

# Self-Feeding vs. Six Or Three Times Per Week Feeding Of High Urea Winter Supplements To Range Cows

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## Story in Brief

A 30 percent protein supplement with one-half of the protein equivalent from urea was provided for Angus x Holstein crossbred cows wintered on dry native grass. The supplement was (1) self-fed (with salt to limit intake), or (2) fed six times per week, or (3) fed three times per week; the weekly intake of supplement was similar among treatments. Although self-fed cows lost less winter weight, differences were small and other observations indicated no marked detrimental effects from feeding the urea-containing supplement six times per week or even three times per week.

Observations on the supplement feeding patterns of the cows showed that (1) cows self-fed ate supplement 3.4 times per day for a total of 34 min., (2) cows fed six times per week consumed their supplement allowance in 12 min., and (3) cows fed three times per week required three feedings in 8.2 hours and ate a total of 62 min. to consume their supplement allowance.

High winter weight loss and poor rebreeding performance of cows indicated that urea utilization was poor in all treatments.

## Introduction

One way that a cattleman can lower the cost of wintering cattle is to lower the labor requirement of feeding. Not only is the cost of labor increasing, but the availability of qualified personnel for ranch work is decreasing, so cattlemen are presently attempting to maintain more cattle per man. Research at the Oklahoma Agricultural Experiment Station has shown that cattle do not require daily protein supplementation but can be fed larger quantities 2 or 3 times per week with no sacrifice in performance. The previous research was done with natural protein supplements. Today there is economic pressure to feed larger quantities of urea and other non-protein-nitrogen sources, but there has been no research concerning the frequency of feeding of range supplements that contain high levels of urea.

Theoretically, based on laboratory and metabolism research, urea consumed in small amounts at frequent intervals should be utilized

better than larger quantities consumed less frequently. This suggests that self-feeding should be most desirable and two or three times per week feeding should be least desirable. Furthermore, the less frequent feeding of larger quantities of urea supplements suggests a question concerning a possible hazard of urea toxicity.

## Procedure

The experiment was conducted at Lake Carl Blackwell Range located 10 miles west of Stillwater, Oklahoma. The predominant forage is of the tall grass prairie type with climax species consisting of little bluestem, tall bluestem, Indian and switch grass. Since these grasses were dormant during the winter trial the major portion of the cows' diet consisted of dry weathered grass. Prairie hay was fed only on a few occasions when snow covered the range forage.

The experimental cattle were crossbred Angus x Holstein cows, 4 and 5 years old at the beginning of the trial. All cows in the trial were bred to Hereford bulls. The cows started calving December 1, 1971 and finished March 3, 1972, a 94 day period.

The experiment was conducted during a 123 day period from November 19, 1971 to March 21, 1972. The experiment consisted of six groups of cows with two groups randomly assigned to each of three treatments. Treatment 1 involved self-feeding the supplement; salt was mixed with the supplement to limit its intake. The cattle on Treatment 2 were fed 6 times per week while those on Treatment 3 were fed 3 times per week. The amount of self-fed supplement consumed was calculated each week and this quantity was fed in the hand-fed groups the following week. This allowed all groups of cows to consume approximately the same amount of supplement during the trial. The groups of cattle were rotated among the six experimental pastures at approximately 28-day intervals to minimize differences in performance due to possible pasture differences.

The ingredient makeup of the protein supplement was as follows:

Ingredient	Percent of Formula
Milo	55.10
Soybean meal (44%)	18.79
Alfalfa, dehydrated	5.00
Molasses, blackstrap	5.00
Wheat middlings	5.00
Urea (45% N)	5.31
Dicalcium phosphate	1.12
Monosodium phosphate	2.66
Sodium sulfate	1.97
Trace minerals	.05
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	100.00

Vitamin A—added to supply 10,000 IU/lb. of supplement.

The supplement was formulated to contain 30 percent crude protein with urea furnishing one-half of the crude protein equivalent. The intended intake was 3 lb. per head per day before the majority of the cows calved. To regulate intake the level of salt ranged from 25 to 33 percent; the average level during the trial was 28 percent of the supplement mixture.

The supplements which were hand-fed six and three times per week were initially processed into a 3/4 inch range cube and fed on the grass. At a later mixing some problems were encountered in making the large cube, so a 5/8 inch pellet was made and this was fed in feed bunks.

Supplement intake patterns were observed on all groups during two 24-hour periods in March. The self-feeders were observed for 24 continuous hours and the time of day and duration of supplement feeding of each cow was recorded. The hand-fed groups were observed until all supplement was consumed.

Calves were weaned and weighed August 10, 1972; weaning weights were adjusted for age of calf, sex of calf and age of dam.

## Results and Discussion

A summary of the amount of supplement consumed and the weights and condition of the cows is shown in Table 1. The cows that were self-fed lost less weight than the cows that were fed six or three times

Table 1. Cow Weight, Cow Condition Score and Supplement Consumption (Winter 71-72)

	Frequency of Feeding		
	Self-Fed	Six Times Per Week	Three Times Per Week
No. cows	16	18	17
Weight			
Initial, 11-19-71, lb.	1164	1135	1109
End of winter, 3-21-72, lb.	876	817	806
Winter loss, lb.	288	318	303
Winter loss, %	24.8	28.2	27.3
Fall, 8-10-72, lb.	1050	1109	1110
Condition score <sup>2</sup>			
Initial, 11-19-71	5.19	5.17	4.94
End of winter, 3-21-72	1.81	1.78	1.47
Change	3.38	3.39	3.47
Supplement per cow daily, lb.	3.29 <sup>2</sup>	3.32	3.40

<sup>1</sup> On a scale of 1 to 9 with 1 the thinnest and 9 the fattest.

