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L. B. Embry
South Dakota State University

W. S. Swan

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Dry or High-Moisture Corn with Hay or Haylage
at Various Levels for Feedlot Lambs

L. B. Embry and W. S. Swan

Several experiments at this station with feedlot cattle have shown that high-moisture corn grain has frequently resulted in improved weight gain and feed efficiency over dry corn. There have been indications that the level of roughage and the moisture content of the roughage may have an influence on the comparative value of dry and high-moisture corn.

This experiment was designed to study the value of dry or high-moisture corn in all-concentrate rations and with various levels of alfalfa-brome hay or haylage for growing and finishing lambs.

Procedures

Native lambs from the south central part of the state were purchased for the experiment. Dietary treatments consisted of dry or high-moisture corn fed in all-concentrate rations or with alfalfa-brome hay or haylage at 0.3 or 1.0 lb. roughage dry matter per lamb daily. The design of the experiment was thus a 2 x 3 x 3 factorial with four pens of lambs receiving each dietary treatment for a total of 48 pens. Seven lambs were allotted initially to each pen with four ewes and three wethers per pen. The response to zeranol implants was also tested in this experiment. Implant treatments were balanced as to dietary treatments. Implant treatments did not appear to affect the response to dietary treatments. Therefore, results for implant treatments are presented separately in another report.

The corn was grown locally and purchased through a local grain elevator. An oxygen-limiting silo (14 ft. x 40 ft.) was filled with undried corn using a silage blower and some added water in mid-October. While several sources of corn were represented, various loads appeared to be of relatively uniform quality and moisture content. A quantity of similar quality corn was dried by the elevator for use in the rations with dried corn. Average moisture content as fed obtained from samples taken at approximately weekly intervals during the experiment was 23.74% for the high-moisture corn and 15.95% for the dried corn.

Alfalfa-brome hay was chopped with a forage harvester and stored in an oxygen-limiting silo (17 ft. x 50 ft.) and fed as reconstituted haylage. Water was added at the chopper and at the silage blower. Average moisture content as fed obtained from samples taken at approximately weekly intervals during the experiment was 47.92%. Similar quality of hay was also chopped with the forage chopper for feeding in the treatments with dry hay. Average moisture content of the hay during the experiment was 17.71%.

Rations were planned to provide 0.3 lb. or 1.0 lb. roughage dry matter per lamb daily along with the all-concentrate rations. Levels of roughage dry matter were slightly lower than planned but were similar between the hay and reconstituted haylage (table 2).

Supplements were formulated for each roughage level in the rations. Protein contents were varied so rations would be similar in total protein contents (about 12%, air-dry basis). Ingredient composition of supplements are shown in table 1.

The lambs were started on the experiment with an initial level of 1.5 lb. of hay or the equivalent dry matter as reconstituted haylage. The level was reduced to the 1.0 lb. level in 3 days, to the 0.3 lb. level in 12 days and to the zero level in 15 days. Corn grain was started at 0.3 lb. per head daily and increased by 0.1 lb. daily to a full feed for all roughage levels. Feeding was once daily in outside, unpaved pens.

Results

Results of the experiment are presented in table 2. Two blizzards occurred during the course of the experiment. One in early January was severe in low temperatures, strong winds and deep drifting of snow. Three sheep were lost as a result of this storm. The second storm occurred four days before the experiment was terminated. Since plans had been made with a local packing plant to slaughter the lambs, they were shipped as scheduled.

The lambs had considerable snow on their backs and in the wool when the experiment was terminated. The final weight was not considered to represent an accurate live weight. Therefore, final live weights were calculated from carcass weights using a yield of 52%. Average daily gains calculated in this way did not result in any appreciable change in results based on live weights but were at a lower rate.

All-Concentrate Rations

Average daily gain for lambs fed the all-concentrate rations was 0.426 lb. for high-moisture corn and 0.443 lb. for dry corn. Feed consumption on a dry basis was essentially the same between dry and high-moisture corn. The 4.0% faster gain by those fed dry corn was accompanied by a similar improvement in feed efficiency. Type of corn appeared to have no effect on carcass grade.

