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Forage Sorghum Silage and Summer Annual Silage and Hays for Growing Steers and Heifers

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Summary

Sorghum-Sudan hay and silage and sudangrass hay were compared with forage sorghum silage in an 80-day growing trial involving 60 calves. Calves fed forage sorghum gained 14% faster than those fed sudangrass hay ($P < .05$). Calves fed either of the two silages consumed less feed ($P < .05$) but were more efficient ($P < .05$) than those fed either of the two hays.

This and two previous trials indicate that early-harvested summer annual silages and hays produce similar rates of gain but that silages are used 10 to 20% more efficiently by growing cattle. These forages have 75 to 90% of the relative feeding value of average-quality forage sorghum silage. With crude protein content of 12 to 15%, our summer annuals required little, if any, supplemental protein.

Introduction

In four previous trials, summer annuals produced high-yielding, high-quality forages when harvested early. (Progress Reports 320, 350, and 377, Kansas Agricultural Expt. Station).

We continued evaluating those forages by comparing an early-harvested summer annual silage and two early-harvested summer annual hays with forage sorghum silage in growing rations.

Experimental Procedure

Four forages harvested in the summer and fall, 1980, were compared: 1) forage sorghum (Dekalb FS-25a+) was direct-cut in the soft dough stage at 28 to 30% dry matter and ensiled between October 6 and 9 in a 14 ft x 60 ft concrete stave silo; 2) Sorghum-sudan (Dekalb 7a+) was swathed with a mower-conditioner in a late-vegetative growth (July 10) before heads emerged. Alternate windrows were harvested after a 24-hr wilt and ensiled at 35% DM (range, 29.0 to 44.7%) in a 10 ft x 50 ft concrete stave silo; 3) remaining windrows were turned twice, allowed to field-wilt over a weekend, and baled; and 4) sudangrass (Northrup King Trudan-6) was harvested for hay at the same time and by the same methods as was sorghum-sudan. Both hays were made into 70 to 80 lb bales, stored under cover, and chopped with a tub grinder with a 2-inch screen before being fed.

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For the sorghum-sudan forage treatment, six nylon bag and six plastic container silages were made from wilted material obtained from load 4 (29.0% DM) and load 8 (42.9% DM) (see page 7, this Progress Report).

Each of the four forages was fed to 15 Hereford and Simmental steer and heifer calves (three pens of five calves) during an 80-day growing trial. Silages and hays were full-fed along with 2.0 lb of supplement per calf daily (air-dry basis). Supplements were formulated to bring the rations (dry basis) to 12.0% crude protein (all natural), .45% calcium, and .35% phosphorus and to provide 30,000 IU of vitamin A and 70 mg of aureomycin per calf daily. Rations were fed twice daily, with forage and supplement mixed in the bunk.

All calves were weighed individually, after 16 hr without feed or water, at the start and at the end of the trial. Intermediate weights were taken before the a.m. feeding on days 28 and 56.

Silage aerobic stability (bunk life) was determined as described on page 7 of this Progress Report.

Results

Chemical analyses and silage aerobic stabilities are shown in Table 8.1. Silages were well preserved and were relatively high in lactic acid. Crude fiber values were similar for all forages, but the three summer annuals averaged 3.6 percentage units higher crude protein than did the forage sorghum. Both silages were highly stable in air. Forage sorghum silage heated on day 9; sorghum-sudan silage, on day 13.

Table 8.2 shows that calves fed forage sorghum silage outperformed those fed sorghum-sudan silage or hay and calves fed sudangrass hay had the poorest performance. Dry matter consumption averaged 25% higher for the two hays than for the two silages; however, hays were used far less efficiently.

Table 8.1. Chemical analyses of the four forages and aerobic stability of the two silages.

Item	Forage sorghum silage	Sorghum-sudan		Sudangrass hay
		silage	hay	
Dry matter, %	28.77	32.42	90.10	90.48
pH	3.78	4.26	--	--
NH ₃ -N*	3.75	5.37	--	--
		% of the DM		
Ash	9.03	10.91	9.50	9.62
Crude protein	9.42	14.68	12.49	11.98
Crude fiber	25.25	27.77	25.90	24.99
Lactic acid	5.03	4.86	--	--
Acetic acid	2.01	2.30	--	--
Propionic acid	.37	.38	--	--
Butyric acid	.34	.03	--	--
Day of initial rise above ambient temp.**	9.0	13.3	--	--
Maximum temp., C	37.2	26.7	--	--
Loss of DM after 14 days, % of DM exposed to air	10.1	1.8	--	--

*NH₃-N expressed as a percent of total nitrogen.

**1.5 C rise above ambient (18.3 C).

Table 8.2. Performance by steers and heifers fed the four silage and hay rations.

	Silage		Hay	
	forage sorghum	sorghum- sudan	sorghum- sudan	sudangrass
No. of calves	15	15	15	15
Initial wt., lb	482	480	477	475
Final wt., lb	625	606	602	576
Avg. daily gain, lb	1.78 ^a	1.57 ^a	1.56 ^a	1.26 ^b
Avg. daily feed intake, lb ²				
silage	11.93	11.47	--	--
hay	--	--	15.47	14.62
supplement	1.80	1.80	1.80	1.80
total	13.73 ^b	13.27 ^b	17.27 ^a	16.42 ^a
Feed/lb of gain, lb ²	7.73 ^a	8.47 ^b	11.01 ^c	13.00 ^d

¹ 80-day trial: January 5 to March 26, 1981.

² 100% dry matter basis.

a,b,c,d Values with different superscripts differ significantly (P<.05).