Kansas Agricultural Experiment Station Research Reports

Volume 9
Issue 1 *Cattlemen's Day*

Article 4

2023

Effects of Biuret and Lasalocid (Bovatec) Inclusion into a Commercial Mineral Supplement on Growth Performance of Yearling Calves Grazing in the Kansas Flint Hills

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Recommended Citation

Pflughoeft, M. G.; Duncan, Z. M.; DeBord, Z. L.; Hollenbeck, W. R.; Brazle, F. K.; Titgemeyer, E. C.; Olson, K. C.; and Blasi, D. A. (2023) "Effects of Biuret and Lasalocid (Bovatec) Inclusion into a Commercial Mineral Supplement on Growth Performance of Yearling Calves Grazing in the Kansas Flint Hills," *Kansas Agricultural Experiment Station Research Reports*: Vol. 9: Iss. 1. https://doi.org/10.4148/2378-5977.8414

Effects of Biuret and Lasalocid (Bovatec) Inclusion into a Commercial Mineral Supplement on Growth Performance of Yearling Calves Grazing in the Kansas Flint Hills

Abstract

Objective: The objective of this experiment was to measure the effects of non-protein nitrogen (NPN; i.e., biuret) or NPN + ruminal modifier (i.e., biuret + lasalocid) inclusion in a commercial mineral mix on growth performance of yearling beef calves grazing in the Kansas Flint Hills.

Study Description: Over a two-year period, 742 crossbred steers [initial body weight (BW): 655 ± 52.2 lb] of Texas and Nebraska origin previously backgrounded at the Kansas State Beef Stocker Unit were used in this experiment. The three mineral treatments consisted of a basal supplement (Control), a basal supplement plus biuret (Biuret), and a basal supplement plus biuret and lasalocid (Bovatec; Zoetis, Parsippany, NJ) with a 4 oz/head daily mineral consumption target. Each treatment was randomly assigned to one of 18 pastures with a total of six pastures per treatment. To determine days-to-empty, mineral feeders were checked daily. Mineral feeders were also weighed weekly to determine mineral consumption. At the onset and conclusion of the experiment, pasture weights were taken to determine average initial and average final BW.

Results: Total BW gain, average daily gain (ADG), and mineral consumption did not differ ($P \leq 0.15$). However, final BW did differ between mineral treatments ($P \leq 0.03$). Likewise, there was an interaction between treatment and week for days-to-empty ($P \leq 0.05$).

The Bottom Line: These data were interpreted to suggest that the addition of biuret or biuret + Bovatec to a commercial mineral supplement may improve the growth performance of yearling beef cattle grazing in the Kansas Flint Hills.

Keywords

stocker, grazing, NPN, non-protein nitrogen

Authors

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Abstract

Inclusion of feed additives (i.e., ruminal modifiers or non-protein nitrogen) to mineral supplements may improve health and performance of grazing cattle. The objective of this experiment was to evaluate the inclusion of biuret with or without Bovatec (Zoetis, Parsippany, NJ) in a commercial mineral supplement on growth performance of yearling beef calves grazing in the Kansas Flint Hills. Over a 2-year period, 742 crossbred steers [initial body weight (BW): 655 ± 52.2 lb] were randomly assigned to one of three mineral treatments (i.e., control, biuret, biuret + Bovatec). Mineral treatments were randomized into one of 18 pastures, with six pastures per mineral treatment. Steers grazed from May to August for a total of 90 days. Mineral tubs were weighed weekly to determine mineral consumption and refilled with respective mineral treatments to target a daily consumption of 4 oz per head per day. Mineral feeders were checked daily to estimate the number of days until an individual feeder was empty (days-to-empty). Total BW gains, average daily gains (ADG), and mineral consumption did not differ ($P \geq 0.15$) among mineral treatments; however, final BW were greater ($P \leq 0.03$) for biuret and biuret + Bovatec mineral treatments compared with the control mineral treatment. Initially, biuret and biuret + Bovatec led to more days-to-empty than the control ($P \leq 0.05$), but these differences disappeared by week 8.

Introduction

Mineral supplementation to cattle grazing in the Kansas Flint Hills may improve growth performance and overall profitability. A possible way to improve overall productivity of grazing cattle is through the addition of ruminal modifiers (lasalocid) or non-protein nitrogen (NPN) in mineral supplements. The objective of this experiment was to measure the effects of NPN (biuret) or NPN + ruminal modifier (biuret + lasalocid) inclusion in a commercial mineral supplement on growth performance of yearling beef calves grazing in the Kansas Flint Hills.

