EFFECTS OF GROWING DIETS AND GRAZING REGIMEN ON FEEDLOT PERFORMANCE AND CARCASS TRAITS

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Story in Brief

One hundred sixty, 463 pound, crossbred steer and bull calves were randomly allocated into 4 winter growing treatments for 84 days. Calves in Treatment 0.0 grazed dormant native range and were offered 4.7 pounds of a 38% protein supplement three days a week; Treatments 1.0, 1.5, and 2.0 were program-fed (net energy basis) a high concentrate ration to gain 1.0, 1.5, and 2.0 pounds daily, respectively. Observed gains were 1.53, 2.01 and 2.54 lbs/day. During the summer grazing season, calves were either double stocked and grazed for 84 days intensive early stocking (IES) or single stocked and grazed seasonlong (SLS) for 153 days. Following these grazing periods, cattle (IES average weight 677 pounds; SLS 743 pounds) were placed in the feedlot. Daily gains in the feedlot of both pasture treatments were similar (IES 4.13; SLS 4.17 lb/day), however, feed intake was 16% less for the IES than the SLS cattle (25.7 vs 29.2 lb/day). As a result, IES required 12.7% less feed per pound of gain. Neither the higher feed intake or lower efficiency of the SLS cattle can be explained by their higher initial feedlot weight. Programmed feeding before grazing compared to winter grazing, increased initial weight at the time cattle entered the feedlot with a 49 pound difference between the highest and lowest treatments. At slaughter, this difference had again increased to 75 pounds. Body composition of all treatment groups at slaughter were similar. Thus, the higher gains during the winter period produced heavier cattle and carcasses. Level of programmed feeding level did not alter feedlot daily gain or feed efficiency.

(Key Words: Backgrounding, Calves, Program-fed, Grazing Systems, Feedlot Performance.)

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Introduction

Programmed feeding of energy dense diets during the growing phase allows one to restrict feed intake to match desired rate of gain. Per unit of net energy supplied, concentrates usually are priced lower than forages, require less labor to handle and to feed and maintain a more consistent nutrient profile than do forages. In contrast, in conventional growing programs one feeds low energy diets to restrict energy intake and thereby attains a desired rate of gain. Feedlot and carcass performance may be altered by the previous growing program. Compared to those grown on low energy diets, calves grown on high energy diets were more efficient during both the growing and finishing phases (Merchen et al., 1986, Pritchard, 1987; Goldy et al., 1988); moreover, they tended to have higher quality and yield grades, and a greater degree of kidney, pelvic, and heart fat (McCarthy et al., 1985).

The objectives of this study were to evaluate the effects of programmed feeding of high energy diets to growing calves during winter and summer grazing periods as well as examine subsequent feedlot performance and carcass merit.

Materials and Methods

The experimental procedures for the winter and grazing portion of this experiment were discussed in last year's research report (McLean et al., 1990). During the programmed feeding portion of the experiment, 160 cattle were stratified by weight and randomly divided into 8 groups of 20 each. Two groups were combined and released to pasture (0.0) where they were wintered on dormant range grass for 84 days and fed 4.7 lbs per head of a 38% protein range cube three times a week. The remaining 6 groups (2 pens per group; 20 steers per pen) were assigned to gain 1.0, 1.5 or 2.0 lbs per day for 84 days. The program-fed cattle were fed once daily (Table 1). The amounts fed are indicated in Table 2. All pens had an adequate amount of

Table 1. Ingredient composition of program-fed diet -- Experiment One.

Ingredient	% As Fed
Corn, #2 (Whole)	81.08
Supplement	18.92

Table 2. Programmed feed intake.

	Pounds dry matter intake/day Treatment		
Days	1.0	1.5	2.0
1-14	7.04	8.35	9.74
15-28	7.19	8.61	10.14
29-42	7.33	8.87	10.54
43-56	7.48	9.13	10.93
57-70	7.63	9.38	11.32
71-84	7.77	9.63	11.71

