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however the daily intake data indicates the majority of feed changes were increases, questioning if maximum dry matter intake was achieved on some days of the feeding period. It was also noted the bunks were slick on numerous occasions. Because of overall high intake, all cattle gained at a higher level than would have been predicted.

Because of the significant reduction

in feed intake the cattle consuming the chicory pulp were significantly ($P < .05$) more efficient than those fed the beet pulp ration. Part of the improvement in efficiency is due to the lower intake. When intake is limited an improvement in efficiency is often observed. The improvement of efficiency of the corn silage control diet over the beet pulp is due to the increase in gain over the beet pulp

ration as the intake was essentially the same. In summary, chicory pulp can be utilized as a suitable cattle feed, however intake may be decreased and efficiency will be improved.

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Crude Protein and Energy Combinations for Finishing Yearling Steers

Burt Weichenthal
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Maintaining more dietary roughage during the first half of finishing for medium-frame yearling steers or more than 12.3 percent crude protein throughout did not affect overall performance and carcass values.

Summary

Yearling Angus steers averaging 889 pounds were fed 12.1 or 13.8 percent crude protein with two energy levels during the first half of finishing, followed by 12.3 or 13.8 percent crude protein with the higher energy level during the second half of finishing. In a 126-day trial, finishing performance and carcass traits were not improved by feeding more than 12.1 percent crude protein or more than 56 Mcal/cwt NE_g during the first half of finishing or more than 12.3 percent crude protein in the second half. These results indicate increased corn silage levels during the first half of finishing may not reduce overall performance.

Introduction

Protein and energy levels are major inputs in formulating diets for finishing cattle. The goal is to have enough protein and energy in the diet for the age, type and condition of the animal

so desirable performance and carcass traits are achieved for a competitive cost of gain. Feeding more roughage in the first half of finishing may be one way to cope with periods when grain prices are high relative to forage. Feeding more protein during the first half of finishing may seem logical when cattle may be gaining at a fast rate, but the additional expense must be covered by improved overall performance.

The objective of this study was to study protein and energy level combinations during first and second half finishing phases on overall performance and carcass traits in Angus yearling steers.

Procedure

Angus yearling steers averaging 889 pounds were randomly assigned to four pens of seven or eight steers on each of four treatment combinations of crude protein (CP) and net energy for gain (NE_g) during the first half of finishing. All pens received the higher energy diet during the second half. The diets shown in Table 1 were combinations of two levels of CP and two levels of NE_g in a 2x2 factorial arrangement as shown in Table 2. Diets were based on dry-rolled corn with variation in levels of CP or roughage achieved by varying the percentages of

(Continued on next page)

Table 1. Composition of diets and calculated nutrient analyses.

Diet	1	2	3	4
Diet composition, dry matter basis				
Dry-rolled corn, %	53.5	76.4	61.5	72.2
Corn silage, %	39.6	16.7	15.5	16.7
Alfalfa hay, %			16.1	
Supplement 58, % ^a	6.9	6.9	6.9	6.9
Supplement 40, % ^b				4.2
Nutrient analysis, dry matter basis				
Crude protein, %	12.1	12.3	13.8	13.8
UIP, %	3.86	4.47	4.18	4.62
NE_m , Mcal/cwt	85.7	91.5	85.5	90.1
NE_g , Mcal/cwt	56	61	56	60
Salt, %	.28	.28	.28	.51
Calcium, %	.80	.75	.97	1.07
Phosphorus, %	.32	.33	.33	.37
Potassium, %	.80	.66	1.00	.74
Rumensin, g/ton	29	29	29	29
Tylan, g/ton	9.7	9.7	9.7	9.7

^aSupplement contains 58 percent crude protein, air dry basis, with 2/3 of that from urea.

^bSupplement contains 40 percent crude protein, air dry basis, with 2/3 of that from urea.

corn, corn silage, alfalfa hay or protein supplement. The CP levels assumed for the corn and corn silage in calculating the diets were 8.8 and 7.8 percent with NE_g at 67 and 45 Mcal/cwt dry matter (DM), respectively. Dry supplements contained 58 or 40 percent CP (air dry basis) with about two-thirds of CP coming from urea. Monensin and tylosin were included in all diets at 29 and 9.7 grams/ton, respectively. All steers were implanted at the start of the trial with Synonex S. Carcass data were collected and final weights were calculated by dividing hot carcass weights by a common dressing percentage (62). Results were analyzed by using the General Linear Model in SAS.

