Calculation of value of the gain and return above feed cost showed a similar potential profit for the three groups of calves, with the unweaned calves the highest.

There was no sickness among the unweaned calves during the trial, while several calves in the weaned groups suffered from mild respiratory infections; 3 calves in the drylot group and 1 calf in the trap group required treatment with antibiotics.

If the calves in this experiment had been sold on the basis of ranch weights, there would have been no advantage in preweaning. The weaned calves actually returned less above feed costs than the unweaned calves, and presented more risk from sickness. Had the calves been hauled to market, the weaned calves should have had some advantage in regaining hauling shrink due to better eating and drinking at the market.

There was no advantage in these trials for preweaning calves in terms of increasing returns above feed costs. Had the calves been marketed at a central or auction market, the results might have been somewhat different. Furthermore, if calves were being sold direct, the possible superior performance of weaned calves might result in repeat sales, or possibly a premium, in subsequent years.

Methods of Harvesting and Processing the Sorghum and Corn Plants for Finishing Cattle

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Story in Brief

Yearling steers were used to compare four rations: (1) dry-harvested milo plus corn silage, (2) dry-harvested milo plus sorghum stover (silage or dry), (3) high-moisture-harvested milo plus corn silage, and (4) high-moisture-harvested corn plus corn silage. A supplement was added to all rations. The replacement of corn silage with sorghum stover resulted in little change in daily gain (0.1 lb. less), but a 9.3 percent improvement in feed efficiency. Steers on high-moisture-harvested milo or corn gained 10 percent faster and 19.0 and 23.9 percent more efficiently, respectively, than steers on dry milo. Net energy values followed the same trends as feed effiicency. Carcass traits were not significantly affected by rations.

In cooperation with USDA Agri. Research Service, Animal Husbandry Research Division.

Introduction

Sorghum grain (milo) is the principle feed grain produced in the Panhandle areas of Oklahoma and Texas at the present time. However, with the increasing use of irrigation, corn production is increasing and the future outlook is for a continued increase in production of this feed grain. The predicted competition between the sorghum and corn grains raises questions that need to be answered regarding their production capacities and relative feeding values.

Research studies in Oklahoma and elsewhere have pointed to the relatively inefficient utilization of milo by beef cattle. This has stimulated a search to find methods of preparation that will increase the efficiency of utilization of the feed grains, particularly the sorghums. Results obtained with high-moisture grains for beef cattle in research and in the feedlot have been encouraging. Expensive structures have not been required for the satisfactory preservation of these high-moisture-harvested grains when stored in the ground form. Both ground milo and ground corn harvested at about 30 percent moisture have been preserved in large conventional concrete floored trench silos with very little loss from spoilage.

When the grain is harvested at a moisture content of about 30 percent, the forage portion of the plant is relatively green and at a moisture content of about 65 percent. This level of moisture in the forage is adequate for satisfactory preservation as ensilage and the nutritive value of the potential feed source for feedlot cattle needs to be determined.

The agronomic phase of the present study was designed to study and measure the comparative yield of dry matter from the conventional and high moisture (30 percent) harvested milo the efficiency of harvesting of high moisture corn and milo grains, and the storage of these grains from harvesting to feeding.

The feedlot phase of the study was designed to measure the relative feeding value of the following ration treatments:

1. Dry harvested milo plus corn silage
2. Dry harvested milo plus sorghum stover silage
3. High-moisture-harvested (HMH) milo plus corn silage
4. High-moisture-harvested (HMH) corn plus corn silage.

Materials and Methods

This experiment was conducted at Panhandle State College at Goodwell, Oklahoma. Sixty head of 690 lb. yearling Hereford steers were used in a 142-day feeding trial. Four representative steers were selected from the initial group of 60 steers for initial body composition measurements. The remaining 56 head were divided into eight groups of seven steers each according to body weight and conformation. These weight groups were randomly assigned to the four ration treatments listed above, two replicates per treatment. The steers on Treatment 2 received sorghum stover silage the first 46 days, then dry sorghum stover the remaining 96 days.

The HMH corn and milo contained 25 to 30 percent moisture when harvested. These grains were ground through a conventional type hammer mill using a three-eighths in. screen and blown into two small above ground horizontal concrete trench silos. The silos were 50 ft. x 4 ft. x 4 feet. The ground grains were packed by tramping as they were blown into the silos. Grain in the filled silos was covered with polyethelene sheeting and green chopped sorghum and corn forage. A sheet of the polyethelene was placed next to the grain, then six to eight in. of the green chop was added, and then another sheet of polyethelene was placed over the green chop. Used tires were placed on top to protect against wind.

The ration of all steers consisted of ground grain, silage or stover, and supplement, plus plain block stock salt free choice. The steers were to receive 80 percent of their daily dry matter intake from the concentrate portion of the ration and 20 percent from the forage portion. The protein supplement shown in Table 1 was fed at a constant level of 1.6 lb. per steer per day throughout the feeding period. Initially, the steers were started on a concentrate: roughage ratio of 50:50 on a dry matter basis; this ratio was gradually changed during a 28-day period to an 80:20 concentrate: roughage ratio.

