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EFFECT OF PREVIOUS GROWING PROGRAM ON THE BENEFITS OF
RESTRICTING FEED INTAKE DURING THE FINISHING PHASE

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CATTLE 88-5

Summary

Eight pens of cattle that had been limit-fed a high energy growing diet and eight pens that had been full-fed a high roughage growing diet were fed either ad libitum amounts of a finishing diet or 93% of ad libitum for the first 70 days of the finishing phase. From day 71 through slaughter, all cattle received ad libitum amounts of the finishing diet. Interactions between previous growing program and level of feed intake during the finishing phase were significant ($P < .05$). Restricting the intake of finishing cattle that had been grown using a limit-fed, high energy diet resulted in improved ($P < .05$) feedlot performance (3.58 vs 3.28 lb per head daily average daily gain, respectively) and efficiency (6.18 vs 7.11, respectively) over the ad libitum fed cattle. For the cattle that had been grown using a high roughage program, restricting the intake of finishing cattle resulted in poorer ($P < .07$) performance (2.83 vs 3.16 lb per head daily, respectively) and efficiency (7.88 vs 7.19, respectively) compared with the ad libitum fed cattle. Whether or not cattle respond to restricted intake finishing regimens may be dependent upon level of dry matter intake, dietary energy density or rate of gain during previous growing program.

(Key Words: Restricted Intake, Limit Feeding, Finishing Programs, Growing Programs.)

Introduction

Typically, cattle are full-fed high energy diets during the finishing phase. Maximum energy intake generally promotes the greatest average daily gain by cattle. Some researchers have suggested that feed conversion could be improved by restricting the intake of finishing cattle. Such an improvement may be the result of improved energy utilization and/or less feed waste.

Previous research conducted at the Southeast South Dakota Experiment Farm showed no benefits associated with restricting the intake of finishing cattle. Average daily gains were reduced and days on feed were increased for restricted intake cattle compared with full-fed controls. Feed conversion and calculated dietary net energy values were not improved by restricting feed intake.

Cattle involved in previous South Dakota trials had been limit-fed high energy diets during the growing phase prior to placement on the restricted finishing program. Information concerning interactions between limit-fed growing programs and restricting the intake of finishing cattle is needed. The objectives of this trial were to determine the effect of restricted intake during the finishing phase on cattle performance and energy utilization and to determine the effect of previous growing program on the benefits of restricting the intake of finishing cattle.

Materials and Methods

Sixteen, 8-head pens of yearling Angus steers that had been grown as described in CATTLE 88-4 of this report were blocked according to previous growing treatment and assigned to either a full-fed finishing program or a finishing program where intake was restricted to approximately 93% of ad libitum for the first 70 days. Cattle that had been on the limit-fed regimen during the growing phase were brought up to full feed of their limit-fed diet in 1 week. Then they were offered ad libitum amounts of the finishing diet or about 93% of ad libitum as appropriate to their assigned treatment (Table 1). Cattle that had been on the full-fed regimen during the growing phase were fed ad libitum amounts of step up diet one for 1 week followed by ad libitum amounts of step up

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diet two for one week (Table 1). Following this 2-week adjustment period, these cattle were offered ad libitum amounts of the finishing diet or about 93% of ad libitum as appropriate to their assigned treatment.

TABLE 1. DIETS FED TO STEERS DURING THE FINISHING PHASE

Ingredient ^a	Diet			
	Limit-fed grower	Step up one	Step up two	Finish
Whole shelled corn		17.08	30.65	40.87
Ground high moisture corn	69.19	17.25	30.65	40.87
Alfalfa-grass hay	8.67	27.44	15.36	6.66
Corn silage	8.67	32.73	18.49	6.66
Supplement				
Soybean meal	11.16	2.97	2.97	2.97
Limestone	1.00	1.05	1.05	1.05
Dicalcium phosphate		.17	.17	.17
Trace mineralized salt ^b	.80	.50	.50	.50
Molasses	.40	.09	.09	.09
Vitamins A, D and E ^c	.063	.05	.05	.05
Potassium chloride		.10	.10	.10
Rumensin 60 ^d	.024	.017	.017	.017

^a Percentage of diet dry matter.

^b Composition, minimum percentage, NaCl 96.0, Zn .350, Mn .209, Fe .200, Mg .150, Cu .003, I .007 and Co .005.

^c Composition, IU per lb, vitamin A 2,000,000, vitamin D 400,000, vitamin E 200

^d Composition, 60 grams monensin per pound.

