Department of Animal and Range Sciences

CLAYTON LIVESTOCK RESEARCH CENTER

PROGRESS REPORT

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Effects of Pre-shipping Versus Arrival Medication with Micotil® (Tilmicosin Phosphate) and Feeding Aureomycin® (Chlortetracycline) on Health and Performance of Newly Received Beef Steers[1]

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Previous research conducted at the Clayton Livestock Research Center (Progress Report No. 101) suggested that pre-shipping prophylactic medication programs using tilmicosin phosphate (Micotil®) may be as effective or more effective than arrival medication programs in decreasing bovine respiratory disease (**BRD**) in highly-stressed beef cattle from the southeastern United States. However, the week that the cattle were treated differed among medication programs. Cattle receiving pre-shipping tilmicosin phosphate displayed symptoms during the second week of the experiment, compared with week 1 for arrival medication and control cattle. Chlortetracycline (Aureomycin®) included as part of the receiving program may offer a means of controlling the shift in the week that the animals were treated when fed at 10 mg/lb body weight as a top-dress. However, data are limited evaluating the effects of prophylactic medication with tilmicosin phosphate before shipping versus on arrival and the possible interaction with feeding chlortetracycline on health and performance of newly received beef cattle.

Two loads of cattle were used in the experiment. Both loads contained 120 crossbred (British x Continental) beef bull and steer calves. Cattle were purchased from an order buyer in Mississippi. Cattle were purchased at auction barn(s) on a Monday and Tuesday and held at the order buyer's facility until pre-shipping processing and shipment. Pre-shipping processing procedures included individual identification and 40 calves in each load received pre-shipping treatment with Micotil® (6.0 mL). Treatments were assigned based on processing order using random numbers. Cattle left Mississippi at approximately 0130 CST on Tuesday and arrived at Clayton at approximately 0800 MST on Thursday. Cattle experienced a 6.3 and 5.7% shrink from pay weights of 413 and 418 pounds for load 1 and 2, respectively. Cattle were processed immediately upon arrival including individual weight, branded, castrated (80 and 73.3% for load 1 and 2, respectively) and dehorned as needed (26.7 and 27.5% for load 1 and 2, respectively), vaccinated with a clostridial antigen (Fortress-7; Pfizer Animal Health; Exton, PA), and an IBR-PI_3-BRD-BRSV vaccine (Bovishield-4; SmithKline Beecham Animal Health; West Chester, PA), treated for internal and external (Ivomec pour-on; Merck AgVet Division, Rahway, NJ) parasites, and injected with vitamin A/D_3 (AgriLabs, St. Joseph, MO). Treatments were arranged in a 3 x 2 factorial. Micotil treatments included: 1) no Micotil® (**CON**), 2) pre-shipping Micotil® (6.0 mL; **PRE**), and 3) arrival Micotil® (6.0 mL **ARR**). Aureomycin treatments included: 1) no aureomycin (**CTR**) and 2) aureomycin fed on days 5 to 9 at 10 mg/lb of body weight (as-fed basis; **AUR**). Pens were assigned randomly to treatments (2 pens per treatment per load). After processing, steers were placed in their respective pens, offered sorghum-sudangrass hay (first week only) and a 70% concentrate diet (Table 1) in quantities sufficient for ad libitum consumption throughout the receiving period. Cattle were monitored daily for symptoms of BRD. Symptoms included nasal or ocular discharge, labored breathing, lethargy and(or) emaciated body condition. Cattle displaying symptoms were removed from their

Table 1. Ingredient composition of 70% concentrate diet fed to steers receiving tilmicosin phosphate

Ingredient/Item	%, dry matter basis
Sorghum sudangrass hay	9.97
Alfalfa hay	19.20
Whole corn	9.78
Steam-flaked corn	46.50
Soybean meal	3.87
Molasses	5.13
Fat (yellow grease)	1.97
Limestone	.73
Dicalcium phosphate	.49
Salt	.30
Urea	.83
Ammonium sulfate	.24
Premix[a]	.99

