EFFECT OF AN ANTHELMINTIC PROGRAM WITH MORANTEL TARTRATE ON THE PERFORMANCE OF BEEF CATTLE

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Summary

A field trial was conducted to determine (1) the effectiveness of an anthelmintic program using morantel tartrate (MT) to control subclinical gastrointestinal parasitism among cattle on pasture and (2) the effects of the program on the performance of cattle. Two Hereford herds, each on a separate pasture with forage of comparable quality and quantity, were used. A stocking rate of .62 ha/cow-calf was maintained in both pastures. One herd consisted of 124 cows and 122 calves and served as a non-medicated control group. The second herd consisted of 126 cows and 124 calves. Cows and calves from the latter group were treated with a bolus formulation of MT at a dosage of 10 mg/kg body weight at the beginning of the trial and again 55 d later. Calves were treated again 42 d after the second treatment. Cattle were weighed individually each month and rectal fecal samples for nematode egg counts were obtained from 36 cows and 36 calves from each group at that time. These donor cattle were selected at random at the time of the first weighing; fecal samples were then obtained from the same animals throughout the study. Eggs of the Cooperia-Ostertagia-Trichostrongylus complex predominated in all fecal samplings. There was no difference in the number of nematode eggs from the two groups of cows. However, the medicated cows gained significantly more weight than the controls and had an average weight gain advantage of 28.8 kg. The medicated calves had significantly lower average egg counts and made higher weight gains than the unmedicated calves. The medicated calves had an average weight gain advantage over the control group of 11.1 kg.

(Key Words: Morantel Tartrate, Cattle, Nematode Egg Counts, Anthelmintic Program, Parasitism.)

Introduction

The evaluation of anthelmintics is based, for the most part, on the capacity of such compounds to reduce the number of parasite eggs passed by the host animal and on the residual worm counts at necropsy. Although both methods give a true evaluation of efficacy, neither method provides an economic evaluation, because the effect of the anthelmintic on growth (performance) and feed efficiency is not measured. Determination of the effect of an anthelmintic on performance is of added importance because of the predominance of inapparent or subclinical parasitism in grazing cattle. Even though it has been estimated that subclinical parasitism due to nematode parasites is responsible for up to 75% of the financial losses to the beef industry (Egerton, 1972), the economic benefit of anthelmintics is still a matter of debate (Leland et al., 1980). Data from more field trials with various anthelmintics and deworming programs are needed in order to resolve the question (Todd and Kohls, 1979).

The trial reported in this paper was designed to evaluate the effect of an anthelmintic program on fecal egg counts and growth rates of cows and their calves under field conditions. A
new anthelmintic, morantel tartrate (MT)\textsuperscript{5}, was used in this trial because of its reported efficacy against the nematode parasites in Georgia cattle (Ciordia and McCampbell, 1973).

**Materials and Methods**

Two established pastures located within 7 km of each other at the Central Georgia Branch Experiment Station, Eatonton, Georgia, were used. Both pastures consisted of a mixture of tall fescue (Festuca arundinacea) and Bermudagrass (Cynodon dactylon) forages. Each pasture had previously been subdivided into six replicate lots, but this only facilitated the handling of the cattle. The pastures were similar in species, quality and quantity of forage available. The similarity was verified by a comparative analysis showing no statistical difference in weight gains made by calves from the two pastures during each of five grazing seasons before the beginning of the study.

Hereford cows of similar genetic background were used. The cows varied in age because some were the original cows on pasture, whereas others were introduced at later dates as replacement heifers. Calves were born from January through April. The calves were, therefore, between 41 and 142 d of age at the beginning of the study. Cattle remained in their respective pasture lot until the end of the study. Cattle were provided a free-choice mineral mixture containing one part of trace mineralized salt and one part dicalcium phosphate.

Cattle from one of the pastures, known as the “Tom Hall Herd,” consisted of 124 cows and 122 calves. They grazed a total of 76.8 ha of pasture. This herd served as a nonmedicated control group. Cattle from the second pasture, the “Garrison Herd,” consisted of 126 cows and 124 calves and grazed a 78.6 ha pasture. Thus, each pasture was stocked at a rate of .62 ha/cow-calf unit. Failure of some of the cows to calve and/or death losses accounted for the difference in number of cows and calves between the two pastures.

