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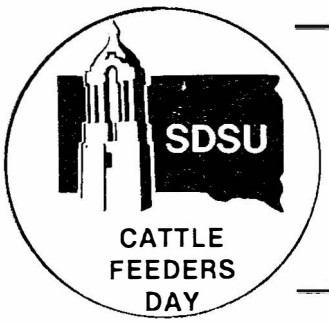

UNTREATED AND MICROBIAL INOCULATED CORN SILAGE IN HIGH SILAGE RATIONS FOR BEEF STEERS

R. M. Luther And J. Nothnagel

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Summary

A total of 56 feeder steers were divided into four weight groups to compare untreated silage and silage inoculated with a Lactobacillus acidophilus fermentation product. The steers were fed a diet of 80% corn silage and 20% supplement (32% protein) on a dry basis for a period of 125 days.

Steers from two lighter weight groups fed the inoculated silage made faster weight gains and were more efficient converters of dry matter than steers fed the untreated silage. With the two heavier weight groups, the gains were poorer with the treated silage. The results of all groups indicate essentially no difference in feedlot performance between the silage treatments. Preservation of dry matter was about the same for inoculated silage as for untreated silage.

Introduction

Results of research reported a year ago (CATTLE 81-3) indicated that corn silage inoculated with a Lactobacillus acidophilus fermentation product had lower temperatures during the fermentation period than untreated silage. Lactic and volatile fatty acid formation was also higher for the treated silage. Dry matter recovery was only slightly higher for the treated silage. Digestibility of dry matter, crude protein and organic matter by beef steers was similar for treated and untreated silage.

The purpose of this experiment was to determine the effect of inoculating corn forage of high dry matter content with a Lactobacillus acidophilus fermentation product. Response to inoculation was compared with untreated silage in terms of feedlot performance of beef steers fed high silage rations. Preservation of silage dry matter and chemical quality were also determined.

Procedures

Corn forage from the 1980 corn crop was harvested with a conventional field chopper in early October. Moisture determinations on loads of forage ranged from 36.5 to 54.5% with an average of 42.2%. Water was added at the blower from a garden hose.

Two concrete stave silos (16 x 35 ft) were the storage structures. A forage blower was installed at each silo and alternate loads of forage were stored until a silo was filled. One blower was equipped with a Gandy

applicator calibrated to dispense one pound of Lactobacillus acidophilus fermentation product (Sila-Bac Silage Inoculant[a]) per ton of forage. About 68 tons of untreated forage was ensiled in one silo while 82 tons of inoculated forage was stored in the other. The difference in amounts of material stored was caused by the presence of a silo unloader in the silo containing the untreated forage. An unloader was later installed in the silo containing the inoculated silage. The silos were opened for feeding in mid-June of 1981. Silage for each feeding day was removed from the silos and transported to the feedlot by truck. The truck was equipped with two plywood boxes which held the feed supply for one day.

A total of 56 steers of Hereford, Angus and exotic breeds and breed crosses were used in the experiment. Shrunk weights of steers ranged from 640 to 876 pounds. The steers were stratified into four weight groups and the steers from each group were allotted into two pens of seven steers each. The steers were full fed a high roughage ration of alfalfa haylage for about six weeks before being placed on experiment. After the steers were individually identified, they were implanted with 36 mg of Ralgro. They were injected with Clostridium chouvoei-septicum-novyi-sordelli bacterin and given a Warbex pour-on treatment. Initial and final weights were recorded following an 18-hour stand without feed and water. Filled weights were recorded at 28-day intervals during the 125-day trial.

The silages were fed in quantities such that accumulation of refusals was minimal. A pelleted protein supplement was fed to contribute 20% of the ration dry matter. Samples of untreated and treated silage and supplements were collected twice weekly for moisture determinations and other chemical analysis. The rations were adjusted weekly to maintain the ratio of supplement dry matter to silage dry matter. Composition of the supplement was soybean meal (44%) 57.0%; ground corn, 34%; trace mineral salt, 3.6%; and dicalcium phosphate, 5.4%. The supplement was formulated to contain 32% protein, 1.42% calcium and 1.55% phosphorus. Vitamin A was added to provide 10,700 International Units (IU) per pound of supplement.

The experiment was terminated as the supply of untreated silage was exhausted. All cattle were then fed treated silage to empty the silo in order to determine dry matter preservation.

Results

Feedlot performance summarized by weight groups is presented in table 1. Steers in group I (700 lb) fed the microbial-treated corn silage consumed less ration dry matter but gained more rapidly than steers fed the untreated silage. Feed requirements were also lower for the steers on this treatment. Steers in weight group II (750 lb) gained faster when fed the treated corn silage than steers fed the untreated silage. The cattle also consumed more dry matter and were more efficient in feed conversion than the steers fed the untreated silage. Performance of steers in weight group III (800 lb) and IV (850 lb) was generally poorer with the microbial inoculated silage than with the untreated silage. Steers in group IV consumed less of the treated silage dry matter which appeared to reduce weight gains.

