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Beef Cattle Commercial Feedlot Studies
Trial 2--Effects on Steer Performance of Variable
Protein Levels, Implanting and Worming

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Summary

A 189-day trial used 280 mixed-breed steers to study effects of various protein levels in finishing steer rations. Rations containing 15.4 or 13.4% crude protein significantly improved rate of gain during the first 42 days compared with an 11.4% crude protein ration. Rates of gain after 91 or 189 days did not differ significantly indicating that steers make compensatory gains.

Removing supplemental protein from the ration of 140 steers the final 28 days did not adversely affect rate or efficiency of gain.

One hundred forty steers implanted with 36 mg. zeranol^{1/} and 140 with 36 mg. stilbestrol^{2/} gained similarly, however, Ralgro implanted steers graded significantly higher.

Steers wormed with levamisole^{3/} or thiabendazole^{4/} gained 0.06 pound per day faster than steers not wormed.

Introduction

Protein requirements for growing-finishing cattle published in the 1970 edition of "Nutrient Requirements of Beef Cattle" are generally accepted as the basis for ration formulation. However, dramatic increases in supplemental protein costs have generated numerous studies to more accurately define protein requirements at different stages of growth and development. Results reported by Kansas State, Ohio State, Texas Tech., and Kentucky in 1973 suggest that cattle on typical feedlot rations may require less crude protein than previously reported. The reduced requirement seems to be true after a certain time on feed or after attaining a specific weight.

^{1/} Marketed under tradename RALGRO, an exclusive product of Commercial Solvents Corporation, Terre Haute, Ind. RALGRO provided by Commercial Solvents Corporation.

^{2/} Marketed under tradename STIMPLANTS by Chas. Pfizer and Co., Inc., Terre Haute, Ind. STIMPLANTS provided by Chas. Pfizer and Co., Inc.

^{3/} Marketed under tradename Tramisol by American Cyanamid Co., Princeton, N. J. Tramisol provided by American Cyanamid Co.

^{4/} Marketed under tradename Thibenzole and TBZ by Merck and Co., Inc., Rahway, N. J. TBZ was provided for this trial by Merck and Co., Inc.

Stilbestrols (DES) removal from the market stimulated an interest in finding an acceptable, growth promoting alternative. Previous work at Kansas State has indicated that zeranol (RALGRO) implants can be as effective as DES implants. (KSU Bulletin 568, 1973).

Objectives of this trial were to provide additional data on protein levels, implants, and worming.

Experimental Procedure

Two hundred eighty mixed-breed steers averaging 603 lb. were randomly allotted to four pens of 70 steers each. Group 1 was fed a 15.4% crude protein (C.P.) ration for 42 days, 13.3% C.P. for 49 days, 11.3% C.P. for 70 days and 9.8% C.P. the final 28 days. Group 2 was fed a 13.3% C.P. ration for 91 days and 11.3 or 11.0% C.P. the remaining 98 days. Group 3 was fed an 11.3% ration for all but the final 28 days, then the protein supplement was removed so C.P. of the ration was 9.8%. Group 4 served as the control whose ration C.P. varied from 11.4-11.0% during the 189-day trial. Composition of the supplement is shown in table 1.1; of the complete rations, in table 1.2.

Protein supplement removed the final 28 days was replaced with rolled milo. No adjustment was made for variation in mineral contents between soybean oil meal and milo. Periodic samples of each ingredient used in the rations were taken and proximate analyses obtained. Average crude protein was calculated as shown in table 1.2.

An equal number of steers from each protein treatment group were wormed with Tramisol, Thibenzole, or served as nonwormed controls. In addition, 35 steers in each pen were implanted with 36 mg. of Ralgro, and 35 steers with 36 mg. of stilbestrol. Individual weights were taken at selected intervals and adjustments made in levels of crude protein fed. Carcass data were collected for each steer at the end of the trial. The study was from October 3, 1972 to April 10, 1973 (189 days).

Results and Discussion

Performance of the steers is presented in table 1.3. Feeding 15.4% or 13.4% crude protein rations the first 42 days significantly ($P < .01$) increased rate of gain compared with the 11.4% control ration. However, no significant differences in accumulative daily gain were obtained after 91, 161, or 189 days. Adverse weather and lot conditions severely affected performance of all cattle the final 90 days. The effect on steer performance of discontinuing protein supplementation during the final 28 days is shown in table 1.4. Rates of gain did not differ significantly. Daily feed intake was low and efficiency was poor for all groups, mostly because of extremely muddy lots, but the data indicate that supplemental protein can be withdrawn the final 28 days with no adverse effects. That agrees with trial 1 results from similar type and weight steers.

Steers implanted with Ralgro or with DES made similar gains but Ralgro produced carcasses that graded significantly ($P < .05$) higher. Ralgro was more beneficial the first 120 days indicating that re-implanting may be beneficial in longer feeding programs. Results (table 1.5) agree with previous findings here (KSU Bulletin 568, 1973).

Effects of worming on steer performance are shown in table 1.6. Tramisol and TBZ treated steers gained 0.06 lb. more per head per day than steers not wormed, a non significant difference.

