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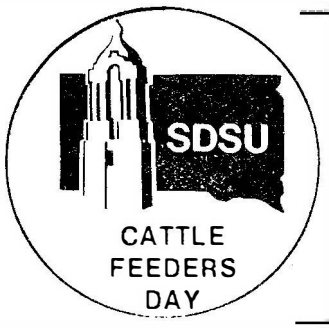

FEEDING VALUE OF PRO-SIL TREATED HIGH-MOISTURE GROUND EAR CORN WITH TWO GROUPS OF CROSSBRED HEIFERS[1]

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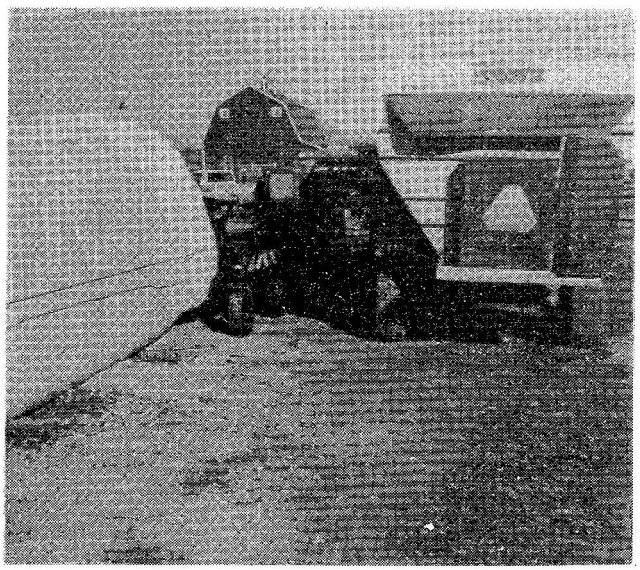
Summary

British and exotic crossbred yearling heifers were used to evaluate the feeding value of high-moisture ear corn (HMEC) when either treated with Pro-Sil at ensiling time or supplemented with urea at feeding time.

Supplementation of regular HMEC with urea increased gains 20% and improved feed conversion about 17% compared to regular HMEC without added protein in the supplement.

The addition of Pro-Sil to HMEC increased its crude protein content about 1.5%. However, feedlot performance of heifers fed the Pro-Sil treated HMEC was no better than that of cattle fed the regular HMEC without urea supplementation in this short study. Further research is needed to determine the effectiveness of adding ammonia based silage additives such as Pro-Sil to HMEC under more optimum moisture levels in the silage.



High-moisture ground ear corn was mixed with Pro-Sil and ensiled in a Silopress bag for this study.

[1] Trial conducted at the James Valley Research and Extension Center, Redfield, South Dakota.

Feedlot performance of the British and exotic cross heifers was very similar in this study.

The Silopress bag was found to be a very satisfactory ensiling structure for HMEC.

Introduction

Pro-Sil, an ammonia-molasses-mineral suspension, has been shown to be a highly effective commercial additive for corn silage in studies at SDSU and other midwest universities. When added to corn silage at the time of ensiling, this product stimulates beneficial fermentation and increases the crude protein content of the silage, thereby reducing or eliminating the need for protein supplementation at the time of feeding.

While Pro-Sil has been thoroughly tested with whole plant corn silage, no research has been conducted with ensiled high-moisture ear corn (HMEC). Since the crude protein content of HMEC is low compared to the needs of feedlot cattle, research is needed to evaluate economical methods of boosting the level of this critical nutrient.

Thus, the major objective of this initial study was to compare the feedlot performance of cattle fed Pro-Sil treated HMEC or regular HMEC mixed with either a control or a urea-based protein supplement at the time of feeding. Both types of HMEC were ensiled in a plastic Silopress bag to examine the effectiveness of this storage method with HMEC.

The relative performance of exotic and British crossbred yearling heifers was also studied in this trial.