0.3 Lb. Roughage Dry Matter

Rate of gain was improved with both dry and high-moisture corn when the rations included 0.3 lb. roughage dry matter. Lambs fed dry corn gained at a faster rate (7.5%) than those fed high-moisture corn. Feed consumption on a dry basis was essentially the same between dry and high-moisture corn as observed with the all-concentrate rations. The faster rate of gain with only small differences in feed intake resulted in an improvement in feed efficiency of 8.1% for dry corn and high-moisture corn. Carcass grade was similar between dry and high-moisture corn and did not appear to be affected by the low level of roughage.

Lambs fed reconstituted haylage gained at a faster rate than those fed hay at this low level of roughage. The improvement for haylage amounted to 4.2% with high-moisture corn and 6.6% with dry corn. Differences in feed consumption between hay and haylage were small with either dry or high-moisture corn. The higher rates of gain for haylage resulted in an improvement in feed efficiency of 3.8% with high-moisture corn and 7.1% with dry corn.

On basis of feed efficiency, 1 lb. of haylage dry matter was about equal to 1 lb. of corn dry matter from either type of corn. Hay had slightly less value than haylage in replacement value of corn. This level of roughage had essentially no effect on corn consumption in comparison to the all-concentrate rations.

1.0 Lb. Roughage Dry Matter

Rate of gain was reduced in comparison to all-concentrate rations by this level of roughage dry matter with either high-moisture or dry corn. The reduction amounted to 7.7% with high-moisture corn and 12.4% with dry corn.

Corn consumption was reduced by the 1.0 lb. level of roughage dry matter in comparison to the all-concentrate rations. Total feed consumption and feed requirements were increased, but there was some reduction in corn required by the higher level of roughage. On basis of feed requirements per 100 lb. of gain, 100 lb. of roughage dry matter reduced concentrate dry matter (corn and supplement) requirements by 20.8 lb. with high-moisture corn and 8.5 lb. with dry corn. These values would result in a low value for hay or haylage at the higher level in comparison to the all-concentrate rations. However, the value was higher with high-moisture corn than with the dry corn.

At this higher level of roughage, rate of gain was higher for haylage than for hay. The improvement for haylage over hay amounted to 5.5% with high-moisture corn and 18.9% with dry corn. Feed consumption was improved with haylage in the rations with dry corn, but feed efficiency was improved by 11.1% over hay. With high-moisture corn, feed intake was about the same between hay and haylage with an improvement in feed efficiency of 6.1%.

The lambs in all treatment groups were marketed at the same time. Therefore, those fed the higher level of roughage and making the lower rate of gain had lighter carcasses. However, the carcass grade was not appreciably different from that for lambs fed the more concentrated rations.

Summary

In this experiment, feedlot lambs were fed dry (15.9% moisture) or high-moisture (23.74% moisture) whole corn grain in all-concentrate rations or rations with 0.3 or 1.0 lb. roughage as chopped alfalfa-brome hay (17.71% moisture) or reconstituted haylage (47.92% moisture) with 50 to 55 lambs per roughage level group with each type of corn.

Lambs fed dry corn gained at a faster rate and had lower feed requirements on a dry basis than those fed high-moisture corn except when fed the higher level of roughage as hay. The advantage for dry corn over high-moisture corn on basis of weight gain and feed efficiency amounted to 4.0 and 4.0% with all-concentrate rations and 7.5 and 8.1% for rations with 0.3 lb. roughage dry matter. With 1.0 lb.

roughage dry matter, gain and feed efficiency, averaged for hay and haylage, were about the same for dry or high-moisture corn. The results indicate an advantage for dry corn over high-moisture corn for growing and finishing lambs, especially at the lower level of roughage.

Rate of gain and feed efficiency were improved with 0.3 lb. roughage dry matter over all-concentrate rations. At this level of roughage, 1 lb. of roughage dry matter had a replacement value equal to about 1 lb. of concentrates (corn and supplement).