<sup>2</sup> Pounds of protein supplement consumed. In addition, 1.28 pounds of salt were consumed/head/day

per week, and the cattle fed three times per week lost slightly less than those fed six times per week; differences in weight changes among treatments were not statistically significant ( $P < .05$ ). The weight loss of cows on all treatments was higher than desired on cows of this age and the cows became very thin by the end of the trial.

Cattle fed three times per week were slightly thinner in condition at the end of the trial than cows that were self-fed or fed six times per week. The thin condition cows on all treatments is reflected in the poor conception rate shown in Table 2; all groups are below an acceptable fertility level.

These observations on weight loss, condition and rebreeding suggest that the utilization of urea was low; comparable levels of an all-natural-protein supplement fed to the same cows a year earlier resulted in less weight loss and much better rebreeding performance.

The performance of the calves (Table 2) did not appear to be greatly affected by the treatments. The trends in calf performance were in contrast to cow weight changes. The calves from cows fed three times per week had a higher average daily gain while on treatment and from birth to weaning plus a higher adjusted weaning weight; calves from self-fed cows had the lowest average daily gain and adjusted weaning weights.

Part of the difference in calf performance can be explained by the differences in date of calving (which was unrelated to winter treatment in this trial). Self-fed cows calved 17 and 10 days earlier than those fed three and six times per week, respectively; calves that were on the winter treatment the longest had the poorest performance. It is also

**Table 2. Performance of Calves and Rebreeding Performance of Cows (Winter 1971-72)**

	Frequency of Feeding		
	Self-Fed	Six Times Per Week	Three Times Per Week
No. cows	16	18	17
Avg. calving date	Jan. 6	Jan. 16	Jan. 23
Birth wt. <sup>1</sup> , lb.	78	81	84
Wt. of calves 3-21-72, lb.	202	200	193
Daily gain to 3-21-72, lb.	1.70	1.88	1.93
Weaning wt. <sup>2</sup> , lb.	561	592	595
Condition score <sup>3</sup> of calves	6.38	6.39	6.53
No. of cows rebred	12	12	12
Percent cows rebred	75	67	71

<sup>1</sup> Heifer calves adjusted to bull equivalent by multiplying actual birth weight by 1.048.

<sup>2</sup> Weaning weight adjusted to 205-day, steer, mature dam basis.

<sup>3</sup> On a scale of 1-9 with 1 the thinnest and 9 the fattest.

possible that due to chance the treatment groups were unequal in genetic ability for cow productivity. Certainly there would be no reason to expect cows with greater winter weight loss to produce heavier calves. The condition of the calves at weaning did not appear to be affected by the winter treatments.

The supplement feeding patterns of the cows are shown in Table 3. Self-fed cows ate supplement an average of 3.4 times per day and a total of 34 minutes for the 24-hour period, an average of 10 minutes at each feeding. During the 24-hour period when observed they consumed approximately 5 lb. of supplement which included 2.15 lb. of salt; the supplement mix contained 30 percent salt during the days of observation. The cattle fed six times per week consumed the same quantity of pelleted supplement in 12 minutes.

It was interesting to note that when the cows fed three times per week were fed 10 lb. per head they did not eat the entire amount at one time, but ate the supplement very slowly for 10 to 20 minutes and then grazed for a period of time before returning for more supplement. Their supplement contained no salt to limit intake. On the average a cow ate the supplement at three different times in 8.2 hours with a total eating time of 62 minutes. This suggests that the unpalatable urea limited the intake or that possibly some feed-back mechanism, developed from prolonged feeding of urea, stopped the cattle from eating toxic levels of urea.

Table 3. Frequency and Time of Supplement Feeding (Winter 71-72)

	Frequency of Feeding		
	Self-Fed	Six Times Per Week	Three Times Per Week
First 24-hr. observation, 3-3-72			
Eating time/head/day, min.	39	10	61
No. times ate/day	4.1	1.0	3.0
Time feed was available, hr.	24	--	8.3
Amount consumed, lb.	5.44	5.0	10.0
Second 24-hr. observation, 3-10-72			
Eating time/head/day, min.	29	14	62
No. times ate/day	2.7	1.0	3.1
Time feed was available, hr.	24	--	8.1
Amount consumed, lb.	4.65	5.0	10.0
Both 24-hr. observations			
Eating time/head/day, min.	34	12	62
No. times ate/day	3.4	1.0	3.1
Time feed was available, hr.	24	--	8.2
Amount consumed, lb.	5.04	5.0	10.0

It should be emphasized that the cattle had been fed supplement for approximately 3 months before these observations were taken. Oklahoma State University research has shown that about 20 gm of urea per 100 lb. body weight in a single dose to unadapted cows will cause death. In this trial, the cows fed six times per week received a maximum of about 15 gm urea per 100 lb. body weight at a feeding (consumed in about 12 minutes). The cows fed three times per week received a maximum of about 30 gm per 100 lb. body weight at a feeding, but the supplement was consumed at three different times during 8.2 hours.

This intermittent consumption of supplement, somewhat similar to the feeding pattern exhibited by the self-fed cows, may explain why the performance of these cows was not at a lower level. Furthermore, at the start of the trial the cows were gradually switched from six to three times per week feeding during a 2-week period.

### Conclusion

This trial suggested a slight improvement in utilization of urea from self-feeding the supplement, as indicated by cow weight loss, but urea containing supplements were hand-fed six or three times per week without serious consequences. High weight losses and poor rebreeding performance suggested poor utilization of urea in all treatments.

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