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Department of Animal and Range Sciences

CLAYTON LIVESTOCK RESEARCH CENTER

PROGRESS REPORT

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Effects of Switching Steam-Flaked Corn and Steam-Flaked Milo During the Finishing Period on Performance and Carcass Characteristics of Beef Steers[1]

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Corn and milo are the two most common grain sources fed by feedlots in the Great Plains region of the United States. Feedlots frequently switch grain sources on a least-cost basis. Data are limited evaluating the effects of switching grain sources during the finishing period on performance by finishing beef cattle. Our objective was to evaluate the effects of switching steam-flaked corn and steam-flaked milo on day 56 of the finishing period on performance and carcass characteristics of beef steers.

This study was conducted concurrently with Progress Report No. 100 "Effects of proportions of steam-flaked corn and steam-flaked milo on performance and carcass characteristics of finishing beef steers." Seventy-two medium-framed beef steers (British x Continental) were selected from a group of 370 steers and used to study the effects of switching grain sources during the finishing period on performance and carcass characteristics. An additional seventy-two steers fed either steam-flaked corn (100:0) and steam-flaked milo (0:100) from Progress Report No. 100 were used for comparisons. Hence, a total of 144 steers were used in the present study. Steers were sorted by body weight (**BW**) into heavy and light blocks. The steers had previously grazed improved pastures or were fed a 90% concentrate diet at restricted intake during a growing program at the Clayton Livestock Research Center. Steers were adapted to a 90% concentrate diet for at least 2 weeks. Approximately 2 weeks before the start of the experiment, steers were weighed, implanted with Synovex-S, and vaccinated with a Clostridial antigen. One week before the start of the experiment, steers were treated for internal and external parasites with Ivomec pour-on and fed a 90% concentrate diet in an amount sufficient to provide ad libitum consumption. Steer BW were obtained, and steers were sorted into their respective pens on d 0. Steer BW were stratified such that pens had an equal average BW. Treatments were assigned randomly to eight pens, resulting in four pens of nine steers each per treatment. Treatments included feeding steam-flaked corn for the entire finishing period (**CORN**), feeding steam-flaked corn for 56 days followed by steam-flaked milo for the remainder of the finishing period (**SFC/SFM**), feeding steam-flaked milo for 56 days followed by steam-flaked corn for the remainder of the finishing period (**SFM/SFC**), and feeding steam-flaked milo for the entire finishing period (**MILO**). Diets were 90% concentrate (Table 1). Bushel weight of the steam-flaked corn and steam-flaked milo was determined at 2-hour intervals during the flaking process and averaged 28 lb/bu for both grains. Feed bunks were evaluated visually each day of the trial at 0730 to determine the amount of feed to offer each pen. The bunk management approach was designed to allow for 0 to .5 kg of unconsumed feed per pen. Computer records for each pen were available when feed bunks were evaluated. Samples of dietary ingredients were taken every 2 weeks during the experiment to determine DM content. Steers were weighed individually at 28-day intervals throughout the experiment. At each 28-day weigh

Table 1. Composition (% of DM) of finishing diets

	Diet[a]	
Ingredient	CORN	MILO
Sudangrass hay	10.31	10.28
Whole corn	10.13	12.59
Steam-flaked corn	63.44	-
Steam-flaked milo	-	64.81
Soybean meal	3.79	-
Molasses	5.34	5.31
Fat (yellow grease)	3.14	3.14
Limestone	.76	.76
Dicalcium phosphate	.50	.51
Salt	.30	.31
Urea	1.02	1.02
Ammonium sulfate	.25	.25
Premix[b]	1.02	1.02

[a] CORN = Steam-flaked corn; MILO = Steam-flaked milo.

[b] Premix contained (DM basis): wheat midds (90.253%), Vitamin A - 30,000 IU/g (.665%), Vitamin E - 500 IU/g (.27%), Rumensin-80 (1.687%), Tylan-40 (1.125%), and trace mineral package (6%). Trace mineral package contained (DM basis): calcium iodate (.269%), cobalt carbonate (.362%), copper sulfate (3.268%), ferrous sulfate (19.445%), magnesium oxide (29.762%), manganous oxide (6.944%), zinc sulfate (28.169%), wheat midds (7.831%), and mineral oil (3.95%).

