EFFECT OF PROTEIN CONCENTRATION IN SUPPLEMENTS AND FREQUENCY OF SUPPLEMENTATION ON THE PERFORMANCE OF BEEF COWS GRAZING DORMANT BLUESTEM RANGE[1]

J.L. Beaty, R.C. Cochran, E.S. Vanzant, J.L. Morrill, R.T. Brandt, Jr., and D.E. Johnson[2]

Summary

One hundred twenty-eight, pregnant, Angus × Hereford cows were used to determine whether response to altering frequency of winter range supplementation depends on the protein concentration in the supplements. Supplements containing 12%, 21%, 31%, or 41% crude protein (CP) were fed either daily (7X) or three times weekly (3X). Both groups consumed 31 lbs of supplement per head weekly. Frequency of supplementation exerted only minor influences on cow performance and had no effect on calf performance. However, cows lost less body weight and condition as CP concentration in the supplement increased. In addition, calf weaning weights were improved with increasing CP in the supplement. In conclusion, the impact of supplement CP concentration was much greater than the impact of alteration in supplementation frequency.

(Key Words: Beef Cows, Winter Range, Frequency, Protein, Supplementation.)

Introduction

In addition to actual supplement costs, winter supplementation involves additional expenses associated with labor and time. Previous research indicates that supplements with high CP concentrations (30 to 40%) may successfully be fed less frequently. However, less frequent feeding of supplements with low to moderate CP concentration has not been thoroughly evaluated. Our objective was to determine if response to altering frequency of supplementation depends on CP concentration in supplements fed to cows grazing winter range.

Experimental Procedures

One hundred twenty-eight, pregnant, Angus × Hereford cows (average initial body weight = 1047 lb; average initial body condition = 5.2) were assigned to one of four different supplement CP concentrations: 12%, 21%, 31%, or 41% CP, fed at two different frequencies: daily (7X) or three times weekly (3X). Both 7X and 3X groups consumed 31 lbs (dry matter basis) of the respective supplement per head during each week. Supplements were comprised of rolled sorghum grain and soybean meal. A trace mineralized salt/dicalcium phosphate mix was available at all times. At the initiation of the trial, cows received an injection of 1,000,000 IU of vitamin A. Treatment supplements were fed beginning on November 20, 1991 and continued through calving (average calving date = March 4, 1992).

All treatments were equally represented in each of four pastures. Cows were rotated among pastures at monthly intervals. All cows were gathered (by pasture) in the morning, sorted into treatment groups, and group-fed their supplement. On days on which only the

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[1]The authors would like to thank Gary Ritter, Wayne Adolph, and the student workers at the Range Research Unit for their invaluable assistance in conducting this trial.

[2]Department of Statistics.

7X treatment groups were fed, cows in the 3X treatment groups were maintained in a pen while the 7X groups consumed their supplement. The order of pastures in which cows were gathered was rotated daily. Grazing time was recorded during a 1-week period in January. Cows within a single pasture were fitted with vibracorders (grazing recorder) and were individually fed during the measurement period. Before each weigh period, (days 0, 58, 86, calving (average 105 days), 166, and 321 of the trial) cows were penned and held off water overnight. Cows were weighed and condition-scored within 48 hours after calving, and then removed from the trial and managed similarly. Cows were pasture-mated to Angus bulls during a 60-day breeding season. Pregnancy was determined by rectal palpation.

Results and Discussion

Response to frequency of supplementation did not depend on the protein concentration in the supplements. Losses in body weight and condition measured at calving were slightly greater for cows supplemented 3X versus 7X ($P \leq .10$; Table 1). Calf birth weights and weaning weights were similar ($P > .10$) regardless of supplementation frequency. Similarly, grazing times and pregnancy rates were not different ($P > .10$) between 7X and 3X supplementation groups. However, all treatment groups were gathered daily in this study in an attempt to concentrate on potential detrimental effects on ruminal function when supplementation frequency is altered. This may have affected the behavioral patterns of the 3X group. Research is currently underway to evaluate potential behavioral differences in animals on treatments similar to our 3X and 7X treatments.

As supplement CP increased, cows lost less body weight and condition ($P < .01$). Cows offered the 12% CP supplement lost considerable body weight and condition from the start of the trial through calving. However, the magnitude of change in these variables decreased as the CP concentration in the supplement increased above 21%. Calf birth weights tended ($P = .15$) to increase and then level off as CP in the supplement increased. Weaning weights increased ($P = .05$) in direct proportion to increasing CP in the supplement. Grazing time and pregnancy rate were not different ($P > .10$) among the supplements.

Although the numbers of animals available likely limited the ability to detect statistical significance in pregnancy rate, the magnitude of difference between groups fed the 12% and 41% CP supplements warrants careful consideration. Other research reports suggest that prepartum body weight and condition changes of the magnitude observed in those cows receiving the 12% CP supplement would be expected to negatively impact reproductive performance.

Table 1. Effect of Frequency of Supplementation and Protein Concentration in Supplements Offered to Beef Cows Grazing Dormant Bluestem[a]

	Protein concentrations					P ≤			Frequency[b]			
Item	12%	21%	31%	41%	SE	L	Q	C	7X	3X	SE	P≤
Initial BW[c]	1054	1048	1046	1040	15.23	.54	.99	.91	1040	1054	10.77	.37
Initial BC[d]	5.2	5.1	5.2	5.3	.08	.48	.43	.72	5.2	5.2	.06	.77
Calving												
Δ[e] BW	-285.3	-185.8	-132.5	-114.0	6.72	.01	.01	.70	-165.9	-193.0	4.75	.01
Δ BC	-1.97	-1.06	-.78	-.56	.09	.01	.01	.16	-1.02	-1.17	.06	.10
166 d (Breeding)												
Δ BW	-211.9	-171.4	-180.7	-144.9	19.99	.04	.91	.30	-178.0	-176.5	14.14	.94
Δ BC	-1.29	-.81	-.69	-.51	.09	.01	.11	.28	-.79	-.86	.06	.47
321 d (Weaning)												
Δ BW	7.6	24.4	23.6	20.5	8.92	.35	.28	.71	21.94	16.06	6.34	.52
Δ BC	.02	.04	.05	.03	.08	.89	.70	.93	.03	.04	.05	.83
Grazing time,h	7.2	6.6	7.4	6.3	.59	.47	.68	.21	6.8	7.0	.42	.75
PR%[f]	90.3	96.7	93.8	100.0					95.2	95.2		
Calf birth wt	74.2	79.0	80.6	78.6	2.23	.15	.15	.96	77.7	78.5	1.58	.71
Calf WW[g]	491.5	505.2	521.6	523.6	12.38	.05	.64	.76	511.8	509.1	8.76	.83

[a]No frequency × protein interaction ($P > .10$) on variables presented. SE = standard error, L = linear, Q = quadratic, and C = cubic effects.
[b]7X = received supplement daily and 3X received supplement three times weekly.
[c]BW = body weight (pounds).
[d]BC = body condition (1 = thinnest and 9 = fattest).
[e]Δ = change.
[f]PR = pregnancy rate. Chi-square analysis indicated no significant differences.
[g]WW = weaning weight (pounds).