Kansas Agricultural Experiment Station Research Reports

Volume 4
Issue 1 *Cattlemen's Day*

Article 10

2018

Evaluation of Salt, Trace Mineral Sources, and Growth Implants on Performance of Stocker Cattle Grazing Native Flint Hills Pasture

C. S. Weibert
Kansas State University, ccsweibert@k-state.edu

T. J. Spore
Kansas State University, tjspore@ksu.edu

M. A. Johnson
Kansas State University, marissajo@k-state.edu

Recommended Citation

Weibert, C. S.; Spore, T. J.; Johnson, M. A.; Brazle, F. K.; Kuhl, G. L.; Hollenbeck, W. R.; Wahl, R. N.; and Blasi, Dale (2018) "Evaluation of Salt, Trace Mineral Sources, and Growth Implants on Performance of Stocker Cattle Grazing Native Flint Hills Pasture," *Kansas Agricultural Experiment Station Research Reports*: Vol. 4: Iss. 1. https://doi.org/10.4148/2378-5977.7537

Evaluation of Salt, Trace Mineral Sources, and Growth Implants on Performance of Stocker Cattle Grazing Native Flint Hills Pasture

Abstract

Objective: Determine the efficacy of providing salt alone or with injectable trace minerals compared to a complete mineral supplement and growth implants for improving the growth of stocker calves grazing native grass pastures in the Flint Hills region of Kansas.

Study Description: A total of 248 steers originating from Texas and New Mexico were used to determine the effects on performance when provided with salt blocks with or without an injectable trace mineral, compared to performance when provided with a complete mineral supplement. Moreover, the response of two commonly-used growth implants were evaluated.

The Bottom Line: While there was no growth response to salt block and injectable trace mineral supplementation when compared to a complete mineral supplementation, there was a significant growth response with growth implants.

Keywords

salt, mineral, implants, stocker

Authors

C. S. Weibert, T. J. Spore, M. A. Johnson, F. K. Brazle, G. L. Kuhl, W. R. Hollenbeck, R. N. Wahl, and Dale Blasi

Evaluation of Salt, Trace Mineral Sources, and Growth Implants on Performance of Stocker Cattle Grazing Native Flint Hills Pasture

C.S. Weibert, T.J. Spore, M.A. Johnson, F.K. Brazle,[1] G.L. Kuhl,[2] W.R. Hollenbeck, R.N. Wahl, and D.A. Blasi

Introduction

Graber et al. (1985) studied mineral supplementation with stockers grazing Flint Hills native grass pastures and concluded that improvements in performance may or may not occur when investing in this management practice. While most stocker operations today utilize some source of complete mineral, some producers use only salt while their calves are on pasture. The objective of this study was to determine the efficacy of providing salt alone or with injectable trace minerals compared to a complete mineral supplement and growth implants for improving the growth of stocker calves grazing native grass pastures in the Flint Hills region of Kansas.

Experimental Procedures

Crossbred steers originating from Texas and New Mexico (n = 248; 697.8 lb ± 9.6) were randomized by initial weight across 15 pastures. All steers in this study were previously used in a receiving study that focused on limit feeding either wet distillers grains or corn gluten feed at 2% of their body weight (Spore et al., 2018). The final weights of the receiving trial were used to randomly assign each animal to a treatment.

Pastures were randomly assigned to three different treatment groups: (1) Salt block only; (2) Salt block and Multimin90; and (3) a Kansas State University complete mineral (Brazle, personal communication; Table 1) formulated for 3 oz/day daily consumption. Multimin90 is an injectable chelated aqueous supplemental source of trace minerals administered at 1 mL/100 lb body weight (1 mL contains 60 mg zinc, 10 mg manganese, 5 mg selenium, and 15 mg copper).

Within each pasture treatment group, equal number of steers were randomly given either: Ralgro (36 mg zeranol) or Revalor-G implants (40 mg of trenbolone acetate and 8 mg estradiol; Merck Animal Health, Madison, NJ), or no implant. Stocking rates

[1] Retired Kansas State University Southeast Area Livestock Specialist, Chanute, KS.
[2] Retired K-State Research and Extension Beef Specialist, Nutrition and Management, Manhattan, KS.

were based on pasture size (avg: 250 lb/acre ± 5.2). All steers were weighed individually on days 0 and 90.

On a weekly basis, the mineral feeders and salt blocks were weighed to determine consumption. The collected data were used to calculate the previous week's intake of mineral. Consumed mineral was replaced and the distance to a water source was adjusted as needed to achieve 3 oz per head daily target. The movement and opening of mineral feeders were done in pasture blocks to ensure intake differences were due to mineral and not to human error.

