High Moisture Corn for Finishing Steers

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Summary

We used 135 yearling steers in two trials to compare dry with high moisture (HM) corn and soybean meal (SBM) supplement with urea supplement.

Results of trial 1 (88 days) show HM corn either rolled and ensiled in a stave silo or ensiled whole in a fiberglass O_2-limiting silo supported faster and more efficient gains than dry rolled, steam-flaked or HM-corn treated with a preservative. A 50% SBM + 50% urea supplement tended to be used more efficiently than either 100% SBM or 100 % urea supplements.

In trial 2 (97 days) steers fed dry rolled corn or HM corn ensiled with a commercial additive had similar gains and 6.2% faster gains then steers fed HM corn ensiled without an additive. HM corn ensiled with the additive produced 7.1% more efficient steer gains than dry rolled corn and 4% more efficient gains than HM corn ensiled without the additive. An all-SBM supplement gave slightly better steer performance than an all-urea supplement.

Introduction

Previous research at Kansas State University has consistently shown high moisture milo superior to dry rolled milo in rations for finishing cattle. Our purpose in these two trials was to evaluate several methods of harvesting, storing, and processing corn grain for feedlot rations. In addition, soybean meal and urea were compared as protein sources.

Experimental Procedure

Trial 1. Seventy-five yearling steers averaging 812 pounds were allotted by weight to 15 pens of five each. Three pens were assigned to each of five corn treatments: (1) dry rolled; (2) steam-flaked; (3) high moisture, treated whole with 1.5% commercial grain preservative[1] (HM preservative) on a dry matter (DM) basis; (4) high moisture, rolled and ensiled in a concrete stave silo (HM-stave); and (5) high moisture, ensiled whole in a fiberglass oxygen-limiting silo (HM-O_2- limiting). One pen from each corn treatment was assigned to each of three supplemental protein treatments: all supplemental protein from (A) soybean meal (SBM); (B) from urea; and (C) 50% from SBM and 50% from urea (SBM + Urea). Supplemental protein

[1]Commercial grain preservative, Chem Stor, provided by Celanese Corporation, Corpus Christi, Texas.

supplied 21% of the total ration protein. All of the corn was harvested from the same field at 26% to 28% moisture. Corn for the dry rolled and steam-flaked treatments was artificially dried and stored at 88% DM; commercially preserved corn was stored in a polyethlene-lined metal bin; and corn stored whole was rolled before being fed. A 3- to 4-day supply of corn was steam-flaked at one time and stored for feeding.

The trial was 88 days (January 28 to March 26, 1977). All rations were 80% of the appropriate corn, 15% corn silage and 5% of the appropriate protein supplement on a DM basis. Rations were formulated to contain 11% protein (DM basis), mixed twice daily and fed free-choice.

Trial 2. Sixty yearling Angus and Angus X Hereford steers were allotted by breed and weight to 12 pens of five each. Four pens were assigned to each of three corn treatments: (1) dry rolled; (2) high moisture, rolled and ensiled (HM-no additive); and (3) high moisture, rolled, treated with 0.1% commercial silage additive[2], and ensiled (HM-additive). Two pens from each corn treatment were assigned to each of two supplemental protein treatments: all supplemental protein from (A) soybean meal or (B) urea. Supplemental protein supplied 17% of the total ration protein. All of the corn was harvested September 7 and 8, 1977, from the same field at approximately 18% moisture. The dry rolled corn was artificially dried, stored at 13.8% moisture, and rolled before being fed. Both the high moisture corn treatments were ensiled in 10- x 50-foot concrete stave silos.

The trial was 97 days (March 7 to June 12, 1978). All rations were 80% of the appropriate corn, 14% corn silage and 6% SBM or urea supplement on a DM basis. Rations were formulated to contain 11.5% protein (DM basis), mixed twice daily and fed free-choice.

In both trials, individual steer weights were taken at the beginning and end of the trial after steers were without feed or water 15 hours. Final live weights were calculated from carcass weights, using a 60.1 dressing percent in trial 1 and 61.6 dressing percent in trial 2.

