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Managing the Intake of Mineral Supplements that Contain Feed Additives for Beef Calves Grazing Flint Hills Native Grass Pasture is Important

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Managing the Intake of Mineral Supplements that Contain Feed Additives for Beef Calves Grazing Flint Hills Native Grass Pasture is Important

Abstract

Objective: The objective of this study was to determine the efficacy of mineral supplementation programs that provide a performance-enhancing antibiotic for improving growth of stocker calves grazing native grass pastures in the Flint Hills region of Kansas.

Experimental Procedures: A 91-day grazing study was conducted at the Kansas State University Beef Stocker Unit starting in May 2020 utilizing 314 Brahman influenced crossbred steers (739.57 ± 10.54 lb) from Gorman, TX. Steers were randomized and allocated across 18 pastures and randomly assigned to three treatments groups with six replications (paddocks) per group. The treatments assessed consisted of standard free-choice mineral: 1) control, 2) Bambermycin, and 3) Monensin. Cattle were weighed individually on day 0 and day 90. Group pasture pen scale weights were taken and recorded on day 0, 45, and 90.

Results: During the initial stages of the trial, the consumption of the Monensin treatment was significantly lower than the other two treatments ($P < 0.05$). However, by week seven the Monensin consumption was improved yet still lower than the other two treatments. There were no significant differences in average daily gain ($P = 0.72$) from the mineral supplement over the 91-day trial.

The Bottom Line: Over the 91-day trial, there were no significant differences in average daily gain between the mineral treatments.

Keywords

mineral, stocker, feed additives

Authors

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Abstract
Managing the consumption of feed additives through a self-fed mineral is an important consideration for ensuring that improved cattle performance and pasture productivity can occur. In 2020, a 91-day grazing study was conducted at the Kansas State University Beef Stocker Unit to compare the performance of 314 crossbred steers provided with a self-fed mineral supplement containing either Bambermycin, Monensin, or fed the control. The initial consumption of Bambermycin and Monensin was substantially less than the intended daily intake of 4 oz per head. To attain the desired mineral intake level, dry molasses was added to all three supplements in increasing amounts as the grazing season progressed. Unfortunately, the Bambermycin treatment was consumed quickly, sometimes in one day, with no additional provision of mineral containing the additive for the remainder of the week. Even with the addition of dried molasses to the Monensin treatment, consumption was still significantly lower than the Bambermycin and control treatments. There were no statistical differences in performance between the three groups.

Introduction
For stocker cattle grazing in native Flint Hills pasture, optimizing growth rate is important in determining overall profitability. The use of feed additives as a part of a mineral supplementation program is a management practice that can be effectively used to help promote overall productivity during a grazing season. However, provision of mineral on pasture also requires a dedicated effort to manage for the intended level of consumption. The objective of this study was to manage the consumption of a mineral supplement containing two different types of feed additives that can improve the growth rate of stocker calves grazing native grass pastures in the Flint Hills region of Kansas.

[1] Huvepharma, Peachtree, GA.

Experimental Procedures

A 91-day grazing study was conducted at the Kansas State University Beef Stocker Unit, Manhattan, KS, starting in May 2020 utilizing 314 Brahman influenced crossbred steers (739.57 ± 10.54 lb) from Gorman, TX. Steers were randomized and allocated across 18 pastures at a targeted stocking density of 250 lb/acre. Pastures were randomly assigned to three treatment groups with six replications (paddocks) per group. Identical supplement feeders (Bullmaster; Mann Enterprises, Inc., Waterville, KS) were used in each pasture. The treatments assessed consisted of standard free-choice mineral: 1) control; 2) Bambermycin to be included in the supplement at 32 lb/ton on a dry matter basis to provide 20 mg/head/day, when consumed in 4 oz of supplement; and 3) Monensin to be included in the supplement at 26.67 lb/ton on a dry matter basis to provide 150 mg/head/day when consumed in 4 oz of supplement (see Table 1). Additionally, these treatments were randomly allocated with prescribed fire burn treatments (spring, summer, and fall). A common basal mineral supplement was used for all treatment groups throughout the study. In addition to the mineral supplement, cattle were provided free-choice salt blocks ad libitum.