[a]Premix contained (DM basis): wheat midds (83.375%), vitamin A - 30,000 IU/g (.66%), vitamin E - 500 IU/g (1.98%), Bovatec-68 (1.985%), and trace mineral package (12%). Trace mineral package contained (DM basis): calcium iodate (.269%), cobalt carbonate (.362%), copper sulfate (3.268%), ferrous sulfate (19.445%), magnesium oxide (29.762%), manganous oxide (6.944%), zinc sulfate (28.169%), wheat midds (7.831%), and mineral oil (3.95%).

[1]We thank Elanco Anim. Health, Farr Better Feeds, Fort Dodge Anim. Health, Pfizer Anim. Health, Merck AgVet, and Roche Anim. Health for product support.

pens, taken to a processing facility and rectal temperature measured. Cattle with elevated rectal temperature (> 103.5° F) received medical treatments. Medical treatments included Micotil® and penicillin. After medical treatments, the cattle were returned to their respective feedlot pen. Cattle were weighed on days 0, 5, 10, 14, and 28. On days 14 and 28, feed bunks were swept and any feed remaining was weighed and sampled for DM determination. Bunk samples were obtained on weekly intervals during the study and dried at 100°C for approximately 22 hours. In addition, dietary ingredient samples were obtained every 2 weeks for DM determination.

Performance data were analyzed using GLM procedures of SAS (1987). Pen was considered the experimental unit. For average daily gain, daily DM intake and the feed:gain ratio the model included effects for Micotil treatment, Aureomycin treatment, Micotil x Aureomycin interaction, and pen within Micotil x Aureomycin. Orthogonal contrasts were used to separate Micotil treatment means. Contrasts were: 1) CON versus the average of PRE and ARR and 2) PRE versus ARR. Morbidity data were first analyzed using the CATMOD procedure of SAS (1987) for with individual calves as the experimental unit. The model included effects for Micotil, Aureomycin and Micotil x Aureomycin. Contrasts were used to separate Micotil treatment means for morbidity. Contrasts were: 1) CON versus the average of PRE and ARR and 2) PRE versus ARR. No Micotil x Aureomycin interactions were observed; therefore, chi-square analysis was used to analyze morbidity data for Aureomycin treatments. Morbidity data were separated into 5-day periods to determine when steers were treated. The 5-day periods were then analyzed by chi-square. Only six steers required more than one treatment (repull) for BRD; therefore, repull data were not analyzed.

Performance data are presented in Table 2. A Micotil x Aureomycin treatment interaction ($P < .05$) was observed during days 5 to 10 of the experiment; no other interaction were observed. Average daily gain was improved ($P < .10$) for the average of the Micotil treatments versus controls and for ARR versus PRE ($P < .10$) during days 0 to 5. Likewise, average daily gain was improved for the average of the Micotil treatments versus control cattle on days 10 to 14 ($p < .05$) and 0 to 14 ($P < .01$) of the experiment. No other differences were noted among treatments for daily gain. Cattle receiving Aureomycin gained .10 lb per head during days 5 to 10, whereas control cattle lost .70 lb per head during the same period ($P < .01$). The interaction during days 5 to 10 did not preclude analysis of main effect means (-.18, -.58, .40, -1.14, .07, and -.38 for ARR:AUR, ARR:CTR, CON:AUR, CON:CTR, PRE:AUR, and PRE:CTR, respectively). Control cattle compensated for the decreased gain during days 5 to 10 and had higher average daily gain durlng days 10 to 14 than cattle receiving Aureomycin ($P < .10$). No other differences in average daily gain were observed for Aureomycin treatments. Daily DM intake did not differ among Micotil or Aureomycin treatments during any of the 14-day periods for or for the overall 28-day receiving period (Table 2). Feed to gain ratio was increased for control versus Micotil treatments during days 0 to 14 of the experiment. No other differences in the feed to gain ratio was observed. Likewise, no differences in the feed to gain ratio were observed among Aureomycin treatments during the experiment. The percentage of steers treated for BRD was decreased ($P < .05$) for the average of the Micotil® treatments compared with controls and decreased ($P < .05$) for ARR versus PRE. No differences were observed for Aureomycin® treatments for the percentage of calves treated for BRD. No differences were observed for Micotil or Aureomycin treatments in the period that cattle were treated for BRD.

