# DETERMINING THE INFLUENCE OF DIFFERENT LEVELS OF UREA SUPPLEMENTATION WHEN BEEF COWS GRAZING WINTER PASTURE ARE SUPPLEMENTED AT DIFFERENT FREQUENCIES DURING THE PREPARTUM PERIOD

*C. G. Farmer, R. C. Cochran, and T. A. Wickersham*

## Summary

One hundred sixty spring-calving Hereford × Angus cows grazing low-quality, tallgrass-prairie range during the winter of 2000-2001 were supplemented before calving either daily or three times weekly. The supplement contained 40% CP with 0, 15, 30, or 45% of the supplemental degradable intake protein from urea. Supplement was fed at 4 lbs/head daily to cows receiving supplement daily. Cows receiving supplement three times weekly were fed the same amount of weekly supplement, but split equally among their supplementation events. After calving, all cows received a supplement without urea on a daily basis. In general, prepartum supplements that contained more urea prompted greater body weight loss; however, the effect of increasing urea was most noticeable when supplements were fed only three times weekly. When averaged across supplementation frequencies, increasing the level of supplemental urea tended (P=0.15) to decrease pregnancy rate in beef cows that had received urea supplementation before calving.

(Key Words: Range, Supplementation, Frequency, Urea.)

## Introduction

Winter supplementation strategies often use daily feeding of true protein supplements. However, when beef cows are not easily accessible, less frequent supplementation may be more practical. Additionally, because true protein supplements are often costly, incorporation of urea as a degradable protein substitute may be more economical. Previous research at Kansas State University indicated that reducing true protein supplementation frequency from daily to three times weekly resulted in minimal performance differences of beef cows. In other previous research, in the context of a 30% CP supplement, when up to 45% of that supplement's degradable intake protein was supplied as urea, the magnitude of body condition loss over a winter supplementation period was minimal, compared with true protein supplementation. However, it is unknown whether decreasing the feeding frequency of supplements that contain appreciable urea will significantly harm cattle performance. Therefore, our objective was to evaluate the effects of two frequencies of prepartum supplementation with high-protein supplements that delivered four levels of supplemental urea on performance of spring-calving beef cows grazing winter pasture.

## Experimental Procedures

One hundred sixty Hereford × Angus cows were weighed and body condition was scored (1 to 9 scale) on November 27, 2000. Initial condition score averaged 5.2, and initial body weight averaged 1157 lbs. Two frequencies of supplementation were assigned randomly to two of four evenly sized pastures. Two pastures contained cows supplemented daily. The other two

pastures contained cows supplemented Monday, Wednesday, and Friday. Pastures contained low-quality, tallgrass-prairie range (4.1% CP). Pastures were used to represent frequencies of supplementation so that behavior-induced effects on performance would be expressed. Cows were stratified by body condition score and body weight and assigned randomly to one of the four pastures. Finally, within each pasture, cows were assigned randomly to receive one of four different supplements (each of which contained 40% CP) with various urea levels: 1) 0% of degradable intake protein (true protein supplement); 2) 15% of degradable intake protein; 3) 30% of degradable intake protein; and 4) 45% of degradable intake protein. Supplements were comprised of soybean meal and ground milo and offered at 4 lbs/ head daily (as-fed) to cows that received supplement daily. Cows fed three times weekly were also offered 28 lbs of supplement per week, but evenly split among the three days. On their supplementation days, cows were gathered and sorted into their supplement treatment groups. For statistical purposes, treatment group within a pasture was the experimental unit. Supplement refusals were measured through the entirety of the trial. Prairie hay (5.8% CP) was fed (10 lbs/head daily) because of significant snow coverage from December 23 through January 3. Cows were weighed and body condition was scored again on January 9, February 8, and within 48 hours after calving. All cows were fed alfalfa hay (21.6% CP) at 10 lbs/head daily after parturition until there was significant green grass available for grazing. Additional weight and body condition measurements were made immediately before breeding season (May 15) and on August 14. Cows were pregnancy tested on August 14 by rectal palpation. Calves were weighed within 48 hours after birth, on May 15, and on August 14 (ending weight).

## Results and Discussion

During December, one to four cows in each of the groups receiving the highest urea level (45% of the degradable intake protein as urea) completely refused the supplement. After December, all cows usually consumed at least a portion of their allotted supplement. On average, from December 6 through February 8, cows fed that supplement three times weekly refused 44% of their supplement. Those fed daily, refused 4%. Cows fed the supplement with 30% of the degradable intake protein as urea three times weekly refused 8% of their supplement. In the period immediately before calving (February 8 to calving), supplement refusal became more dramatic. In that period, cows fed supplement with 45% of the degradable intake protein as urea three times weekly refused 62% of their supplement, versus 23% for those fed daily. From February 8 to calving, cows fed the supplement with 30% of the degradable intake protein as urea three times weekly refused 28% of their supplement. All other treatment groups consumed their entire supplement allotment.

For body weight changes during the winter supplementation period (December 6 – calving), there was a frequency of supplementation × supplemental urea level interaction (Figure 1). In general, as supplemental urea level increased, there was greater loss in body weight. However, the effect of increasing urea level was most dramatic when cows were supplemented only three times weekly. In fact, cows fed the supplement with 45% of the degradable intake protein as urea, three times weekly lost 87 more lbs of body weight than cows fed the same supplement daily. There was no significant frequency of supplementation × supplemental urea level interaction from December 6 through calving for body condition changes; however, the general trend for this trait seemed to follow the

same pattern as that observed for body weight loss (Figure 1). When averaged across frequency of supplementation, body condition loss increased (linear, P≤.01) with an increase in supplemental urea level during the winter supplementation period (December 6 to calving), whereas no significant difference was observed due to different frequencies of supplementation.

