1995

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**CATTLE 95-7**

## Summary

A spring grazing trial was conducted to determine the effect of a supplement with lower rumen degradability (sometimes referred to as escape protein or bypass protein) than soybean meal on cow and calf performance. Three supplement treatments based on corn, soybean meal and blood meal/corn gluten meal were fed to 70 Simmental-Angus crossbred cows grazing native range from early April to late May. There was no advantage to the escape protein as measured by cow weight change, reproductive performance or calf gain. Corn supplemented cows performed similar to soybean meal supplemented cows.

Key Words: Beef Cows, Blood Meal, Corn Gluten Meal, Range, Escape Protein, Supplement

## Introduction

The time from calving to rebreeding is a critical nutritional period affecting reproductive performance of beef cows. Protein and energy requirements are the highest during this stage of production. Cattle may meet their protein requirements from protein produced in the rumen by rumen microorganisms or from feed protein that "escapes" degradation in the rumen but is absorbed in the small intestine. Research in Nebraska suggests that cows grazing lush green forages in the spring may benefit from an escape protein supplement. Other research has shown that in some situations improved reproduction can result when heifers or young cows are fed escape protein supplements. The improved reproduction may be from metabolic effects independent of meeting the animal's protein requirement. Two earlier grazing trials at the SDSU Cottonwood Research Station did not demonstrate an advantage in feeding a more expensive escape protein supplement (blood meal and corn gluten meal) compared to soybean meal for cows grazing native range after calving. Those trials were conducted from early March to mid May with cows that had calved from mid February to late March. The objective of this trial was to reevaluate the effect of an escape protein supplement for cows grazing native range during the time from early April to late May.

## Materials and Methods

A grazing trial was conducted from April 7 to May 26 using 70 lactating Angus-Simmental crossbred cows grazing native range at the SDSU Cottonwood Research Station west of Philip, South Dakota. Treatments (Table 1) included a corn-based supplement, a soybean meal-based supplement and an escape protein supplement. The escape supplement provided equal amounts of rumen undegradable protein from blood meal and corn gluten meal. The escape and soybean meal treatments provided 1.35 lb of crude protein per cow daily. The corn supplement was formulated to provide equal amounts of energy as the other higher protein supplements. All treatments were balanced to supply equal amounts of phosphorous, potassium, and sulfur that exceeded NRC (1984) requirements. Cows grazed the same pasture (primarily western wheatgrass) and were gathered every morning, sorted into treatment groups, and bunk fed their respective supplements in pellet form (3/8 inch diameter).

Cows were allotted to treatment by age and calving date. Initial and final weights were the

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Table 1. Composition of supplements

| | Corn | Escape | Soybean meal |
|---|---|---|---|
| Ingredients, % dry matter basis | | | |
| Corn | 80.5 | 24.7 | — |
| Soybean meal | — | — | 86.2 |
| Blood meal | — | 19.3 | — |
| Corn gluten meal | — | 37.6 | — |
| Molasses | 9.1 | 9.1 | 9.0 |
| Dicalcium phosphate | 6.4 | 6.1 | 4.6 |
| Potassium chloride | 2.6 | 3.3 | — |
| K/Mg/S premix | 1.4 | — | .2 |
| Daily supplemental intake per cow | | | |
| Dry matter, lb | 2.97 | 2.99 | 3.02 |
| Crude protein, lb | .24 | 1.35 | 1.35 |
| Rumen undegradable protein, lb[a] | .16 | .88 | .38 |
| $NE_m$, Mcal[b] | 2.65 | 2.64 | 2.65 |
| Phosphorus, g | 21 | 21 | 21 |
| Potassium, g | 30 | 30 | 30 |
| Sulfur, g | 7 | 7 | 7 |

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

average of two weights on consecutive days taken in the morning after overnight removal from feed and water. Cows received no supplement for 4 days prior to the first final weight to remove any treatment effects of gut fill on cow weight. Condition scores (1 to 9, 1 = extremely emaciated and 9 = obese) were assigned by the same two people at the beginning and end of the trial. Subcutaneous fat thickness at the 12th rib was measured with an Aloka 500v ultrasound system using a 5 MHZ, 5.8 cm probe (Corometrics Medical Systems, Inc., Wallingford, CT).

