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Performance and Forage Intake of Range Cows as Affected by Mineral Supplement and Delaying Winter Supplemental Feed

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Summary

Polled Hereford cows on native Flint Hills pasture not supplemented until February lost more weight from November to February and were in poorer condition during the winter and early spring than cows supplemented beginning in November. But birth weights, weaning weights, conception percentages, and calving intervals were similar for both groups. Balancing for phosphorus, potassium, and copper deficiencies in the forage did not improve cow or calf performance. Forage intake ranged from 1.70% of fall body weight when dormant winter grass was low in protein and digestibility to 3.45% when spring grass was higher in protein and more digestible. Forage intake was not influenced by winter supplement program but was slightly higher when minerals were fed. Although forage consumption increased with cow size, it was not affected by level of milk production.

Introduction

Previous research at Kansas State (Davis and others, 1977 Cattlemen's Day) with spring-calving, Polled Hereford cows grazing native bluestem range indicated that reproductive performance can be maintained if cows are supplemented with 3 pounds of alfalfa hay per cow daily during winter and 6 pounds of sorghum grain per cow daily beginning in mid-February. Flint Hills forage is deficient in sodium, phosphorus, and copper year-round and potassium during winter (Harbers and others, Cattlemen's Day, 1978). Our study was designed to determine: 1) if supplemental feeding early in the winter could be eliminated, 2) if balancing for the deficient minerals was beneficial, 3) how much forage mature cows consumed, and 4) other factors affecting forage consumption.

Experimental Procedure

From November 1977 to November 1979, Polled Hereford cows (calving in March and April) were maintained in 6 native bluestem pastures near Manhattan. Those in three pastures were fed 3 pounds of alfalfa hay per cow daily from November 1 to about April 20 and, in addition, 6 pounds of sorghum grain daily per head from February 15 to about April 20. Cows in the other three pastures (delayed feeding) got 3 pounds of alfalfa hay and 6 pounds of sorghum grain per cow daily from February 1 to about April 20. During long periods of snow cover, 10 lbs of hay per cow daily was fed.

One pasture of each winter supplement group received a salt-mineral mixture year-round, and the other 4 pastures received only salt free choice.

We assumed 16.5 lbs of grass intake per day and 30 lbs in the summer (dry basis). Then, using grass analysis from Harbers and others (Cattlemen's Day, 1978), we formulated and fed a mineral mixture to meet NRC (1976) requirements for sodium, potassium, phosphorus, and copper. For the first winter, no minerals were credited to alfalfa hay, and soybean meal was added to insure desired mineral intake. Equal amounts of soybean meal were added to all pastures. During the second winter, an allowance for the minerals in alfalfa hay was included and no soybean meal was added. Content and intake of the mineral mixture are given in Table 9.1.

During the first year, forage intake was measured for 52 cows in four pastures in November, December, and monthly from March through October. Forage intake was estimated from fecal output (chromic oxide) and forage indigestibility (in vitro dry matter disappearance on samples from esophageally fistulated steers). We assumed that level of supplement did not influence forage digestibility.

Cows were exposed to Polled Hereford bulls for sixty days beginning May 25. Weights were taken near the first of the month after cows were held off feed and water overnight. Only cows weaning a calf were included in the analysis of weight change and condition. Only pregnant cows were used for analysis of forage intake for November through March, and only lactating cows for April through October.

Results and Discussion

Cow and calf performance are given in Table 9.2. Cows not supplemented until February lost more weight up to February and were in poorer body condition in February, at the beginning of the calving season (March), and at the beginning of the breeding season (June). Cows not supplemented until February gained weight during February while the early supplemented cows continued to lose. Yet delaying supplementation did not affect conception percentage, calving interval, calf birth weight, or weaning weight. This study indicates that if cows are in good condition going into the winter and plenty of forage is available, supplemental feeding can be delayed until one month before calving, if a high level of concentrate is fed then.

Supplying a salt-mineral mixture to correct for deficiencies in the standing forage improved neither cow condition nor reproductive performance.

Forage dry matter intake was not influenced by winter supplemental program. Cows receiving salt and minerals consumed slightly more forage (24.07 vs. 23.08 pounds), but differences among pastures on the same treatment were larger. Forage intake, digestibility, and crude protein are shown in Table 9.3. Forage intake was the highest in the spring when forage is high in crude protein and digestibility. For every 100 pound increase in November cow weight, forage dry matter consumption increased .974 pound per day. Forage intake was not influenced by level of milk production.