There was no significant frequency of supplementation × supplemental urea level interaction for pregnancy rate (Figure 1), and frequency of supplementation did not affect pregnancy rate. However, when averaged across frequency of supplementation, pregnancy rate tended to decrease with increasing exposure to urea during the prepartum period (linear, P=.15). Cows fed higher levels of urea had pregnancy rates in the mid- to upper-80s compared with low- to mid-90s for those receiving lower levels. Calf birth weights and calf gains during the nursing period were not significantly affected by treatment.

Refusal to consume the supplement that contained 45% of the degradable intake protein as urea is different from our previous experiments with supplements that contained the same percent of degradable intake protein as urea. However, in the present study, all of our supplements contained 40% CP. In previous studies we worked with supplements that contained 30% CP. Clearly, by feeding the same percentage of the degradable intake protein as urea in the context of a higher protein supplement (40% CP) one would be delivering a greater amount of urea as a percent of DM (5% of the DM in the 40% CP supplement compared with 3.6% of the DM in the 30% CP supplement). In conclusion, if one is feeding a 40% CP supplement to prepartum range cows, low-level urea inclusion (≤15% of degradable intake protein from urea) appears to be compatible with less-frequent supplementation. However, because of supplement refusal and subsequent negative performance, caution should be exercised in feeding higher protein supplements with higher levels of urea (>15% of degradable intake protein from urea) at less frequent intervals (i.e. three times weekly), especially if cows enter the winter feeding period in lower body condition.

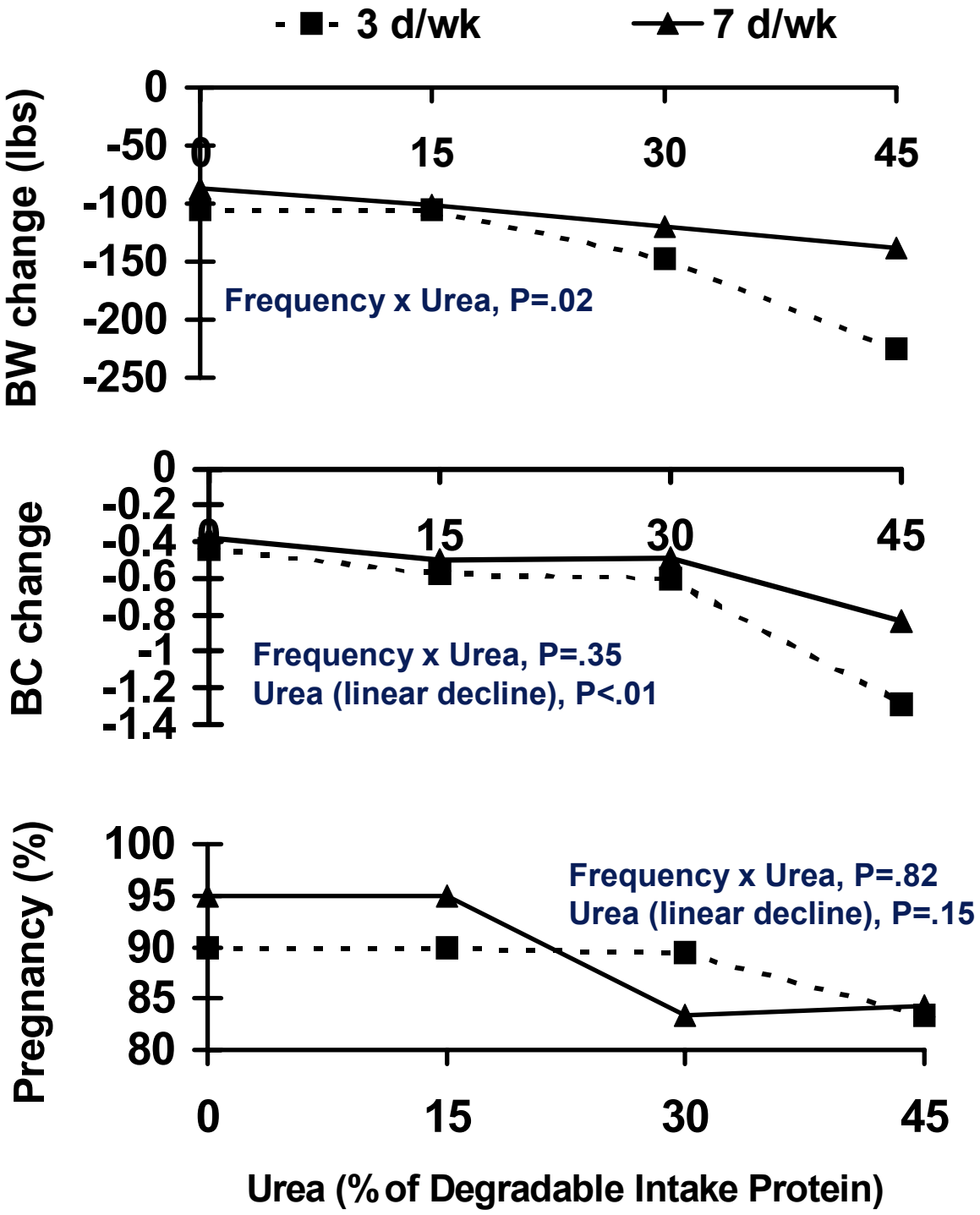


**Figure 1. Interaction Between Frequency of Supplementation and Supplemental Urea Level on Beef Cow Body Weight and Body Condition Score Change from December 6 through Calving (Winter Supplementation Period) and Subsequent Pregnancy Rate.**