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Effects of Programmed Gain Feeding Strategies on Performance and Carcass Characteristics of Yearling Steers

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Effects of Programmed Gain Feeding Strategies on Performance and Carcass Characteristics of Yearling Steers

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Programming gain for the first 21 or 42 days of the feeding period reduced the total amount of feed consumed but did not improve cumulative performance compared with ad libitum feeding.

Summary

Two hundred forty-five crossbred yearling steers were used in a randomized complete block design to determine effects of including a programmed gain phase in the feeding period on performance and carcass characteristics. Including a programmed gain phase in the finishing period resulted in similar cumulative daily gains and feed conversions when compared with steers allowed to consume feed ad libitum. Programming gain reduced the total amount of feed consumed per animal; however, the lack of an improvement in feed conversion coupled with slight numerical differences in hot carcass weights resulted in net profits favoring ad libitum feeding.

Introduction

Previous research regarding controlling intake during the finishing period has focused on maintaining a static intake relative to ad libitum fed control pens. Improvements in efficiency have been demonstrated; however, daily gain may decrease, resulting in increased days on feed. Recent studies (Knoblich, et al., 1997, J. Anim. Sci., 75:3094; Loerch and Fluharty, 1998, J. Anim. Sci., 76:371) have shown similar daily gains, hot carcass weights and days on feed. At the same time, reductions in the amount of feed consumed result in improvements in efficiency.

Currently research on controlling intake during the finishing period has shifted toward programmed gain systems. Programmed gain systems are based on the net energy equations in the NRC (1996). Based on the diet being fed, a programmed rate of gain is selected and the amount of feed required to achieve the programmed rate of gain can be calculated.

In a previous study (1999 Nebraska Beef Report, pp 46-48), programmed

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Table 1. Composition of finishing diet.

Ingredient	% of diet DM
Dry-rolled corn	49
Wet corn gluten feed	40
Corn silage	8
Dry supplement	3

gain strategies were investigated in calves. Since yearlings tend to consume large quantities of feed, the objective of our study was to determine effects of including a programmed gain phase in the finishing period on performance and carcass characteristics of yearling steers.

Procedure

Two hundred forty-five crossbred yearling steers (868 lb) were blocked by weight into seven weight blocks and randomly assigned within block to one of five pens (7 head/pen). Each pen was randomly assigned to one of five treatments based on rate and duration of programmed gain. Control (Ad Lib) steers were allowed ad libitum access to feed for the entire finishing period. Programmed gain treatments were as follows: 2.4 lb/day for 21 days (2.4/21); 2.4 lb/day for 42 days (2.4/42); 2.8 lb/day for 21 days (2.8/21); 2.8 lb/day for 42 days (2.8/42). Following the programmed gain phase (either 21 or 42 days), steers were allowed to consume feed ad libitum. Intake required to achieve the programmed rate of gain was calculated using the net energy equations contained in the NRC (1996) computer model and were adjusted every 7 days.

Adaptation diets contained 57, 44, 32 and 18% corn silage (DM basis). The final diet (Table 1) was formulated to contain a minimum of 13.5% CP, .70% Ca, .35% P and .65% K, and contained 25g/ton Rumensin and 10 g/ton Tylan (DM basis). Steers were implanted with Revalor-S® at the beginning of the trial. Steers were slaughtered when the ad libitum control group was visually estimated to have reached .45 inches of fat over the 12th rib. Following a 24-hour chill, USDA yield grade, marbling score, and 12th rib fat thickness were recorded. Final weights were calculated by adjusting hot carcass weights to a common dressing percentage (63%). In an effort to adjust for gut fill differences, weights of steers consuming feed ad libitum were shrunk 4% to be used in programmed gain period performance calculations.

Results

Cumulative performance and performance during the programmed gain period is shown in Table 2. During the programmed gain period, feeding steers ad libitum resulted in higher ($P < .10$) feed consumption compared with steers in treatments that included a programmed gain phase. Daily gain was reduced ($P < .10$) in steers programmed to gain 2.4 or 2.8 lb/day for 21 days compared with steers fed ad libitum or steers programmed to gain 2.4 or 2.8 lb/day for 42 days. Steers fed to gain 2.4 or 2.8 lb/day for 42 days gained more rapidly than predicted while steers programmed to gain 2.4 or 2.8 lb/day for 21 days gained at or near predicted levels. The underprediction of gain is consistent with previous research in that as duration of the programmed gain period increases relative to the entire feeding period, daily gain exceeds predictions. Feed conversion was improved ($P < .10$) in steers programmed to gain 2.4 or 2.8 lb/day for 42 days compared with steers fed ad libitum or steers programmed to gain 2.4 or 2.8 lb/day for 21 days. Feed conversion was numerically increased in steers programmed to gain 2.4 lb/day for 21 days and increased ($P < .10$) significantly in steers programmed to gain 2.8 lb/day for 21 days compared with steers offered feed ad libitum.