Results suggest that with the percentage of cattle treated for BRD in the present experiment, the optimum time to administer Micotil® en masse is at arrival. Feeding Aureomycin® resulted in greater average daily gain during the time that it was fed. If producers know the origin of cattle and have had previous experience with similar cattle, feeding Aureomycin® at a time close to an outbreak may prove advantageous.

Literature Cited

SAS. 1987. SAS/STAT® Guide for Personal Computers (Version 6 Ed.). SAS Inst. Inc., Cary, NC.

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Table 2. Effects of pre-shipping versus arrival mass medication with tilmicosin phosphate and feeding therapeutic concentrations of chlortetracyline on health and performance by beef steers [a]

Item	Micotil treatment				Contrast		Aureomycin treatment		
	Control	Pre-shipping	Arrival	SE[b]	1	2	With	Without	SE[c]
No. of steers	80	80	80				120	120	
Day 0 body weight	391.0	390.9	389.1	2.48			389.5	391.2	2.02
Day 28 body weight	473.2	479.0	471.7	3.99	NS	NS	474.8	474.4	3.22
Average daily gain, lb									
Days 0 to 5	5.23	5.45	6.07	.221	.10	.10	5.60	5.57	.180
Days 5 to 10	-.37	-.16	-.38	.161	NS	NS	.10[d]	-.70[e]	.131
Days 10 to 14	2.52	3.81	3.71	.360	.05	NS	2.97[d]	3.72[e]	.291
Days 0 to 14	2.49	2.98	3.09	.119	.01	NS	2.91	2.80	.096
Days 14 to 28	3.39	3.31	2.81	.260	NS	NS	3.20	3.14	.210
Days 0 to 28	2.94	3.14	2.95	.130	NS	NS	3.05	2.97	.105
Daily dry matter intake, lb									
Days 0 to 14									
Hay	2.04	2.02	2.02	.108	NS	NS	2.03	2.02	.015
Concentrate	5.14	5.71	5.42	.219	NS	NS	5.24	5.60	.179
Total	7.19	7.73	7.43	.216	NS	NS	7.27	7.63	.176
Days 14 to 28	12.33	13.15	12.66	.348	NS	NS	12.95	12.48	.284
Days 0 to 28	9.76	10.44	10.05	.260	NS	NS	10.11	10.05	.213
Feed to gain ratio									
Days 0 to 14	2.99	2.65	2.42	.098	.01	NS	2.57	2.80	.080
Days 14 to 28	3.80	4.15	5.02	.423	NS	NS	4.34	4.31	.345
Days 0 to 28	3.35	3.33	3.45	.136	NS	NS	3.32	3.42	.111
Morbidity									
Calves treated for BRD, %	40.0	18.7	7.5		.01	.05	19.2	25.0	
Period, % of calves treated[f]									
1	65.6	60.0	66.7				73.9	56.7	
2	28.1	26.7	0				21.7	26.6	
3	6.3	13.3	33.3				4.3	16.7	

[a]A Micotil x Aureomycin interaction was observed for days 5 to 10 (see text). No other Micotil x Aureomycin interactions ($P > .10$) were observed.

[b]Standard error of treatment means; n = 8 pens per treatment.

[c]Standard error of treatment means; n = 12 pens per treatment.

[d,e]Within a row for Aureomycin treatments, means lacking a common superscript letter differ ($P < .10$).

[f]Period 1: days 1, 2, 3, 4, and 5; Period 2: days 6, 7, 8, 9, and 10; Period 3: days ≥ 11.