Supplemental Value of Urea and Extruded Grain-Urea for Range Beef Cows

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Story in Brief

A winter trial was conducted to evaluate the supplemental value of urea and extruded grain-urea for beef cows grazing dry native range grass.

Pregnant-lactating Angus and Hereford cows were fed 30 and 15% natural protein (positive and negative controls, respectively), urea, Starea 44, and Starea 70 supplements. Each non-protein-nitrogen (NPN) source furnished one-half of the supplemental nitrogen. Positive control cows sustained the smallest weight loss and negative control cows the greatest weight loss. Weight loss of NPN supplemented cows was intermediate. Apparent utilization of NPN was 36, 38, and 25 percent for urea; Starea 44 and Starea 70, respectively.

Introduction

Supplementation with protein is usually needed for satisfactory performance of beef cows wintered on dry native range. A summary of 16 experiments involving beef cattle wintered on native range grass in Oklahoma showed that urea-containing supplements were consistently of lower value than supplements containing natural protein. Since poor utilization of urea is caused in part by rapid break-down in the rumen, interest has developed in extruded grain-urea products because of their slower break-down.

The objective of this study was to determine the value of extruded grain-urea compared to "conventional" urea and natural protein sources for lactating beef cows.

Procedure

The trial was conducted at the Lake Carl Blackwell Range located 10 miles west of Stillwater. The predominant forage was of the tall-grass prairie type with climax vegetation of little bluestem, big bluestem, Indian grass, and switch grass. Ingredient makeup of supplements is shown in Table 1.

One-hundred-four mature Angus and Hereford cows were randomly alloted to five treatments for a 113-day trial. Treatments 1 and 2, posi-

Table 1. Ingredient Makeup of Protein Supplements (Percent).

Ingredient	Supplement number, description and % crude protein[1]				
	1 Natural 30	2 Natural 15	3 Urea[2]	4 Starea 44[2]	5 Starea 70[2]
Corn	27.77	68.75	59.35	23.32	41.35
Soybean meal, sol (44%)	58.25	17.25	19.25	16.30	18.45
Ground alfalfa hay	5.00	5.00	5.00	5.00	5.00
Molasses, sugarcane	5.00	5.00	5.00	5.00	5.00
Monosodium phosphate	2.50	2.75	2.85	2.80	2.80
Dicalcium phosphate	0.75	1.20	1.17	1.18	1.15
Sodium sulfate[3]	0.68	---	2.03	2.10	2.05
Trace mineral mix	0.05	0.05	0.05	0.05	0.05
Vitamin A[4]	+	+	+	+	+
Urea[2]	---	---	5.30	---	---
Starea 44[2,5]	---	---	---	44.25	---
Starea 70[2,5]	---	---	---	---	24.15

[1] Approximate crude protein as determined by feed composition table, Crampton and Harris (1969).
[2] Urea and the urea portion of Starea products to furnish 50% of total crude protein.
[3] Formulated to supply 12:1 nitrogen:sulfur ratio.
[4] 10,000 IU per pound of supplement.
[5] Gelatinized grain-urea mixture.

tive and negative controls, respectively, consisted of 30 and 15 percent natural protein supplements. Treatments 3, 4, and 5 consisted of 30 percent crude proteins supplements in which one-half of the nitrogen was provided by urea (treatment 3) and urea within starea 44 and starea 70 (treatments 4 and 5). Starea 44, containing 44 percent crude protein equivalent, consists of 13 percent urea and 87 percent milo. Starea 70, containing 70 percent crude protein equivalent, consists of 22 percent urea and 78 percent milo.

Cows, allowed to graze in a common pasture, were gathered to a central feeding area each morning six days per week, placed in 3 X 8 feet stalls located in a shed and individually fed their supplement. Twenty minutes was allowed for consumption of supplement. Feed refusals were recorded daily, and intake adjustments were made periodically to maintain equal intake of supplement among all treatments. Supplement intake, lower than desired, was dictated by the level of NPN supplements which the cows would consume during the individual feeding period.

