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EFFECT OF SOURCE AND LEVEL OF SUPPLEMENTAL PROTEIN ON PERFORMANCE OF POSTPARTUM RANGE COWS

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Summary

Two postpartum grazing trials were conducted from early March to mid May in consecutive years to determine the effects of supplemental rumen escape protein on the performance of spring calving beef cows grazing native range. Simmental x Angus cows were allotted within 7 to 14 days of calving to three supplement treatments formulated to provide equal amounts of energy from corn, soybean meal, and a combination of blood meal and corn gluten meal. Cows supplemented with corn lost more weight than cows supplemented with soybean meal. Supplemental escape protein did not improve weight gains over the soybean meal supplement. Supplemental treatments did not affect cow body condition, percentage of cows cycling, or calf performance. Results from this trial indicated that supplemental escape protein did not improve cow performance over that of a more rumen degradable protein source such as soybean meal.

(Key Words: Beef Cattle, Postpartum, Escape Protein, Protein Supplementation.)

Introduction

The period from early lactation to rebreeding is a very critical time for cows. At this time, protein and energy requirements are at their highest level of the year. Therefore, postpartum cows may need some form of supplementation in order to meet the extra nutritional requirements. This is especially true if they have high milking abilities, are extremely thin, or if they are 2-year-old cows.

Recent research has focused on different supplementation schemes involving the use of escape protein which is low in rumen degradability. The protein which reaches the small intestine for absorption is composed of microbial crude protein and feed protein which escapes ruminal degradation. When protein requirements are high, as in the case of a lactating beef cow, microbial crude protein may not meet the cow's metabolizable protein requirements. By providing a less rumen degradable (or escape) protein, the total amount of metabolizable protein available to the small intestine can be increased. Others have reported that supplemental escape protein has improved cow weight gains, milk production and decreased the interval between calving and first estrus. Research in Nebraska has suggested that cows grazing lush green forages such as smooth brome may benefit from supplemental protein that is low in rumen degradability. The objective of this study was to determine the effect of escape protein supplementation on the performance of lactating cows grazing native range in the spring.

Materials and Methods

Two postpartum grazing trials conducted in consecutive years involved lactating Simmental x Angus crossbred cows grazing native range from early March to mid-May were conducted at the SDSU Range and Livestock Research Station near Cottonwood. Dietary treatments (Table 1) included a corn-based supplement (Corn), a soybean meal based supplement (SBM), and a supplement which provided a higher level of rumen undegradable protein (Escape). The Escape supplement provided equal amounts of rumen undegradable protein from blood meal and corn gluten

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Table 1. Supplemental treatments[a]

	Escape	SBM	Corn
	First Year		
Corn	26.4	-	82.7
Soybean meal	-	90.0	-
Blood meal	19.8	-	-
Corn gluten meal	39.3	-	-
Molasses	5.6	5.6	5.4
Dicalcium phosphate	5.9	4.4	6.1
Potassium chloride	3.0	-	2.9
Sodium sulfate	-	-	2.9
	Second Year		
Corn	26.5	-	82.8
Soybean meal	-	90.0	-
Blood meal	19.5	-	-
Corn gluten meal	39.3	-	-
Molasses	5.5	5.5	5.6
Dicalcium phosphate	5.9	4.5	6.0
Potassium chloride	2.9	-	2.8
Sodium sulfate	-	-	2.8

[a] Percentage on a dry matter basis.

meal (Table 2). The Escape and SBM treatments provided 1.35 lb of crude protein per day to meet cow requirements not provided by grass (Table 2). The Corn treatment was formulated to provide equal amounts of energy to the Escape and SBM treatments (Table 2). All supplement treatments were balanced to supply equal daily amounts of calcium, phosphorus, potassium, and sulfur exceeding NRC (1984) requirements. They were gathered every morning, sorted into treatment groups and bunk fed their respective supplements in pellet form (3/8 inch diameter). Cows were grazed on a native pasture composed primarily of western wheatgrass.