All calves were inspected multiple times weekly throughout the trial for pinkeye, lameness, and other ailments. If diagnosed with foot rot or pinkeye, cattle received Bio-Myocin 200. Upon conclusion of the study, all steers were weighed and placed in a small pasture overnight before shipping to a commercial feedlot.

Data were analyzed using the MIXED procedure (version 9.4, SAS Inst. Inc., Cary, NC). Data were arranged in a randomized incomplete block design, with pasture serving as the experimental unit for growth and health outcomes as impacted by treatment. In the model, the fixed effects were treatment and pasture while the random effects were pasture × treatment, pasture, and animal identification.

Results and Discussion

There were no statistical interactions; therefore, only the main effects of mineral supplementation and implant are presented in Tables 2 and 3, respectively. There were no significant differences in average daily gain ($P=0.40$) from salt or mineral supplementation (Table 2). It should be noted that all steers in this study were previously used in a 90-day growing study with diets well-fortified with macro and trace minerals that may have influenced the results observed. The results in Table 4 show the forage quality at three time points of the experimental pastures during the course of the experiment. Overall, the crude protein levels in the complete salt and mineral supplement pastures were significantly higher ($P<0.02$) than the other two treatments.

Compared to non-implants, calves gained significantly faster when implanted with either Revalor-G or Ralgro (average of 8.9%, $P=0.02$). The average block salt intake was approximately 1.43 oz/head daily while the daily intake of the K-State complete mineral was 3.3 oz/head. Salt and complete mineral intakes of the stockers were fairly consistent throughout the 13-week trial, with greater usage rates associated with periods of high precipitation (Figure 1). Two calves were pulled or treated during the course of the trial; one for a broken leg and the other for lameness.

Implications

While there was no growth response to salt block and injectable trace mineral supplementation when compared to a complete mineral supplementation, there was a significant growth response with growth implants.

References

Gradber, R.W., E.F. Smith, C.E. Owensby, J. Riley, and R.R. Schalles. Mineral, Rumensin, and chlortetracycline supplementation for steers on native bluestem pasture. Cattlemen's Day 1985, Kansas State University, March 1985. Kansas Agricultural Experiment Station Research Report SRP470, pages 8-11.

Spore, T.J., S.P. Montgomery, E.C. Titgemeyer, G.A. Hanzlicek, C.I. Vahl, T.G. Nagaraja, W.R. Hollenbeck, R.N. Wahl, and D.A. Blasi. Wet distiller's grains and wet corn gluten with dry-rolled or whole-shelled corn in high-energy limit-fed diets do not affect growing cattle performance. Cattlemen's Day 2018, Kansas State University, March 2018. Kansas Agricultural Experiment Station Research Reports. Vol. 4. Iss. 1.

Table 1. K-State complete mineral[1,2]

Ingredient	lb per ton
Dicalcium phosphate	450
White salt	650
Ground limestone	350
Dried distillers grains	349
Dried molasses	100
Magnesium oxide	40
Mineral/soybean oil	20
Zinc oxide	20
Copper sulfate	10
Vitamin A (30,000 IU/g)	10
Iodine (EDDI)	1
Total	2000

Mineral	Calculated concentration in mineral
Calcium, %	11.9
Phosphorus, %	3.9
Magnesium, %	1.3
Potassium, %	0.6
Salt, %	32.5
Sulfur, %	0.2
Copper, ppm	1,278
Cobalt, ppm	0.2
Iodine, ppm	394
Iron, ppm	126
Manganese, ppm	6.1
Vitamin A, kIU/lb	68.1
Zinc, ppm	7,812

[1]Designed for a 650-lb steer; 3 oz intake per day.
[2]Dr. Frank Brazle, 2017, personal communication.

Table 2. Effects of mineral supplementation on stocker performance

	Mineral supplementation			
Item	Salt block	Salt block and injectable trace mineral	Complete salt and mineral supplement	Standard error of mean[1]
Number of pastures	5	5	5	
Day 0 weight, lb	698	695	700	9.6
Day 90 weight, lb	847	838	856	13.6
Average daily gain, lb	1.63	1.61	1.73	0.07

[1]Greatest standard error of the mean among treatments reported.

Table 3. Effects of implant on stocker performance

	Growth implant			Standard error of mean[1]
Item	No implant	Ralgro	Revalor-G	
Number of steers	82	82	81	
Day 0 weight, lb	693	699	702	7.9
Day 90 weight, lb	830	857	855	10.9
Average daily gain, lb	1.53[a]	1.75[b]	1.70[c]	0.07

[1]Greatest standard error of the mean among treatments reported.
[a,b,c]Means within a row with uncommon superscripts differ ($P<0.05$).

