

NUTRITION— COW-CALF AND STOCKER

Energy vs Protein Supplementation of Steers Grazing Native Range in Late Summer and Early Fall

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Story in Brief

Forty-seven Hereford steers and 36 Angus × Hereford crossbred yearling steers weighing about 575 lb were grazed on native range from July 16 to October 20, 1981. Steers were divided into four groups and fed no supplement (control), .8 or 1.5 lb/day of protein supplements, or 3.0 lb/day of a 10 percent protein corn-based supplement. Soybean meal was the protein source. Supplements were fed on Monday, Wednesday and Friday. Average daily gains for the 96-day period were 1.44, 1.88, 1.97 and 1.78 pounds, respectively. Pounds of supplement per pound of added gain were 1.8, 2.8 and 8.8 for the .8, 1.5, and 3.0 lb/day supplements. A small amount of supplemental protein apparently increased forage intake and digestibility. Feeding supplemental energy was not efficient in increasing gains in steers grazing native range.

Introduction

Feeding small amounts of high protein meals to ruminants consuming low quality roughages has been shown to increase forage digestibility and intake. Increased weight gains from feeding high protein meals to cattle fed low quality roughages have generally been more efficient than increased gains from feeding energy supplements. Native grass is relatively low in protein from mid-summer to the end of the growing season. If efficient increases in weight gains could be accomplished with small amounts of soybean meal-based supplements, the cost of gain for summer grazing could be reduced. The objective of this research was to compare gains and efficiency of gains of yearling steers grazing native range from mid-summer to early fall and being fed two levels of high protein supplement and a high energy supplement.

Experimental Procedures

Forty-seven Hereford steers and 36 Angus × Hereford crossbred steers, approximately 16 months old, were allotted by breed to four treatments. Treatments were (1) control, no supplement, (2) .8 lb per day of a 39 percent protein

supplement, (3) 1.5 lb per day of a 43 percent protein supplement and (4) 3.0 lb per day of a 10 percent protein supplement. Composition of the supplements is shown in Table 1. Treatments 2 and 4 provided the same amount of supplemental protein, but treatment 4 provided additional supplemental energy. Treatment 3 provided twice the amount of supplemental protein as treatments 2 and 4. Each supplement provided approximately 9 g of calcium, phosphorus and potassium per day. The additional mineral in a small amount of supplement necessitated the feeding of .8 lb of supplement 2 in order to provide the desired amount of soybean meal. All supplements were fed on Monday, Wednesday and Friday with supplement amounts prorated to give the prescribed daily amount.

The trial was conducted at the Lake Carl Blackwell Range 10 miles west of Stillwater in North Central Oklahoma. Each group of steers was grazed on 160 acres of native range and group-fed from July 16, 1981, to October 20, 1981. Weights of the steers were taken after the steers were held off pasture and water overnight. Prior to the start of the study, all steers were implanted with 36 mg of Ralgro, wormed with TBZ paste and vaccinated for IBR, PI-3, Lepto and BVD. Salt and minerals were provided free-choice for control steers.

Table 1. Supplement composition (as-fed)

	Treatment		
	2 .8 lb/day 39% protein	3 1.5 lb/day 43% protein	4 3.0 lb/day 10% protein
Ingredients, %			
Soybean meal	87.5	95.0	4.0
Corn	—	—	92.85
Limestone	1.5	2.0	.6
Dicalcium phosphate	10.0	3.0	1.8
Potassium chloride	1.0	—	.75
Composition, %			
Crude protein	39.0	42.6	10.0
TDN	62.0	68.0	72.0
Calcium	2.3	1.5	.6
Phosphorus	2.2	1.1	.6
Potassium	2.1	1.9	.7
Supplied/day in supplement			
Crude protein, lb	.31	.64	.30
TDN, lb	.50	1.0	2.2
Calcium, grams	8.3	10.5	8.2
Phosphorus, grams	8.0	7.8	8.2
Potassium, grams	7.9	12.6	9.3

Results and Discussion

Gains of steers and pounds of supplement required per pound of added gain are shown in Table 2. Steers fed no supplement gained 1.44 lb/day. Feeding .8 lb/day of protein supplement increased daily gains over the 96-day period by .44 lb/day (1.88 vs 1.44) with a conversion of 1.8 lb supplement per pound of added