Initial and final slaughter weights were obtained following an overnight withdrawal of feed and water. Unshrunk weights were obtained on days 29, 42, 70 and 84 of the finishing period. Previous work at the Southeast South Dakota Experiment Farm showed no differences in dressing percentage between restricted intake and full-fed cattle. Therefore, performance data were not adjusted to a standard dressing percentage. All cattle were implanted with Ralgro at the initiation of the finishing trial. Cattle were slaughtered on a pen basis when five of eight head in each pen reached an anticipated low choice grade.

Data were analyzed as a randomized design with a 2 x 2 factorial arrangement of treatments. Factors were previous treatment during the growing phase and finish treatment. Carcass fat thickness at the 12th rib was used as a covariate in the analysis.

Results and Discussion

Interactions between growing treatment and finishing treatment were significant (P<.05). Therefore, performance of steers for each treatment combination is displayed in Table 2. Restricting the intake of finishing cattle that were grown using a limit-fed, high energy diet resulted in improved (P<.05) feedlot performance (3.58 vs 3.28 lb per head daily average daily gain, respectively) and efficiency (6.18 vs 7.11, respectively) over the ad libitum fed cattle. For the cattle that were grown using a high roughage program, restricting the intake of finishing cattle resulted in poorer (P<.07) performance (2.83 vs 3.16 lb per head daily, respectively) and efficiency (7.88 vs 7.19, respectively) compared with the ad libitum fed cattle. Carcass characteristics were similar for all treatments.

Previous growing program influenced the response of cattle to the restricted intake finishing treatment. Cattle grown using a limit-fed, high energy diet responded favorably to the restricted intake regimen. These cattle were fed less dry matter, a higher energy diet and achieved greater average daily gains than cattle grown using a full-fed high roughage diet. It is not clear which of these items may be responsible for the favorable response.

TABLE 2. PERFORMANCE OF STEERS DURING THE FINISHING PHASE^a

Item ^c	Treatment ^b				Standard error
	LGRF	LGFF	FGRF	FGFF	
Initial wt, lb	783	786	757	752	6.28
Daily gain, lb	3.58	3.28	2.83	3.16	.09
DMI, lb	21.84	23.02	22.09	22.52	.48
F/G	6.12	7.01	7.83	7.15	.24
Days on feed	101	102	121	112	4.57
Slaughter wt, lb	1136	1117	1096	1103	8.48
HCW, lb	713	703	693	694	6.04
Fat thickness, in ^d	.67	.62	.57	.61	.03
Rib eye area, in ²	12.55	12.52	12.08	12.33	.26
Marbling score, units ^e	6.08	6.02	5.93	6.07	.15
Choice, %	86.51	96.87	94.29	100.00	3.81
Yield grade, units	3.17	3.13	3.19	3.13	.08

^a Least square means adjusted to a common fat thickness.

^b LGRF = limit-fed growing, restricted finishing; LGFF = limit-fed growing, full-fed finishing; FGRF = full-fed growing, restricted finishing; FGFF = full-fed growing, full-fed finishing.

^c DMI = dry matter intake, HCW = hot carcass weight.

^d Raw means.

^e Small^o = 5.00, modest^o = 6.00, moderate^o = 7.00.

Cattle limit-fed the high energy growing diet appeared to use metabolizable energy more efficiently than cattle full-fed the high roughage growing diet (.1242 vs .0956 lb gain per Mcal ME intake, respectively). This efficiency may have continued into the finishing phase for cattle fed restricted amounts of dry matter. Cattle fed to appetite during the finishing phase may not have retained this increased efficiency during the finishing phase. However, finishing trials conducted previously at the Southeast South Dakota Experiment Farm utilized limit-fed cattle and showed no benefit to restricting intake during the finishing phase. Cattle used in the previous studies were from the same cow herd as cattle used in this year's trial but had been grown at 2.7 lb per head daily and were 60 lb heavier at the start of the finishing phase.

The basic design of this trial needs to be repeated to establish if this interaction would be observed again. Particular care needs to be taken to equalize daily gains between the limit-fed and full-fed treatments during the growing phase. In addition, the intent of this finishing trial was to restrict dry matter intake to 93% of ad libitum for the first 70 days. Dry matter intake for the first 70 days for the restricted intake treatments were 94.5 and 96.3% of ad libitum for cattle grown using the limit-fed vs full-fed diets, respectively. This discrepancy needs to be corrected in future trials as well.