Ninety-six and 103 cows were used in the study in the spring of 1991 and 1992. First calf heifers and cows were bred to either Angus or Simmental bulls to begin calving on February 15 and March 15 respectively. Within 7 to 14 days of calving, cows were allotted by age of cow, calving date, and sex of calf. Initial cow weights were taken in the morning after overnight removal from feed and water. Weights taken in early April and mid-May were the averages of weights taken in the morning after two consecutive days after overnight removal from feed and water. Condition scores (1 to 9, 1 = extremely emaciated) were assigned by two trained technicians in early April and mid May.

Blood samples were taken via jugular venipuncture 10 days apart in early May and early June to determine the number of cows cycling. Blood samples were analyzed for serum progesterone levels by radioimmunoassay. Cows having serum progesterone levels greater than 1 ng/ml were considered cycling. The breeding season began on June 6 with 6 days of estrus detection and artificial insemination. Remaining cows were then injected with prostaglandin. Estrus detection and artificial insemination continued for 6 more days. Cows were than exposed to bulls for 48 days.

Table 2. Composition of daily supplemental intake per cow

	Escape	SBM	Corn
First Year			
Dry matter, lb	3.03	3.19	3.13
Crude protein, lb	1.34	1.35	.24
Rumen undegradable protein, lb[a]	.92	.42	.17
NE_m, Mcal[b]	2.72	2.82	2.76
Calcium, lb	.06	.05	.04
Phosphorus, lb	.05	.05	.04
Potassium, lb	.06	.08	.07
Second Year			
Dry matter, lb	2.72	2.91	2.85
Crude protein, lb	1.35	1.35	.26
Rumen undegradable protein, lb[a]	.82	.38	.15
NE_m, Mcal[b]	2.44	2.79	2.74
Calcium, lb	.05	.05	.05
Phosphorus, lb	.05	.05	.05
Potassium, lb	.06	.07	.07

[a] Calculated from NRC Ruminant Nitrogen Usage (1985) values.
[b] Calculated from NRC (1984) values.

Conception date was calculated from calving date the following year, assuming a 283-day gestation period. Cow cycling rate and pregnancy rate were analyzed by the Chi-square analysis of SAS. Other performance data was analyzed by the GLM procedure of SAS with treatment means separated by the PDIFF option.

Results and Discussion

Cows supplemented with Corn lost more weight ($P<.05$) than cows supplemented with SBM (Table 3). The Escape supplement did not improve weight gains over the SBM treatment. Cow body condition scores and milk production as reflected by calf weight gains and weaning weights (year 1) were not affected by supplement treatment. Supplement treatment did not affect pregnancy rate, conception date or the percentage of cows cycling in early May and early June or during the first 12 days of the breeding season (Table 3). Based on cow weight change, protein seems to be limiting for lactating beef cows grazing native range in the spring. Contrary to other reported research, feeding an escape protein provided no additional benefit in cow weight gains or improvement in percentage of cows cycling or other measures of reproductive performance for lactating beef cows grazing native range in the spring.

Table 3. Cow and calf performance[a]

	Escape		SBM		Corn	
Initial weight, lb	1000	(17.0)	972	(17.6)	988	(15.3)
Cow average daily gain, lb/day						
Calving to mid-May	-.08[bc]	(.17)	.04[c]	(.18)	-.35[b]	(.15)
Initial condition score	4.6	(.08)	4.5	(.09)	4.6	(.08)
Condition score change	.2	(.08)	.2	(.08)	.1	(.07)
	Reproductive Performance (Year 1)					
Number of cows	30		34		33	
Cows cycling in May, %	26.7		35.3		21.2	
Cows cycling in June, %	73.3		82.4		72.7	
Cows artificially inseminated, %	83.3		76.5		87.9	
Cows pregnant, %	96.7		94.1		90.9	
Conception date	June 19 (2.3)		June 18 (2.6)		June 20 (2.0)	
	Reproductive Performance (Year 2)					
Number of cows	34		35		34	
Cows cycling in May, %	29.4		34.3		38.2	
Cows cycling in June, %	55.9		68.6		67.7	
Cows artificially inseminated, %	61.8		65.7		61.8	
Calf average daily gain, lb/day						
Birth to mid-May	2.0	(.07)	1.9	(.07)	1.9	(.06)
Weaning weight, lb[d]	572	(10.7)	574	(13.0)	567	(9.1)

[a] Least squares means followed by standard errors.
[b,c] Means within a row with uncommon superscripts differ (P<.05).
[d] Data from first year only.