The four steers selected for the initial body composition measurements were slaughtered after a 16-hr. shrink without feed and water. Initial body composition was estimated from carcass specifc gravity using the procedure outlined by Lofgreen *et al.* at the California Station.

Initial and final weights in the feeding trial were taken after a 16-hr. shrink. All steers were slaughtered at the end of the feeding period and

Table 1. Ingredient Makeup of the Supplement.

Ingredient	Amount (Percent)
Dehydrated alfalfa meal (17%)	37.0
Soybean meal (50%)	40.0
Urea (45% nitrogen)	10.0
Stock salt	5.0
Dicalcium phosphate	2.0
Calcium carbonate	6.0
	100.0
Aureomycin	87 gms/ton
Stilbestrol	12 gms/ton

final body composition estimated by the specific gravity method. Other pertinent carcass data were also collected. The net energy value of the rations was calculated from feed consumption and body composition data.

Results and Discussion

The HMH milo and corn grains were harvested four and three weeks, respectively, prior to the initiation of the feeding trial. When the silos were first opened, only a very small amount of spoilage was observed in the first four to six in. layer at the entrance. Very little additional spoilage was encountered. The appearance of the corn was similar to that at the time of ensiling while the milo was somewhat darker in color. Both grains had a pleasant yeasty aroma and were moist and crumbly. There was a slight but distinct odor difference between the corn and milo with the sorghum having more of an alcohol aroma than the corn.

Periodic dry matter determinations of the ensiled grains and other ration ingredients were made and are shown in Table 2. There was very little change in the moisture content of the HMH grains as they were fed from the silo; the corn was particularly consistent in dry matter content.

No difficulty was encountered in bringing the steers to a full feed, with no difference due to ration treatment noted. No digestive disturbances were noted at any time during the feeding trial and visual signs of bloat and urinary calculi were absent.

The feedlot performance of the steers is shown in Table 3. The steers on the dry milo-corn silage ration gained on excellent 2.9 lb. per

Table 2. Dry Matter of Feeds in Percent.

Date	Corn Silage	Sorghum Stover Silage	Sorghum Stover	HMH Corn	HMH Milo	Dry Harvested Milo	Supplement
11-14-67	23.03			68.17	70.90		
12-12-67	30.06	33.04		71.65	75.18	87.73	93.05
12-19-67	39.17	32.97		70.91	75.64	88.76	92.63
1- 4-68	26.83	33.23		70.78	74.65	87.29	93.05
1-11-68	25.23		79.11	71.11	74.71	83.23	92.28
1-19-68	25.67		73.22	71.25	76.42	88.13	93.69
1-26-68	27.16		83.18	70.92	71.56	88.39	93.73
2- 1-68	27.39		82.81	70.71	70.80	87.97	93.63
2- 8-68	25.58		87.21	71.57	70.20	88.34	93.59
2-15-68	25.48		79.07	70.11	73.26	87.60	93.29
2-22-68	24.25		81.97	70.49	73.79	88.27	93.92
2-29-68	24.96		82.71	71.11	73.58	88.16	93.16
3- 7-68	28.70		85.92	71.10	74.25	88.12	93.36
3-15-68	26.93		86.18	71.11	74.90	87.96	93.84
Average	27.17	33.08	82.14	70.79	73.56	87.69	93.32

Table 3. Feedlot Performance and Net Energy Data.

	Treatment			
	Dry Milo Corn Silage	Dry Milo Sorghum Stover	HMH Milo Corn Silage	HMH Milo Corn Silage
No. steers	14	14	14	14
Initial wt., lb.	701	682	671	706
Final ft., lb.	1116	1081	1125	1156
Daily gain, lb.	2.9	2.8	3.2	3.2
Daily feed, lb.[1]				
Grain	18.6	17.2	16.4	15.2
Silage	5.6	4.0	5.3	5.0
Supplement	1.6	1.6	1.6	1.6
Total	25.8	22.8	23.3	21.8
Feed/lb. gain, lb.[1]				
Grain	6.52	6.20	5.16	4.80
Total	9.05	8.21	7.33	6.89
Net Energy Data (megcal. per 100 lb.)				
NEm+p of total ration	55.4	59.4	64.4	71.1
NEm+p of grain	58.0		70.6	80.1
NEm of grain	62.4		78.6	89.6
NEp of grain	41.6		52.4	59.7

[1] All feed values are expressed on a 90% dry matter basis.

day on 9.05 lb. feed per lb. of gain, a rather normal feed conversion for the type of ration and size of steers involved. The steers on the dry milo-sorghum stover ration gained only slightly less, but consumed 3.0 lb. less feed per day, consequently their feed efficiency was 9.3 percent better. This result was unexpected. It should be noted that the concentrate: roughage ratio was higher for the dry milo-sorghum stover ration than for the dry milo-corn silage ration, because less of the dry sorghum stover was consumed. It is also possible that a slower passage of the dry stover ration in the digestive tract resulted in a higher digestibility of the dry milo-sorghum stover ration.