Roughage at 1.0 lb. of dry matter per lamb daily resulted in reduced gains and an uneconomical replacement value in terms of concentrates on basis of feed efficiency.

Lambs fed reconstituted haylage gained at a faster and more efficient rate than those fed hay. The improvement was greater with dry corn and at the higher level of roughage.

Table 1. Dry and High-Moisture Corn with Hay or Haylage at Various Levels

	Ingredient composition of supplements, %		
	All-concentrate supplement	0.3 lb. roughage supplement	1.0 lb. roughage supplement
Soybean meal (44%)	83.96	62.50	5.20
Ground corn grain	---	24.06	86.06
Dicalcium phosphate	4.20	4.20	5.30
Limestone	8.40	5.80	---
Trace mineral salt	2.50	2.50	2.50
Trace mineral premix	0.10	0.10	0.10
Aureomycin-10	0.84	0.84	0.84
Vitamin A premix, g ^a	33	33	33
Vitamin E premix, g ^b	54	54	54

^a 30,000 IU/g.
^b 220 IU/g.

Table 2. Dry or High-Moisture Corn with Hay or Haylage at Various Levels (December 13 - March 25, 1975 - 98 days)

Item	No roughage	0.3 lb. roughage		Avg.	1.0 lb. roughage		Avg.
		Hay	Haylage		Hay	Haylage	
<u>Rations with high-moisture corn</u>							
No. of animals	54	28	26	54	28	27	55
Initial wt., lb.	72.9	72.3	73.3	72.8	73.1	72.7	72.9
Final wt., lb.	114.7	114.4	117.3	115.8	110.6	112.3	111.4
Avg. daily gain, lb.	0.426	0.431	0.449	0.440	0.383	0.404	0.393
Avg. daily ration, dry							
Corn grain	1.85	1.80	1.82	1.81	1.50	1.51	1.50
Hay or haylage	0.10	0.31	0.30	0.30	0.98	0.94	0.96
Suppl.	0.27	0.27	0.27	0.27	0.27	0.27	0.27
Total	2.22	2.38	2.39	2.38	2.75	2.72	2.73
Feed/100 lb. gain, dry							
Corn grain	434	418	405	411	392	374	382
Hay or haylage	23	72	67	68	256	233	244
Suppl.	63	63	60	61	70	67	69
Total	520	553	532	540	718	674	695
Carcass wt., lb.	59.7	59.4	61.0	60.2	57.5	58.5	58.0
Conformation ^a	12.2	12.2	12.1	12.1	11.7	11.7	11.7
Carcass grade ^a	11.8	11.3	11.2	11.3	11.2	11.3	11.3
<u>Rations with dry corn</u>							
No. of animals	52	28	22	50	27	26	53
Initial wt., lb.	71.8	72.8	74.7	73.8	72.4	73.5	72.9
Final wt., lb.	115.2	117.6	122.5	120.1	107.1	114.9	111.0
Avg. daily gain, lb.	0.443	0.458	0.488	0.473	0.355	0.422	0.388
Avg. daily ration, dry							
Corn grain	1.84	1.79	1.78	1.78	1.41	1.60	1.50
Hay or haylage	0.10	0.31	0.30	0.30	0.98	0.94	0.96
Suppl.	0.27	0.27	0.27	0.27	0.27	0.27	0.27
Total	2.21	2.37	2.35	2.35	2.66	2.81	2.73
Feed/100 lb. gain, dry							
Corn grain	415	391	365	376	397	379	387
Hay or haylage	23	68	61	63	276	223	247
Suppl.	61	59	55	57	76	64	70
Total	499	518	481	496	749	666	704
Carcass wt., lb.	59.9	61.2	63.7	62.4	55.7	59.8	57.7
Conformation ^a	12.4	12.2	11.8	12.0	11.5	11.9	11.7
Carcass grade ^a	11.8	11.4	11.5	11.5	11.1	11.4	11.2

^a Good = 8, Choice = 11, Prime = 14. Graded to one-third of a grade.