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Abstract

Lightweight stocker calves experience variable degrees of physiological stress resulting from weaning, transport, food and water deprivation, diet changes, inclement weather, and infectious diseases. Consequently, preconditioning and specialized nutrition that include direct-fed microbials may become more common in the beef industry as a means of controlling disease and minimizing the effects of stress.

Keywords

Cattlemen's Day, 2012; Kansas Agricultural Experiment Station contribution; no. 12-231-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 1065; Beef Cattle Research, 2012 is known as Cattlemen's Day, 2012; Beef; ProTernative stress formula; Growth performance; Health performance; Microbials

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Direct-Fed Microbials for Receiving Cattle I: Effects of ProTernative Stress Formula Fed in a Liquid Suspension on Growth and Health Performance of Receiving Beef Heifers

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Introduction

Lightweight stocker calves experience variable degrees of physiological stress resulting from weaning, transport, food and water deprivation, diet changes, inclement weather, and infectious diseases. Consequently, preconditioning and specialized nutrition that include direct-fed microbials may become more common in the beef industry as a means of controlling disease and minimizing the effects of stress.

Experimental Procedures

All procedures were approved by the Kansas State University Institutional Animal Care and Use Committee.

Over a 7-day period (June 23 through 30, 2010), 279 heifers (497 lb initial body weight) were assembled through sale-barn market facilities in Tennessee and transported to the Kansas State University Beef Stocker Unit. Upon arrival (day 0), all calves were weighed, given a visual identification tag, tested for bovine respiratory disease, assessed for initial overall health, and placed in a temporary pen. Calves were provided with brome grass hay (1.5% of body weight; 11.0% crude protein, and 0.34 Mcal/lb NEg) and water. Calves were blocked by truckload and randomly assigned to 1 of 24 pens by arrival weight. Treatments (Table 1) were assigned randomly to pen in an incomplete block design. The day after arrival, all calves were vaccinated for clostridial and viral diseases and dewormed. Animals allocated to the low- and high-dose ProTernative SF (Lallemand Animal Nutrition, Milwaukee, WI) treatments were drenched with 0.07 oz/head of their respective treatments in 3.8 oz of water, whereas control calves were drenched with water alone. All calves were revaccinated 14 days later. Feed ingredients were randomly sampled once for each base diet to determine nutrient content. The amount of feed delivered to each pen was recorded on a daily basis. Feed refusals were weighed and recorded. Calves were gradually adapted to their final diets using the step-up diets shown in Table 2. All diets contained Rumensin (Elanco Animal Health, Greenfield, IN) at 660 g/ton of dry matter.

Treatments were administered once daily for 44 days as a liquid top-dress (3.8 oz/head daily) on the morning feed ration. Care was taken to evenly distribute the allotted supplement across the bunk line of each pen. Animals were individually weighed at initial processing (day 0), during revaccination (day 14), and at the end of the study. Weights were collected prior to the morning feed delivery.

All calves were observed twice daily for symptoms of sickness or lameness. Caregivers were blinded to treatment. Calves with a clinical illness score greater than 1 (1 = normal, 2 = slightly ill, 3 = moderately ill, or 4 = severely ill) were removed from their respective pens for physical examination. Animals with a rectal temperature ≥103.6°F were treated for bovine respiratory disease.

Results and Discussion

Incidence of respiratory disease was relatively high; however, treatment had no effect on average daily gain or dry matter intake (Table 3). Similarly, treatment had no effect on the number of heifers treated once or twice for respiratory disease. A greater percentage of heifers in the ProTernative SF groups tended ($P = 0.06$) to require a third treatment for bovine respiratory disease compared with the control group. Control calves also tended to have greater ($P < 0.10$) average daily gain than treated calves.

Implications

ProTernative SF direct-fed microbial delivered as a liquid suspension had no influence on dry matter intake, average daily gain, or health of high-risk beef calves.

Table 1. Direct-fed microbial treatments applied to highly stressed heifers during receiving

Treatment	Dose, oz/head daily
Control	0.0
ProTernative SF, low dose	0.017
ProTernative SF, high dose	0.035

Table 2. Composition of diets fed to highly stressed heifers during receiving

Ingredient	Diet 1	Diet 2	Final diet
Number of days fed	8	10	26
Cracked corn	28.0	29.0	36.0
Wet corn gluten feed	30.0	37.0	37.0
Alfalfa hay	23.0	15.0	9.0
Prairie hay	16.0	16.0	16.0
Supplement	3.0	3.0	3.0
Nutrient composition			
Dry matter %	70.47	66.19	78.04
Crude protein, %	15.33	15.75	13.31
NE_m, Mcal/lb	0.79	0.81	0.82
NE_g, Mcal/lb	0.46	0.48	0.49
Calcium, %	0.93	1.29	0.75
Phosphorus, %	0.38	0.42	0.44

Table 3. Performance of highly stressed heifers during receiving that were orally treated with no direct-fed microbial (Control), a low dose of ProTernative SF, or a high dose of ProTernative SF direct-fed microbial

Item	Control	Low dose	High dose	SEM
Dry matter intake, lb/day	12.52	12.64	12.80	0.48
Average daily gain, lb	2.81	2.93	2.98	0.10
Feed:gain	4.46	4.33	4.28	0.153
Morbidity, %	38.8	47.5	30.3	0.99