

January 2016

Effects of Altering Supplementation Frequency During the Pre-Partum Period of Beef Cows Grazing Dormant Native Range

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McMullen, C. J.; Jaeger, J. R.; Waggoner, J. W.; Harmony, K. R.; and Olson, K C. (2016) "Effects of Altering Supplementation Frequency During the Pre-Partum Period of Beef Cows Grazing Dormant Native Range," *Kansas Agricultural Experiment Station Research Reports*: Vol. 2: Iss. 2. <https://doi.org/10.4148/2378-5977.1181>

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Funding Source

Article was previously published in 2016 Cattlemen's Day. <http://newprairiepress.org/kaesrr/vol2/iss1/15/>

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Abstract

Spring-calving beef cattle that are grazing low-quality (< 7% crude protein) dormant forage typically are unable to meet their maintenance requirements for protein. Providing a protein supplement (> 30% crude protein) is recommended to decrease losses of body weight and body condition. Nutrient supplementation when forage quality is poor or limited is one of the largest expenditures for forage-based beef cattle operations. The expansion of the ethanol industry has afforded many producers in corn and sorghum-producing regions an alternative to traditional oilseed-based protein supplements. The availability and nutrient profile of distiller's grains with solubles (DDG) has made it popular as a supplement for cows that are grazing dormant lowquality forages.

Decreasing supplementation frequency reduces costs for labor and fuel. Previous research has shown no difference in body weights or body condition scores of cows supplemented with distiller's grains daily, once every three days, or once every six days; however, the proportion of cows that ate hay during the 60 minutes immediately after supplementation was less on the day of supplementation for cows supplemented once every six days compared to cows supplemented daily. The observed decrease in hay consumption following supplementation could potentially decrease total organic matter intake during late gestation. More frequent supplementation may increase organic matter intake and improve performance during the month before parturition.

Therefore, the objective of this study was to evaluate effects of altering frequency of supplementing distiller's grains during the last 28 days of gestation with respect to performance of spring-calving beef cows consuming low-quality dormant native range.

Keywords

supplementation, gestation, distiller's grains

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Introduction

Spring-calving beef cattle that are grazing low-quality (< 7% crude protein) dormant forage typically are unable to meet their maintenance requirements for protein. Providing a protein supplement (> 30% crude protein) is recommended to decrease losses of body weight and body condition. Nutrient supplementation when forage quality is poor or limited is one of the largest expenditures for forage-based beef cattle operations. The expansion of the ethanol industry has afforded many producers in corn and sorghum-producing regions an alternative to traditional oilseed-based protein supplements. The availability and nutrient profile of distiller's grains with solubles (DDG) has made it popular as a supplement for cows that are grazing dormant low-quality forages.

Decreasing supplementation frequency reduces costs for labor and fuel. Previous research has shown no difference in body weights or body condition scores of cows supplemented with distiller's grains daily, once every three days, or once every six days; however, the proportion of cows that ate hay during the 60 minutes immediately after supplementation was less on the day of supplementation for cows supplemented once every six days compared to cows supplemented daily. The observed decrease in hay consumption following supplementation could potentially decrease total organic matter intake during late gestation. More frequent supplementation may increase organic matter intake and improve performance during the month before parturition.

Therefore, the objective of this study was to evaluate effects of altering frequency of supplementing distiller's grains during the last 28 days of gestation with respect to performance of spring-calving beef cows consuming low-quality dormant native range.

Key words: supplementation, gestation, distiller's grains

Experimental Procedures

Pregnant Angus crossbred cows ($n = 238$; age = 6 ± 2.5 years; initial body weight = 1362 ± 123.9 lb; initial body condition score = 5.7 ± 0.03) were maintained on dormant native range for 88 days until the onset of calving. Pasture botanical composi-

tion included the following species; sideoats grama (*Bouteloua curtipendula*), western wheatgrass (*Pascopyrum smithii*), blue grama (*Bouteloua gracilis*), Japanese brome (*Bromus arvensis*), and buffalograss (*Bouteloua dactyloides*).

Cows were stratified by age, weight, and body condition score, and assigned randomly to one of four treatments: 1) dried distiller's grains fed daily (D1); 2) dried distiller's grains fed once every 6 days (D6); 3) dried distiller's grains fed daily for the first 60 days and then once every 6 days for the remaining 28-day period (D1-D6); and 4) dried distiller's grains fed every 6 days for the first 60 days then daily for the remaining 28-day period (D6-D1).

Treatments were initiated 100 days prior to expected onset of calving. Dried distiller's grains with solubles were delivered and stored in bulk for use throughout the duration of the study. Cows were sorted daily into treatment groups and supplement was delivered at 8:30 a.m. into a bunk for consumption. Only one set of bunks was available; therefore, on days when multiple supplement treatments were fed, each group was given one hour to consume the supplement before being moved out of the feeding area. Cows were allotted 28 linear inches of bunk space each. Supplement intake was prorated to supply 0.79 lb crude protein per cow daily (2.58 lb dried distiller's grains in year 1 and 2.60 lb dried distiller's grains in year 2, dry matter basis). Mineral (Prairie Cow 4P; Suther Feeds, Inc., Frankfort, KS) and salt were available continuously during the experiment. At the onset of calving, treatments were discontinued and cows were fed forage sorghum hay at 2% of body weight and supplemented 1.43 lb dried distiller's grains (dry matter basis) daily in a common pasture.