Results and Discussion

Trial 1. Effects of corn treatment on steer performances are shown in Table 16.1; effects of protein treatment, in Table 16.2. Steers fed HM-stave and HM-O_2-limiting corn gained faster ($P<.05$) than steers fed steam-flaked and HM-preservative corn, however, steam-flaking the corn several days in advance likely influenced the results. Dry rolled corn was consumed in the greatest amount ($P<.05$). Although differences in feed efficiency were not statistically significant, HM-stave and HM-O_2-limiting corn tended to be more efficient than the other corn treatments.

Results show similar daily gains, feed intake and feed efficiency by steers fed rations supplemented with SBM or urea. The SBM + urea supplement tended to improve rate and efficiency of gains over either SBM or urea supplement, although the differences were not significant.

Carcass quality and yield grades were not affected by corn or protein treatments.

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[2]Commercial silage additive, Silo-Best, and partial financial assistance provided by Cadco, Inc., Des Moines, Iowa.

Trial 2. Effects of corn treatment on steer performances are shown in Table 16.3; effects of protein treatment, in Table 16.4. Steers fed dry rolled corn consumed more feed (P<.05) than steers fed either of the two high moisture corns; however, dry rolled corn was used 3.4% less efficiently than HM-additive corn. Although differences in performance between steers fed SBM or urea supplements were not significant, those receiving SBM gained 4.4% faster and 2.7% more efficiently than those receiving urea. Carcass quality and yield grades were not affected by corn or protein treatments.

Table 16.1. Effects of corn treatment on steer performances in Trial 1.

Item	Corn				
	Dry rolled	Steam flaked	HM preservative	HM stave	HM O_2-limiting
No. of steers	15	15	15	15	15
Initial wt., lbs.	808	811	811	810	810
Final wt., lbs.	1045	1018	1036	1063	1053
Avg. daily gain, lbs.	2.69[ab]	2.35[b]	2.56[b]	2.88[a]	2.76[a]
Avg. daily feed, lbs.[1]	21.05[a]	18.61[c]	20.45[ab]	19.85[b]	20.17[b]
Feed/lb. of gain, lbs.[1]	7.82	8.01	8.00	6.94	7.32
Carcass quality grade[2]	12.6	12.6	12.2	12.4	12.6
Carcass yield grade	2.9	2.7	3.0	2.7	2.8

[1]100% DM basis.

[2]12 = low choice, 13 = average choice.

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

Table 16.2. Effects of protein supplement treatment on steer performances in Trial 1.

Item	Protein supplement		
	SBM	Urea	SBM + Urea
No. of steers	25	25	25
Avg. daily gain, lbs.	2.56	2.58	2.82
Avg. daily feed, lbs.[1]	19.82	20.02	20.24
Feed/lb. of gain, lbs.[1]	7.80	7.82	7.24
Carcass quality grade[2]	12.6	12.3	12.5
Carcass yield grade	2.8	2.7	2.9

[1]100% DM basis.

[2]12 = low choice; 13 = average choice.

Table 16.3. Effects of corn treatment on steer performances in Trial 2.

Item	Corn		
	Dry Rolled	HM no additive	HM commercial additive
No. of steers	20	20	20
Initial wt., lbs.	699	699	697
Final wt., lbs.	998	981	997
Avg. daily gain, lbs.	3.09	2.91	3.10
Avg. daily feed, lbs.[1]	20.80[a]	18.93[b]	19.33[b]
Feed/lb. of gain, lbs.[1]	6.73[b]	6.51[ab]	6.25[a]

[1]100% DM basis.

[a,b]Means on the same line with different superscripts differ significantly (P<.05).

Table 16.4. Effects of protein supplement treatment on steer performances in Trial 2.

Item	Protein supplement	
	SBM	Urea
No. of steers	30	30
Avg. daily gain, lbs.	3.10	2.97
Avg. daily feed, lbs.[1]	19.81	19.56
Feed/lb. of gain, lbs.[1]	6.41	6.59

[1]100% DM basis.