Over the entire feeding period, feed consumption was higher ($P < .10$) in steers allowed to consume feed ad libitum throughout the feeding period. Steers programmed to gain 2.4 or 2.8 lb/d for the initial 21 days of the feeding period had similar cumulative DMI and both consumed more feed ($P < .10$) than steers programmed to gain 2.4 or 2.8 lb/day for the first 42 days. Steers programmed to gain 2.4 lb/day for the initial 42 days of the feeding period consumed less feed ($P < .10$) than all of the other treatments. Slight numerical differences in daily gain existed among the treatments; however, only steers programmed to gain 2.4 lb/day for the initial 42 days of the feeding period gained slower ($P < .10$) than steers offered feed ad libitum. There were no differences observed in feed conversion among the treatments. Differences in total feed consumed (lb/head) were reflective of the differences in DMI.

Currently, our hypothesis as to why we have been unable to detect a significant efficiency response in this and a previous trial (1999 Nebraska Beef Report, pp 46-48) is related to the nature of our finishing diets. In both of our programmed gain trials, wet corn gluten feed has been included in the diet at

Table 2. Effect of programmed gain on performance of yearling steers.

	Treatment					
Item	Ad Lib	2.4/21	2.4/42	2.8/21	2.8/42	SEM
Treatment Description						
ADG, lb	Maximum	2.4	2.4	2.8	2.8	
Duration, days	98	21	42	21	42	
Days on feed	98	98	98	98	98	
Pens	7	7	7	7	7	
Initial Wt., lb	868[a]	870[a]	863[b]	868[a]	871[a]	2
Final Wt., lb	1265[a]	1253[a]	1223[b]	1245[a]	1253[a]	9
Programmed Gain Period[c]						
DMI, lb/day	23.63[d]	17.97[e]	17.94[e]	19.55[f]	19.78[f]	.18
ADG, lb	3.34[de]	2.33[f]	3.16[e]	2.44[f]	3.69[d]	.16
Feed/Gain	7.2[d]	8.1[de]	5.7[f]	8.6[e]	5.4[f]	.5
Cumulative Performance						
DMI, lb/day	25.17[d]	24.39[e]	22.22[f]	24.48[e]	23.50[g]	.28
ADG, lb	4.05[d]	3.92[d]	3.67[e]	3.85[d]	3.90[d]	.08
Feed/Gain	6.2	6.2	6.1	6.4	6.1	.1
Total feed, lb/head	2467[d]	2390[e]	2178[f]	2399[e]	2303[g]	27

[ab]Means within a row with unlike superscripts differ ($P < .10$).
[c]Days 1-21 for Treatments 2 and 4; Days 1-42 for Treatments 1, 3, and 5.
[defg]Means within a row with unlike superscripts differ ($P < .10$).

Table 3. Effect of programmed gain on carcass characteristics of yearling steers.

	Treatment					
Item	Ad Lib	2.4/21	2.4/42	2.8/21	2.8/42	SEM
Hot carcass weight, lb	785[a]	777[a]	758[b]	772[ab]	777[a]	5
Marbling score[c]	530	529	517	533	531	14
Yield grade	2.47[d]	2.34[de]	2.03[f]	2.24[ef]	2.47[d]	.13
Fat thickness, in	.50[d]	.47[d]	.40[e]	.47[d]	.47[d]	.02
Net profit, $[gh]	(.74)	(4.32)	(8.51)	(8.53)	(1.37)	5.07

[ab]Means within a row with unlike superscripts differ (P<.10).
[c]Marbling score: Small 0 = 500.
[def]Means within a row with unlike superscripts differ (P<.10).
[g]Values used in calculations: purchase price = $75.00/cwt; sales price = $65.00/cwt; yardage = $.30/d; feed cost = $100.00/ton; feed and cattle interest = 10%.
[h]Values in parentheses indicate losses.

relatively high levels (35-40% of DM). In previous studies reporting an efficiency response with programmed gain systems, the finishing diets did not contain byproduct feedstuffs. It has been shown that wet corn gluten feed inclusion in finishing diets helps to alleviate sub-acute acidosis. Part of the efficiency response that has been observed in previous studies could be related to a reduced level of acidosis that would likely accompany the limited amounts of feed offered to programmed gain treatment groups. Consequently, the number and severity of acidosis challenges during the feeding period could be reduced.

Carcass characteristics are shown in Table 3. Hot carcass weights were reduced (P < .10) in steers programmed to gain 2.4 lb/day for the initial 42 days of the feeding period compared with steers offered feed ad libitum, steers programmed to gain 2.4 lb/day for 21 days, or steers programmed to gain 2.8 lb/d for 42 days. There were no differences among the treatments in marbling score. Yield grade was lower (P < .10) in steers programmed to gain 2.4 lb/day for 42 days than in steers offered feed ad libitum, steers programmed to gain 2.4 lb/day for 21 days, or steers programmed to gain 2.8 lb/d for 42 days. Steers programmed to gain 2.4 lb/day for 42 days had less (P < .10) fat over the 12th rib compared with all other treatments. Though there were no significant differences in calculated net profit values, they are reflective of slight differences in hot carcass weight among the treatments. Offering feed ad libitum was calculated to be the most profitable of the feeding systems in this trial. However, in times of high feed costs, differences in the amount of feed consumed per animal may allow producers to effectively and economically utilize programmed gain feeding systems.

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