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Table 2. Effects of pre-shipping versus arrival medication with tilmicosin phosphate (Micotil®) on health and performance by beef steers

Item	Treatment			SE[a]	Contrast[b]	
	Control	Pre-shipping	Arrival		1	2
No. of steers	32	31	32			
Day 0 body weight, lb	486.5	502.2	488.8	6.50		
Day 35 body weight, lb	577.0	597.5	586.5	11.61	NS	NS
Daily gain, lb						
Days 0 to 7	1.85	3.19	2.34	.478	NS	NS
Days 7 to 21	1.63	1.56	1.98	.353	NS	NS
Days 21 to 35	3.96	3.72	3.82	.212	NS	NS
Days 0 to 35	2.60	2.73	2.79	.193	NS	NS
Daily dry matter intake, lb/steer						
Days 0 to 7						
Hay	4.36	4.59	4.38	.153	NS	NS
Concentrate	1.77	3.15	2.31	.349	.07	NS
Total	6.14	7.74	6.69	.267	.02	.04
Days 7 to 21	9.58	10.71	10.52	.320	.03	NS
Days 21 to 35	15.07	14.82	15.12	.696	NS	NS
Days 0 to 35	11.09	11.76	11.60	.363	NS	NS
Feed/gain						
Days 0 to 7	3.49	2.44	3.46	.643	NS	NS
Days 7 to 21	6.32	7.52	5.26	1.285	NS	NS
Days 21 to 35	3.81	4.00	3.97	.168	NS	NS
Days 0 to 35	4.31	4.35	4.16	.224	NS	NS
Morbidity						
No. treated	23	14	15			
% treated	71.9	45.2	46.9		.02	.90
Week treated, % of treated[c, d]						
1	65.2	21.4	46.7			
2	30.4	50.0	33.3			
3	4.4	28.6	20.0			
Repulls, no.[e]	9	2	4			
Repulls,						
% of calves treated	39.1	14.3	26.7		.14	.42

[a]Pooled standard error of treatment means, n = 3 pens per treatment.
[b]Observed significance level of contrasts: 1 = Control versus medication; and 2 = Pre-shipment versus arrival medication.
[c]Week 1 = Days 1 to 7; Week 2 = 8 to 14; Week 3 = 15 to 21.
[d]Chi-square ($P < .10$).
[e]Calves treated two times for respiratory disease.

period, feed bunks were swept, and any feed remaining in the bunk was weighed and its DM content determined. At the 56-day weigh period, light-block steers were re-implanted with Synovex-Plus; heavy-block steers were not re-implanted. Steers in the heavy block were deemed to have sufficient finish after 84 days on feed and were shipped to a commercial slaughter facility. Light-block steers were shipped to a commercial slaughter facility on day 147. Carcass characteristics obtained included hot carcass weight, ribeye area, percentage of kidney, pelvic, and heart fat, fat thickness measured between 12th and 13th rib, marbling score, and yield grade.

Daily DM intake, daily gain, feed:gain ratio, calculated NE_m, NE_g, and ME values (NRC, 1996), and carcass data were analyzed as a randomized block design with pen as the experimental unit.

Performance data are shown in Table 2. Differences were noted among treatments for average daily gain during days 0 to 28 (CORN versus the average of SFC/SFM and SFM/SFC; $P < .10$). These differences are reflected in decreased average daily gain by cattle fed steam-flaked milo compared with those cattle fed steam-flaked corn. However, these data also demonstrate the normal variation that occurs in feeding steam-flaked corn diets. During days 0 to 28, both the CORN and SFC/SFM treatments were fed steam-flaked corn; however, the SFC/SFM group had numerically decreased average daily gain compared with the CORN group. For the overall experiment, average daily gain was decreased for the average of SFC/SFM and SFM/SFC compared with CORN ($P < .10$). No differences ($P > .10$) were observed in daily DM intake during the experiment. Switching grain sources during the finishing period had a negative influence on the feed:gain ratio for days 0 to 28 ($P < .10$) and for the overall experiment ($P < .05$) compared with continuous feeding of steam-flaked corn (CORN; Table 2). Likewise, calculated (NRC, 1996) NE_m, NE_g, and ME were decreased by the average of SFC/SFM and SFM/SFC compared with CORN.