Procedures

Since a field harvester capable of direct chopping high-moisture ear corn was not available, snapped ear corn was harvested and stored at the station with an additional quantity purchased from a local producer. Approximately 40 tons of ear corn containing 20 to 24% moisture was finally obtained for the study. Once picking was complete, the ear corn was ground in a tub grinder, using a 1-inch screen, and conveyed directly to a large mixing wagon equipped with an electronic scale for recording load weights. Since the ear corn was too dry for direct ensiling, 20 gallons of water was added per ton to increase the final moisture content. About 60% of the high-moisture ground ear corn (HMEC) was ensiled directly after the water addition, while the remainder had Pro-Sil III added at the rate of 65 lb. per ton. This product, containing 85% crude protein, 1.2% sulfur and trace minerals, was applied over the top of each load in addition to the water. All loads were thoroughly mixed prior to ensiling. Samples of each load were taken before and after Pro-Sil and/or water addition.

The ground ear corn was ensiled in a 8-ml. thick, white, plastic "sausage" bag, 8 feet in diameter, using the Eberhardt Silopress ensiling system. The regular (untreated) HMEC was stored in one end of the bag with Pro-Sil treated HMEC stored in the other end. A 1-foot thick, chopped forage "buffer" was placed between the two types of ensiled HMEC. The bag was sealed shut until the start of the trial in June, 1979.

Seventy-two crossbred yearling heifers averaging about 700 lb. were purchased in May, 1979, from a reputation backgrounder in central South Dakota. The cattle were selected from a group of about 400 head on the basis of large frame size and breed background. One-half of the heifers were British cross (black baldies), while the other half were exotic crossbreds. The exotic crosses were further sorted by visual appraisal into Charolais-cross and Limousin cross groups. Eighteen head of each exotic breed group were obtained to gain some information on the value of the traditional practice of sorting feeder cattle according to color and apparent breed identity.

Upon arrival at the research feedlot, the cattle were backgrounded on chopped alfalfa-brome hay and whole oats. The level of oats was gradually increased to 10 lb. per head daily. Pro-Sil treated HMEC was slowly substituted for the oats during the last 12 days prior to the start of the trial. High level antibiotic (AS-700 crumbles) was fed for the first 3 weeks after arrival. In addition, the heifers were ear tagged, implanted with Synovex-H, 7-way vaccinated, poured with Warbex and dewormed with Tramisol injectable during the pretrial period.

The experiment was initiated on June 26, 1979. The heifers were uniformly allotted into six outside lots of 12 head each on the basis of breed group and shrunk body weight obtained after an 18-hour stand without feed and water. Three of the pens contained the black baldy heifers, while the other three pens each received six head of Charolais cross and six head of Limousin cross heifers.

Three basic rations were used in this study: (1) Pro-Sil treated HMEC fed with a control (low protein) supplement, (2) regular (untreated) HMEC fed with a urea-based protein supplement and (3) regular HMEC mixed with the control supplement. The latter ration served as the control to establish whether supplemental protein was indeed necessary for optimum cattle performance. All rations consisted of 96% HMEC and 4% supplement on an as fed basis. The supplements were gradually increased to the 4% level during the first 5 days of the trial. Chopped alfalfa-brome hay was used to get the cattle on a full feed of the respective HMEC and supplements, with the hay being slowly withdrawn during the first 8 days. Each ration was fed to one pen of black baldies and one pen of exotic cross heifers.

The supplements were custom mixed at the SDSU feed mill. The urea supplement contained 45% crude protein, while the control supplement contained only 7.6% (as fed basis). The urea supplement contained .65% added sulfur to maintain a nitrogen:sulfur ratio of about 10:1. Otherwise, both supplements contained 3.6% calcium, 4.9% salt, 9% molasses, 300 mg. Rumensin and 30,000 I.U. vitamin A per pound.

Results and Discussion

The comparative feedlot performance of yearling heifers fed Pro-Sil treated or regular (untreated) high-moisture ground ear corn (HMEC) is shown in table 1. The results in this table represent the average performance of one pen of black baldies and one pen of exotic cross heifers fed each of the three rations. The regular HMEC was fed with either a low protein, control supplement or a 45% urea-based protein supplement. Due to the limited amount of HMEC available, the trial lasted only 37 days.

