Comparative Clinical Efficacy of Fenbendazole and Thiabendazole in Feedlot Heifers

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Calves coming into feedlots from southern states may have a subclinical level of nematode parasitism that will respond to treatment with anthelmintics in a manner that justifies the cost. (1) Many anthelmintics have been used to deworm feedlot cattle, including substituted and nonsubstituted benzimidazoles. Thiabendazole, a nonsubstituted benzimidazole, has a wide range of antiparasitic, larvicidal and ovicidal activity due to inhibition of the fumarate reductase mechanism of the parasites. Fenbendazole, a substituted benzimidazole compound, derives its activity from inhibition of glucose transport and stimulation of glycogen utilization as well as probable inhibition of fumarate reductase. Fenbendazole is especially efficacious against tissue forms of Ostertagia, has been reported to removed 99% of the immature 5th stage of all major nematode parasites of cattle, and also effectively controls lungworm.

(2) Thiabendazole has been widely accepted in the United States since being approved as an anthelmintic for cattle. Fenbendazole has been widely used to control nematode parasites in cattle in many parts of the world, and has recently been approved for use in feedlot cattle in this country.

This report presents data on the comparative clinical efficacy of fenbendazole and thiabendazole, based on differential egg counts per gram of feces (EPG), average daily gain (ADG), and feed per kg of gain (F/G) compared to untreated controls.

Materials and Methods

Three hundred and forty crossbred heifer calves, purchased by an order buyer in Kentucky, were co-mingled for 24 hours upon arrival at the feedlot. The receiving ration was good quality first cutting mixed orchard grass and alfalfa hay. The cattle received an intranasal infectious bovine rhinotracheitis vaccine (Nasalgen)®,[a] an intramuscular bovine virus diarrhea vaccine of procine cell line origin (Jenecine B)®[a] 2.5 M units of Vitamins A IM were implanted with 36 mg/animal of zearalanone (Ralgro)®[b]. Heifers that weighed less than 182 or more than 273 kg, or with clinical signs of respiratory disease were excluded from the study. Three hundred and twenty four heifers were randomly assigned to each of three treatment groups, 6 pens of 18 heifers to each treatment. The treatments assigned to the 3 groups consisted of: Group 1, fenbendazole (FBZ) administered orally as a suspension containing 10% active ingredient at the rate of 5 mg/kg; Group 2, thiabendazole (TBZ) administered orally as a paste at the rate of 110 mg/kg, and Group 3, untreated controls (UCON).

Parasitologic Procedures: Individual fecal samples were collected at the initiation of the study, day 0, and on day 7 post-treatment. Samples could not be obtained from all heifers due to lack of feces in the rectum. The number of samples per treatment group varied from 87 to 101 from 108 heifers at a given collection. Counts of parasite ova as EPG were done by a modified Gordon and Whitlock method as described by Boddie. (3) The ova were enumerated by genus, except for the trichostrongyles (Trichostrongylus, Ostertagia, Haemonchus, etc.), which were enumerated by superfamily.

Feedlot Performance: Chopped mixed orchard grass and alfalfa thoroughly incorporated with 0.45 kg/head each of rolled dry shelled corn and soybean oil meal was fed to appetite the first 2 days following assignment to treatment group. Corn silage was added to the ration on day 3, and the amount of hay progressively reduced daily to withdrawal on day 6. The corn and soybean oil meal were each increased to 0.68 kg/head on day 5, to 0.9 kg/head on day 9 and maintained at that level until the end of the trial on day 34. The corn silage was increased as necessary to keep feed in the bunks 24 hours per day. Trace mineral salt and a mineral mixture were offered ad libitum. Daily weight of the complete ration less the weight of any unconsumed feed provided a record of the feed consumption by pen. The heifers were weighed individually on days 0 and 34.

Treatment of Respiratory Disease: All heifers were observed daily, and any with clinical signs of respiratory disease (RD) evaluated clinically. A rectal temperature of 40° C or greater and the clinical condition of the animal were indications for the initiation of antibiotic therapy.

[a] *Jensen-Salsbery Laboratories, Kansas City, MO 64141.*

[b] *International Mineral and Chemical Corp., Terre Haute, IN, 47808.*

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Treatment was continued until the rectal temperature was 39 C or less for 48 hours. After a protracted course of therapy when further treatment was not considered beneficial, heifers were withdrawn from the trial.

Results and Discussion

Parsitologic: The EPG data for pre- and post-treatment fecal samples were summarized in Tables 1, 2 and 3. Ninety percent of the pre-treatment fecal samples contained nematode or Monezia eggs. Trichostrongyle eggs were present in all of the positive samples and in greater numbers of EPG than for the other nematodes or Monezia. Ninety percent, 82 of 91, of the post-treatment samples from the UCON heifers were positive for trichostrongyles, virtually unchanged from the pre-treatment rate. Further, the distribution of all parasites by genera was virtually unchanged. By comparison, only strongyle eggs were found in feces of either group of treated heifers 7 days post-treatment, and in relatively few samples; 2 of 91 samples

TABLE 1. Quantitative Parasite Egg Identification Fenbendazole* Treated Feedlot Heifers.

Genus of Parasite	Treatment Day 0 No. of Animals	EPG Range	EPG X	Treatment Day 7 No. of Animals	EPG Range	EPG X
† Trichostrongyles	81	25-575	200	2	25	25
Trichuris	3	25-50	33	0	—	—
Nematodirus	1	75	75	0	—	—
Capillaria	2	25	25	0	—	—
Moniezia	3	125-2000	766.7	0	—	—
No Eggs	7			89		
**Total Fecal Samples	88			91		

*Hoechst-Roussel Pharmaceuticals, Inc., Somerville, NJ 08876 as a suspension containing 10% active ingredient; dose 5mg/kg.
†Includes Trichostrongylus, Ostertagia, Cooperia, etc.
**Adequate samples not obtained from all animals.

