BYPASS PROTEIN SUPPLEMENTATION OF FALL-CALVING BEEF COWS GRAZING DORMANT NATIVE RANGE

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Story in Brief

Seventy-seven lactating Hereford X Angus cows were fed supplements containing different amounts of blood meal to evaluate the effect of supplemental bypass protein on cow weight, body condition, milk production and calf growth. Cows grazed dormant native tallgrass pastures from January 2 through March 26, 1987. Supplements were formulated to provide 1.42 lb crude protein/day with either .40 or .71 lb of bypass protein. In addition, supplements were fed at two energy levels (2.6 or 5.2 lb TDN/day). Increased supplemental energy (5.2 lb TDN/day) decreased losses of cow body weight and condition and increased milk production and calf weight gain. Bypass protein supplementation also decreased cow body weight losses but did not affect body condition. Cows receiving bypass protein produced more milk (1.0 to 1.7 lb/day). Calves suckling cows supplemented with bypass protein gained an average of 7.5 lb additional body weight during the 83-day study. This study suggests that the productivity of lactating beef cows grazing dormant native range may be improved with bypass protein supplementation.

(Key Words: Beef Cattle, Native Range, Supplement, Blood Meal)

Introduction

Fall-calving beef cows grazing dormant native range require protein supplementation to adequately lactate and rebreed. Traditionally, ruminal degradable protein sources such as soybean meal or cottonseed meal have been used in protein supplements. Ruminal microorganisms utilize ruminal degradable protein to supply ammonia for fiber digestion and bacterial protein synthesis. When the diet supplies enough digestible energy and/or animal requirements are low, ruminal bacteria can synthesize enough protein to meet the requirements of the cow. With lactating beef cows grazing dormant native range, however, requirements for lactation are high and the digestibility of the forage is low. Under these circumstances, protein feeds that are more resistant to ruminal degradation (bypass proteins) can be used to augment the supply of bacterial protein reaching the small intestine. Thus, fall-calving beef cows grazing dormant native range may benefit from bypass protein supplementation. The objective of this study was to evaluate the effects of level of supplemental bypass protein and energy on the productivity of fall-calving beef cows grazing dormant, tallgrass native range.

Materials and Methods

Seventy-seven fall-calving Hereford X Angus cows (average calving date = October 26, 1986) were grazed on dormant native grass

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pastures from January 2 through March 26 at the Southwest Livestock and Forage Research Station, El Reno, OK. Native grass pastures were dominated by little bluestem with smaller quantities of big bluestem, switchgrass and indiangrass. Cattle were managed as one large group and rotated among pastures every two to four weeks to equalize forage quality throughout the study. Cows were blocked by previous treatment, weight and body condition into four supplementation groups. Supplements (Table 1) were formulated to supply 1.42 lb crude protein/day with 2.6 or 5.2 lb TDN. Soybean hulls were utilized as the supplemental energy source. Blood meal was added to increase the bypass protein supply from .40 to .71 lb/day. Supplements were pelleted and the weekly allotment individually fed five days per week. In addition, cows had access to a mineral mix composed of 50% dicalcium phosphate, 45% trace mineralized salt and 5% potassium chloride.

Cows were weighed every two weeks following an 8-hour shrink. Condition scores were assigned (1=emaciated, 9=obese) by four independent evaluators. Calves were weighed following a 4-hour shrink. Milk production was estimated every 2 to 4 weeks using the weigh-suckle-weigh technique. Calves were fasted for 12 hours and suckled at 2000 and 0800 hours.

Data were subjected to least squares analysis with calf age (covariate), calf sex, energy level, protein source and the energy level by protein source interaction included in the model. Because the interaction was not significant for any variable (P>.46), differences due to energy level or protein source were evaluated by F-test.

Table 1. Feedstuff and chemical composition of supplements.