Levels of parasitic infections in the cattle were determined from nematode egg counts in samples of rectal feces made at the beginning of the experiment and at approximately monthly intervals thereafter. Because of their large size, the herds were sampled on alternate weeks. There was a 1- to 3-d difference in the number of days samples were obtained each month from the two groups, except during the last month. In September, all the calves on the farm were weaned at the same time, and as a result, the cattle from the treatment group were sampled 1 wk earlier than originally scheduled. Thus, the control cattle were on test for a total of 134 d and the treated cattle for 127 d.

The first time a herd was worked, fecal samples were obtained from eight cows and eight calves picked at random from each of the six lots. These cattle served as permanent donors; each month after the initial sampling, feces were collected from six of the eight cows and six of the eight calves randomly selected. The modified Stoll technique was used to count nematode eggs. At the time fecal samples were obtained, all cattle were weighed for an evaluation of rate of growth. Data obtained were tested for significance by least-squares analysis of variance and since only two variables were involved, mean separation was involved by this analysis.

Cows and calves from the Garrison Herd were treated with a bolus formulation of MT on May 24 and again on July 18, 1979. Calves were treated for a third time on August 29. Each bolus contained 2.2 g of active ingredient. To approximate the desired dosage of 9.7 mg/kg body weight, the boluses were given either whole or halved.

**Results and Discussion**

The levels of nematode parasitism, determined from fecal egg counts, were lower (P < .01) in cows than in the calves on each sampling date (table 1). The number of nematode eggs/gram of feces (e/g) from all cows was low on each of the sampling dates and the average did not differ significantly between the two groups of cows. Of the eggs identified from all the cows, 96.7% were of the Cooperia-Ostertagia-Trichostrongylus complex (COT), 2.9% were of the Haemonchus-Oesophagostomum complex (HO), and .4% were Bunostomum phlebotomum eggs. HO and B. phlebotomum eggs were identified only in May.

Average worm egg counts were lower (P < .01) for the MT-treated calves than for the nonmedicated calves on each of the collection dates following the first one. Egg counts for the control calves increased progressively during the

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\textsuperscript{5} Rumate\textsuperscript{®}, Pfizer Inc., New York.
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TABLE 1. AVERAGE NUMBER OF NEMATODE EGGS PER GRAM OF FECES FROM COWS TREATED TWICE AND CALVES TREATED 3X WITH MORANTEL TARTRATE

<table>
<thead>
<tr>
<th>Sampling date</th>
<th>Egg counts in cows</th>
<th>Egg counts in calves</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control</td>
<td>Treated</td>
</tr>
<tr>
<td>May&lt;sup&gt;a,b&lt;/sup&gt;</td>
<td>1.5</td>
<td>1.0</td>
</tr>
<tr>
<td>June</td>
<td>.4</td>
<td>.7</td>
</tr>
<tr>
<td>July&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.5</td>
<td>1.3</td>
</tr>
<tr>
<td>August&lt;sup&gt;c&lt;/sup&gt;</td>
<td>.5</td>
<td>.9</td>
</tr>
<tr>
<td>September</td>
<td>3.0</td>
<td>2.2</td>
</tr>
<tr>
<td>Entire period&lt;sup&gt;d,e&lt;/sup&gt;</td>
<td>1.2</td>
<td>1.2</td>
</tr>
</tbody>
</table>

<sup>a</sup>Egg counts made before treatment.
<sup>b</sup>Cows and calves treated at this time.
<sup>c</sup>Calves treated at this time.
<sup>d</sup>Average egg counts between groups of cows were not significantly different, but significance was observed between groups of calves.
<sup>e</sup>No interaction of time X treatment was observed between egg counts from cows, however, interaction was observed for calves (P<.05).

experiment, following the epizootiological trend reported from Georgia cattle (Ciordia, 1975), with the highest average, 176.9 e/g, observed in September. For the medicated calves, on the other hand, higher egg counts were observed before treatment than on subsequent sampling dates. Egg differentiation at the time of the first treatment was as follows: for control calves—91% COT, 7% HO, and 2% Nematodirus sp.; for the treated calves—88% COT, 10% HO and 2% Nematodirus sp. The relative frequencies of the various genera for the two groups of calves remained essentially unchanged. At the end of the experiment the eggs were identified as follows: for control calves—91% COT, 8% HO and 1% Nematodirus; for the treated calves—89% COT, 9% HO and 2% Nematodirus.

