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K. Bolsen

J. Oltjen

H. Ilg

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Milo stover, forage sorghum, and protein levels compared for growing calves

Abstract

Milo stover silage, baled silo stover or forage sorghum silage was fed in 10, 12, or 14% protein rations to 120 calves in a 95-day growing trial, December 9, 1976, to March 14, 1977. Calves fed forage sorghum silage outperformed those fed milo stover silage or baled milo stover. Ensiled and baled milo stover supported similar performances. Calves fed 10% protein gained slower and less efficiently than those fed 12 or 14% protein. Observed gain and efficiency for a ration containing equal parts of milo stover silage and forage sorghum silage exceeded predicted gain and efficiency by 7.8% and 15.4%, respectively.

Keywords

Cattlemen's Day, 1978; Report of progress (Kansas State University. Agricultural Experiment Station); 320; Beef; Milo stover; Forage sorghum; Protein; Calves

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Milo Stover, Forage Sorghum, and Protein
Levels Compared for Growing Calves

Keith Bolsen, Jim Oltjen, and Harvey Ilg

Summary

Milo stover silage, baled milo stover or forage sorghum silage was fed in 10, 12, or 14% protein rations to 120 calves in a 95-day growing trial, December 9, 1976, to March 14, 1977.

Calves fed forage sorghum silage outperformed those fed milo stover silage or baled milo stover. Ensiled and baled milo stover supported similar performances. Calves fed 10% protein gained slower and less efficiently than those fed 12 or 14% protein. Observed gain and efficiency for a ration containing equal parts of milo stover silage and forage sorghum silage exceeded predicted gain and efficiency by 7.8% and 15.4%, respectively.

Introduction

Milo stover and forage sorghum silages were compared in four previous heifer growing trials at this station (Prog. Rpt. 210, 230, 262, and 291, Kansas Agr. Expt. Sta.). Results show: (1) growing calves fed milo stover silage should gain about 1.0 lb. per day and require 10 to 14 lbs. of dry matter per lb. of gain, (2) milo stover silage has a feeding value of 63 to 67% that of forage sorghum silage, (3) milo stover silage is a better feed for growing calves fed in combination with forage sorghum silage than when fed alone, and (4) supplying supplemental protein is a large cost in milo stover silage rations because the stover usually contains so little protein.

This trial was to verify previous results from feeding a combination of milo stover and forage sorghum silages, to compare ensiled and dry-baled milo stover, and to evaluate three levels of supplemental protein in milo stover growing rations.

Experimental Procedure

Shown below are the four forage treatments and three protein levels compared in the 95-day growing trial (December 9, 1976, to March 14, 1977).

<u>Forage treatment</u>	<u>Protein, % of the ration</u>
Milo stover silage (MSS)	10, 12, and 14
Baled milo stover (BMS)	10, 12, and 14
Forage sorghum silage (FSS)	12
$\frac{1}{2}$ MSS + $\frac{1}{2}$ FSS	10, 12, and 14

One hundred and twenty calves (91 heifers and 29 steers) averaging 462 lbs. were allotted by breed, sex, and weight into 20 pens of six calves each. Breeds included Angus, Hereford, Angus x Hereford, and Hereford x Simmental. Two pens were assigned to each of the 10 rations. Compositions of the rations are shown in Table 15.1. All rations were formulated on a fixed percentage basis to be equal in minerals, vitamins, and additives, and all were mixed and fed to appetite twice daily.

All calves were fed the same amount of prairie hay for 5 days before initial weighing and the same amount of experimental ration for 2 days before final weighing. All feed and water were withheld 16 hours before weights were taken.

Forage sorghum was a high-grain variety harvested in the dough-stage at 68 to 70% moisture. Milo stover was from dry-land milo and the grain had been harvested about 30 days before stover was harvested. The forage sorghum and milo stover silages were stored in concrete silos (10 ft. x 50 ft.). The baled milo stover was swathed and field-dried before baling in large rectangular and round bales about 1500 to 2000 lbs. each. Milo stover silage was about 65% moisture at harvest; baled milo stover, about 30 to 35% moisture at harvest. Some heating occurred in the bales but mold and visual deterioration were not excessive. The baled stover was processed in a tub grinder before being fed.

Results

Dry matter (%), crude protein (% DM basis), and crude fiber (% DM basis), respectively, for the three forages were: 36.9, 4.3, 32.8 for milo stover silage; 71.6, 3.6, 35.4 for baled milo stover, and 31.9, 5.2, 23.7 for forage sorghum silage.

Performances of calves fed each ration are shown in Table 15.2. Forage sorghum silage (12% protein) supported faster and more efficient gains than the 12% protein rations of the other three forage treatments.

Performances of calves fed milo stover silage, baled milo stover, or MSS + FSS average across protein levels are shown in Table 15.3. Calves fed MSS + FSS gained faster ($P < .05$) and more efficiently ($P < .05$) than those fed milo stover silage or baled milo stover. Ensiled and baled stover supported similar performances although feed intake was higher ($P < .05$) for milo stover silage than for baled milo stover.