Table 9.1. Intake of salt, mineral, and soybean meal (pounds per cow daily).

	1977-1978						1978-1979					
	November 14-May 7		May 8-July 31		August 1-October 30		November 1-February 4		February 5-June 11		June 12-October 14	
	Salt + mineral	Salt	Salt + mineral	Salt	Salt + mineral	Salt	Salt + mineral	Salt	Salt + mineral	Salt	Salt + mineral	Salt
Salt	.019	.208	.037	.124	.020	.075	.021[1] (.014)	.079	.054	.060	.035	.087
Soybean meal	.223	.222	----	----	----	----	---- (----)	----	----	----	----	----
Potassium chloride	.188	----	----	----	----	----	---- (.076)	----	----	----	----	----
Dicalcium phosphate	.169	----	.147	----	.057	----	.107 (.099)	----	----	----	.088	----
Trace mineral mix[2]	.008	----	.012	----	.004	----	.001 (.001)	----	----	----	.006	----

[1]Figures not in parentheses are for cows fed alfalfa during this period (winter supplement began Nov. 1). Figures in parentheses are for cows not supplemented until Feb. 1.

[2]Trace mineral mix included 10% manganese, 10% iron, 14% calcium, 1% copper, 5% zinc, 0.3% iodine, and 0.1% cobalt.

Table 9.2. Cow and calf performance with indicated supplements.

	Supplemental feeding		Mineral treatment	
	Begun Nov. 1	Begun Feb. 1	Salt + mineral	Salt
Cows per treatment	61	72	47	86
Calf birth weight, lbs	75	77	76	76
Weaning weight, lbs	380	389	386	383
Number of cows open	2	1	2	1
Calving interval*	363	363	361	365
Beginning Nov. cow wt., lbs	1072	1039	1057	1055
Weight change, lbs				
November to February	- 73[a]	-105[b]	-104[a]	- 73[b]
February to March	- 16[a]	+ 10[b]	+ 6[a]	- 12[b]
March to June	- 71	- 72	- 76	- 68
June to November	+156	+167	+162	+161
Ending Nov. cow wt., lbs	1068	1039	1046	1062
Weight to height ratio (lbs/in.)**				
Beginning November	23.19[a]	22.50[b]	22.81	22.87
February	21.62[a]	20.23[b]	20.56	21.29
March	21.29[a]	20.44[b]	20.71	21.02
June	19.74[a]	18.86[b]	19.07	19.53
Ending November	23.13	22.50	22.60	23.03

*Includes only 1 year.

[a,b]Within supplemental feeding or mineral treatment, means with different superscripts differ significantly ($P<.05$).

**Weight in pounds divided by height in inches at the withers. Used as an indication of condition. A lower ratio indicates a thinner animal.

Table 9.3. Monthly forage intake per cow daily.

Month	Number of cows	Monthly cow[1] weight, lbs.	Forage dry matter intake lbs[2]	Forage dry matter intake lbs/100 lbs. Nov. wt.[3]	Crude protein (%)	Forage digestibility (%)
November	44	1065	17.90± .88[a]	1.70±.08[a]	6.80	44.04
December	44	1043	21.08± .88[bc]	2.00±.08[b]	6.28	48.30
March	30	966	18.21±1.04[ab]	1.70±.10[a]	4.78	38.79
April	33	816	26.96±1.01[d]	2.54±.09[c]	10.53	47.54
May	37	825	19.32± .95[e]	2.73±.09[c]	15.23	61.26
June	33	899	37.10±1.01[f]	3.45±.09[d]	12.73	64.74
July	34	959	21.76± .99[c]	2.05±.09[b]	10.19	41.04
August	36	1021	20.77± .97[bc]	1.94±.09[ab]	8.26	35.74
September	37	1030	20.22± .95[abc]	1.90±.09[ab]	8.16	42.89
October	37	1003	21.87± .95[c]	2.04±.09[b]	8.67	46.70

[1]Only weights of cows included in that month's forage intake.

[2]The statistical model included month, mineral treatment, pasture within mineral treatment, age, and November weight.

[3]The statistical model included month, mineral treatment, pasture within mineral treatment, and age.

[a,b,c,d,e,f]Means in a column with different superscripts differ significantly ($P<.05$).