No differences ($P > .10$) were noted among treatments for hot carcass weight, dressing percent, ribeye area, percentage of kidney, pelvic and heart fat, fat thickness, or marbling score (Table 2).

Results from the present experiment suggest that switching grain sources during the finishing period may have detrimental effects on performance. In addition, there seemed to be no benefit from switching from steam-flaked milo to steam-flaked corn during the finishing period.

Literature Cited

NRC. 1996. Nutrient Requirements of Beef Cattle (7th Ed.). National Academy Press, Washington, DC.

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Table 2. Effects of switching grain sources during the finishing period on performance and carcass characteristics of beef steers

Item	Treatment[a]				SE[b]	Contrast[c]
	CORN	SFC/SFM	SFM/SFC	MILO		
Initial BW, lb	783.7	789.6	789.3	779.8	2.66	
Final BW, lb	1,266.6	1,232.2	1,244.2	1,246.6	13.12	NS
Daily gain, lb						
Days 0 to 28	5.66	5.24	4.77	5.07	.24	1 (.10)
Days 28 to 56	4.33	3.69	4.22	4.15	.23	NS
Days 56 to 84	3.73	3.47	3.85	3.78	.22	NS
Days 84 to 112	3.38	3.04	3.22	3.42	.18	NS
Days 112 to 140	3.46	3.30	3.35	3.62	.19	NS
Days 0 to end	4.25	3.92	4.02	4.08	.12	1 (.10)
Daily DM intake, lb/steer						
Days 0 to 28	19.93	19.80	19.24	20.21	.54	NS
Days 28 to 56	23.43	22.05	23.57	23.57	.62	NS
Days 56 to 84	22.48	22.11	23.03	24.33	.51	NS
Days 84 to 112	20.28	20.45	20.86	21.67	.44	NS
Days 112 to 140	19.92	19.89	20.85	21.53	.65	NS
Days 0 to end	22.04	21.47	22.13	22.78	.44	NS
Feed:gain						
Days 0 to 28	3.52	3.78	4.05	4.02	.16	1 (.10)
Days 28 to 56	5.43	5.99	5.67	5.78	.26	NS
Days 56 to 84	6.11	6.47	6.01	6.48	.38	NS
Days 84 to 112	6.01	6.75	6.49	6.33	.26	NS
Days 112 to 140	5.76	6.03	6.23	5.97	.19	NS
Days 0 to end	5.17	5.49	5.50	5.58	.11	1 (.05)
NE_m, Mcal/kg of dietary DM	2.22	2.16	2.14	2.10	.03	1 (.10)
NE_g, Mcal/kg of dietary DM	1.54	1.49	1.47	1.44	.02	1 (.10)
ME, Mcal/kg of dietary DM	3.23	3.16	3.13	3.08	.04	1 (.10)
Hot carcass wt, lb	767.1	749.3	756.9	754.6	7.70	NS
Dressing percent	63.2	63.4	63.4	63.1	.37	NS
Ribeye area, sq. in.	13.89	13.51	13.71	13.79	.19	NS
KPH, %	2.33	2.26	2.29	2.28	.03	NS
Fat thicknes, in.	.44	.44	.46	.42	.04	NS
Marbling score[d]	39.3	40.5	42.2	43.1	1.02	NS
Yield grade	2.54	2.57	2.59	2.46	.13	NS
Choice + Prime, %	52.8	51.4	69.4	66.7		NS

[a]CORN = Fed steam-flaked corn based diet for entire finishing period; SFC/SFM = Fed steam-flaked corn for 56 days and switched to steam-flaked milo for the remainder of the finishing period; SFM/SFC = Fed steam-flaked milo for 56 days and switched to steam-flaked corn for the remainder of the finishing period; MILO = Fed steam-flaked milo based diet for entire finishing period.

[b]Pooled standard error of treatment means, n = four pens per treatment for days 0 to 28, 28 to 56, 56 to 84 and 0 to end; n= two pens per treatment for days 84 to 112 and 112 to 140.

[c]Observed significance level (in parentheses) for contrasts. Contrasts evaluated were: 1) CORN versus the average of SFC/SFM and SFM/SFC; 2) SFC/SFM versus SFM/SFC; and 3) average of CORN and MILO versus the average of SFC/SFM and SFM/SFC. NS = non-significant (P > .10).

[d]30 = Slight^0; 40 = Small^0; 50 = Modest^0.