TABLE 2. Quantitative Parasite Egg Identification Thiabendazole* Treated Feedlot Heifers.

Genus of Parasite	Treatment Day 0 No. of Animals	EPG Range	EPG X	Treatment Day 7 No. of Animals	EPG Range	EPG X
†Trichostrongyles	93	25-4425	303.5	10	25-100	35
Trichuris	2	25	25	0	—	—
Nematodirus	5	25	25	0	—	—
Capillaria	0	—	—	0	—	—
Moniezia	2	50-250	150	0	—	—
No Eggs	8			83		
**Total Fecal Samples	101			93		

*Merck and Company, Rahway, NJ 07065. Omnizole paste, dose 110 mg/kg.
†Includes Trichostrongylus, Ostertagia, Cooperia, etc.
**Adequate samples not obtained from all animals.

TABLE 3. Quantitative Parasite Egg Identification Untreated Feedlot Heifers.

Genus of Parasite	Treatment Day 0 No. of Animals	EPG Range	EPG X	Treatment Day 7 No. of Animals	EPG Range	EPG X
†Trichostrongyles	81	25-4000	411.4	82	25-3600	255.8
Trichuris	3	25-75	41.7	1	25	25
Nematodirus	5	25-50	35	1	25	25
Capillaria	3	25-50	41.7	0	—	—
Moniezia	2	250-400	325	13	25-125	50
No Eggs	13			9		
*Total Fecal Samples	94			91		

†Includes Trichostrongylus, Ostertagia, Cooperia, etc.
*Adequate samples not obtained from all animals.

TABLE 4. Clinical Evaluation of Fenbendazole* and Thiabendazole† in Feedlot Heifers.

Genus of Parasite	Treatment Group: Fenbendazole No. Animals Before	After	% Change	Thiabendazole No. Animals Before	After	% Change	Control No. Animals Before	After	% Change
‡Trichostrongyles	81	2	(97.5)	93	10	(89.4)	81	82	0
Trichuris	3	0	(100)	2	0	(100)	3	1	(67)
Nematodirus	1	0	(100)	5	0	(100)	5	1	(80)
Capillaria	2	0	(100)	0	0	—	3	0	(100)
Moniezia	4	0	(100)	2	0	(100)	2	13	650
No Eggs	7	89	92.2	8	83	90.4	13	9	(31)
Total Samples ϕ	88	91		101	93		94	93	

* Hoechst-Roussel Pharmaceuticals, Inc., Somerville, NJ 08876, as a suspension containing 10% active ingredient. Dose 5mg/kg.
† Merck and Company, Rahway, NJ 07065. Omnizole paste, dose 100mg/kg. Before - at time of treatment; after 7 days post treatment.
‡ Includes Trichostrongylus, Ostertagia, Cooperia, etc.
ϕ Total samples - animals from which adequate feces were obtained for laboratory evaluation.

positive from the FBZ group, and 10 of 93 from the TBZ treated group. Both anthelmintics markedly reduced the EPG compared to the UCON heifers; FBZ reduced the number of samples containing trichostrongyle eggs by 97.5%, compared to an 89.4% reduction in the TBZ group. (Table 4) No other nematode or Monezia eggs were found post-treatment in either the FBZ or TBZ resulted in an approximately equal reduction in shedding of nematode and tapeworm eggs.

Respiratory disease: The overall incidence of RD was 26%, 84 of 324 heifers. The distribution between treatment groups was FBZ, 28; TBZ, 33; and UCON, 23. Four heifers died and 4 were withdrawn in the FBZ group; 2 died and 1 withdrawn in the TBZ group, and 3 and 3 in UCON. The RD was an extremely severe pasteurella pneumonia due to *Pasteurella hemolytica.* The gross lesions included fibrinous bronchopneumonia of the cranial and caudal lobes, and severe fibrinous pleuritis that necessitated dissecting the lungs from the parietal pleura at necropsy. A hemorrhagic necrotizing myositis was observed in major muscle masses of the pectoral limbs of some heifers, suggestive of classical hemorrhagic septicemia. The difference in morbidity and mortality were not significantly different between treatment groups. The severity of the pneumonic lesions and the necrotizing myositis suggested that the heifers were highly susceptible, or that the *Pasteurella hemolytica* was extremely virulent.

Feedlot Performance: **The ADG for the heifers for the 34 days varied from 0.75 kg in the FBZ group to 0.82 in the TBZ and 0.81 in the UCON. The F/G was 2.63 kg, 2.42 kg and 2.58 kg respectively for FBZ, TBZ and UCON. Neither the ADG nor the F/G were significantly different between treatment groups.**

Summary

Treatment of heifers with FBZ or TBZ markedly reduced the shedding of nematode and cestode eggs by 7 days post-treatment as compared to untreated controls. Only trichostrongyle eggs were found in the post-treatment samples from 2 of 91 FBZ treated heifers and 10 of 93 TBZ heifers. The EPG shedding in the controls was relatively unchanged. Treatment with either FBZ or TBZ resulted in about equal reductions in shedding of parasite eggs. Neither anthelmintic treatment produced the anticipated improvement in the performance of the heifers during the 32 days of the trial. Thus, the reported cost effectiveness of treating calves entering the feedlot with an anthelmintic was not substantiated.

References

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