Experimental Procedures

Over a 2-year period, 742 crossbred steers (initial BW 655 ± 52.2 lb) previously backgrounded at the Kansas State Beef Stocker Unit were used to evaluate the effects of three mineral supplementation strategies on growth performance of yearling grazing cattle. Steers were purchased in Texas and Nebraska and randomly assigned to one of 18 pastures. Pastures were randomly assigned to one of three mineral treatments consisting of a basal supplement (control), a basal supplement with biuret and a basal supplement with biuret and Bovatec (Zoetis, Parsippany, NJ). Biuret was included in the supplement at 300 lb/ton dry matter (DM) basis to provide 0.6 oz per day of biuret when mineral was consumed at 4 oz per head daily. Bovatec was included in the supplement at 15.50 lb/ton DM basis to provide 180 mg/head/day lasalocid when mineral was consumed at 4 oz per head daily. An identical supplement feeder (Bullmaster; Mann Enterprises, Inc., Waterville, KS) was placed in each pasture.

Prior to grazing, steers were individually assigned a pasture tag, and treated for external (Standguard; Elanco, Greenfield, IN) and internal (Valbazen; Zoetis, Parsippany, NJ) parasites. In addition, steers were administered a growth promoting implant (Ralgro; Zoetis, Parsippany, NJ). Steers were grazed for 90 days from May to August at a targeted stocking density of 250 lb of live weight per acre. Immediately prior to turn out, pasture weights were measured using a pen scale. Following initial processing, steers were sorted and allocated to pastures over a 3-day period. At the completion of the grazing period, cattle were gathered, and pasture weights were immediately measured to determine average final BW, total BW gains, and ADG.

Mineral feeder flaps were initially folded up for approximately 2 weeks to allow cattle to locate the mineral. Flaps were unfolded, in the event of inclement weather, to prevent rain from getting into the mineral tubs. Following the two-week adaptation period, flaps were folded down for the remainder of the grazing season. Tubs were checked daily to monitor mineral consumption and determine days-to-empty. Mineral tubs were weighed each week to determine weekly mineral consumption. Mineral feeders were then refilled to target a mineral consumption of 4 oz/head/day for the following 7 days.

Results and Discussion

At the conclusion of the grazing period, total BW gains, ADG, and mineral consumption did not differ among treatments ($P \geq 0.15$; Table 2). Final BW were greater ($P \leq 0.03$; Table 2) for biuret and biuret + Bovatec mineral treatments compared with the control mineral treatment. Mineral feeders were monitored for mineral consumption daily and a visual estimate was made on the number of days until each mineral feeder was empty, this was expressed as days-to-empty. In weeks two and three of the grazing period, rate of mineral consumption (i.e., days-to-empty) was greater ($P \leq 0.01$; Figure 1) for steers consuming the control mineral treatment compared with steers consuming the biuret or biuret + Bovatec mineral treatments. In addition, rate of mineral consumption during weeks 4, 5, 6, and 7 of the grazing period was greater ($P \leq 0.01$; Figure 1) for the control compared with biuret + Bovatec. Overall, mineral consumption during the beginning of the grazing period was low; however, consumption increased so days-to-empty were 2 to 4 days by week 4 of the experiment. In late June, mineral consumption decreased, coinciding with elevated ambient temperatures.

After the elevated ambient temperatures, normal mineral consumption resumed, and all treatments were consistently between 2 to 4 days-to-empty at each observation.

Implications

These data were interpreted to suggest that the addition of biuret or biuret + Bovatec to commercial mineral supplement may improve growth performance of yearling beef cattle grazing in the Kansas Flint Hills.

Brand names appearing in this publication are for product identification purposes only. No endorsement is intended, nor is criticism implied of similar products not mentioned. Persons using such products assume responsibility for their use in accordance with current label directions of the manufacturer.

Table 1. Mineral ingredients and nutrient composition[1]

	Mineral treatment		
Item	Control	Biuret	Biuret + Bovatec
Ingredient, lb/ton			
Salt	485	485	485
Monocalcium phosphate 21%	385	385	385
Calcium carbonate	350	300	300.25
Dried distillers grains	310	310	310
Microlite	200	15.75	---
Dried molasses	120	120	120
Soy hulls	85	---	---
Soy oil	20	20	20
Magnesium oxide	15	30	30
Zinc oxide	15	15	15
Copper sulfate	8	8	8
Sulfur flour	---	4.25	4.25
Vitamin A 60,000	6	6	6
Ethylenediamine dihydroiodide	1	1	1
Biuret	---	300	300
Bovatec[2]	---	---	15.5
Total	2000	2000	2000

continued

Table 1. Mineral ingredients and nutrient composition[1]

