These results show that calving Hereford heifers first at 30 months of age improves conception at both first breeding and rebreeding after calving over that seen with calving first at 24-months. Weaning weight of the first calf crop was increased by 45 lb with the older heifers. Calving difficulty and calf mortality were similar with both groups. If forage and feed supplies are adequate, heifers may be properly developed and maintained for calving at 24-months. On the other hand, these results show that many effects of harsh weather and marginal nutrition can be overcome by calving at 30 months of age.

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Effect of Potassium on Weight Gains of Steers Wintered on Dormant Native Range[1]

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Story in Brief

Hereford steer calves were wintered on dormant native range and fed protein supplements containing 20 or 40 percent crude protein. The 40 percent crude protein supplements contained all natural protein or coated urea and 1.47 or 3.0 percent potassium (K). Gains of steers fed the coated urea, 3 percent K supplement were similar to those of steers fed the coated urea, 1.47 percent K supplement when averaged across four blocks of pastures.

Introduction

Potassium (K) markedly affects cellular protein synthesis (Lubin and Lubin and Ennis, 1964). In experiments conducted by Rinehart *et al.* (1968), significantly less of the amino acid, leucine, was incorporated into skeletal muscle protein by chicks fed a K-deficient diet.

Weight gains of steers, fed rations in which supplemental soybean meal was withdrawn during the latter part of the finishing period, were slightly increased by supplemental K (Preston *et al.*, 1974 and Preston and Cahill, 1974).

Recent studies by Karn and Clanton (1976 and 1977) have shown that weight gains of steer calves wintered on dry, native range were increased by the addition of K to urea-containing protein supplements. The object of this study was to obtain additional information relative to the effect of K, when added to urea-containing supplements, on weight gains of steers wintered on dry, native range.

[1]In cooperation with USDA, Science and Education Administration, Agricultural Research, Southern Region.

Experimental Procedure

The trial was conducted during a 99-day period, December 19, 1977 to March 28, 1978, at the Southern Plains Experimental Range, Woodward, Oklahoma.

Ninety-six (96) fall-weaned Hereford steer calves (mean initial weight of 538 lb) were randomly allotted to four treatments of six steers per treatment in a randomized complete block design with four blocks. Steer treatment groups were rotated among the four pastures of each block at two-week intervals throughout the trial. The steers had been vaccinated for blackleg, malignant edema, IBR, PI_3, leptospirosis, treated for ear ticks and implanted with 15 mg diethylstilbestrol.

Steers were group fed 1.75 lb/head/day,[2] six days per week, of a (1) 20 percent crude protein, all-natural supplement (negative control), (2) 40 percent crude protein, all-natural supplement (positive control), (3) 40 percent crude protein, coated urea[3]-containing supplement (coated urea), or (4) 40 percent crude protein, coated urea[3]-containing supplement plus additional K (coated urea plus K). Composition of the supplements is shown in Table 1.

Coated urea supplied 50 percent of the total crude protein equivalent of the urea-containing supplements. The negative control and coated urea supplements were formulated to contain the same amount of K (1.47 percent) as the positive control supplement. The coated urea, plus K supplement contained 3.0 percent K. All supplements contained 1.2 percent phosphorus and were fed in meal form, since the stability of the coated urea to pelleting was unknown at the time the trial was conducted.

Steers were weighed at early morning prior to grazing at approximately 28-day intervals throughout the trial. Initial and final steer weights were means of two consecutive day weights. The steers did not have access to water for approximately 12 hr prior to each weighing.

The data were analyzed by analysis of variance. Differences among planned, two-mean comparisons were tested for significance by the least significant difference procedure.

[2]An equivalent of 1.5 lb/head/day, 7 days per week.
[3]Nipak Chemical Company, Pryor, Oklahoma.

Table 1. Composition[a] of supplements.

	Negative control	Positive control	Coated urea	Coated urea plus K
Corn	43.86	- - -	43.30	39.36
Cottonseed meal	37.86	92.40	34.31	35.17
Soybean meal	- - -	4.40	4.40	4.40
Coated urea[b]	- - -	- - -	9.35	9.35
Cottonseed hulls	10.11	- - -	- - -	- - -
Profos	3.27	.20	3.39	3.40
KC1	1.15	- - -	1.25	4.32
Na_2SO_4	.75	- - -	1.0	1.0
Molasses	3.00	3.00	3.0	3.0
$NE_{maint.}$	81.64	78.19	77.73	74.38
NE_{gain}	51.37	51.37	51.07	48.87
Crude protein	22.2	44.4	44.4	44.4
Ca	1.13	.27	1.17	1.17
P	1.20	1.20	1.20	1.20
K	1.47	1.47	1.47	3.0
S	.39	.40	.44	.44

[a]Percent of ration dry matter except for $NE_{maint.}$ and NE_{gain} which are expressed as Mcal/cwt.
[b]Nipak Chemical Company, Pryor, Oklahoma.

Results and Discussion

Total weight gains or losses of steers during the trial are shown in Table 2. Since the analysis of variance procedure indicated a significant block x treatment interaction ($P<.022$), steer weight gains or losses are shown (1) for each block and (2) averaged across all blocks. The mean square for variation among steers within treatments and blocks (80 degrees of freedom) was used for testing for block x treatment interaction.

Weight gains of steers fed the positive control supplement were greater than those of steers fed the negative control, although this difference varied among blocks from 4.2 to 53.3 lb and was significant ($P<.05$) only for steers of block 2. Gains of steers fed the coated urea supplement in blocks 1 through 4 were decreased by 10.9, 30.8, 25.9 and 9.2 lb, respectively, as compared with gains of steers fed the positive control.

In all blocks except number 4, the inclusion of additional K in the coated urea supplement increased steer gains as compared with steers fed the coated urea supplement which contained 1.47 percent K. The magnitude of the increased gains was very small, however, for steers of blocks 2 and 3.

The primary grass species composition, based on forage production analysis, of the pastures of blocks 1, 2 and 3 is blue grama, sand dropseed, little bluestem, sand bluestem and switchgrass; whereas, that of block 4 is caucasian bluestem, blue grama, sideoats grama and hairy grama. Possible differences in the K content of the grasses may partially account for the observed differences in response to the inclusion of additional K in the coated urea supplement.

Steer weight gains pooled across blocks were about 25 lb greater ($P<.05$) for steers fed the positive versus negative control supplements. Gains of steers fed the coated urea and coated urea plus K supplements were similar and only about 36 percent of those of steers fed the positive control supplement.

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Table 2. Mean steer weight gains or losses (pounds) during 99-day trial.

Treatment:	Negative control	Positive control	Coated urea	Coated urea plus K	LSD[a]
Block					
1	5.0	16.7	5.8	18.3	37.9
2	−25.8	27.5[b]	−3.3	0	37.9
3	15.0	19.2	−6.7	−3.3	37.9
4	25.8	55.0	45.8	30.0	37.9
Mean of all 4 blocks:	5.0	29.6[b]	10.4[c]	11.2	19.0

[a]Least significant difference (P=.05); calculated from the pooled block x treatment error mean square.
[b]Significantly different from negative control (P<.05).
[c]Significantly different from positive control (P<.05).