The Professional Animal Scientist 34:42–50
https://doi.org/10.15232/pas.2017-01639

Effects of oral tilmicosin on health and performance in newly received beef heifers

J. D. Rivera,*[1] J. T. Johnson,* and G. K. Blue†
*Mississippi Agricultural and Forestry Experiment Station—White Sand Unit, Poplarville 39470; and †Elanco Animal Health, Lawrenceburg, TN 38464

ABSTRACT

The objective of these studies was to determine the effects of feeding tilmicosin on health and performance of newly received beef cattle. Beef heifers (n = 480) were used in 2 studies to determine effects of oral tilmicosin on health and performance. In Exp. 1, 320 heifers (BW = 196 ± 3.3 kg) were administered antimicrobial metaphylaxis before shipment. At arrival they were monitored for signs of bovine respiratory disease. When 10% of the population was morbid, heifers were assigned to either a control receiving diet (CON) or a diet providing 12.5 mg of tilmicosin/kg of BW (TIL). Treatments were fed for 14 d, and morbid animals were treated with injectable antibiotics. Cattle were weighed individually on d 0, 28, and 56. Data were analyzed as a randomized complete block, and morbidity was analyzed as nonparametric data. Feeding TIL resulted in reduced BW at d 28 ($P = 0.03$). Moreover, TIL decreases DMI during the first 14 d ($P = 0.0001$) and decreased ADG ($P = 0.03$) and G:F ($P = 0.05$) from d 0 to 28. There were no differences in morbidity ($P = 0.20$), and TIL increased total antibiotic cost ($P = 0.004$). In Exp. 2, 160 beef heifers (BW = 227 ± 2.3 kg) received no metaphylaxis and were processed at arrival. Feeding TIL did not affect morbidity ($P = 0.44$); however, TIL decreased the number of animals re-treated ($P = 0.03$) and increased total antibiotic cost ($P = 0.04$).

Key words: beef cattle, bovine respiratory disease, oral antibiotics, performance

INTRODUCTION

Bovine respiratory disease (**BRD**) is estimated to cost the beef industry approximately $500 million per year (Miles, 2009). Abrupt weaning and commingling can result in greater health challenges as compared with calves from a single source and weaned before shipment (Step et al., 2008). Historically, metaphylactic use of injectable therapeutic antibiotics has been one of the primary methods of addressing the issue of BRD (Lofgreen, 1983; Galyean et al., 1995; Duff et al., 2000) and has demonstrated variable decreases in BRD morbidity and mortality and increases in performance. Although injectable antibiotics for treatment and control of BRD have been very well studied, the use of oral antibiotics has not been as well evaluated. Cole (1996) suggested that when expected morbidity is low, oral antibiotics may be effective; however, in higher risk situations, feed intake may be depressed to the point that it may be difficult to achieve therapeutic intakes of fed antibiotics. Equivocal evidence for the use of oral antibiotics was noted by Taylor et al. (2010) and is evident in other experiments. Duff et al. (2000) examined the effects of preshipping versus arrival medication with tilmicosin phosphate and feeding chlortetracycline (**CTC**) on health and performance of beef calves. Although CTC resulted in increased G:F for the period it was fed, no additive positive effects for oral CTC were noted in any of the experiments for performance during the overall 28-d receiving period. Recently, oral tilmicosin (Pulmotil, Elanco Animal Health, Greenfield, IN) has been approved by the FDA for use in beef cattle when ≥10% of the population has been identified as having BRD. Data from registration studies (FDA, 2011) determined that tilmicosin fed at the level of 12.5 mg of tilmicosin/kg of BW for 14 d decreased BRD morbidity as compared with cattle fed nonmedicated feed. The objective of this study was to examine the effects of oral tilmicosin on health and performance in commingled beef heifers.

MATERIALS AND METHODS

Care and use of the animals used in the study were done under auspices of the Mississippi State University Animal Care and Use Committee (Protocol # 15028).

Exp. 1

A total of 320 crossbred (English × Continental, with <25% *Bos indicus* influence) beef heifers (average BW = 196 ± 3.3 kg) were purchased over a 4-d period (Monday through Thursday) by an order buyer in Waynesboro, TN. Heifers were shipped in 2 blocks (160 heifers per block) 4 wk apart. Once the 160 cattle in each block were assembled (Thursday evening) at the order buyer facility, they were vaccinated against infectious bovine rhinotracheitis virus, bovine virus diarrhea virus (**BVD**), bovine

J. D. Rivera and J. T. Johnson declare no conflict of interest. G. K. Blue is an employee of Elanco Animal Health.
[1] Corresponding author: jdr398@msstate.edu

Table 1. Ingredient composition of diets used in the receiving study

	Treatment diet,[1] DM basis					
Ingredient, %	**CON diet 1**	**TIL diet 1**	**CON diet 2**	**TIL diet 2**	**CON diet 3**	**TIL diet 3**
Cracked corn	49.8	47.7	49.7	48.0	50.1	47.9
Dried distillers grains with solubles	23.0	19.7	22.1	19.15	22.5	19.0
Chopped bahiagrass hay	23.9	23.6	—	—		
Cotton gin mote	—	—	25.0	24.75	25.1	24.9
Beef mineral premix[2]	3.1	3.0	3.0	2.1	2.1	2.1
Pulmotil Pellet[3]	—	5.8	—	5.8	—	5.9
Water[4]	0.2	0.2	0.2	0.2	0.2	0.2