Table 4. Forage quality of Flint Hills pasture by date of sampling[ab]

Nutrient composition	May 16 Salt block	May 16 Salt block and inject-able trace mineral	May 16 Complete salt and mineral supplement	June 16 Salt block	June 16 Salt block and inject-able trace mineral	June 16 Complete salt and mineral supplement	July 31 Salt block	July 31 Salt block and inject-able trace mineral	July 31 Complete salt and mineral supplement	Standard error of the mean	P-value[b]
Dry matter, %	32.20	37.30	31.90	41.10	41.40	41.70	49.70	47.90	51.70	2.14	0.79
Crude protein, %	11.87	10.90	13.56	7.68	7.82	8.36	5.40	5.96	6.11	0.50	0.02
Acid detergent fiber, %	35.80	39.90	35.00	38.10	38.10	37.00	40.70	43.70	40.80	0.91	0.0001
Neutral detergent fiber, %	57.30	57.70	55.70	61.70	61.10	59.50	64.20	65.50	61.50	1.40	0.07
Net energy-maintenance, Mcal/lb	0.50	0.41	0.52	0.46	0.46	0.47	0.40	0.33	0.39	0.01	0.0001
Net energy gain, Mcal/lb	0.25	0.17	0.26	0.21	0.20	0.23	0.15	0.09	0.15	0.02	0.0001
Total digestible nutrients, %	54.20	48.60	55.30	51.10	51.10	52.50	47.60	43.50	47.40	1.20	0.0001
Calcium, %	0.66	0.80	0.67	0.58	0.62	0.71	0.68	0.69	0.92	0.07	0.21
Phosphorus, %	0.18	0.20	0.21	0.11	0.11	0.12	0.08	0.09	0.09	0.01	0.31
Potassium, %	1.80	1.60	1.85	1.38	1.51	1.41	0.91	0.96	1.03	0.13	0.74
Magnesium, %	0.18	0.19	0.20	0.19	0.19	0.19	0.16	0.21	0.21	0.02	0.30
Sodium, %	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.24	0.01	0.08	0.39
Sulfur, %	0.12	0.13	0.16	0.07	0.07	0.08	0.09	0.10	0.12	0.01	0.10
Cobalt, ppm	0.39	0.39	0.47	0.54	0.46	0.54	0.24	0.31	0.33	0.08	0.52
Copper, ppm	7.30	7.60	8.10	4.20	4.20	5.10	4.70	5.30	5.55	0.58	0.25
Manganese, ppm	45.30	36.60	46.30	26.20	27.60	29.90	30.50	39.60	44.40	6.60	0.55
Molybdenum, ppm	1.02	1.16	1.25	0.82	0.67	0.93	1.26	1.57	1.54	0.18	0.31
Zinc, ppm	24.30	27.30	25.70	13.00	12.60	16.00	18.10	20.00	25.70	2.37	0.20

[a]Each value represents the average of 5 forage samples. One sample was collected from each treatment pasture per time period and composited into one sample.
[b]Significance by date of sampling.

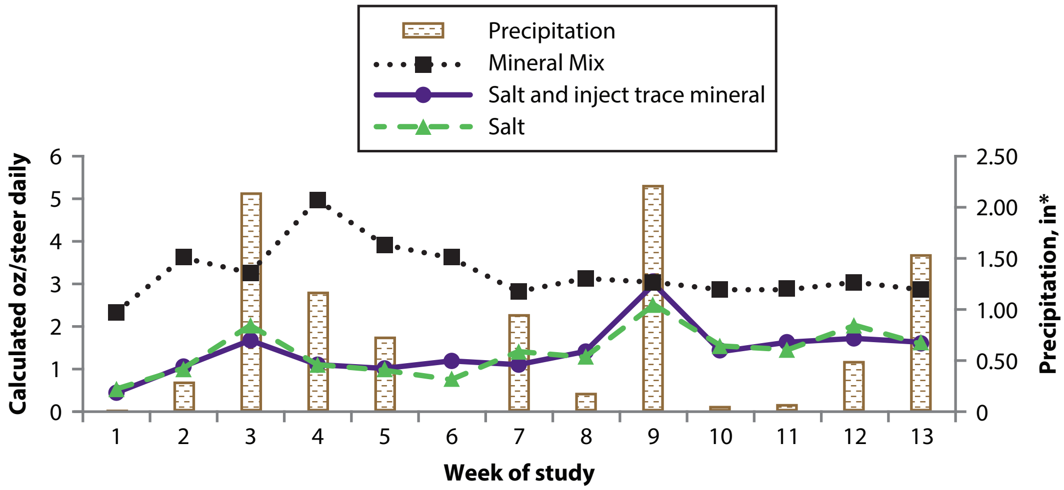

Figure 1. Calculated intake of salt and mineral provided to steers.
* = Estimated values obtained from Climate Fieldview.