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EFFECTIVENESS OF COLD-FLO ANHYDROUS AMMONIA WITH FORAGE SORGHUM SILAGE[1]

G. Kuhl, C. Carlson, G. Williamson and B. Jurgensen
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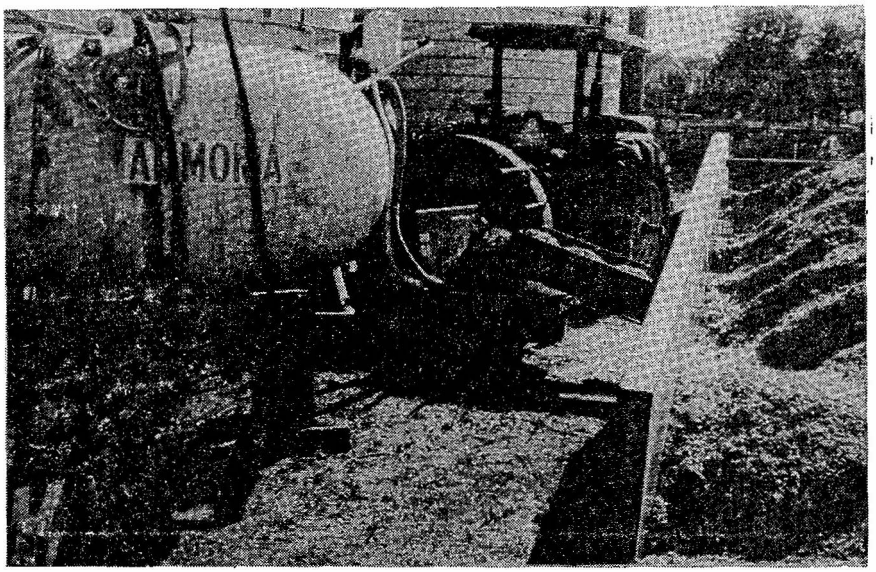
Summary

Forage sorghum was treated with Cold-Flo anhydrous ammonia at ensiling time and compared with untreated silage supplemented with soybean meal at feeding time. One hundred Angus steers were used in the 91-day trial.

Average daily gain of the cattle fed the two silages was very similar. However, cattle fed the ammonia-treated forage sorghum consumed less feed than controls, resulting in a substantially better (16.7%) feed conversion by steers on the ammonia-treated silage ration.

The results of this experiment indicate that Cold-Flo anhydrous ammonia is efficiently utilized as a nonprotein nitrogen source with forage sorghum silage. Further research is necessary with other low energy silages to confirm this original finding and expand the beneficial uses of this inexpensive silage additive for producers.



Anhydrous ammonia was applied to chopped forage sorghum using the Cold-Flo system.

[1] Trial conducted at the Southeast South Dakota Experiment Farm, Beresford, South Dakota.

Introduction

The application of liquid anhydrous ammonia to corn plant material has been demonstrated by several agricultural experiment stations to be a highly effective and economical means of increasing the crude protein content of corn silage.

In order to apply anhydrous ammonia as a liquid, a condensation chamber (Cold-Flo Converter) has been developed which converts pressurized gaseous ammonia to a super-cold liquid. This has the advantage of decreasing losses of the ammonia during application. This system has been patented by USS Agri-Chemicals and has received FDA approval for use with "freshly chopped corn plant material" as a source of nonprotein nitrogen However, research with other types of silages is lacking.

The objective of this study was to evaluate the feedlot performance of cattle fed Cold-Flo anhydrous ammonia-treated forage sorghum silage or untreated (control) silage supplemented with soybean meal at time of feeding. Since forage sorghum is lower in energy than corn silage, it was of great interest to determine whether ammonia would be efficiently utilized as a crude protein source with this type of silage.

Procedures

Late planted Pioneer 956 forage sorghum was harvested in late October, 1978, and ensiled in two 18 x 50 feet concrete air-tight silos. One silo was filled with untreated (control) silage, while the other had liquid anhydrous ammonia applied to the silage at the blower. An anhydrous ammonia field applicator equipped with a regulator supplied the ammonia. A Cold-Flo Converter was connected between the regulator and the forage intake of the blower.

Initially, several loads of chopped forage sorghum were weighed and their unloading times measured. From this information, the average unloading rate was calculated, and the ammonia regulator flow rate set to apply about 10 lb. of ammonia per ton of silage. However, the amount of anhydrous ammonia ultimately applied averaged 12.5 lb. per ton due to variations in regulator efficiency and unloading rate. The forage sorghum yielded 9.2 tons per acre with an average dry matter content of 36%. Crude protein content of the control silage averaged 7.9% on a dry basis.

One hundred Black Angus steers from a single herd in western South Dakota were used for the study. The short yearlings were allotted into four pens of 25 head each with shrunk body weights obtained after an 18-hour stand without feed and water. The steers were housed in an enclosed barn with access to outside concrete lots. All steers were implanted with Ralgro, poured with a half dose of Warbex for lice control and wormed with a TBZ feed additive prior to the start of the trial on March 30, 1979. One animal died of pneumonia during the trial.

Two pens of cattle received a full feed of control silage plus 2 lb. of soybean meal and 6 lb. of cracked corn per head daily, while the other two pens were full fed the anhydrous ammonia-treated silage plus 8 lb. of cracked corn per head daily. All cattle received 1 ounce of a high iodine trace mineral salt to control foot rot and .5 lb. of a custom supplement per head

per day. The supplement consisted of 65% ground corn, 22% dicalcium phosphate, 10% trace mineral salt and 3% of a Rumensin-vitamin A premix to provide 200 mg. of Rumensin and 30,000 I.U. of vitamin A per head daily. All steers received 1 lb. of a 38% protein supplement, 2.5 lb. of alfalfa hay and .2 lb. of a high level antibiotic (AS-700) per head daily during the first 4 days of the trial.

Results

The results of the 91-day trial are presented in the table. Average daily gains of the steers fed the two silages were very similar (2.24 vs. 2.18 lb.). However, the cattle fed the anhydrous ammonia-treated forage sorghum consumed about 7.5 lb. (24%) less silage than the control silage fed steers, while maintaining comparable weight gains. Thus, the total pounds of feed required per pound of gain was about 17.5 lb. with the control silage and about 14.6 lb. with the ammonia-treated silage (as fed basis), or about 16.7% better feed efficiency with the latter ration.

These results suggest that anhydrous ammonia is an effective silage additive for forage sorghum. However, additional studies are necessary to confirm these original research findings. It should be noted that the Cold-Flo anhydrous ammonia treatment of forage sorghum is not technically approved by FDA at this time.

Table 1. Effectiveness of Cold-Flo Anhydrous Ammonia With Forage Sorghum Silage

Item	Control silage	Ammonia-treated silage
No. of steers	50	49
Initial shrunk wt., lb.	625.9	623.4
Final shrunk wt., lb.	829.8	821.7
Avg. daily gain, lb.	2.24	2.18
Avg. daily ration, lb. (as fed)		
Silage	30.80	23.33
Cracked corn	6.02	7.87
Soybean meal	1.86	--
Supplement	.52	.52
Trace mineral salt	.05	.05
Total	39.25	31.77
Lb. feed/lb. gain (as fed)		
Silage	13.74	10.71
Cracked corn	2.69	3.61
Soybean meal	.83	--
Supplement	.23	.24
Trace mineral salt	.02	.02
Total	17.51	14.58