
Feed/lb. gain, lb.	5.87[c]	6.43[d]	6.95[e]

[a]100% dry matter basis.

[b]Values in parentheses are dry matter intake as a percent of body weight.

[c,d,e]Means on the same line with different superscripts differ significantly ($P<.05$).

Table 11.3. Potential Gain per Acre from each of the Three Alfalfa Treatments

Item	Ration 1 Alfalfa treatment: Direct-cut silage	Ration 2 Alfalfa treatment: Field-wilted silage	Ration 3 Alfalfa treatment: Baled hay
DM[a]/lb. of gain[b]			
alfalfa, lb.	3.05	3.00	3.46
milo, lb.	2.67	3.28	3.34
Potential DM yield/ acre, lb.[c]	5,500	5,500	5,500
DM loss at harvest, lb.[d]	550 (10%)	825 (15%)	1,320 (24%)
DM loss during storage, lb.[d]	825 (15%)	413 (7.5%)	275 (5%)
DM actually fed, lb.	4,125	4,262	3,905
Gain/acre of alfalfa, lb.	1,352	1,420	1,129

[a]DM = dry matter.

[b]From data reported in table 11.2.

[c]Average yield in Kansas; Kansas State Board of Agriculture, 55th Annual Report, 1971-72.

[d]Percent DM loss in parenthesis.