Forage samples for nutrient analysis were obtained prior to trial initiation. Samples ($n = 24$) were collected from multiple areas in each pasture using a randomly-placed 2.69-ft² clipping frame. All forage within the frame was clipped 0.79 inch above the surface. All samples were dried at 131°F for 96 hours, ground through a Wiley Mill (0.79 inch screen; Arthur H. Thomas, Philadelphia, PA), and stored at room temperature for subsequent nutrient analysis (Table 1). A representative sample of distiller's grains was collected at delivery, composited, and frozen. Forage and distiller's grains samples were submitted to a commercial laboratory (SDK Laboratories, Hutchinson, KS) and analyzed for dry matter, crude protein, neutral detergent fiber, acid detergent fiber, calcium, phosphorus, and sulfur (Table 1).

Cow body weights and body condition scores were measured every 28 d at 9:00 a.m. Supplement was withheld the morning of data collection and fed immediately after all cows had been weighed. Two independent, trained observers assigned body condition scores using a 9-point scale (1 = extremely emaciated, 9 = extremely obese; Wagner et al., 1988) on each respective weigh date. Cows that calved before the final weigh day were excluded from the analysis, resulting in a total of 232 observations in the experiment.

Results and Discussion

Cattle consuming low-quality dormant native range generally do not consume sufficient nitrogen to optimize ruminal fermentation, which hinders nutrient digestion absorption. Previous research reported that supplementation frequency had no effect on cow performance when cattle were supplemented protein as infrequently as once per

week. In agreement with these reports, we found no differences between groups of cows supplemented daily or at 6-day intervals (Table 2).

We hypothesized that increasing supplementation frequency for the 28 days prior to onset of calving from once every 6 days to daily would increase dry matter intake, thus resulting in greater nutrient intake and more favorable performance. In contrast, increasing supplementation frequency had the opposite of its intended effect (Table 2). Cows in the D6-D1 group had lighter body weights ($P=0.04$) and less body weight gain at the end of the 88-day supplementation period compared to cows in the D1, D6 and D1-D6 groups. Likewise, body condition scores of D6-D1 cows tended ($P=0.09$) to be lower than those of cows in the D1, D6 or D1-D6 supplementation groups.

Implications

Under the conditions of our study, increasing supplementation frequency from once every 6 days to daily during the final 28 days prior to calving resulted in less body weight gain and poorer body condition scores for pregnant beef cows supplemented with dried distiller's grains. No adverse effects of reducing supplementation frequency to once every 6 days were observed in pregnant beef cows fed dried distiller's grains. Reducing supplementation frequency may be a viable means of reducing supplementation costs when dried distiller's grains are used as supplement.

Table 1. Nutrient composition (dry matter basis) of native range and dried distiller's grain with solubles¹

Item	Native range		Dried distiller's grains with solubles	
	Year 1	Year 2	Year 1	Year 2
Dry matter, %	85.5	87.4	88.4	88.2
Crude protein, %	5.5	4.6	32.7	31.2
Neutral detergent fiber, %	69.1	73.4	29.7	37.0
Acid detergent fiber, %	47.3	47.1	18.7	17.7
Calcium, %	0.36	0.28	0.09	0.07
Phosphorus, %	0.13	0.10	0.82	0.85
Sulfur, %	0.10	0.06	0.80	0.60
Net energy for maintenance, Mcal/kg	0.95	0.56	1.98	1.93

¹Analysis conducted by SDK Laboratories, Hutchison, KS.**Table 2. Performance of spring-calving cows supplemented with dried distiller's grains during the last trimester of gestation**

Item	Supplement treatments ¹					<i>P</i> -value		
	D1	D6	D1-D6	D6-D1	SEM	Treatment	Year	Treatment × Year
Number of cows	57	65	57	59				
Body weight, lb								
day 1	1430.7	1432.9	1438.4	1401.2	7.99	0.37	0.39	0.77
day 60	1512.9	1468.1	1519.1	1503.3	7.99	0.13	0.24	0.74
day 88	1540.4 ^a	1532.1 ^a	1540.7 ^a	1479.9 ^b	8.23	0.04	0.14	0.96
Body weight change, lb								
day 1-60	84.9 ^c	73.3 ^{c,d}	84.5 ^c	70.0 ^{d,e}	2.82	0.08	< 0.01	0.65
day 60-88	26.2 ^a	27.3 ^a	19.4 ^{a,b}	10.3 ^b	2.07	0.03	0.53	0.07
day 1-88	111.8 ^a	101.2 ^a	105.0 ^a	81.2 ^b	3.23	< 0.01	< 0.01	0.39
Body condition score ²								
day 1	5.9	5.8	6.0	5.9	0.03	0.45	0.53	0.59
day 60	5.6	5.5	5.6	5.5	0.03	0.39	< 0.01	0.89
day 88	5.8 ^c	5.8 ^c	5.8 ^c	5.6 ^d	0.03	0.09	< 0.01	0.75

¹Supplements provided during the last trimester of gestation. Treatments: D1= dried distiller's grains fed daily from day 1 to day 88; D6= dried distiller's grains fed every 6 days from day 1 to day 88; D1-D6= dried distiller's grains fed daily from day 1 to day 60 and every 6 days from day 61 to day 88; and D6-D1= dried distiller's grains fed every 6 days from day 1 to day 60 and daily from day 61 to day 88.

²Scale of 1 to 9; 1 = extremely emaciated, 9 = extremely obese (Wagner et al., 1988).

^{a,b}Means with different superscripts denote difference between treatments ($P < 0.05$).

^{c,d,e}Means with different superscripts denote a tendency for difference between treatments ($0.05 < P \leq 0.10$).