bunk space to allow all steers to eat simultaneously. After 84 days, each pen was divided into two groups (10 animals each) and steers were assigned to either intensive early stocking (IES) or single stocking and grazing (SLS) treatments. The forage consisted of tallgrass prairies and was available in excess of demand. Following the grazing period and prior to shipment to the feedlot, all cattle were reimplanted with Synovex-S® and dewormed with Ivermectin. On July 18, 1989 the IES cattle were transported 310 miles to Panhandle State University for feedlot finishing; SLS cattle were shipped on September 26, 1989. The cattle were individually weighed as they came off the trucks, placed in 10 head pens with two replicate pens for each level of wintering for each of the two summer grazing systems. Program-fed cattle were penned with their original pen mates at the feedlot. The cattle were given ad libitum access to feed with fresh feed added twice daily throughout the feedlot phase. They were staged through a series of four diets to a 91% concentrate diet in 14 days (Table 3). In these diets, ground corn replaced alfalfa hay and cottonseed hulls (2 to 1 ratio) to achieve 50%, 60%, 70%, and 80% concentrate levels. Cattle were fed to a point at which experienced cattle buyers estimated the cattle should grade 70% choice and have a dressing percentage typical for their type. The IES cattle were fed for 142 days; SLS cattle were fed 128 days. The IES cattle were trucked to Booker, Texas (80 miles) for slaughter and collection of carcass data; SLS cattle were trucked to Dodge City, Kansas (120 miles) for slaughter. All feedlot gains and feed efficiencies were adjusted to a standard dressing percentage (64%).

Effects of wintering treatment and pasture type (IES vs SLS) on feedlot measurements were tested statistically. The only interaction between wintering and grazing classes was in overall feedlot daily gain.

Table 3. Feedlot diet composition (final diet).

Item	Diet %	Supplement %
Corn dry rolled	79.61	
Alfalfa hay ground	5.02	
Cottonseed hulls	3.90	
Cane molasses	4.38	
Cottonseed meal	3.55	50.08
Meat & bone meal	1.42	20.00
Corn distillers grains	.81	11.40
Salt	.35	5.00
Calcium carbonate	.35	4.49
Urea, 46% N	.30	4.20
Ammonium sulfate	.21	3.00
Vitamin A & D_3	---	.40
Monensin, 60 gram/454g	---	.25
Trace mineral premix	---	.20
Vitamin	---	.20

Results and Discussion

Performance of the cattle during the winter period is summarized in Table 4. The efficiency of feed utilization for the program-fed cattle was 34, 25, and 21% higher than expected for the respective 1.0, 1.5, and 2.0 lb per day targets. Much of the weight advantage gained by at the end of the wintering period was lost during the spring grazing phase (McLean et al., 1990). Weight of steers at entry into the feedlot reflected their winter treatments. Cattle programmed for 2.0 lbs per day weighed 49 lbs more than the dry wintered cattle. They remained 75 lbs heavier ($P<.05$) at slaughter. There was no evidence of compensatory gain for the cattle fed for slower gains. During the first 28 days on feed, ADG was greater ($P<.05$) for the cattle which had been program-fed during the winter period (5.80 vs 4.98) than for the cattle which had been wintered on dry grass.

In the feedlot phase (Table 5), the intensive early grazed (IES) cattle consumed less feed ($P<.05$) than the SLS cattle (25.1 vs 29.2) lb DM/day. Adjusted daily gains for the two groups were similar (IES=4.13 vs SLS=4.17); however, an interaction ($P<.05$) was detected for feedlot gain between winter and spring grazing treatments. Previous program feeding proved more advantageous for IES than SLS calves, perhaps because there

Table 4. 84-day dry winter or programmed feeding performance.

	Treatment			
	0.0	1.0	1.5	2.0
Allocation wt., lb	445	459	463	465
Off wt., lb	547.95[a]	586.10[b]	629.95[c]	676.07[d]
Total gain, lb	80.05[a]	126.85[b]	166.49[c]	211.20[d]
ADG, lb	.96[a]	1.53[b]	2.01[c]	2.54[d]
Avg daily feed, lb	---	7.41	9.00	10.71
Feed/gain, actual	---	4.87	4.53	4.26
Feed/gain, theoretical	---	7.40	6.00	5.36
Change in backfat Depth, in	.006[a]	.035[b]	.046[b]	.059[c]

[a,b,c,d]Means with different superscripts differ (P<.05)

was a shorter time interval for IES calves to forget how to eat concentrate diets. Feed efficiency differed (P<.05) being 6.05 for the IES and 6.93 for the SLS cattle. The major difference in these two groups was the much higher feed intake by SLS cattle especially those programmed to gain at faster rates during the wintering period. Differences in the carcass traits except weight were minor (Table 6). Although these cattle were uniform in weight at the start of the experiment (January, 1989), differences in body size were extreme at slaughter. The smallest steer in the SLS group weighed 1000 lbs; the largest weighed 1619 lbs. For IES cattle, the lightest steer weighed 966 and the heaviest weighed 1499 lbs. This diversity illustrates the difficulty in sorting cattle only once for an experiment that takes 13 months.