Table 1. Comparison of Control, Urea Supplemented and Pro-Sil Treated Ensiled High-Moisture Ear Corn

Item	HMEC ration		
	Control	Urea supplement	Pro-Sil treated
No. heifers	2	24	24
Initial shrunk wt., lb.	743.0	742.0	739.6
Final shrunk wt., lb.	816.5	830.5	813.8
Avg. daily gain, lb.	1.99	2.39	2.00
Avg. daily ration, lb. (as fed)			
Ensiled HMEC	24.58	24.88	23.52
Supplement	1.03	1.04	.98
Hay	1.33	1.33	1.33
Total	26.94	27.25	25.83
Lb. feed/lb. gain (as fed)			
Ensiled HMEC	12.35	10.41	11.76
Supplement	.52	.44	.49
Hay	.67	.56	.66
Total	13.54	11.41	12.91

Supplementation of regular HMEC with urea boosted daily gains about 20% (1.99 vs. 2.39 lb.) and increased feed efficiency 15.7% compared with the control HMEC ration, demonstrating the need and substantial benefit of protein supplementation of HMEC. The urea supplemented HMEC ration contained about 11.4% crude protein, whereas the control ration averaged about 9.3% (dry basis).

Cattle fed the Pro-Sil treated HMEC performed no better than those fed the regular HMEC without urea supplement in terms of average daily gain and feed conversion. While daily consumption of the Pro-Sil treated HMEC was over 1 lb. per head less than the regular HMEC on an as fed basis, dry matter intakes were very similar due to an unanticipated difference in the moisture contents of the two types of ensiled HMEC. Analysis of the samples collected at ensiling time revealed that the Pro-Sil treated HMEC averaged 27.0% moisture, while the untreated HMEC contained 30.8%. This inadvertent difference in moisture contents may have changed the fermentation characteristics of the two types of ensiled HMEC and consequently altered their relative feeding values. Thus, additional research is necessary to closely evaluate the value of Pro-Sil as a nutrient additive for HMEC.

The average crude protein content of the control HMEC was 9.3%, while the Pro-Sil treated HMEC contained over 10.7% on a dry matter basis. Thus, the application of 65 lb. of Pro-Sil III per ton of HMEC increased the crude protein content of the ensiled material over 1.5%. However, this increase represents an apparent recovery of only about 50% of the crude protein (largely as ammonia) supplied by the Pro-Sil. Whether this recovery rate could be increased by direct application of Pro-Sil to HMEC at a more optimum moisture level needs to be determined.

Further research is currently under way to determine the fermentation characteristics, digestibility and overall feeding value of ensiled high-moisture ear and shelled corn treated with ammonia based silage additives in an attempt to find more economical ways of supplementing the protein needs of feedlot cattle with these feeds.

The relative feedlot performance of the two groups of crossbred yearling heifers, averaged across all three rations, is shown in table 2. Very little difference in average daily gain, feed intake or feed efficiency was noted between the black baldies and exotic cross heifers in this short study. It should be noted that both breed groups were selected for large frame size. There was also no material differences in daily gains of the two subgroups of exotic crossbreds with the Limousin cross heifers averaging 2.12 lb. and the Charolais cross heifers averaging 2.09 lb. per day.

The Silopress "sausage bag" was found to be a very useful and effective ensiling structure for high-moisture ground ear corn. The bags must be located on a clean, well drained site in order to minimize rodent problems and insure year-round access to the bags with mechanized feeding equipment. The ends should be kept tightly closed between feedings to minimize surface spoilage of the exposed silage. The HMEC was stored for over 8 months in the plastic bag without evidence of bag deterioration.

Table 2. Relative Feedlot Performance of British and Exotic Crossbred Yearling Heifers

Item	British cross	Exotic cross
No. heifers	36	36
Initial shrunk wt., lb.	723.7	759.4
Final shrunk wt., lb.	803.1	837.4
Avg. daily gain, lb.	2.15	2.11
Avg. daily ration, lb. (as fed)		
Ensiled HMEC	23.97	24.68
Supplement	1.00	1.03
Chopped hay	1.33	1.33
Total	26.30	27.04
Lb. feed/lb. gain (as fed)		
Ensiled HMEC	11.15	11.70
Supplement	.47	.49
Chopped hay	.62	.63
Total	12.24	12.82