Cows calved from September 28 to February 16, with an average calving date of November 21. Calving was completed before the trial was ended. Initial and final condition of cows was estimated by scoring each cow on a scale of 1 to 9, with 1 being the thinnest and 9 the fattest.

Since the number of cows which calved prior to the trial was disproportionate among treatments, initial weight of the cows that had

calved before the trial was adjusted to a pregnant weight basis with the following formula:

Adjusted initial weight = actual initial weight + (calf birth weight x 1.9697 — 19.0).

Results and Discussion

Results are presented in Table 2. Average daily supplement intake per cow was 2.5 pounds for all groups. Cows fed the 30 percent natural protein supplement, the positive control, lost less weight than cows fed the 15 percent protein supplement, the negative control. This indicated that the negative control was low in protein and provides a valid basis of comparison for the NPN supplements. Weight loss of cows fed the NPN-containing supplements was intermediate between positive and negative control. Weight loss expressed as a percentage of initial weight provides a more valid comparison of supplements due to variation in initial weight among treatments. On this basis none of the NPN-containing supplements were significantly different from the negative control.

Weight loss of NPN-supplemented cows can be compared to the weight loss of negative and positive control cows to provide an estimate of the apparent utilization of the NPN. Such a comparison shows an apparent utilization of 36, 38, and 25 percent for urea, Starea 44 and Starea 70, respectively.

Negative control cows lost more condition than positive control cows, consistent with the difference in weight loss. Condition loss of NPN-

Table 2. Performance of Cows and Calves During Winter Supplementation Period.

	Supplement, % crude protein				
Item	Natural 30	Natural 15	Urea[1] 30	Starea 44 30	Starea 70 30
No. cows	21	21	20	21	21
Daily supplement, lb.	2.5	2.5	2.5	2.5	2.5
Daily crude protein intake, lb.	0.75	0.37	0.75	0.75	0.75
Initial weight, lb.	1037	1110	1094	1049	1067
Weight loss, lb.	238	362	336	321	334
Weight loss, %	27.3[1]	32.6[2]	30.7[2]	30.6[2]	31.3[2]
Condition score change[3]	—1.8[1]	—2.8[2]	—2.5[1,2]	—2.6[2]	—2.4[1,2]
Calf weight gain, lb.	107	71	105	95	98

[1,2] Means in the same row with different superscripts differ significantly ($P<.05$).
[3] Difference in initial and final condition based on a scale of 1 to 9, with 1 being the thinnest and 9 the fattest.

supplemented cows, intermediate between the controls, was closer to that of negative controls.

Weight and condition loss comparisons in this trial indicated a low utilization of the NPN portion of the supplements, consistent with previous results obtained in the same area on similar dry winter range grass. In a previous trial, utilization of urea was greater than an extruded grain-urea product, but utilization of the extruded grain-urea products used in this trial (starea 44 and starea 70) was similar to urea.

Positive control calves gained significantly more than negative control calves. However, gains of calves in NPN-supplemented groups were not significantly different from positive controls, and significantly different from negative controls in only one case (urea). A lack of effect of supplement treatments on calf gain, even though weight loss of cows was affected, has been observed at this station. In short duration trials of this nature cows probably maintain milk production at the expense of body tissues.

Performance of Five-Year-Old Hereford, Hereford X Holstein and Holstein Females as Influenced by Level of Winter Supplementation Under Range Conditions

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Story in Brief

The performance of winter calving, 5-year-old Hereford, Hereford x Holstein and Holstein females under tallgrass range conditions was compared. Two levels of winter supplementation were imposed on groups within each breed at calving and extended through the winter.

As the level of winter supplement increased, winter weight loss decreased for cows in the Hereford x Holstein breed group. This trend was not evident in the Hereford and Holstein breed groups due to the increased lactation interval during the winter in treatments receiving the

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