Performances of calves fed each protein level averaged across forage treatments are shown in Table 15.4. Calves receiving 10% protein gained slower ($P < .05$) and less efficiently ($P < .01$) than calves receiving 12 or 14% protein. Performance was similar for the 12 and 14% protein rations. There were no interactions between forage treatment and protein level. However, the milo stover silage and baled milo stover rations gave more response to additional protein than did the MSS + FSS rations. Daily feed costs and feed cost per lb. of gain can be estimated for calves fed each level of protein. When the price of soybean meal is low compared with the price of grain, the economic advantage of feeding 12 or 14% protein is greater than it is when the price of soybean meal is high compared with the price of grain.

Observed gains and feed efficiencies for the 100% MSS (12% protein) and 100% FSS (12% protein) rations were used to calculate predicted gain and efficiency for the 50% MSS + 50% FSS (12% protein) ration (Table 15.5). Observed gain exceeded predicted gain by .10 lb. per day or 7.8%, and observed feed efficiency exceeded predicted efficiency by 1.86 lbs. of feed per lb. of gain or 15.4%. These results agree with results from two previous trials at this station that showed 10.7% improved gain and 12.8% improved feed efficiency by feeding combinations of milo stover and forage sorghum silages.

Table 15.1. Compositions of rations and supplement used to compare milo stover, forage sorghum, and protein levels.

Ingredient	Rations ¹			
	100% MSS	50% MSS 50% FSS	100% FSS	100% BMS
Milo stover silage	73.0	36.5	--	--
Forage sorghum silage	--	36.5	73.0	--
Baled milo stover	--	--	--	73.0
Milo + soybean meal concentrate	22.0 ^a	22.0 ^a	22.0	22.0 ^a
Supplement ²	5.0	5.0	5.0	5.0

¹% on a 100% dry matter basis.

²Lbs. per ton, air-dry basis: rolled milo, 1675; dicalcium phosphate, 122; limestone, 50, salt, 100; fat, 20; trace minerals, 5; antibiotic, 23, and vitamin A premix, 5.

^aRatio of milo and soybean meal adjusted to provide 10, 12, and 14% protein.

Table 15.2. Performances of calves fed the 10 rations for the 93-day trial, December 9, 1976, to March 14, 1977.

Item	Forage treatment and protein %									
	FSS		MSS		BMS			MSS + FSS		
	12	10	12	14	10	12	14	10	12	14
No. of calves	12	12	12	12	12	12	12	12	12	12
Initial wt., lbs.	469	474	457	457	459	464	469	471	468	455
Final wt., lbs.	629	546	539	548	625	548	570	590	589	594
Avg. total gain, lbs.	160	72	82	91	66	84	81	119	121	139
Avg. daily gain, lbs.	1.68	.76	.87	.95	.70	.89	.85	1.25	1.38	1.46
Avg. daily feed, lbs.										
FSS	11.02	--	--	--	--	--	--	5.20	5.14	5.49
MSS	--	9.70	9.67	9.54	--	--	--	5.20	5.14	5.49
BMS	--	--	--	--	8.77	9.35	9.07	--	--	--
milo	1.13	1.49	.74	--	1.15	.52	--	1.71	.91	--
soybean meal	2.19	1.46	2.17	2.53	1.39	2.30	2.74	1.41	2.18	3.30
supplement	.75	.67	.66	.65	.80	.64	.62	.71	.70	.75
total	15.09	13.41	13.24	13.07	13.01	12.81	12.43	14.23	14.07	15.03
Feed/lb. of gain, lbs. ¹	8.98	17.83	15.21	13.75	17.43	14.47	14.76	11.43	10.24	10.30

¹100% dry matter basis.

Table 15.3. Performances of calves fed forage treatments: MSS, BMS, or MSS + FSS.

Item	Forage treatment		
	MSS	BMS	MSS + FSS
No. of calves	36	36	36
Avg. daily gain, lbs.	.86 ^b	.81 ^b	1.36 ^a
Avg. daily feed, lbs. ¹	13.24 ^b	12.42 ^c	14.44 ^a
Feed/lb. of gain, lbs. ¹	15.60 ^b	15.55 ^b	10.66 ^a

¹100% dry matter basis.

a,b,c Means in the same row with different superscripts differ significantly (P<.05).

Table 15.4. Performances of calves fed the three protein levels.

Item	Protein %		
	10	12	14
No. of calves	36	36	36
Avg. daily gain, lbs.	.90 ^b	1.05 ^a	1.09 ^a
Avg. daily feed, lbs. ¹			
forage	9.66	9.76	9.87
milo	1.45	.72	--
soybean meal	1.45	2.22	2.97
supplement	.66	.67	.67
total	13.22	13.37	13.51
Feed/lb. of gain, lbs.	15.55 ^d	13.31 ^c	12.94 ^c

¹100% dry matter basis.

a,b Means in the same row with different superscripts differ significantly (P<.05).

c,d Means in the same row with different superscripts differ significantly (P<.01).

Table 15.5. Observed vs. predicted rates and efficiencies of gain by calves fed 100% MSS, 50% MSS + 50% FSS, or 100% FSS.

Item	Ration		
	100% MSS	50% MSS 50% FSS	100% FSS
No. of calves	12	12	12
<u>Avg. daily gain, lbs.</u>			
observed	.87	1.38	1.68
predicted	--	1.28	--
improvement, lbs. ¹		+ .10	
improvement, %		+7.8	
<u>Feed/lb. of gain, lbs.</u>			
observed	15.21	10.24	8.98
predicted		12.10	
improvement, lbs. ¹		-1.86	
improvement, %		+15.4	

¹Observed minus predicted.