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# Supplementation of stocker steers grazing native flint hills pasture with a protein and mineral supplement increases average daily gains

## Abstract

Supplementation of range cattle with minerals is a common management practice that is used to maximize performance. Flint Hills grasses provide an adequate amount of protein for the diet through the first half of a doublestock grazing period, but declining protein content of native grasses during the latter parts of the grazing season typically cause decreases in forage digestibility and daily gains. The goal of this experiment was to measure differences in performance between steers that were supplemented with a) loose salt for the entire grazing period, b) a stocker mineral supplement for the entire grazing period, or c) a stocker mineral supplement for the first half of the grazing period followed by supplementation with a combination of protein and mineral for the second half of the grazing season.

## Keywords

Cattlemen's Day, 2007; Kansas Agricultural Experiment Station contribution; no. 07-179-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 978; Beef; Cattle; Stocker steers; Average daily gain (ADG)

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## **SUPPLEMENTATION OF STOCKER STEERS GRAZING NATIVE FLINT HILLS PASTURE WITH A PROTEIN AND MINERAL SUPPLEMENT INCREASES AVERAGE DAILY GAINS**

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### **Introduction**

Supplementation of range cattle with minerals is a common management practice that is used to maximize performance. Flint Hills grasses provide an adequate amount of protein for the diet through the first half of a double-stock grazing period, but declining protein content of native grasses during the latter parts of the grazing season typically cause decreases in forage digestibility and daily gains. The goal of this experiment was to measure differences in performance between steers that were supplemented with a) loose salt for the entire grazing period, b) a stocker mineral supplement for the entire grazing period, or c) a stocker mineral supplement for the first half of the grazing period followed by supplementation with a combination of protein and mineral for the second half of the grazing season.

### **Experimental Procedure**

This experiment used 239 crossbred beef steers (589 lb) of Tennessee origin. Steers were held in a dry-lot receiving facility for 50 days prior to placement in grazing paddocks. The steers were individually identified, weighed, and randomly assigned to treatments. Ivomec<sup>1</sup> injectable, Bar-vac 7 with somnus (clostridial vaccine), and Reliant<sup>1</sup> plus

(viral vaccine) were given during the receiving period. Revalor<sup>2</sup>-G (a growth promoting implant) was given to all cattle immediately before the grazing period.

The grazing season began on May 3 and ended on August 1. Steers were assigned to treatment by weight, with three treatments and four replicates per treatment. The first treatment consisted of free-choice loose salt with Chlortetracycline (CTC) added at a rate of 300 mg/lb for the entire grazing season (SALT). The second treatment consisted of summer stocker mineral containing CTC for the entire grazing period (MIN). The third treatment consisted of a free-choice mineral supplement containing CTC for the first half of the grazing period, followed by a protein-mineral supplement containing CTC during the second half of the grazing period (PROMIN). All feeders were placed near a water source for the first week before being moved to a central area within each paddock. Loose salt was blended with the protein mineral as needed to achieve the desired intake levels.

The contents of the mineral feeders were weighed on a weekly basis to measure intake. On day 45, all of the steers were gathered and held overnight without feed or water at the centrally located processing facility. The fol-

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<sup>1</sup>Ivomec and Reliant are registered trademarks of Merial.

<sup>2</sup>Revalor is a registered trademark of Intervet, Inc.

lowing morning, steers were weighed individually and returned to their respective grazing paddocks. During the weighing process, cattle received Ivomec pour-on for control of internal and external parasites. Also, on day 45, the PROMIN feeder contents were weighed and replaced with the protein-mineral supplement. The supplement contained a combination of protein sources with different levels of rumen degradability. This 35% crude protein formulation was developed to provide a constant supply of nitrogen to rumen microbes. The formulation also contained macro minerals, trace minerals and CTC in amounts equal to the stocker mineral supplement. Consumption of the protein and mineral supplement at the desired levels increased the total protein level of the diet by two percentage points.

During the grazing period, forage samples were collected every two weeks from one paddock representing each of the pasture treatments. Forage samples were collected by clipping all plants within a two-foot square with electric garden shears. At the end of the grazing period, cattle were gathered and held overnight without feed and water, then weighed individually the following morning before shipment.

## **Results and Discussion**

In comparing SALT to MIN there were no significant differences in average daily gain (ADG) or gain per acre ( $P > 0.10$ ). There was however, a significant economic benefit to feeding the mineral supplement, as the additional gain of 0.088 lb/d (1.506 vs. 1.594) generated an estimated 200% return on extra dollars invested. In comparing MIN to PROMIN for the last 45 days of the grazing season, there were significant differences in ADG ( $P < 0.01$ ) and gain per acre ( $P = 0.01$ ). Gains for PROMIN were 2.12 lb/d as compared to MIN at 1.62 lb/d for the last 45 days of the grazing period. Overall consumption of the protein mineral plus salt that was used as a limiter was 16 oz. per head daily. Cattle fed the SALT treatment consumed 2.2 oz. per head daily over the entire grazing period and cattle fed the MIN treatment consumed 4.3 oz. per head daily over the entire grazing period.

## **Implications**

Providing a protein and mineral supplement during the last half of a 90 day summer grazing season can dramatically increase average daily gains and gain per acre when grazing steers on native Flint Hills pastures.

**Table 1. Grazing Performance of Steers**

Item	SALT <sup>1</sup>	MIN <sup>2</sup>	PROMIN <sup>3</sup>	SEM
Number of steers	80	85	74	-
Number of pastures	4	4	4	-
Stocking rate, lb/acre	237	236	232	-
Starting weight, lb	588	589	589	2.03
Day 45 shrunk weight, lb	653	657	654	4.62
Final shrunk weight, lb	725	733	752	7.66
ADG day 1 to day 45, lb	1.48	1.58	1.46	0.09
ADG day 46 to day 90, lb	1.54	1.62	2.12	0.10
ADG day 1 to day 90, lb	1.51	1.61	1.81	0.07
Gain per acre during day 46 to day 90, lb	29	31	38	1.84

<sup>1</sup>SALT: receiving salt with CTC for the entire grazing season.

<sup>2</sup>MIN: summer stocker mineral with CTC for the entire grazing season.

<sup>3</sup>PROMIN: summer stocker mineral with CTC from day 1 to day 45 and protein mineral with CTC from day 46 to day 90.

**Table 2. Chemical Analyses of Forages Taken from Experimental Pastures**

Date	DM%	CP%	NDF%	ADF%	P%	Cu ppm	Se ppm	Mo ppm	Zn ppm	S%
11 May	43.0	8.82	60.1	35.1	0.127	8.91	0.05	1.03	26.38	0.11
31 May	42.3	7.94	62.2	37.6	0.124	10.66	0.05	1.03	27.17	0.10
14 June	45.7	7.84	63.0	37.1	0.113	10.26	0.20	1.03	25.67	0.10
29 June	47.6	6.21	64.4	36.2	NA	8.62	0.05	1.03	22.75	0.08
10 July	50.3	6.07	60.3	35.3	0.092	9.23	0.04	1.06	27.40	0.08
25 July	51.7	6.02	62.1	36.5	0.085	7.85	0.04	1.02	21.16	0.07
7 August	52.5	5.95	58.7	34.2	0.086	8.58	0.06	1.03	30.18	0.09