Compared to cattle with a short period of intensive grazing, cattle subjected to prolonged grazing (SLS) lost feedlot efficiency. Feed intake for the SLS cattle appeared excessive. Several checks were instigated during this study to ensure that the reported intakes were accurate. Occasionally pens of commercial cattle have feed intakes this high. Had the corn fed in this test been steam flaked, perhaps intakes and efficiency would have been better. Sindt et al. (1991) reported that steers grazed on bromegrass followed by sudangrass consumed 14.9% more feed and were 14.9% less efficient in the feedlot than cattle that grazed on bromegrass and then finished. Rapid gains during the first 28 days in the feedlot period for the calves that had been

Table 5. Live cattle performance -- feedlot period

	Growing Treatment				
		Programmed ADG, pounds			
	Dry wintered	1.0	1.5	2.0	Mean
Off pasture wt, lb					
IES[f]	697	714	745	772	732[d]
SLS[f]	763	778	789	818	787[e]
Initial feedlot wt, lb					
IES	649	669	690	702	677[d]
SLS	728	728	743	774	743[e]
Mean	689[c]	699[cb]	716[b]	738[a]	
Slaughter weight, lb*					
IES	1201	1295	1245	1313	1264
SLS	1260	1237	1311	1299	1277
Mean	1231[b]	1266[ab]	1278[ab]	1306[a]	
ADG, lb*					
IES	3.89	4.40	3.91	4.30	4.13
SLS	4.15	3.97	4.44	4.11	4.17
Mean	4.02	4.19	4.18	4.21	
Total gain, lb*					
IES	552	626	556	611	586
SLS	532	509	567	525	534
Mean	542	568	562	568	
Feed intake, lb					
IES	25.33	25.17	23.98	25.93	25.10[d]
SLS	26.67	26.70	32.42	31.08	29.22[e]
Mean	26.00	25.94	28.20	28.51	
Feed efficiency, lb*					
IES	6.47	5.67	6.10	5.96	6.05[d]
SLS	6.37	6.67	7.21	7.47	6.93[e]
Mean	6.42	6.17	6.65	6.72	

*Expressed as LSMEANS.

a,b,cMeans with different superscripts within winter feeding treatments differ ($P<.05$).

d,eMeans with different superscripts within summer grazing treatments differ ($P<.05$)

[f]IES = Intensive early stocking, SLS = seasonlong stocking

Table 6. Carcass characteristics.

	Growing Treatment				
		Programmed ADG, pounds			
	Dry wintered	1.0	1.5	2.0	Mean
Carcass weight, lb*					
IES[e]	768.6	829.0	797.1	840.6	808.8
SLS[e]	806.6	791.7	838.8	831.6	817.2
Mean	787.6[a]	810.2[ab]	817.9[ab]	836.0[b]	
% Choice*					
IES	52.77	53.33	40.00	60.00	51.5
SLS	50.00	76.25	51.66	61.11	59.8
Mean	51.39	64.79	45.83	60.56	
Marbling Score[f]					
IES	383	401	400	409	398.4
SLS	381	438	405	420	410.7
Mean	383	420	402	414	
REA, sq. in,*					
IES	13.38	14.00	12.97	13.64	13.5
SLS	13.62	12.73	13.60	13.03	13.3
Mean	13.45	13.37	13.29	13.34	
KPH, %*					
IES	1.94	2.00	1.95	1.95	2.0
SLS	2.04	2.02	1.83	1.77	1.9
Mean	2.00	2.02	1.90	1.86	
Yield Grade[g]					
IES	2.87	2.78	3.09	3.17	
SLS	2.96	3.22	3.12	3.27	
Mean	2.92	3.00	3.11	3.22	

*Expressed as LSMEANS.

a,b,c,dMeans with different superscripts within winter feeding treatments differ ($P < .05$).

[e]IES = Intensive early stocking, SLS = seasonlong stocking

[f]300-399 = Sight (Select); 400-499 = Small (Choice).

[g]USDA 1-5.

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