Results

Steers fed 12.1 percent CP in diets with about 40 percent corn silage in the diet DM during the first half of finishing did not appear to gain as fast as those fed about 17 percent corn silage, but overall gains for the 126-day trial were similar for those first half treatments when followed with 17 percent corn silage and 12.3 percent CP in the second half or for those fed 17 percent corn silage throughout the trial with 13.8 percent CP. First half and overall daily gain and feed conversion appeared to be lower when 13.8 percent CP was fed with the lower energy diet during the first half, but that diet included alfalfa hay to meet CP and energy targets while the 12.1 percent CP, lower energy diet included only corn silage as the source of roughage. The calculated NE_g levels, however, were the same for these diets. Carcass traits appeared to be unaffected, except for an apparent relationship to the lower gain in the group receiving 13.8 percent CP and lower energy during the first half. The results from this protein level comparison are consistent with earlier data from the University of Nebraska (1994 Nebraska Beef Report, pp. 35-36) in which 12 percent CP resulted in yearling performance unimproved by higher protein levels obtained by urea additions to dry-rolled corn diets containing 5 percent

Table 2. Performance and carcass results from diet protein and energy combinations.

Diets, first half	1	2	3	4	
Crude protein, %	12.1	12.3	13.8	13.8	
NE _g , Mcal/cwt	56	61	56	60	
Diets, second half	2	2	4	4	
Crude protein, %	12.3	12.3	13.8	13.8	
NE _g , Mcal/cwt	61	61	60	60	P-value
Number of pens	4	4	4	4	
Number of steers	29	29	29	28	
Initial weight, lb	888	890	887	889	
Final weight, lb ^a	1321	1324	1281	1316	.35
Daily gain, lb					
First half	4.09	4.33	3.84	4.09	.14
Overall	3.43	3.45	3.13	3.39	.35
Feed DM/day, lb					
First half	22.2	22.6	22.8	24.1	.12
Overall	23.0	23.1	23.2	24.4	.24
Feed/gain ratio					
First half	5.45	5.23	5.93	5.90	.14
Overall	6.73	6.71	7.45	7.20	.13
Gain/feed ratio					
First half	.185	.191	.169	.170	.13
Overall	.149	.150	.135	.139	.14
Hot carcass weight, lb	819	821	795	816	.35
Dressing percentage	59.5	58.9	58.7	59.0	.17
Fat thickness, in	.54	.56	.47	.55	.20
Ribeye area, sq in	12.6	12.6	12.5	12.7	.88
Marbling score ^b	6.1	6.4	6.0	6.5	.35
Quality grade ^c	19.6	19.7	19.1	20.0	.22
USDA yield grade	3.4	3.3	3.0	3.4	.03

^aFinal weight calculated by dividing hot carcass weight by a common dressing percentage (62).

^bMarbling score: Modest = 6.0-6.9.

^cQuality grade: Choice⁻ = 19.0-19.9.

corn silage and 5 percent alfalfa hay as the source of roughage.

Finishing diets based on dry-rolled corn contribute substantial amounts of rumen bypass or rumen undegradable intake protein (UIP), often resulting in dietary metabolizable protein (MP) levels in excess of the amount needed by finishing yearling steers. Evaluating the diets with corn silage as the only source of roughage with the NRC metabolizable protein model showed MP levels more than adequate for finishing Angus yearling steers gaining an average of 3.45 pounds per day for 126 days. The rumen degradable intake protein (DIP) was about adequate in the 12.3 percent CP diet in which two-thirds of the supplemental protein came from urea.

Utilizing more corn silage in the diet (56 Mcal/cwt NE_g) during the first half of finishing was not detrimental to overall

daily gain, feed efficiency and carcass traits when fed with 12.1 percent CP and followed by 12.3 percent CP and 61 Mcal/cwt NE_g in the diet. Using a lower energy level during the first half of finishing allows the flexibility of using more forage when available and priced to be economical on cost of gain. These results, showing higher corn silage levels can be used during the first half of finishing without sacrificing overall performance or carcass traits achieved with higher grain diets, may be especially useful when grain prices are high relative to forage prices.

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