The steers on both HMH grains gained about 10 percent faster than those on dry milo. This advantage in gain for high moisture grain has been observed in some but not all other trials.

The advantage in feed efficiency for the HMH grains over dry milo was even more striking since rate of gain was up and feed intake was down. The HMH milo and corn rations were utilized 19.0 and 23.9 percent more efficiently than dry milo. A dry corn treatment was not used in this trial, but a current trial at Goodwell includes a comparison of dry vs. HMH shelled corn as well as dry vs. HMH ground ear corn.

The net energy values of the rations determined from feed consumption and body energy gain is shown in Table 3. The net energy values are very consistent with the feed conversion figures which were observed. The HMH milo-corn silage ration contained 64.4 megcal. of NEm+p per 100 lb. milo — which was 16.2 percent greater than the value of 55.4 obtained for the dry milo-corn silage ration. The HMH corn-corn silage ration had a value of 71.1 megcal. of NEm+p per 100 lb., 28.3 percent greater than the value for the dry milo-corn silage ration and 10.4 percent greater than the value for the HMH milo-corn silage ration. Calculation of NEm+p, NEm, and NEp of the grain portion of the ration resulted in even greater advantages for the HMH grains. It is not known whether the greater net energy value of the HMH grains was due to an improvement in digestibility, an improvement in utilization of digested nutrients, or both. Previous work at the Oklahoma and Texas Stations has shown that high moisture milo is digested to a greater degree than dry milo.

There was an increase of 7.2 percent in the NEm+p value of the dry milo-sorghum stover ration compared to the dry milo-corn silage ration.

The carcass characteristics of the steers on the ration treatments are shown in Table 4. There was no significant treatment effect on any of the carcass traits measured.

Table 4. Carcass Data.[1]

	Treatment			
	Dry Milo Corn Silage	Dry Milo Sorghum Stover	HMH Milo Corn Silage	HMH Milo Corn Silage
Dressing %[2]	60.9	61.1	60.7	60.7
Carcass Grade[3]	9.7	10.4	10.6	9.9
Ribeye Area, sq. in.	11.4	11.8	11.4	11.9
Fat Thickness, in.	.66	.68	.72	.71
Marbling[4]	14.8	16.4	17.0	14.9
Cutability,[5] %	48.4	49.0	48.1	48.3

[1] Treatment did not significantly affect any of the carcass traits ($P < .05$).
[2] Calculated on the basis of final shrunk weight (Goodwell) and chilled carcass weight (Okla. City).
[3] Carcass grade: low choice=10, average choice=11, high choice=12.
[4] Marbling: 11=slight, 14=small, 17=modest.
[5] Estimated from ribeye area, fat thickness, kidney fat and carcass weight.

Grinding Milo Before vs After Reconstitution

Dennis White, James Newsom, Vincent Neuhaus
and Robert Totusek

Story in Brief

Milo reconstituted and stored in the whole form, then ground before feeding (reconstituted-ground), was compared to milo which was ground before being reconstituted and stored (ground-reconstituted) and both were contrasted to dry finely ground milo. Compared to dry milo, the reconstituted-ground milo produced 11.6 percent greater gain and 9.0 percent better feed efficiency, whereas the ground-reconstituted milo produced 1.8 and 3.5 percent decrease in gain and efficiency, respectively. Apparently, at the moisture level used in this trial, milo must be in the whole form to benefit from reconstitution.

Introduction

Milo is the best source of feed grain for fattening cattle in the Southwest; as the number of cattle fed in the Southwest increases, milo will increase in importance as an energy source.

High moisture processing (both high moisture harvesting and reconstituting) of milo has received considerable attention as a method of improving utilization over the dry product. Reconstituting milo (adding water to air-dry milo to raise the moisture to about 30 percent, followed by storage under oxygen-free conditions) has increased feed efficiency an average of 8 percent in previous research. In some comparisons the improvement has been greater. There are still many unanswered questions concerning the optimum conditions of harvesting storing, processing and feeding high moisture milo.

Reconstituted milo is usually stored in either an upright air-tight structure or packed in a trench silo to exclude air. The upright structure is versatile in that the wet grain can be stored in either whole or ground form. However, due to packing problems, the wet whole grain cannot be satisfactorily stored in a trench silo without considerable spoilage.

This experiment was designed to determine the effect of storage form (ground vs. whole) on the subsequent utilization of milo in a fattening ration. The following three milo processing methods were compared: (1) fine ground, grinding of dry milo, (2) reconstituting of whole milo, followed by storage for 21 days, followed by grinding before feeding (reconstituted-ground), and (3) grinding of dry milo, followed

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