January 2001

Programmed Gain Finishing Systems In Yearling Steers Fed Dry-rolled Corn Or Wet Corn Gluten Feed Finishing Diets

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Programming gain during the first 100 days of a 161-day finishing period resulted in reduced cumulative performance compared to ad libitum feeding.

Summary

One hundred sixty crossbred yearling steers were used in a completely randomized design to determine the response to a programmed gain finishing system in diets with and without wet corn gluten feed. Including a programmed gain phase in the finishing period reduced daily gain, hot carcass weight, fat thickness and marbling score in diets with and without wet corn gluten feed. Diets containing wet corn gluten feed increased daily gain, hot carcass weight and fat thickness compared with diets containing only dry-rolled corn. Programming gain improved efficiency but reduced net return per animal and increased cost of gain versus ad libitum feeding.

Introduction

Improvements in feed efficiency have been demonstrated with feeding systems designed to control feed intake in feedlot cattle; however, daily gain may decrease, resulting in increased days on feed. There are many methods that can be used to control feed intake, one of which is an approach referred to as programmed gain. Programmed feeding techniques are systems in which the net energy equations are used to calculate the amount of feed required to achieve a predetermined rate of gain. 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. The interest in programmed gain feeding systems has been increased by reports that similar daily gains, hot carcass weights and days on feed can be achieved with programmed gain feeding systems when compared to ad libitum feeding. At the same time, reductions in the amount of feed consumed result in improvements in efficiency. However, two previous studies (1999 Nebraska Beef Report, pp 46-48; 2000 Nebraska Beef Report, pp 41-43) conducted at the University of Nebraska to determine the effects of programmed gain feeding strategies failed to observe a significant improvement in feed efficiency while both daily gains and hot carcass weights were lower as a result of using a programmed gain feeding system.

Both of the previously conducted studies included wet corn gluten feed in the finishing diet. The objective of this study was to determine if the response to a programmed gain feeding system differed in finishing diets with and without wet corn gluten feed.

Procedure

One hundred sixty crossbred yearling steers (643 lb) were stratified by weight

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and randomly assigned to one of 16 pens (10 head/pen). Each pen was randomly assigned to one of four treatments with a 2x2 factorial treatment structure. Treatment factors were: ad libitum feeding system (AL) or programmed gain feeding system (PG); and dry-rolled corn finishing diet (DRC) or wet corn gluten feed finishing diet (WCGF). Pens assigned to PG were targeted to gain 3.0 lb/d for d 1-50 and 3.4 lb/d for d 51-100. On day 101, pens assigned to PG were allowed to consume feed AL for the remainder of the trial. Feed intakes required to achieve the programmed rates of gain were calculated using the net energy equations contained in the NRC (1996) computer model and were adjusted every seven days.

The final diets (Table 1) were formulated to contain a minimum of 13.5% CP, .70% Ca, .35% P, and .65% K, and contained 27g/ton Rumensin and 10 g/ton Tylan (DM basis). Steers were implanted with Synovex®-C on d 1 and reimplanted with Synovex®-Plus on d 50. Steers were slaughtered at a commercial packing plant when the AL control groups were visually estimated to have reached .45 in of fat over the 12th rib. Following a 24-h 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%). Net return and cost of gain for each pen were calculated using Nebraska 10-year average prices for feedstuffs, feeder cattle and slaughter cattle. Wet corn gluten feed was priced at 93% the price of corn.

Results

Performance during the PG period (d 1-100) is presented in Table 2. There was a significant (P<.05) feeding system x finishing diet interaction for DMI during d 1-100. By design, DMI of both PG treatments were similar and significantly less than either AL treatment. However, in steers offered feed AL, feeding WCGF increased DMI significantly versus feeding DRC. Daily gain was not affected by PG; however, feeding WCGF increased (P<.10) daily gain when compared to feeding DRC. A significant

Table 1. Composition of finishing diets (100% DM basis).

Ingredient	DRC[a]	WCGF[a]
Dry-rolled corn	82.4	52.0
Wet corn gluten feed		35.0
Alfalfa hay	4.0	4.0
Sorghum silage	4.0	4.0
Soybean meal	4.0	
Molasses	3.0	
Supplement	2.6	5.0
Finely ground grain sorghum		3.043
Limestone	1.448	1.542
Urea	.685	
Salt	.300	.300
Dicalcium phosphate	.100	
Potassium chloride	.050	.050
Trace mineral	.020	.020
Rumensin	.017	.017
Vitamin premix	.015	.015
Tylan	.013	.013

[a]DRC = dry-rolled corn; WCGF = wet corn gluten feed.

Table 2. Effect of programmed gain (PG) and finishing diet (DRC or WCGF) on programmed gain period performance (d 1-100).