One control cow was positive for the tapeworm Moniezia sp. in May and two were positive in June. Two cows from the medicated group were positive for tapeworms in July. Fecal samples from 10.4, 43.2, 55.6, 28.6 and 2.8% of the control calves sampled each month from May through September were found to be positive for tapeworms. Likewise, 8.3, 47.2, 44.4, 41.7 and 19.7% of the treated calves were positive during the same period, thus possibly indicating that MT was ineffective against Moniezia sp.

The control cows gained an average of 15 kg between May and June, the highest body weight gain for that group during the entire 134-d period (table 2). In July, however, these cows lost an average of 2.3 kg, and they gained only 5.3 kg during August and 1.4 kg during September. Their total average weight gain was 19.3 kg, for an average daily gain (ADG) of .14 kg. The treated cows, on the other hand, gained an average of 22.8 kg of the first month after treatment with MT, and 3.9, 10 and 11.4 kg during subsequent months, for a total average weight gain of 48.1 kg, or .38 kg ADG, over 127 d. The treated cows had an average weight gain advantage of 28.8 kg over the control cows. However, because of the high degree of variation in weights between individuals within groups, the significance was only 10%.

Monthly calf weights gave a better representation of a more realistic growth rate, with less variation within groups, than did the cow weights. The treated calves gained more (P<.01) than the controls. Control calves gained weight at a more uniform rate during the 4 mo period (21.8, 15.2, 28.3 and 19.4 kg, respectively) than did the treated calves, which had peak average weight gains of 33 and 34.3 kg following treatment in May and July. Average weight gain was 84.7 kg (ADG .67 kg) for the control calves and 95.8 kg (ADG .75) for the treated calves, (P<.01).
TABLE 2. AVERAGE WEIGHT, WEIGHT GAIN AND WEIGHT ADVANTAGE OF COWS AND CALVES IN TEST EVALUATING EFFECT OF TREATMENT WITH MORANTEL TARTRATE

<table>
<thead>
<tr>
<th>Item</th>
<th>Avg weight of cows (kg)</th>
<th>Avg weight of calves (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control</td>
<td>Treated</td>
</tr>
<tr>
<td>Sampling date</td>
<td></td>
<td></td>
</tr>
<tr>
<td>May</td>
<td>432.5</td>
<td>428.1</td>
</tr>
<tr>
<td>June</td>
<td>447.4</td>
<td>450.9</td>
</tr>
<tr>
<td>July</td>
<td>445.1</td>
<td>454.8</td>
</tr>
<tr>
<td>August</td>
<td>450.4</td>
<td>464.8</td>
</tr>
<tr>
<td>September</td>
<td>451.8</td>
<td>476.2</td>
</tr>
<tr>
<td>Avg weight gain</td>
<td>19.3</td>
<td>48.1</td>
</tr>
<tr>
<td>Avg weight gain advantage</td>
<td></td>
<td>28.8†</td>
</tr>
</tbody>
</table>

†P<.10.
**P<.01.

The present study was conducted at a farm where management followed the customary animal husbandry practiced by cattle ranchers in Georgia. The fact that two separate but adjacent herds were used should not have had any effect on the results of the experiment because (1) no statistical difference was seen in birth and weaning weights of calves from the two herds during 5 yr before our experiment, (2) the pastures were considered to be as agronomically comparable as practical, (3) the same stocking rate was used for the two groups and (4) egg counts made at the beginning of the study of the two herds were very similar in numbers and nematode species present.

Subclinical parasitism, normally seen in Georgia (Ciordia, 1975), was controlled by the multiple treatment with Rumatel. Egg counts in the treated calves were maintained at a lower level than counts in the same animals made before the first treatment. MT did not have any effect on egg counts in the cows, which were consistently low. Seventy-one percent of the fecal samples from the donor cows were negative for nematode eggs and counts never exceeded 28 e/g.

Body weight gains were significantly improved by the anthelmintic treatment, justifying the cost of the drug and additional labor. The body weight improvement for the treated calves may have been due to direct effects of the medication on parasitism. The weight advantage of the calves may also have been due in part to the minimized effect of parasitism in the cows, which should have resulted in increased milk production (Bliss and Todd, 1976). The treated cows not only made appreciable higher ADG, but they were also considered to have gone into dry fall and winter calving season in better physical condition and hence, perhaps would have required less supplemental feeding during the stress of winter and calving.

Literature Cited