Twenty-four two-year-olds in the study were bred to Angus bulls to start calving on February 15. The 46 cows 3 to 11 years old were bred to Angus or Simmental bulls to start calving on March 15. The breeding season started on June 6 with 14 days of heat detection and artificial insemination. Cows that had not been detected in estrus after 6 days were injected with prostaglandin to synchronize estrus. Following the AI period, cows were exposed to bulls for 50 days. Pregnancy was determined in mid October using the same ultrasound system used for measuring fat thickness. Conception date was determined by subtracting 283 days from the calving date the following year.

Four mature esophageally fistulated steers fitted with screened collection bags were used to collect forage samples (Table 2) while grazing with the cows for 3 days in mid May. Samples were frozen, freeze dried, and ground for later chemical analysis.

Cow and calf performance was analyzed using the Proc GLM procedure of SAS with means separated by the PDIFF option. The model included supplement, cow age, and supplement x cow age. Initial measurements were included as a covariable for analysis of weight, condition score, and backfat change. The model to analyze calf performance also

Table 2. Composition of forage collected in mid May by esophageally fistulated steers

| | Mean | SE |
|---|---|---|
| % organic matter basis | | |
| Crude protein | 13.9 | 1.0 |
| NDF | 65.4 | 4.0 |
| ADF | 43.5 | 2.1 |
| Lignin | 5.0 | .8 |
| % dry matter basis | | |
| Ash | 11.1 | .9 |

included calf sex and date of birth. Cow cycling rate and pregnancy rate were analyzed using the Chi-Square analysis of SAS.

## Results and Discussion

Supplement treatment did not affect cow weight change. Cows receiving the escape protein supplement gained less body condition than the corn supplemented cows ($P<.05$) and less backfat ($P<.05$) than the corn or soybean meal supplemented cows. Supplement treatment did not affect calf weight gain during the trial indicating that cow milk production was not improved by either the escape or soybean supplement compared to corn.

Supplement treatment did not significantly affect the percentage of cows detected in estrus during the 14-day AI period (Table 3). Pregnancy rate and mean conception date were similar for all treatments.

In previous trials conducted at the SDSU Cottonwood Station from early March to mid May, soybean meal supplemented cows gained more than corn supplemented fed cows suggesting that protein was limiting. In this study starting in early April when there is more growing forage available, there was no indication that additional protein in the form of soybean meal was needed. Using a supplement that provides more escape protein did not improve performance as measured by weight change or reproductive performance.

Table 3. Effect of supplement treatment on cow and calf performance[a]

| Item | Corn | Escape | Soybean meal |
|---|---|---|---|
| Cow performance | | | |
| Number of cows | 24 | 22 | 24 |
| Initial wt, lb | 1026 (17) | 997 (18) | 1004 (17) |
| Initial condition score | 4.7 (.1) | 4.8 (.1) | 4.9 (.1) |
| Init. 12th rib backfat, in. | .05 (.01) | .06 (.01) | .06 (.01) |
| Wt change, lb | 19 (6) | 29 (6) | 24 (6) |
| Condition score change | .53[a] (.07) | .28[c] (.07) | .36[bc] (.07) |
| 12th rib backfat change, in. | .03[b] (.01) | .00[c] (.01, | .02[b] (.01) |
| Calf performance | | | |
| Init. calf wt, lb | 136 (4) | 129 (4) | 133 (4) |
| Calf wt change, lb | 98 (3) | 99 (3) | 94 (3) |
| Cow reproductive performance | | | |
| No. of cows | 24 | 22 | 23 |
| % in estrus during 14-day AI period | 66.7 | 59.1 | 47.8 |
| % pregnant | 95.8 | 100.0 | 100.0 |
| Conception date | June 23 (4.0) | June 27 (4.2) | June 28 (3.8) |

[a]Least squares means followed by standard errors.
[b,c]Means within a row with uncommon superscripts differ ($P<.05$).