

Protein Withdrawal for Feedlot Steers¹

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Story in Brief

Seventy-two 759 pound steers were fed shelled corn-soybean meal supplemented rations for 97 days. All steers were fed rumensin. Three pens of steers were fed 11.2 percent protein, three pens at 10.3 percent protein for the entire trial, and three pens at 10.3 percent protein for 28 days (to 835 pounds) after which soybean meal was removed from the supplement to form a 9.5 percent protein ration. Protein reduction to 10.3 percent protein at 760 pounds or 9.5 percent at 835 pounds did not alter performance or carcass characteristics. Feed intake was not reduced by protein reduction in either group. Results suggest that the protein requirement for steers fed whole shelled corn is below 10.3 percent for steers over 760, and may be below 9.5 percent at 835 pounds if steers have gained well at lighter weights. The final drop reduced feed efficiency slightly, however.

Introduction

The amount of protein required for growing steers depends upon: 1) the intestinal amino acid supply relative to the amount of protein growth occurring, which in turn depends upon age, breed, type, and growth rate, and 2) the ammonia need for bacteria in the rumen, which depends on energy level of the ration and amount of protein degraded in and urea recycled to the rumen. Protein requirements decline with maturation as fat rather than muscle is being produced. Consequently, reduced protein supplementation is needed for animals over a certain weight. Some research (Preston and Cahill, 1972) has suggested that all supplemental protein may be deleted from corn based rations for steers over 750 or 850 pounds.

The objective of this experiment was to determine animal response to reduction of protein level from 11.2 to 10.3 percent at 750 pounds and a second reduction to 9.5 percent at 835 pounds.

Materials and Methods

The three rations used in this experiment are the rumensin supplemented 9.5, 10.3, and 11.2 percent protein rations described in the protein level rumensin study (Gill *et al.*) reported on page 51 in this publication. Steers

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were handled in a manner identical to that trial, and were all fed the 11.2 percent protein ration for 58 days until the start of this experiment. Three pens of cattle (24 steers) remained on this ration for the remaining 97 days, whereas, the protein level for six pens (48 steers) was dropped to 10.3 percent at the start of this trial, three pens of which were reduced a second time to 9.5 percent protein at 835 pounds. Performance and carcass measurements duplicated those of the protein level study.

Results and Discussion

Reducing protein level in the whole shelled corn-soybean meal ration from 11.2 to 10.3 percent at 750 pounds had no adverse influence on performance or carcass characteristics (Table 1). Gain and feed efficiencies were slightly improved by the reduction, and rather than feed intake reduction, as has been commonly noted with protein restriction (Thomas, *et al.*, 1976), feed intake was slightly higher for pens of cattle fed lower levels of protein.

The second protein drop, deleting all supplemental protein reduced gain and increased feed intake slightly, and feed efficiency was slightly poorer. This

Table 1. Steer response to protein reduction

Item	Protein level		
	11.2	10.3	10.3-9.5
Initial weight, lb.	759	752	766
28 day weight, lb.	835	827	835
Final weight, lb.	1059	1070	1069
Daily gain, lb.			
0-28	2.70	2.69	2.49
28-97	3.26	3.52	3.39
0-97	3.09	3.28	3.12
Daily feed, lb.			
0-28	16.6	17.0	17.5
28-97	17.3	17.6	18.0
0-97	17.1	17.4	17.8
Feed/gain			
0-28	6.20	6.34	7.15
28-97	5.31	5.02	5.31
0-97	5.52	5.33	5.72
Carcass weight, lb.	657.0	663.8	662.8
Liver abscess incidence	0.54	0.50	0.75
Kidney, heart, pelvic fat, %	2.92	2.90	2.94
Marbling score	15.96	17.29	16.42
Backfat, inches	0.63	0.65	0.61
Ribeye area, sq. in.	12.03	11.99	11.88
Yield grade	3.38	3.47	3.41

drop increased by 20 pounds the feed dry matter needed for 100 pounds of gain. No other adverse affects were apparent.

Results indicate that with whole-corn rations, a 10.3 percent protein level is adequate for steers over 750 pounds. This is below the 10.5 to 10.9 percent recommended by the NRC (1976). The 9.5 percent protein may be slightly deficient for steers from 835 to 1070 pounds. The NRC currently recommends 10.0 percent protein for such steers.

Results also suggest that feed efficiency may respond to protein deficiency before gains are severely depressed. This means that full effects of protein deficiency may not be apparent until total feed costs are tabulated. Consequently, protein deficiency may be a costly problem which is difficult to detect but simple to prevent by feed analysis. Whether dietary protein requirements for steers fed high moisture corn-corn silage rations would differ from that for steers fed whole shelled corn remains to be determined. As corn varies in protein content, protein content should be analyzed to be safe before deletion. Also additives other than protein need to be continually fed and not deleted when protein level is reduced.

References:

1. Preston, R. L. and V. R. Cahill. 1972. Beef Cattle Wooster, Ohio.
 3. Thomas, V. M. 1976. J. Animal Sci. 43:850.
 4. N.R.C. 1976. Nutrient Requirements for Beef Cattle. National Academy of Sciences, Washington, D.C.
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