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[a] Pioneer Hi-Bred International, Microbial Products Division.

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TABLE 1. UNTREATED AND MICROBIAL INOCULATED CORN SILAGE FOR FEEDLOT STEERS (JUNE 18 TO OCTOBER 21, 1981--125 DAYS)

	Silage treatment	
	Untreated	Microbial inoculated[a]
	Weight group I	
No. animals	7	7
Initial shrunk wt, lb	694	695
Final shrunk wt, lb	983	995
Avg daily gain, lb	2.31	2.40
Avg daily ration (dry), lb[b]	23.29	22.20
Feed/100 lb gain (dry), lb	1008	925
	Weight group II	
No. animals	7	7
Initial shrunk wt, lb	749	748
Final shrunk wt, lb	1037	1067
Avg daily gain, lb	2.30	2.55
Avg daily ration (dry), lb[b]	23.99	25.38
Feed/100 lb gain (dry), lb	1043	995
	Weight group III	
No. animals	7	7
Initial shrunk wt, lb	801	801
Final shrunk wt, lb	1095	1068
Avg daily gain, lb	2.35	2.14
Avg daily ration (dry), lb[b]	23.70	24.49
Feed/100 lb gain (dry), lb	1009	1144
	Weight group IV	
No. animals	7	7
Initial shrunk wt, lb	857	856
Final shrunk wt, lb	1172	1140
Avg daily gain, lb	2.52	2.27
Avg daily ration (dry), lb[b]	27.56	23.77
Feed/100 lb gain (dry), lb	1094	1047
	All weight groups	
No. animals	28	28
Initial shrunk wt, lb	775	775
Final shrunk wt, lb	1072	1068
Avg daily gain, lb	2.37	2.34
Avg daily ration (dry), lb[b]	24.64	23.96
Feed/100 lb gain (dry), lb	1040	1024

[a]Silabac Silage Inoculant, Lactobacillus acidophilus fermentation product, 1 lb/ton forage.

[b]80% corn silage, 20% protein supplement.

The results averaged over all weight groups tend to nullify the improved performance observed with the lighter weight cattle (groups I and II) with the poorer performance of the heavier weight cattle (groups III and IV). Rate of gain, feed consumption and efficiency of gains with steers fed the treated silage were essentially the same as those observed with the untreated silage.

The magnitude of differences in weight gains of steers fed either the treated or the untreated silage is not uncommon between replications treated alike. Therefore, the average response shown at the bottom of the table is perhaps more representative of the treatment response.

The gains and feed efficiencies are respectable for cattle fed corn silage and a protein supplement. This experiment was conducted with silage which was drier than normal silage. Further research is needed with the additive under conditions in which the moisture content is more typical of normal silages.

The corn forage harvested and ensiled in this study had an average dry matter content of 58%. This is well below that recommended for ensiling corn forage. The quantity of water added did not raise the moisture content appreciably. Both silos were equipped with metal roofs, but this allowed some precipitation to penetrate the silage. When the silos were opened for feeding, the silage at the top was extremely dry (75% dry matter) and remained dry during the first month of the feeding trial. The microbial treated silage averaged about 4 percentage units higher in dry matter than the untreated silage to the last month of feeding. During this period, the silage was being taken from the bottom portion of the silo and dry matter content of the two silages averaged 52%. Because of the time of the year in which the silage was fed and the small quantity removed each day, the silage on the top surface probably was drier than normal. It is not uncommon to see the moisture content of surface samples differ by 3 to 4% because the silage dries between feedings. Chemical analyses of weekly silage samples are presently in progress.

Dry matter recovery of the experimental silages is presented in table 2. The percentage dry matter available for feeding was about the same for treated as untreated silage. Spoilage from the top layer of silage was small for being in storage for over eight months. Total dry matter loss (spoilage and nonrecoverable silage) was about the same for the untreated and treated silages.

TABLE 2. DRY MATTER RECOVERY OF CORN SILAGE AS AFFECTED BY A MICROBIAL SILAGE INOCULANT

	Untreated	Microbial inoculated[a]
Total dry matter ensiled, lb	77,230	94,854
Total dry matter of feed silage, lb	72,622	89,849
As a percent of dry matter ensiled, %	94.03	94.72
Dry matter losses, lb		
Spoilage	320	1,120
As a percent of dry matter ensiled, %	0.42	1.18
Nonrecovered, lb	4,288	3,885
As a percent of dry matter ensiled, %	5.55	4.10

[a]*Lactobacillus acidophilus* fermentation product applied at 1 lb per ton of forage.