INTERNAL PARASITE LEVELS AND RESPONSE TO ANTHELMINTIC TREATMENT BY BEEF COWS AND CALVES


University of Nebraska, Lincoln 68583-0908

ABSTRACT

Albendazole (methyl 5-propylthio-1 H-benzimidazol-2-yl carbamate) was used as an anthelmintic in a 3-yr study involving 578 beef cows and 438 nursing calves. Infection levels for nematodes, coccidia, and tapeworm were relatively low throughout the 3-yr period. Eggs per gram of feces in cows and calves were lower ($P < .01$) 2 wk posttreatment but were not different 5 mo later, when calves were weaned. Cow weight gain, rate and time of conception, and adjusted calf weaning weights were not affected significantly by deworming of either cows or calves. Level of nematode infection measured as eggs per gram of feces was higher ($P < .01$) in younger cows than in mature cows. Although deworming with Albendazole lowered ($P < .01$) nematode infection levels, no cow or calf performance responses were observed in calves. Key Words: Anthelmintics, Beef, Cows, Calves.
drylot diets with cows blocked across the summer management by previous deworming treatment. Calves were not creep fed and were weaned at approximately 185 d of age. Cows, combined and wintered in one group, grazed cornstalks with hay, supplemented as necessary, until calving, after which they received hay and protein supplement until going on bromegrass pasture. Cows were maintained in good body condition (body score 5 to 6; Neumann and Lusby, 1986) throughout the study. Cow and calf weights on a full-weight basis were obtained when fecal samples were collected (Tables 1, 2, and 6).

Treatments consisted of the following: 1) control (neither cows nor calves treated), 2) only cows drenched precalfing in February and at weaning in October with 7.5 mg of Albendazole (methyl 5-propylthio-1 H-benzimidazo1-2-yl carbamate)/kg BW in 1983 and 10 mg/kg BW in 1984 and 1985, 3) only calves drenched at the same rate/kg BW in May of each year, and 4) both cows and calves drenched as indicated for treatments 2 and 3. All animals were maintained as a single herd and were not separated by treatment. After an animal was assigned to a treatment, it remained in that treatment group for the duration of the 3-yr study. The increased level of treatment in years 1984 and 1985 was based on the manufacturer's recommendation. Fecal samples were collected manually from the rectum at the time of treatment and 2 wk posttreatment. A minimum of 50% of each treatment group was sampled at each fecal collection. Samples were examined microscopically to determine the number of worm eggs per gram (EPG) of feces, presence of Moniezia ova, and species of coccidial oocysts. Counting was done using a direct centrifugal flotation method with saturated sodium nitrate used for the flotation medium.

Cows were pasture bred for 45 d beginning June 1. All open cows were culled; normal culling continued for age, low production, and physical problems (e.g., bad eyes or udders). Replacements at a rate of about 20%/yr

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**TABLE 1. LEVEL OF INTERNAL PARASITE INFECTION IN COWS AND THE EFFECT OF DEWORMING**

<table>
<thead>
<tr>
<th>Treatment (trt)</th>
<th>Pre-trt(a) (Feb)</th>
<th>2 wk post-trt(a) (Feb)</th>
<th>5 mo post-trt (Oct)</th>
<th>2 wk post-trt (Oct)</th>
<th>Summer gain, kg</th>
<th>Cows pregnant, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>13.1</td>
<td>14.3(b)</td>
<td>5.9</td>
<td>6.2(b)</td>
<td>61.4</td>
<td>85.2</td>
</tr>
<tr>
<td>Dewormed</td>
<td>12.3</td>
<td>1.3(c)</td>
<td>6.3</td>
<td>2.3(e)</td>
<td>62.2</td>
<td>84.5</td>
</tr>
<tr>
<td>SE</td>
<td>.98</td>
<td>1.11</td>
<td>.58</td>
<td>.65</td>
<td>3.08</td>
<td>.12</td>
</tr>
</tbody>
</table>

\(a\)Pre-trt = pretreatment; post-trt = posttreatment.

\(b\)Means within column with different superscripts differ \((P < .01)\).
DEWORMING EFFECTS ON BEEF COWS AND CALVES

TABLE 3. PRESENCE OF COCCIDIAL OOCYTES IN COWS

<table>
<thead>
<tr>
<th>Cow category</th>
<th>Incidence in samples, %&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Average age of animal by level of infection, yr&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Eimeria spp.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. bovis</td>
<td>68.0</td>
<td>31.0</td>
</tr>
<tr>
<td>E. auburnensis</td>
<td>91.4</td>
<td>8.4</td>
</tr>
<tr>
<td>E. bukidnonensis</td>
<td>84.2</td>
<td>14.1</td>
</tr>
<tr>
<td>E. zuernii</td>
<td>73.0</td>
<td>26.0</td>
</tr>
</tbody>
</table>

<sup>a</sup>0 = no oocytes; 1 = 1 to 200 oocytes/g of feces; 2 = 201 or above oocytes/g of feces.

