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Evaluation of Trace Mineral Sources on Newly Arrived Stocker Cattle

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Abstract

Light weight stocker calves experience variable degrees of physiological and psychological stressors as they are assembled from various marketing points and transported to their destination. Susceptibility to disease in young, long hauled calves is greatly enhanced and the consequence of sickness is a major cause for poor production outcomes. Enhanced nutritional trace mineral programs that contain zinc, copper, and manganese from organic or hydroxy sources may be more efficacious as a means of minimizing disease or realizing improved performance than the sulfate form of these respective trace minerals.

Keywords

trace minerals, stocker, drylot

Authors

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CATTLEMEN'S DAY 2017

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Introduction

Light weight stocker calves experience variable degrees of physiological and psychological stressors as they are assembled from various marketing points and transported to their destination. Susceptibility to disease in young, long hauled calves is greatly enhanced and the consequence of sickness is a major cause for poor production outcomes. Enhanced nutritional trace mineral programs that contain zinc, copper, and manganese from organic or hydroxy sources may be more efficacious as a means of minimizing disease or realizing improved performance than the sulfate form of these respective trace minerals.

Key words: trace minerals, stocker, drylot

Experimental Procedures

A total of 283 crossbred heifers (initial body weight = 511 ± 29 lb) were blocked by weight and randomly assigned to one of 3 treatments with 6 pens per treatment (18 pens with 15 heifers each). Treatments consisted of supplemental zinc (360 mg/day), copper (125 mg/day), and manganese (200 mg/day) from sulfate, organic complexes (Availa® 4, Zinpro Corp., Eden Prairie, MN), or hydroxy (Intellibond®, Micronutrients, Indianapolis, IN) trace mineral sources fed during a 45 day receiving and backgrounding period (Table 1).

Diets were fed once daily. Unconsumed feed was removed from the bunk, weighed, and a subsample was dried as needed to determine actual feed intake. Body weights were captured at initial processing, during revaccination (day 14), and at completion of the study at day 45. All calves were observed daily for signs of sickness or lameness. If any signs were observed, cattle were pulled from their pens and a rectal temperature was taken. If a temperature of 104°F or higher was found, antibiotics were administered according to the Kansas State University Beef Stocker Unit health protocol. Diagnosis of non-bovine respiratory diseases (lameness, pink eye, etc.) was treated according to the health protocol. The trial was conducted as a randomized complete block design. Statistical analyses were conducted using the MIXED procedure of SAS (version 9.4; SAS Institute, Cary, NC). Data were arranged in a randomized incomplete block design, with pen serving as the experimental unit for growth and health outcomes as impacted

[1] Micronutrients USA LLC, Indianapolis, IN.

by treatment. In the model, the fixed effects were treatment and lot number while the random effects were lot × treatment, pen, and animal ID. Treatment differences were considered significant at P-value less than 0.05 and tendencies at P-value less than 0.10.

Results and Discussion

The effects of source of zinc, copper, and manganese on heifer performance are shown in Table 2. Overall, the cattle performed well on feed among all treatments. There were no significant differences in body weight gain, average daily gain, feed intake, or feed efficiency during the 45 day receiving and growing trial.

Implications

Trace mineral source did not affect total weight gain, average daily gain, feed efficiency or morbidity during the receiving and subsequent growing phase of stocker calves in this particular trial.

Table 1. Basal diet composition of heifers fed a trace mineral supplement

Item, % dry matter basis	Basal diet	Hydroxy	Organic	Control
Dry rolled corn	19.38			
Wet corn gluten feed	40.00			
Alfalfa hay	17.50			
Trace mineral premix[1]	5.63			
Prairie hay	17.50			
Analyzed nutrient composition[2]				
Dry matter, %		73.04	73.22	73.27
Crude protein, %		17.14	17.49	17.26
Acid detergent fiber		16.75	17.39	17.56
Net energy gain, Mcal/lb		0.48	0.47	0.47
Calcium, %		0.68	0.61	0.63
Phosphorus, %		0.60	0.61	0.62
Potassium, %		1.27	1.29	1.32
Magnesium, %		0.36	0.35	0.36
Copper, ppm		10.51	9.13	9.64
Manganese, ppm		37.07	35.47	39.00
Molybdenum, ppm		0.73	0.80	0.73
Zinc, ppm		52.93	52.70	53.73

[1] Formulated to provide 150 mg/day Rumensin (Elanco Animal Health, Greenfield, IN) and to contain the following nutrient levels: 28,000 IU/lb vitamin A; 31 IU/lb vitamin E; 170 ppm added copper; 510 ppm added zinc; 340 ppm added manganese; 2.63 ppm added selenium; 2.5% salt; 4.7% calcium; and 9.4% crude protein from sulfate, organic, and hydroxy mineral sources for the elements of zinc, copper and manganese.
[2] SDK Laboratories, Hutchinson, KS.

Table 2. Performance data for cattle supplemented with sulfate, organic complexes, or hydroxy trace minerals

Item	Sulfate	Organic	Hydroxy	Standard error	P-value
Pens, number	8	8	8		
Animals on trial, number	94	93	89		
Days on feed	45	45	45		
Initial weight, lb	511	511	510	2.26	0.9362
Revaccination weight, lb	582	578	579	3.03	0.7276
Final shrunk weight, lb	645	645	641	6.84	0.7778
Receiving period average daily gain, lb/day	2.97	3.00	2.94	0.11	0.9053
Bovine respiratory disease pull rate, % per treatment	0.81	1.66	2.02		0.4333
Day 14 dry matter intake, lb/day	12.18	12.38	11.91	0.36	0.6754
Day 14 feed:gain, lb dry matter feed/lb gain	2.38	2.53	2.36	0.098	0.4061
Day 14 gain:feed, lb gain/lb dry matter feed	0.425	0.398	0.427	0.016	0.3897
Overall dry matter intake, lb/day	16.36	16.61	16.15	0.503	0.8134
Overall feed:gain, lb dry matter feed/lb gain	5.53	5.54	5.51	0.164	0.9895
Overall gain:feed, lb gain/lb dry matter feed	0.182	0.181	0.182	0.005	0.9786