	Low TDN[a]		High TDN[a]	
Bypass protein:	Low	High	Low	High
Feed composition, % (DM basis)				
Soybean meal	91.49	41.06	25.92	4.33
Blood meal		18.72		8.93
Soybean hulls		30.73	68.29	80.37
Molasses	3.35	3.35	3.35	3.35
Dicalcium phosphate	3.42	4.11	1.51	1.94
Trace mineralized salt[b]	1.52	1.40	.73	.70
Sodium sulfate	.15	.59	.17	.36
Vitamin A (30,000 IU/g)	.06	.06	.03	.03
Dairy Flavors	.02	.02	.02	.02
Nutrient supply, lb/day				
Crude protein	1.42	1.42	1.42	1.42
Bypass protein	.40	.71	.40	.71
TDN	2.6	2.6	5.2	5.2
Feeding level, lb DM/day	3.28	3.58	6.87	7.17

[a]TDN=Total Digestible Nutrients.
[b]Trace mineralized salt contained 92% NaCl, .25% Mn, .2% Fe, .033% Cu, .03% S, .007% I, .005% Zn and .0025% Co.

Results and Discussion

Increased supplemental energy (5.2 lb TDN/day) decreased weight ($P<.0001$) and body condition ($P<.09$) losses of lactating beef cows (Table 2). In addition, cows fed 5.2 lb TDN/day produced more milk ($P<.0001$) and supported calves that gained more weight ($P<.0003$) than cows fed 2.6 lb TDN/day. Increased supplemental energy should increase the productivity of lactating beef cows grazing dormant native range because the digestibility of dormant grass is low.

Bypass protein supplementation in the form of blood meal decreased ($P<.09$) body weight loss of lactating beef cows (Table 1). Body condition, however, was not altered ($P=.90$) by additional bypass protein. Cows receiving blood meal supplements produced 1.0 to 1.7 lb more milk ($P<.006$) than cows fed soybean meal-based supplements. Consequently, calves suckling cows that were supplemented with blood meal gained 7.5 lb more weight ($P<.08$) than calves suckling soybean meal-supplemented cows.

The productivity of lactating beef cows grazing dormant native grass is limited by low forage digestibility and forage protein content. Microbial fermentation of low-quality forage is increased by protein supplementation. The ability of ruminal bacteria to meet the protein requirement of the lactating cow may be limited by low forage digestibility. Under these circumstances, excess ruminal degradable protein would be used for energy rather than protein. Bypass protein

Table 2. Performance of fall-calving beef cows supplemented with different amounts of energy and bypass protein.

	Low TDN		High TDN			Probability	
Bypass protein:	Low	High	Low	High	SE[a]	Bypass	Energy Level
Cow weight, lb							
Initial	1,037	1,038	1,036	1,030	21.3	.90	.85
Final	951	968	998	1,004	19.8	.58	.04
Change, 83 days	-86	-70	-38	-26	8.0	.09	.0001
Cow body condition, units							
Initial	5.01	4.99	5.08	5.16	.172	.87	.49
Final	4.64	4.64	4.89	4.94	.139	.91	.06
Change, 83 days	-.37	-.35	-.18	-.22	.090	.90	.09
Milk production, lb/day							
Initial	10.0	10.0	10.1	9.4	.58	.55	.65
Final	7.9	9.0	10.5	11.4	.55	.07	.0001
Change, 83 days	-2.0	-1.0	.3	2.0	.49	.006	.0001
Calf body weight, lb							
Initial	166	169	168	167	5.3	.77	.96
Final	246	258	264	270	8.5	.30	.08
Change, 83 days	80	88	96	103	4.1	.08	.0003

[a]Standard error of the treatment mean.

augments the supply of bacterial protein reaching the small intestine and should increase the overall protein status of the lactating cow. Increased milk production and calf growth should result. In this study, supplemental bypass protein increased the productivity of fall-calving cows and their calves suggesting that inadequate protein supply to the small intestine may have limited cow productivity.

Although the results of this study are preliminary, the data suggest that management of supplemental protein source may improve the productivity of lactating beef cows grazing dormant native range. Additional research is needed to determine the correct quantity and balance of ruminal degradable and bypass protein necessary for optimum beef cow performance.