After receiving the cattle, a 60 net energy for gain diet (mcal/lb) containing Amprolium 1.25% Medicated Pellets (Huvepharma, Peachtree, GA), was fed for 5 days in a limit-fed fashion. Upon initiation of the study initial weights were recorded, and steers were randomly assigned to treatment. During this process, calves were given an individual numbered tag, dewormed with Prohibit (levamisole hydrochloride) Soluble Drench Powder Anthelmintic (Huvepharma, St. Joseph, MO), implanted with Ralgro (Merck, Madison, NJ), and injected with RespiVax5 plus Pulmogard (Huvepharma, St. Joseph, MO), or vaccinated against Infectious Bovine Rhinotracheitis, Bovine Viral Diarrhea, and Bovine Respiratory Syncytial Virus, *Pasteurella multocida*, and *Manheimia hemolytica*. Cattle also received an injection of Agri-Mectin (ivermectin) (Huvepharma, St. Joseph, MO), and then were sorted according to assigned pastures.

Cattle were weighed individually on day 0 and day 91. Group pasture pen scale weights were taken and recorded on day 0, 45, and 91. On a weekly basis, mineral feeders were weighed to determine consumption. The data collected were used to calculate the previous week's intake of mineral. Mineral in the feeder of each paddock was checked daily for manure, water, or other foreign matter that could interfere with normal supplement consumption. To help cattle find the mineral, all rubber flap covers on all mineral feeders were opened at the beginning of the study. When inclement weather was forecasted, the flaps were closed and reopened as the threat passed. As consumption increased, flaps were closed permanently to minimize exposure to the environment. The initial targeted intake of mineral was 4 oz/head daily for all treatments.

A variety of management strategies were used to drive mineral intake to attain the targeted daily consumption. Because the calculated daily consumption of Monensin was significantly lower during the initial stages of the study, it was deemed necessary to add dried molasses to all treatments. Therefore, beginning week five, 1 lb of dried molasses was added and hand mixed per 50 lb of mineral for all 3 treatments. Because consumption was not increased, the amount of dried molasses was increased to 2 lb per every 50 lb of mineral for all treatments on week six. This concentration remained constant throughout the remainder of the trial for the control and Bambermycin treatments. Despite this increase, low levels of consumption for the Monensin treatment still persisted. On week nine, the level of dried molasses was increased to 3 lb per 50 lb of mineral for the remainder of the trial.

With the addition of dried molasses, the consumption of the control and Bambermycin treatments was vastly improved to the extent that the consumption of their calculated allotted levels was achieved within a 1- to 4-day timeframe over a one-week period. To slow the consumption of these two treatments, mineral feeders were checked daily and moved a distance from the water if mineral was being consumed too quickly. Free-choice salt blocks were also provided to slow the consumption of the control and Bambermycin treatments.

Results and Discussion

Manager attention to detail of the daily intake of mineral supplements is critical as feed additives need to be consumed regularly over several days to attain optimum performance. Figure 1 depicts the actual weekly intake of the mineral treatments over the 91-day grazing season. Daily intake for control and Bambermycin was at or above the target consumption for the first five weeks. During the initial stages of the trial, the consumption of the Monensin treatment was significantly lower than the other two treatments ($P < 0.05$). By week seven, Monensin consumption was improved but the dosage was below the intended optimum level required to demonstrate a response over control. Over the 91-day trial, there were no significant differences in average daily gain ($P = 0.72$) between the mineral treatments. The results in Table 3 show the forage quality at four time points of the experimental pastures during this study.

Implications

Continuous monitoring of mineral consumption in relation to its intended intake target is an important management practice that is often overlooked when using mineral supplements as a vehicle for delivery of feed additives. Strategic placement of mineral supplements in a pasture, use of salt blocks, and addition of flavor enhancers such as dried molasses to continuously adjust desired consumption may be used as needed based on intended intake levels.

Table 1. Nutrient composition of free-choice mineral supplements[a,b]

	Treatment	
Item	**Monensin**	**Bambermycin**
Calcium, minimum %	20.50	20.50
Calcium, maximum %	21.50	21.50
Phosphorus, total minimum %	4.00	4.00
Salt, minimum %	12.50	12.50
Salt, maximum %	13.50	13.50
Magnesium, minimum %	0.50	0.50
Manganese, minimum ppm	435.00	435.00
Zinc, minimum ppm	476.00	474.00
Copper, minimum ppm	24.00	24.00
Cobalt, minimum ppm	28.00	28.00
Iodine, minimum ppm	150.00	150.00
Selenium, minimum ppm	25.00	25.00
Vitamin A, minimum KIU/lb	30.00	30.00
Vitamin D, minimum KIU/lb	10.00	10.00
Vitamin E, minimum IU/lb	10.00	10.00
Active ingredient		
Bambermycin, g/ton		160.00
Monensin, g/ton	1200.00	

[a] Supplements were manufactured by Key Feeds, Fourth and Pomeroy Associates, Inc., Clay Center, KS.
[b] Control mineral was formulated identically but with no Bambermycin or Monensin included.