[1]CON = control; TIL = tilmicosin. Treatment diets: CON diet 1 and TIL diet 1 were fed only the first 14 d to their respective treatment groups, after which all treatment groups were fed CON diet 2. Cattle in block 2 (Exp. 1) were fed CON diet 2 and TIL diet 2 for the first 14 d (based on their respective treatment group), after which all cattle were fed CON diet 2. Cattle in Exp. 2 were fed CON diet 3 and TIL diet 3 for the first 14 d (based on treatment designation), and afterward, all were fed CON diet 3.

[2]Beef mineral premix had 17.10% Ca, 8.0% P, 12.9% NaCl, 2% Mg, 2,500 mg/kg of Cu, 200 mg/kg of I, 26.0 mg/kg of Se, 7,500 mg/kg of Zn, 90,703 IU/kg of vitamin A, 9,070 IU/kg of vitamin D, and 90.7 IU/kg of vitamin E.

[3]Pulmotil Pellet was a commercial pellet distributed by NutraBlend (Neosho, MO), containing 2.58 g/kg of tilmicosin and 8.0% CP.

[4]Water was added to increase palatability, decrease dust, and facilitate mixing.

parainfluenza 3 virus, and bovine respiratory syncytial virus (Titanium 5, Elanco Animal Health, Greenfield, IN) and clostridial organisms (Alpha 7, Boehringer Ingelheim, St. Joseph, MO), treated for internal parasites with moxidectin (Cydectin Injectable, Boehringer Ingelheim), and injected with ceftiofur crystalline free acid (Excede, Zoetis, Parsippany, NJ). In addition, each animal was assigned a unique identification number. An ear notch was collected and submitted for analysis for persistently infected BVD at a commercial laboratory (Gold Standard Labs, Bowling Green, KY) using ELISA. Following processing, cattle were loaded and shipped 620 km south to the White Sand Beef Research Unit in Poplarville, MS. At arrival (September 11, 2015; 0630 h CDT), cattle were off loaded and weighed in a pen scale in groups of 10 to determine arrival weight. They were moved to pens (20 animals per pen) and provided ad libitum access to the receiving diet (Table 1). The pens were small paddocks (1.1 ha) in which existing vegetation received chemical treatment with a 2% treatment of 41% glyphosate (Cornerstone Plus, WinField Solutions LLC, St. Paul, MN) and was burned off with fire so no existing vegetation was left. Feed bunks were added and provided approximately 31 cm of linear bunk space per heifer. The diet consisted of chopped hay, dry-rolled corn, dried distillers grains, and a mineral and vitamin premix (Table 1). Cattle had ad libitum access to feed, and feed calls were designed to leave at least 2 to 3 kg of the previous feeding in the morning before feeding. Feed was offered once daily between 0700 and 0830 h. After arrival, cattle were monitored daily for signs of BRD based on the following scale (modified from Perino and Apley, 1998): 1 being normal, 2 being slightly ill, 3 being moderately ill, 4 being severely ill, and 5 being moribund. Animals with a score $\geq$2 were removed from the pen and moved to the processing facilities, where a rectal temperature (**RT**) was obtained using GLA M700 Rectal Thermometer (GLA Agricultural Electronics, San Luis Obispo, CA). If the rectal temperature was $\geq$40°C, then the animal was classified as morbid and returned to its pen without treatment. According to the label, feeding tilmicosin is only to begin when the population of calves reaches a minimum threshold of 10% respiratory morbidity; therefore, in the present study, when the percentage of morbid animals was $\geq$10% of the group (16 animals), the feeding study began (7 d following arrival in both groups).

The day following the 10% morbidity threshold (d 0), all animals were moved to the working facilities, where they were stratified based on morbidity status and randomized across each treatment. An individual weight was obtained, and they were randomly assigned (within strata) to 1 of 2 treatments: no oral tilmicosin (**CON**) or oral tilmicosin (**TIL**; fed in the diet to deliver 12.5 mg of TIL per kg of BW). Treatments were randomly assigned to pens, with 20 animals per pen. During the weighing and treatment assignment, personnel cleaned out bunks, weighed the remaining feed, and adjusted that day's feed delivery. The remaining feed was discarded.

Diets. The receiving diet was a 74% concentrate diet, consisting of cracked corn, dried distillers grains with solubles, chopped bahiagrass hay (approximately 5 cm in length), and a salt mineral premix (Table 1). Veterinary Feed Directives were obtained for feeding TIL for each block. Once TIL was initiated, the CON diet was mixed first followed by the TIL diet each day. The TIL diet was the CON diet with added tilmicosin (Table 1). The TIL was in the form of a mixing pellet that contained 12.5