	Mineral treatment		
Item	**Control**	**Biuret**	**Biuret + Bovatec**
Calculated nutrient composition			
DM,[3] %	96.46	97.14	97.14
Crude protein, %	5.4	42.9	42.9
Crude fat, %	2.27	2.18	2.18
Crude protein, NPN,[4] %	---	37.95	37.95
Total digestible nutrients, %	21.03	18.05	18.05
Calcium, %	10.35	9.28	9.27
Phosphorus total, %	4.24	4.2	4.2
Salt, %	24.23	24.23	24.23
Sodium, %	9.71	9.66	9.66
Chloride, %	14.74	14.74	14.74
Potassium, %	0.66	0.43	0.41
Magnesium. %	1.38	1.06	1
Sulfur, %	0.33	0.542	0.542
Manganese, ppm	197.8	137.9	132.8
Zinc, ppm	5485.6	5439.6	5435.6
Iron, ppm	1061.2	1024.3	1021.2
Copper, ppm	1019.3	1013.7	1013.3
Cobalt, ppm	52	5.93	2
Iodine, ppm	495.1	495.1	495.1
Selenium, ppm	0.056	0.056	0.056
Vitamin A, total KIU/lb	81.65	81.65	81.65
Bovatec,[2] mg/lb	---	---	705.3

[1]Designed for 4 oz intake per day, Dr. Frank Brazle, 2021, personal communication.
[2]Zoetis, Parsippany, NJ.
[3]Dry matter.
[4]Nonprotein nitrogen.

Table 2. Inclusion of biuret with or without Bovatec[1] on stocker cattle performance when grazing native grass

	Mineral treatments				
Item	Control	Biuret	Biuret + Bovatec	SEM[2]	*P*-value
Initial, lb	653	652	659	6.2	0.66
Final BW,[3] lb	816[b]	827[a]	834[a]	4.5	0.03
Total BW gain, lb/day	162	175	174	4.9	0.15
ADG,[4] lb/day	1.80	1.94	1.94	0.05	0.15
Daily mineral intake, oz/head	3.90	3.86	3.85	0.051	0.77

[ab]Within column, means with unlike superscripts differ ($P < 0.05$).
[1]Zoetis, Parsippany, NJ.
[2]Standard error of the mean.
[3]Body weight.
[4]Average daily gain.

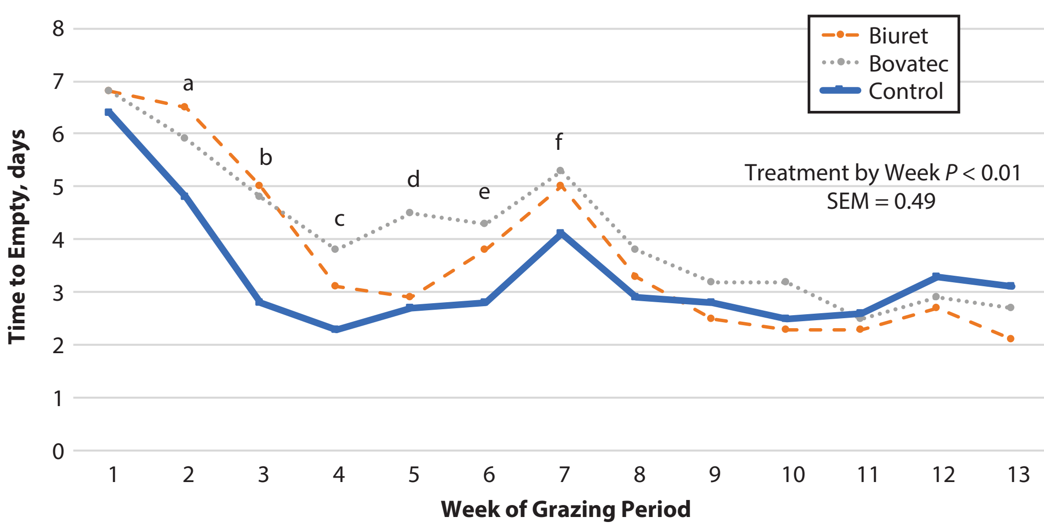

Figure 1. Effects of biuret and Bovatec (Zoetis, Parsippany, NJ) on weekly mineral consumption rate of yearling cattle grazing native grass pasture.
[a] Week 2 Biuret > Control ($P < 0.01$), Bovatec = Control ($P = 0.055$), Biuret = Bovatec ($P = 0.27$).
[b] Week 3 Biuret > Control ($P < 0.01$), Bovatec > Control ($P < 0.01$), Biuret = Bovatec ($P = 0.68$).
[c] Week 4 Bovatec > Control ($P < 0.01$), Biuret = Bovatec, Biuret = Control ($P = 0.22$).
[d] Week 5 Biuret > Bovatec ($P < 0.01$), Bovatec > Control ($P < 0.01$), Biuret = Control ($P = 0.68$).
[e] Week 6 Bovatec > Control ($P < 0.01$), Biuret = Bovatec, Biuret = Control ($P = 0.34$).
[f] Week 7 Bovatec > Control ($P = 0.04$), Biuret = Bovatec, Biuret = Control ($P = 0.58$).