



Department of Animal and Range Sciences
CLAYTON LIVESTOCK RESEARCH CENTER

PROGRESS REPORT

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Effect of Roughage Source and Level on Performance by Finishing Steers

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Several studies have been conducted at the Clayton Livestock Research Center to examine the effects of roughage source and level in corn diets for growing/finishing cattle (Progress Reports 69 and 74). In an attempt to further investigate roughage source and level combinations, the present experiment evaluated either alfalfa or sorghum sudangrass hay (SSH) as roughages in a steam-flaked milo-based concentrate diet fed to finishing steers.

One hundred thirty-two crossbred (British x Continental) steers (average initial BW = 690 lb) were used. All steers had been adapted to a 90% concentrate diet before starting the experiment. Steers were weighed on two consecutive days at the start of the trial and assigned randomly to one of four treatments within light, medium, and heavy weight blocks. Steers were sorted to 12 pens with 11 steers per pen (three pens per treatment). Each steer was implanted with Synovex S¹ and vaccinated with a seven-way clostridial on the first of the two initial weigh days. Ingredient and chemical composition of the four treatment diets is shown in Table 1. Diets were formulated to contain 1) 5% SSH, 2) 7.5% SSH, 3) 10% SSH, and 4) 10% alfalfa as the roughage source/level. Steers were fed once daily in quantities sufficient to allow ad libitum consumption and weighed at 28-day intervals throughout the trial. Steers in the light and medium weight blocks were reimplanted with Synovex S on day 84. The heavy-block steers were taken off trial after 84 days on feed, the medium-block steers after 112 days on feed, and the light-block steers after 140 days on feed.

Diet samples were taken weekly to determine dry matter (DM) content, ground, and analyzed for chemical constituents. Treatment contrasts were analyzed to compare alfalfa vs sudangrass hay, and linear and quadratic effects of sudangrass hay level.

Performance data throughout the experiment are shown in Table 2. During the first 84 days, steers fed sudangrass hay as the dietary roughage grew more rapidly ($P < .01$) than those fed alfalfa. This difference in gain between alfalfa vs the three levels of sudangrass also was evident for the overall feeding period ($P < .05$). Our previous research (Progress Report 69) indicated that heifers gained less when fed alfalfa than when fed sudangrass hay in whole-shelled corn-based diets. Final body weights of cattle fed sudangrass were greater ($P < .05$) than of those fed alfalfa. This difference was significant ($P < .05$) between those fed alfalfa and those fed the 7.5% sudangrass hay diet.

Table 1. Ingredient and chemical composition of concentrate diets fed to beef steers (dry matter basis)

Ingredient, %	Treatment ^a			
	S-5	S-7.5	S-10	A-10
Sorghum sudangrass hay	4.85	7.27	9.70	-
Alfalfa hay	-	-	-	10.88
Whole-shelled corn	16.31	15.82	15.33	15.67
Steam-flaked milo	64.61	62.68	60.73	62.05
Soybean meal	1.98	1.98	1.98	-
Molasses	5.06	5.07	5.07	5.04
Fat	2.00	2.00	2.00	1.99
Limestone	1.01	1.02	1.02	1.01
Dicalcium phosphate	.65	.65	.65	.65
Salt	.51	.51	.51	.51
Urea	.49	.49	.49	.48
Ammonium sulfate	.51	.51	.51	.50
Premix ^b	2.01	2.02	2.02	2.01
Dry matter	94.41	93.78	94.62	94.23
Ash	4.49	4.84	5.52	5.36
Crude protein	11.5	12.2	12.5	12.0
Acid detergent fiber	8.36	8.59	9.31	9.64
Calcium	.58	.62	.76	.77
Phosphorus	.36	.39	.40	.38

^a S-5 = 5% sorghum sudangrass hay; S-7.5 = 7.5% sorghum sudangrass hay; S-10 = 10% sorghum sudangrass hay, and A-10 = 10% alfalfa hay.

^b Hominy feed-based premix consisted of .42% vitamin A (30,000 USP units/g), .15% vitamin E (500,000 IU/kg), 5% trace mineral (4.4% Mn, .30% I, .20% Co, 6.6% Fe, 1.3% Cu, 12.0% Zn, and 20.0% Mg), 1.16% monensin (132 g/kg), and .28% tylosin (220 g/kg).

Dry matter intake was consistently greater throughout the trial with sudangrass than with alfalfa ($P < .05$). Within levels of sudangrass, daily DM intake increased ($P < .05$) quadratically ($P < .05$ for days 0 to 84; $P < .10$ for overall feeding period). Steers fed the 7.5% sudangrass hay diet gained faster and consumed slightly more DM throughout the experiment than those fed either 5 or 10% sudangrass. In our previous experiments (Progress Reports 69 and 74), feed intake was greater with sudangrass hay diets than with alfalfa diets. Feed-to-gain ratio did not differ among the roughage source/levels throughout the trial, although steers fed 5% sudangrass hay diet were slightly more efficient than those in other treatments. This finding contrasts our previous research with corn-based diets (Progress Report 74), in which steers fed sudangrass as the roughage were less efficient than those fed alfalfa.

¹We thank Syntex Animal Health, Inc. for supplying the Synovex S and Elanco Products Co. for supplying Rumensin and Tylan used in this experiment.

We conclude that at the same percentage of roughage in the dietary DM, diets with sudangrass will result in greater DM intake than those with alfalfa; this effect is consistent with milo- and corn-based diets.


Based on the similar ($P > .10$) feed intake by cattle fed 10% alfalfa and those fed 5% sudangrass, it seems that sudangrass has approximately two times the roughage value of alfalfa in high-concentrate finishing diets.

Table 2. Influence of roughage source and level on performance by beef steers

Item	Treatment ^a				A vs SSH	SSH level	SE ^b
	S-5	S-7.5	S-10	A-10			
No. of steers (pens)	33(3)	33(3)	33(3)	33(3)	-	-	-
Initial BW, lb	690.3	689.6	691.0	689.5	NS	NS	1.5
Final BW, lb	1034.2	1041.6	1030.6	1009.9	.05	NS	9.4
Daily gain, lb							
d 0 to 84	3.2	3.3	3.2	2.9	.01	NS	.09
d 0 to end	3.1	3.2	3.1	2.9	.05	NS	.10
Daily dry matter intake, lb/steer							
d 0 to 84	15.9	17.2	16.6	15.3	.01	Q, .05	.28
d 0 to end	16.4	17.4	17.0	15.9	.05	Q, .10	.32
Feed-to-gain							
d 0 to 84	5.2	5.0	5.2	5.3	NS	NS	.11
d 0 to end	5.2	5.4	5.5	5.5	NS	NS	.11

^a S-5=5% sorghum sudangrass hay, S-7.5=7.5% sorghum sudangrass hay, S-10=10% sorghum sudangrass hay, and A-10=10% alfalfa hay. Probability level for contrasts: A vs SSH=alfalfa vs sudangrass hay, and SSH level = quadratic (Q) or linear (L) effect of sudangrass hay.

^b Standard error.


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