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# Influence of supplementation method on forage use and grazing behavior of beef cattle grazing bluestem range

## Abstract

Fifteen ruminally and 12 esophageally fistulated steers were used in two 28-d trials (late summer and early winter) to determine the influence of method of supplementation on forage use and grazing behavior. Treatments were: 1) self-feeding supplement with salt to limit intake; 2) daily hand-feeding supplement and salt; 3) daily hand-feeding supplement without salt. Forage intake was not affected by season or supplementation method; however, total diet organic matter digestibility was higher in the late summer ( $P < .01$ ) and lower when steers received supplement without salt ( $P < .05$ ). Supplementation method did not affect the time that animals spent grazing or the distance travelled; however, both were greater ( $P < .01$ ) during the summer period. Self-feeding supplement did not appear to adversely affect forage use in grazing beef steers.

## Keywords

Cattlemen's Day, 1990; Kansas Agricultural Experiment Station contribution; no. 90-361-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 592; Beef; Protein supplements; Rangelands; Grazing behavior; Stockers

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**INFLUENCE OF SUPPLEMENTATION METHOD  
ON FORAGE USE AND GRAZING  
BEHAVIOR OF BEEF CATTLE  
GRAZING BLUESTEM RANGE<sup>1,2</sup>**

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### **Summary**

Fifteen ruminally and 12 esophageally fistulated steers were used in two 28-d trials (late summer and early winter) to determine the influence of method of supplementation on forage use and grazing behavior. Treatments were: 1) self-feeding supplement with salt to limit intake; 2) daily hand-feeding supplement and salt; 3) daily hand-feeding supplement without salt. Forage intake was not affected by season or supplementation method; however, total diet organic matter digestibility was higher in the late summer ( $P < .01$ ) and lower when steers received supplement without salt ( $P < .05$ ). Supplementation method did not affect the time that animals spent grazing or the distance travelled; however, both were greater ( $P < .01$ ) during the summer period. Self-feeding supplement did not appear to adversely affect forage use in grazing beef steers.

(Key Words: Protein Supplements, Rangelands, Grazing Behavior, Stockers.)

### **Introduction**

During times when forages decrease in quality, supplements are often offered to grazing cattle to improve forage utilization. Typically, such supplements are hand-fed. Self-feeding supplements may be a desirable alternative in situations where labor is limited or cattle are widely dispersed. However, using limiting agents, such as salt, to control supplement intake may influence forage use. Therefore, the objectives of this study were to evaluate the influence of the method of supplementation on forage use and grazing behavior.

### **Experimental Procedures**

Fifteen ruminally and 12 esophageally fistulated crossbred steers (avg. wt. = 695 and 881 lb, respectively) were blocked by weight at the start of the late summer period and assigned to one of the following treatments: 1) self-feeding supplement (via Calan gates) with salt as a limiting agent (SFS); 2) daily hand-feeding supplement with steers receiving the same amount of salt as consumed by the SFS group (HFS); 3) daily hand-feeding supplement without salt (HNS). The supplement was a soybean meal and grain sorghum mix and was formulated to contain 28% crude protein (CP). Supplement intake by the SFS group was restricted to 2.5 lb

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per head daily with .50 and .88 pounds of salt per day during the summer and winter, respectively. Supplement and salt intake in hand-fed groups was based on the previous day's consumption by the SFS group. In order to ensure that each treatment group could develop and follow their "normal" behavioral patterns without being influenced by other treatments, groups grazed three separate but contiguous bluestem-range pastures of approximately 10 acres each. Steers were rotated among these pastures twice weekly, in order to remove pasture effects. The first 28-d trial began in mid-August and consisted of a 14-d adaptation period, a 7-d behavior observation period (which included a 3-d, 24-h observation period to determine the frequency with which cattle visited the self-feeders), a 7-d fecal collection period, a 3-d esophageal collection period (concurrent with the fecal sampling period), and a 1-d ruminal sampling period. Steers' rumens were evacuated on d 25 of the study. Esophageal collections were taken at 7:00 A.M. on d 15, 16, and 17 of the trial. Each group grazed each pasture during the collection period. The second 28-d trial began in late December and followed the same format.