Table 2. Performance data for cattle supplemented with mineral containing Bambermycin or Monensin while grazing Flint Hills pasture

Item	**Control**	**Bambermycin**	**Monensin**	**Standard error**	***P*-value**
Pastures, number	6	6	6		
Animals on trial, number	110	99	105		
Grazing days, number	91	91	91		
Initial weight, lb	717	709	716	10.54	0.8389
Final weight, lb	914	897	908	13.43	0.68
Grazing average daily gain, lb/day, day 0–45	2.24	2.34	2.07	0.127	0.3363
Grazing average daily gain, lb/day, day 45–91	2.16	1.86	2.21	0.108	0.0967
Grazing average daily gain, lb/day, day 0–91	2.2	2.10	2.14	0.087	0.722
Average mineral consumption	3.97[a]	4.06[a]	2.95[b]	0.183	0.0003

[a,b] $P < 0.01$.

Table 3. Forage quality of Flint Hills pasture by date of sampling

	Sample date											
	5/13/2020			6/1/2020			6/22/2020			7/13/2020		
Season of burning	**Spring**	**Fall**	**Summer**	**Spring**	**Fall**	**Summer**	**Spring**	**Fall**	**Summer**	**Spring**	**Fall**	**Summer**
Dry matter, %	28.27	34.31	58.89	30.00	34.89	38.16	38.83	42.01	45.08	44.66	48.88	49.26
Crude protein, %	15.48	11.05	7.06	10.51	8.65	7.63	7.67	6.83	7.24	6.26	6.45	6.19
Acid detergent fiber, %	37.04	41.22	46.36	37.46	41.11	42.95	39.59	44.41	43.50	40.73	43.88	44.03
Neutral detergent fiber, %	49.10	50.89	58.21	52.16	52.51	58.04	58.96	57.29	56.48	60.84	58.88	62.25
Net energy gain, Mcal/lb	0.37	0.34	0.29	0.35	0.28	0.29	0.35	0.29	0.28	0.32	0.25	0.28
Net energy maintenance, Mcal/lb	0.69	0.67	0.62	0.68	0.61	0.62	0.68	0.62	0.61	0.64	0.58	0.60
Total digestible nutrients, %	59.79	60.64	57.14	61.39	56.20	57.14	61.63	56.86	56.48	59.04	54.03	55.78
Calcium, %	0.82	0.86	0.64	0.75	0.90	0.69	0.74	0.87	0.85	0.69	0.77	0.73
Phosphorus, %	0.28	0.24	0.23	0.26	0.23	0.23	0.21	0.22	0.22	0.19	0.20	0.20
Potassium, %	2.20	1.78	1.68	2.08	1.80	1.74	1.62	1.67	1.50	1.38	1.48	1.34
Magnesium, %	0.22	0.14	0.06	0.17	0.15	0.08	0.15	0.19	0.11	0.15	0.16	0.43

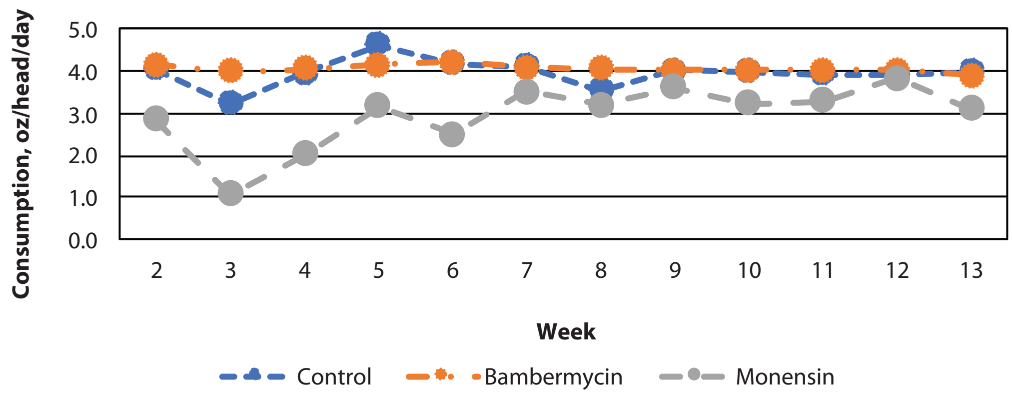

Figure 1. Mineral consumption.