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Moderate versus High Protein Diets for Finishing Yearling Steers

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MODERATE VERSUS HIGH PROTEIN DIETS FOR FINISHING YEARLING STEERS

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Summary

Sixty-four yearling crossbred steers (864 lb) were utilized to study moderate versus high protein finishing diets. Diets were formulated to contain 11.25 or 12.25% crude protein on a dry matter basis. Differences observed for all performance and carcass traits were not significant. Steers on the 11.25 and 12.25% crude protein diets consumed 22.29 and 22.26 lb dry matter per head daily, gained 2.83 and 2.90 lb per head daily and required 7.91 and 7.69 lb dry matter per pound of gain, respectively. Diets formulated to contain 11.25% crude protein appear adequate for finishing heavy yearlings.

(Key Words: Feedlot, Yearling Steers, Protein Levels, Finishing Diets.)

Introduction

The National Research Council (1984) suggested that the protein requirement of 900-lb, large framed finishing steers gaining 3 lb per head daily is approximately 9.8% of diet dry matter. Throughout most of the feedlot industry, finishing diets of 12% crude protein or greater are common.

Feeding high protein levels in the finishing diet is believed to result in improved dry matter digestion and intake, greater average daily gain and improved feed efficiency. However, protein is generally expensive to add to feedlot diets. Reducing dietary protein levels from 12.25% to 11.25% could result in a savings of $.70 to $5.00 per ton of ration dry matter depending upon source and price of protein. This corresponds to $1.12 to $8.00 per head assuming similar performance of 400-lb gain and 8:1 feed conversion for both dietary protein levels.

The objective of this trial was to determine the effect of reducing the protein level in a finishing diet from 12.25 to 11.25% of dry matter on feedlot performance and carcass characteristics.

Materials and Methods

Sixty-four yearling crossbred steers that had been grown for 46 days on a 70% concentrate, 30% roughage diet to about 864 lb were randomly allotted to eight pens and finished using one of two experimental diets (Table 1). Diets were formulated to contain either 11.25 or 12.25% crude protein on a dry matter basis. Soybean meal was used as the source of supplemental protein.

Steers were weighed and implanted with Ralgro[3] following an overnight withdrawal (16 hours) of feed and water. Steers were weighed again after 28 days on feed and on the morning prior to slaughter. Interim weight was obtained following overnight withdrawal of water only. Final weight was obtained after a 16-hour withdrawal of feed and water. All cattle were slaughtered on the same day after 75% of all the cattle on the study reached an anticipated choice grade. Carcass data were obtained 24 hours post-slaughter.

Results and Discussion

Bunk samples were collected each 28 days and composited by treatment. Crude protein contents of the moderate and high protein diet as determined by Kjeldahl analysis were 11.12 and 12.70% of dry matter, respectively. Thus, a wider range in dietary crude protein content appeared to have been fed than was anticipated.

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TABLE 1. EXPERIMENTAL DIETS FED TO STEERS

Item	Diet	
	Moderate protein	High protein
Ingredient[a]		
Whole shelled corn	38.79	37.79
Ground high moisture corn	38.79	37.79
Alfalfa-grass hay	4.22	4.09
Corn silage	12.64	12.28
Supplement		
Soybean meal	3.53	6.01
Limestone	1.07	1.08
Trace mineralized salt	.50	.50
Beet molasses	.13	.26
Dicalcium phosphate	.17	.12
Vitamin ADE premix	.05	.05
Rumensin 60	.02	.02
Potassium chloride	.11	.01
Nutrient composition[b]		
Crude protein	11.25	12.25
NEm, Mcal/cwt	91.60	91.60
NEg, Mcal/cwt	62.00	62.00
Calcium	.50	.50
Phosphorus	.32	.32
Potassium	.65	.65
Vitamin A, IU/lb	1500.00	1500.00

[a] Percentage of dry matter.
[b] Percentage of dry matter unless stated otherwise. Calculated values from feed analysis or book value for individual feed commodities.

The length of the finishing period for all cattle was 91 days. Daily dry matter intake, average daily gain and feed/gain were not affected by dietary crude protein level (Table 2). Cattle fed the 11.25 and 12.25% crude protein diets consumed 22.28 and 22.26 lb of dry matter daily, gained 2.83 and 2.90 lb per head daily and converted feed at 7.91 and 7.69 lb dry matter per pound of gain, respectively.

Carcass traits were not influenced by level of crude protein (Table 3). About 88% of the cattle in this study graded choice or higher. Carcasses carried about .46 in. fat at the 12th rib, had about 13.4 $in.^2$ rib eyes and were yield grade 2.

This study indicates that heavy yearling cattle previously fed a high plane of nutrition may be finished satisfactorily on 11.12% crude protein diets. Formulating diets to contain greater amounts of crude protein will likely not result in improved performance.

TABLE 2. PERFORMANCE OF STEERS FED DIFFERENT LEVELS OF CRUDE PROTEIN[a]

Item	Crude protein percentage		
	11.25	12.25	SE[b]
Initial wt., lb[c]	853	876	9.21
Day 1-28			
Dry matter intake, lb/head/day	21.90	21.70	.10
Average daily gain, lb/head/day	4.90	4.77	.12
Feed/gain	4.47	4.55	.11
Day 1-91			
Dry matter intake, lb/head/day	22.28	22.26	.16
Average daily gain, lb/head/day	2.83	2.90	.11
Feed/gain	7.91	7.69	.30

[a] Least squares means adjusted for initial weight.
[b] Standard error of the mean.
[c] Raw mean.

TABLE 3. CARCASS CHARACTERISTICS OF STEERS FED DIFFERENT LEVELS OF CRUDE PROTEIN[a]

Item	Crude protein percentage		
	11.25	12.25	SE[b]
Hot carcass wt., lb	716	725	6.10
Dressing percentage, %	63.86	64.24	.36
Fat thickness, in.	.45	.48	.02
Rib eye area, $in.^2$	13.30	13.53	.23
Kidney, heart and pelvic fat, %	2.74	2.49	.16
Marbling score, units[c]	5.33	5.35	.06
Percentage choice, %	87.50	88.83	6.95
Yield grade, units	2.08	2.05	.10

[a] Least squares means adjusted for initial weight.
[b] Standard error of the mean.
[c] 5 = small; 6 = modest.