Table 2. Weight gains of steers grazed on native range and fed protein or energy supplements

	Treatments ^a			
	Control no suppl.	.8 lb 39% protein	1.5 lb 43% protein	3.0 lb 10% protein
No. steers/treatment	21	21	21	20
Initial wt., 7/16/81	578	576	578	590
Intermediate wt., 9/4/81	666	673	692	680
Final wt., 10/20/81	717	757	764	760
Wt. gains, lb/day				
96 days, 7/16-10/20	1.44 ^b	1.88 ^c	1.97 ^d	1.78 ^c (P<.001)
1st period, 7/16-9/4	1.76 ^b	1.94 ^b	2.40 ^d	1.81 ^b (P<.05)
last period, 9/4-10/20	1.09 ^b	1.83 ^d	1.50 ^c	1.71 ^{cd} (P<.001)
Lb supp./lb added gain (96 days)	—	1.8	2.8	8.8
		<u>Hereford</u>		<u>Hereford X Angus</u>
No steers/treatment		47		36
ADG (96 days)		1.68		1.90 (P<.005)

^a Supplements fed 3 days/week (Monday, Wednesday and Friday).

^{b,c,d} Means with different superscript letters are significantly different (P<.05).

gain. Feeding 1.5 lb of protein supplement improved gains by .53 lb/day (1.97 vs 1.44) with a conversion of 2.8 lb supplement per pound of added gain. Gains of steers fed 3.0 lb of the high energy (corn-based) supplement were greater than control steers but less than steers fed protein supplements. The conversion of pounds of supplement to pounds of added gain for the corn-based supplement was 8.8:1, roughly three times the conversion rate of the high level of protein and five times the conversion rate for the low level of protein supplement.

Daily gains are also shown by period in Table 2. Steers fed 1.5 lb of protein supplement made the fastest gains during the first 50 days of the study (July 16-September 4). Steers fed .8 lb of protein supplement and 3.0 lb energy supplement gained at similar rates. All supplemented cattle gained faster than control steers during the first period.

Supplemented steers gained faster than control steers during the last 46 days of the study (September 4-October 20). Highest gains for the second period were made by the group fed .8 lb of protein supplement (1.83 lb/day) followed by steers fed 3.0 lb of energy supplement (1.71 lb/day) and those fed 1.5 lb of protein supplement (1.50 lb/day). The lower gains of steers fed 1.5 lb of supplement compared with the .8 and 3.0 lb groups may have been due to the rapid gains of the 1.5 lb group during the first period and their higher degree of condition going into the second period.

Forage samples, hand plucked to estimate forage selected by steers in all four pastures, averaged 9.0 percent crude protein on a dry matter basis and 52.3 percent dry matter on September 4. The protein level may seem high compared to typical levels for mid-summer native range but probably reflects the difference between forage the steers were consuming and whole-plant forage values. The trial period was unusually cool for the July-October period and marked by frequent rainfall.

Abundant forage was available in all pastures and along with the mild temperatures accounted for the very good steer gains even when no supplement was fed.

The dramatic response in gain to a small amount of supplemental protein was likely the result of increased fiber digestibility and increased forage intake. It is obvious that the protein or energy in the supplement alone could not account for an extra pound of gain for each 1.8 lb of supplement fed to the group receiving .8 lb of protein supplement. The fact that the conversion of pounds of supplement to extra gain for steers fed 1.5 lb of protein supplement per day was poorer (2.8:1) suggests that the smaller level of soybean meal probably was producing most of the possible improvement in forage digestibility and intake.

The poor conversion of supplement to added gain for the energy supplement indicates that the high grain supplement did not improve forage digestibility or intake and may have reduced both. Feeding starch has been shown to reduce rumen pH and inhibit fiber digestion. The conversion value of 8.8:1 is typical of many grain-on-grass experiments.

The effect of crossbreeding is dramatically illustrated in Table 2. Hereford x Angus calves gained .22 lb/day faster than straight Hereford steers. All steers were from the same Hereford cow herd.

If supplements used in this study were priced at \$245/ton, \$240/ton and \$135/ton for supplements fed at .8, 1.5 and 3.0 lb/day, respectively, feed costs for each pound of added gain would have been 20.8¢, 36.0¢ and 60.0¢ for the .8 and 1.5 lb/day protein supplements and the 3.0 lb/day energy supplement, respectively.