

---

**K**

## Minerals in Esophageal Samples from Steers on Native Bluestem Pastures

**S**

L. H. Harbers, J. E. Umoh, D. A. Sapienza,  
B. E. Brent, H. A. Peischel,  
J. D. Whitney, and E. F. Smith

**U**

---

### Summary

This report summarizes monthly mineral contents of burned and control native bluestem pastures determined with samples from fistulated steers. Burning decreases calcium (Ca), potassium (K), and iron (Fe), and slightly decreases zinc (Zn). All minerals we studied were adequate for grazing cattle except that magnesium (Mg) and Potassium (K) appear to be borderline during winter months.

### Introduction

Previous work here indicated that salt is the only mineral needed for cow-calf operations on Flint Hills pastures. To test that idea, we studied the mineral contents of native pastures two years using samples collected from esophageally-fistulated steers.

Neither of the two methods to sample pastures is entirely satisfactory. Hand clipping does not represent the same forage an animal would eat. Esophageal samples represent the forage eaten but they are subject to mineral leaching by saliva and to contamination from minerals (Na and P) in saliva. The minerals in saliva must be considered part of the food supply even though we cannot assess their value as a continuous mineral source if feeds do not replenish eventual losses.

This report presents a summary of two years' sampling of control and burned pastures.

### Methods

Burned and control pastures were sampled monthly from esophageally--fistulated steers. Samples were analyzed for calcium, phosphorus, magnesium, sodium, potassium, iron, manganese, and zinc. Results are reported on a dry basis.

## Results and Discussion

Mineral composition is summarized in table 9.1. Macroelements are given in percentages and microelements (trace minerals) in milligrams per 100 grams of dry material.

Calcium: The Ca content of these pastures was highest while grasses emerged (June and September). Burning decreased average Ca content (.88% vs. .64%) but never below levels recommended for gestating and lactating cows (0.16 - 0.24%) or growing steers (0.30 - 0.44%). Control pasture ranged from 0.53% to 1.50% Ca; burned pasture, from 0.49% to 1.18%.

Phosphorus: The P content varied from .11% to 0.35% in control pastures; from 0.21% to 0.39% in burned pastures. Both pastures had yearly means of 0.18%--values consistent with recommended levels (0.18 - 0.22%) so the body pool maintained adequate P.

Magnesium: Burning had no effect on Mg content; however, Mg appears to be borderline during winter but usually meets the lower recommended requirement of 0.06%.

Sodium: Esophageal samples averaged 1.57% for both pasture treatments, but largely from salivary contamination. Animals had access to salt blocks during the year because of low sodium in handclipped samples (Cattlemen's Day Report, 1978). Salt should be kept available because Na turns over rapidly in the body pool.

Potassium: Burning reduced K only slightly; however, its monthly variation in bluestem pastures may be significant. During winter K was below the recommended 0.6 to 0.8%. We are continuing to study effects of adding K to mineral mixes for wintering cattle.

Iron: Burning may affect Fe content of Flint Hills pastures slightly (44.7 vs. 47.7 mg/100g) but contents in the 8 to 80 mg range are thought to be adequate.

Manganese: All Mn values were above the 0.1 - 1.0 mg/100 g recommended by the NRC. Yearly averages for burned pastures were 4.7 and control pastures, 4.8 mg/100g.

Zinc: Yearly means were 4.2 mg/100 g for burned pastures and 3.9 for controls. All Zn values were above the recommended 1.0 - 3.0 mg/100g.

Table 9.1. Mineral contents of forage samples collected from fistulated steers on Flint Hills pastures.

Months	<u>Pasture not burned</u>					Fe	Mn mg/100g	Zn
	Ca	P	Mg	Na	K			
	Percentage							
Jan	.54	.22	.05	1.64	.50	20.8	3.0	4.0
Feb	.55	.26	.07	1.61	.45	37.2	2.2	3.3
Mar	.56	.30	.08	1.66	.48	67.4	4.8	4.2
Apr	.67	.27	.08	1.86	1.09	74.2	5.4	5.4
May	.53	.35	.12	1.57	1.74	55.2	5.5	4.1
Jun	1.14	.32	.27	1.55	1.02	118.3	8.1	6.6
Jul	.53	.23	.12	1.27	.87	34.1	3.8	2.7
Aug	.63	.25	.13	1.48	.77	37.8	4.8	3.2
Sept	1.24	.26	.17	1.56	.98	32.5	6.7	3.4
Oct	1.50	.36	.12	1.62	.73	21.9	4.5	5.1
Nov	.78	.28	.07	1.57	.57	32.2	4.7	3.9
Dec	.70	.23	.06	1.46	.38	33.6	4.6	4.1
Mean	.88	.28	.11	1.57	.80	47.1	4.8	4.2
	<u>Burned pasture</u>							
	Ca	P	Mg	Na	K			
	Percentage							
Jan	.57	.26	.06	1.60	.28	32.9	3.0	4.1
Feb	.51	.35	.07	1.60	.31	43.6	3.5	3.1
Mar	.49	.27	.08	1.70	.27	58.8	3.6	2.8
Apr	.56	.28	.09	1.50	1.03	71.0	6.3	5.2
May	.47	.35	.12	1.50	1.58	68.6	5.2	4.5
Jun	.89	.39	.28	1.45	.88	103.5	10.5	6.6
Jul	.45	.24	.11	1.62	1.05	21.6	3.0	2.7
Aug	.60	.23	.13	1.48	.63	21.6	3.9	2.8
Sept	.67	.26	.18	1.58	.99	24.4	6.9	3.8
Oct	1.18	.27	.12	1.52	.67	38.2	3.6	4.4
Nov	.64	.25	.06	1.59	.39	29.5	3.4	2.9
Dec	.68	.21	.07	1.66	.34	22.8	3.0	3.4
Mean	.64	.28	.11	1.57	.70	44.7	4.7	3.9