Additional trials in progress are to determine more precisely optimum levels of crude protein at various stages of the feeding period. Emphasis is on increased (13%) crude protein when animals weigh less than 750 pounds and reduced (11% and lower) levels after they reach 750 pounds.

Table 1.1. Composition of Protein Supplement

Ingredient	%
Soybean oilmeal ^a	53.5
Rolled milo	15.8
Limestone	15.6
Salt	10.0
Urea ^a	3.2
Trace minerals (Z-5) ^b	1.0
Aureomycin (10 gms/lb.)	0.7
Vitamin A (30,000 I.U./gm)	.2

^aReplaced by rolled milo to provide supplement for lots 1 and 3 the last 28 days of trial.

^bCalcium Carbonate Co.

Table 1.2. Composition of Rations (% , dry matter basis)

Ingredient	15% C.P.	13% C.P.		11% C.P.					Basal
	0-42 days	0-42	43-91	0-42	43-91	92-140	141-161	162-189	162-189
Sorghum silage	20.0	20.0	20.0	20.0	20.0	20.0	15.0	15.0	15.0
Flaked milo	30.4	33.0	35.4	35.6	38.0	46.0	35.0	35.0	35.0
High moisture milo	30.4	33.0	35.4	35.6	38.0	---	---	---	---
Cracked corn	---	---	---	---	---	30.0	46.0	46.0	46.0
Supplement	3.8	3.8	4.0	3.8	4.0	4.0	4.0	4.0	4.0
Dehydrated alfalfa	5.0	5.0	---	5.0	---	---	---	---	---
SBOM	10.4	5.2	5.2	---	---	---	---	---	---
^a Crude protein content, %	15.4	13.4	13.3	11.4	11.3	11.3	11.2	11.0	9.8

^aCalculations based on periodic sampling of each ingredient during experiment.

Table 1.3. Feedlot Performance of Steers Fed Indicated Levels of Protein

Item	% Crude protein (Dry matter basis)				
	Days	1	2	3	4
	0-42	15.4	13.4	11.4	11.4
	43-91	13.3	13.3	11.3	11.3
	92-161	11.3	11.3	11.3	11.3
	162-189	9.8	11.0	9.8	11.0
Lot number		1	2	3	4
Number of steers		69	70	70	70
Initial wt., lb.		603.0	602.1	602.3	603.6
Final wt., lb.		990.5	1002.8	986.0	989.2
Avg. total gain, lb.		387.5	400.7	383.7	385.6
Avg. daily gain, lb.					
0-42		3.15 ^{a,b,d}	3.20 ^{a,b}	2.75 ^c	2.91 ^d
0-91		2.70	2.65	2.58	2.61
0-161		2.31	2.33	2.18	2.25
0-189		2.05	2.12	2.03	2.04
Feed D.M./lb. gain, lb.					
0-42		5.51	5.69	5.98	5.93
0-91		6.53	6.65	6.61	6.77
0-161		7.32	7.32	7.79	7.66
0-189		8.21	7.87	8.29	8.10
Dressing percentage		63.47	63.25	63.19	63.97
USDA grade*		10.16 ^e	10.18 ^e	10.11 ^e	9.61 ^f

^{a,b,c,d} Means in same row with different superscripts differ significantly (P<.01).

^{e,f} Means in same row with different superscripts differ significantly (P<.05).

^gChoice = 11, low choice = 10, high good = 9.

Table 1.4. Effect on Steer Performance of Withdrawing Protein Supplement Final 28 Days

Item	Implant	
	36 mg Ralgro	36 mg stilbestrol
Number of steers	139	140
Avg. initial wt., lb.	964.4	971.4
Avg. final wt., lb.	988.2	996.0
Avg. total gain, lb.	23.80	24.6
Avg. daily gain, lb.	0.85	0.88
Avg. daily D.M., lb.	15.97	16.06
Feed D.M./gain, lb.	18.79	18.25

Table 1.5. Influence of Implants on Performance and Carcass Characteristics of Feedlot Steers (189 days)

Item	Implant	
	36 mg Ralgro	36 mg stilbestrol
Number of steers	139	140
Initial wt., lb.	602.83	602.75
Final wt., lb.	990.28	993.98
Total gain, lb.	387.45	391.23
Number of days	189	189
A.D.G., lb.	2.05	2.07
Dressing percentage	63.59	63.34
USDA grade ^a	10.2 ^b	9.77 ^c

^aChoice = 11, low choice = 10, high good = 9.

^{b,c}Significant (P<.05).

Table 1.6. Effect of Worming on Performance of Feedlot Steers (189 days)

Item	Tramisol	Thibenzole	No wormer
Number of steers	91	93	95
Initial wt., lb.	603.63	602.65	602.08
Final wt., lb.	996.75	995.77	983.86
Total gain, lb.	393.12	393.12	381.78
Number of days	189	189	189
A.D.G., lb.	2.08	2.08	2.02
Dressing percentage	63.61	63.38	63.42