### Results and Discussion

The quality of forage selected by the steers (Table 31.1) was largely unaffected by the method of supplementation, although the self-fed group did select a diet with slightly less fiber ( $P<.05$ ) than the group that received supplement without salt. The fiber and lignin concentrations in the diets selected were higher ( $P<.05$ ) and crude protein concentrations were lower ( $P<.05$ ) in the winter diets compared with summer diets. Neither season nor supplementation method influenced forage organic matter (OM) intake, which averaged 1.64% of body weight (Table 31.2). However, total diet OM digestibility was higher in the summer ( $P<.01$ ; Table 31.2) and was lower ( $P<.05$ ) when steers received supplement without salt. Neutral detergent fiber digestibility was higher ( $P<.01$ ) in the summer than winter, but did not differ among treatments. Ruminal fill and passage characteristics were only moderately influenced by treatments. Steers spent more time and travelled further while grazing ( $P<.01$ ) during the summer than the winter. However, supplementation method did not affect either of these. The 24-hr observations indicated that the SFS steers usually ate from the self-feeders in the afternoon (12:00 to 4:00 P.M.), although on some days steers were observed to

**Table 31.1. Chemical Composition of Grazed Forage**

Item, % OM	SFS	HFS	HNS	SE <sup>a</sup>	Summer	Winter	SE <sup>a</sup>
Lignin	6.97	6.32	6.05	.004	5.63 <sup>d</sup>	7.26 <sup>e</sup>	.004
NDF	70.72 <sup>b</sup>	72.43 <sup>bc</sup>	74.64 <sup>c</sup>	1.27	69.91 <sup>d</sup>	75.28 <sup>e</sup>	1.20
CP	7.17	6.48	6.72	.50	7.96 <sup>d</sup>	5.62 <sup>e</sup>	.43

<sup>a</sup>SE = standard error.

<sup>bc</sup>Means with different superscripts within supplementation method differ ( $P<.05$ ).

<sup>de</sup>Means with different superscripts within season differ ( $P<.05$ ).

**Table 31.2. Influence of Supplementation Method and Season on Organic Matter Digestibility (OMD), Intake (OMI), Neutral Detergent Fiber (NDF) Digestibility, and Grazing Behavior**

Item	Supplementation method			SE <sup>a</sup>	Season		
	Self-fed	Hand-fed			Summer	Winter	SE <sup>a</sup>
	Salt	Salt	No salt				
OMD, %							
Total	62.3 <sup>b</sup>	60.8 <sup>b</sup>	58.1 <sup>c</sup>	.79	65.2 <sup>d</sup>	55.7 <sup>e</sup>	.51
OMI, % BW							
Forage	1.68	1.56	1.69	.08	1.61	1.68	.05
Supplement	.26	.24	.24	.05	.28 <sup>d</sup>	.22 <sup>e</sup>	.01
Total	1.94	1.81	1.92	.09	1.89	1.89	.06
NDF digestibility, %	59.0	59.2	58.3	.01	62.2 <sup>d</sup>	55.5 <sup>e</sup>	.01
Distance travelled, miles/d	2.15	2.06	1.99	.07	2.38 <sup>d</sup>	1.76 <sup>e</sup>	.04
Grazing time, hr/d	8.42	8.36	8.74	.47	9.08 <sup>d</sup>	7.94 <sup>e</sup>	.16

<sup>a</sup>SE = standard error.

<sup>bc</sup>Row means among supplementation methods differ (P<.10).

<sup>de</sup>Row means between seasons differ (P<.01).

also spend a short amount of time at the self-feeder from 9:00 to 10:00 in the morning. Typically, the steers would spend approximately 3 to 5 min actually eating from the self-feeder but would rest in the vicinity of the self-feeder for an hour or more after eating.

In conclusion, self-feeding a supplement with a moderate crude protein concentration appeared to be as effective as hand-feeding. Although including salt in the supplement and altering the method of supplementation influenced seasonal forage use, no significant adverse effects of self-feeding, as opposed to hand-feeding, were found.