	Treatment[a]				
	DRC		WCGF		
	AL	PG	AL	PG	SEM
DMI, lb/day[b]	21.60[f]	15.61[e]	23.91[g]	15.43[e]	.32
ADG, lb[c]	3.65	3.45	3.72	3.82	.15
Feed:gain[bd]	5.9[e]	4.5[f]	6.4[e]	4.0[g]	

[a]DRC = dry-rolled corn; WCGF = wet corn gluten feed; AL = ad libitum; PG = programmed gain.
[b]Feeding system x finishing diet interaction (P<.05).
[c]Finishing diet effect (P<.10).
[d]Analyzed as gain:feed.
[efg]Means within a row with unlike superscripts differ (P<.10).

Table 3. Effect of programmed gain (PG) and finishing diet (DRC or WCGF) on cumulative performance and carcass characteristics.

	Treatment[a]				
	DRC		WCGF		
	Ad Lib	PG	Ad Lib	PG	SEM
Days on feed	161	161	161	161	
Initial wt., lb	644	643	643	643	1
DMI, lb/day[b]	23.03[i]	19.60[k]	25.62[h]	20.33[j]	.31
Total feed, lb/hd[b]	3708[i]	3155[j]	4124[h]	3273[j]	49
ADG, lb[cd]	3.83	3.35	4.07	3.62	.10
Feed:gain[be]	6.0[i]	5.8[i]	6.3[h]	5.6[j]	
Hot carcass wt, lb[cd]	794	745	808	772	11
Marbling score[ce]	492	444	501	448	14
Fat thickness, in.[cd]	.43	.36	.48	.39	.02
Net return, $/head[cdf]	79.15	29.12	119.89	83.69	8.34
Cost of gain, $/cwt[cdf]	41.70	47.32	36.48	39.41	1.19

[a]DRC = dry-rolled corn; WCGF = wet corn gluten feed; AL = ad libitum; PG = programmed gain.
[b]Feeding system x finishing diet interaction (P<.05).
[c]Feeding system effect (P<.05).
[d]Finishing diet effect (P<.10).
[e]Analyzed as gain:feed.
[f]Marbling score: 400 = Slight 0; 450 = Slight 50; 500 = Small 0.
[g]Values used in calculations: cattle purchase price = $81.00/cwt; cattle sales price = $108.00/cwt hot carcass; yardage = $0.30/d; feed cost = $108.58/ton (DRC) and $97.02/ton (WCGF); interest on cattle and 1/2 feed = 10%.
[hijk]Means within a row with unlike superscripts differ (P<.10).

(P<.05) feeding system x finishing diet interaction was observed for feed conversion. Feed conversion was improved in both PG treatment groups irrespective of diet when compared with AL. Additionally, feed efficiency of the PG/WCGF treatment group was improved versus all other treatments.

Cumulative performance and carcass data are presented in Table 3. All steers were fed for 161 days. There was a significant (P<.05) feeding system x finishing diet interaction for DMI related to the magnitude of the difference between each AL control group and its PG counterpart. When feeding DRC, PG reduced intake by 3.43 lb/d. However, the difference when feeding WCGF was 5.29 lb/d. The relationship for the total amount of feed consumed throughout the trial responded similarly. There were significant main effects of both feeding system (P<.05) and finishing diet (P<.10) for daily gain. Feeding WCGF increased daily gain while the PG feeding system reduced daily gain.

There was a significant (P<.05) feeding system x finishing diet interaction for feed conversion similar to that observed for both dry matter intake and total feed consumed. When feeding DRC, PG improved feed conversion 2.4% and the two feeding systems were not statistically different. However, when feeding WCGF, efficiency was improved 11.9% in the PG feeding system.

There were main effects of both feeding system (P<.05) and finishing diet (P<.10) for hot carcass weight. Feeding WCGF increased hot carcass weight while the PG feeding system decreased hot carcass weight. The PG feeding system significantly reduced (P<.05) marbling score. There were significant main effects for both feeding system (P<.05) and finishing diet (P<.10) for 12th rib fat thickness. Feeding WCGF increased fat thickness while the PG feeding system reduced fat thickness. Net return was increased (P<.10) by feeding WCGF and was reduced (P<.05) by the PG feeding system. Similarly, cost of gain was reduced (P<.10) when feeding WCGF and increased (P<.05) by the PG feeding system.

These data indicate that including a programmed gain phase in the finishing system reduced both daily gain and profitability. Regardless of diet, feeding cattle ad libitum was strongly favored in this trial when compared to the programmed gain finishing system. However, there may be differences in the observed efficiency response to programmed gain finishing systems among finishing diets that differ in composition.

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