<sup>b</sup>Average number of animals in 0, 1, and 2 categories was 198, 128, and 6, respectively.

Calving as 2-yr-olds were added to the herd. Cows ranged in age from 2 to 12 yr, approximately two-thirds of the herd was 5 yr of age or younger. Availability of forage on late-summer pasture varied with pasture and year, but moderate to close grazing was common in August and September. Stocking rates were approximately one cow-calf pair per hectare on summer pasture and one cow per hectare on cornstalks during the fall and winter months. The highest average monthly temperature for the area occurred in July (25.1°C) and the lowest in January (~6.8°C); the yearly average was 10.3°C. Average rainfall for the area was about 71.2 cm/yr. Pastures had been used for summer grazing for the previous 20 yr.

A completely randomized design (CRD) with age as a covariate was used to analyze the effect of deworming on cow weight gain, time of conception, and EPG (Steel and Torrie, 1980; SAS, 1982). Cow or calf was the experimental unit.

The orthogonal contrasts included the following: treated vs. untreated, within untreated, and within treated. Time of conception and EPG analyses included year and year × treatment as sources of variation. The orthogonal contrasts for year were (yr 1 vs yr 2 and 3 and yr 2 vs yr 3).

The chi-square test for independence was used to determine the effect of deworming on percentage of conception. The effect of deworming on pregnancy was analyzed using a CRD testing for effects of treatment, year, and age of cow, plus their interactions. Polynomial regression was used to check for significant linear, quadratic, and cubic effects of cow age on EPG. Contingency coefficients were used to study the relationship between age and level of coccidia infection for Eimeria spp. (SAS, 1982).
Results and Discussion

The life cycle of internal parasites involves hatching of the egg, development of larvae to the infective stage, and animal ingestion. Factors affecting larvae survival include temperature, moisture, type of soil, forage plants, and pasture management (Williams and Bikovich, 1973).

Levels of infection in cows for roundworms, coccidia, and tapeworms were consistently low throughout the 3-yr trial. Pretreatment levels of nematodes in February averaged 12.7 EPG (Table 1); the range was 0 to 38, and 41.3% of the cows were at the zero level (Table 2). Treated cows had fewer (P < .01) EPG of feces 2 wk posttreatment in both February and October (Table 1). Summer cow gain, pregnancy rate, and date of conception were not affected by treatment in either the control or dewormed cow groups (Table 1).

Number of worm eggs per gram of feces was higher for cows in February than for cows in October, which is in agreement with data reported by Ward et al. (1979) and Kuhl et al. (1985). Average EPG was highest in 2-yr-olds and declined to below 2 EPG in 10-yr-old cows (Figure 1). However, age of dam was not significant as a covariate in treatment response in 2-yr-old, first-calf heifers. The level of coccidial infection from Eimeria bovis and zuernii (Table 3) declined (P < .01) with age of cow, with a nonsignificant trend toward reduction of Eimeria au-burnensis and bukidnonensis. Moniezia (i.e., tapeworm infection; Table 4 and Figure 2) also decreased with cow age (P < .01). Level of Eimeria and Moniezia infection are shown in Figure 3; less than 2% of the cows showed numerous oocytes.

The reduction of EPG (P < .01) following treatment of cows with Albendazole in both February and October (Table 1) agrees with data reported by Wescott et al. (1979), who used Albendazole on calves. Internal parasite levels dropped from 12.7 EPG pretreatment in February to 6.1 in October; however, there was no difference in October (5 mo posttreatment) between controls and cows that had been dewormed in February. Average date of conception based on subsequent calving date was not affected by deworming; however, age of cow affected rate of pregnancy, as did treatment x age and year of trial age (Table 5). The average age of pregnant cows was greater (P > .03) than that of open cows (5.1 vs 4.3). Although increases in milk production following treatment of dairy cows with subclinical parasites has been reported (Todd et al., 1975), no differences in cow or calf weight change were observed in this study either within treated or untreated groups.

Calf infection for roundworms, coccidia, and tapeworms was low throughout the 3-yr trial, but EPG increased from 1 to yr 3 of

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**TABLE 4. PRESENCE OF MONIEZIA OVA IN COWS**

<table>
<thead>
<tr>
<th>Moniezia</th>
<th>Incidence in samples, %&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Contingency sample coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>February, pre-trt&lt;sup&gt;b&lt;/sup&gt;</td>
<td>96.6</td>
<td>3.2</td>
</tr>
<tr>
<td>February, 2 wk post-trt&lt;sup&gt;b&lt;/sup&gt;</td>
<td>99.6</td>
<td>.4</td>
</tr>
<tr>
<td>October, 5 mo post-trt</td>
<td>87.9</td>
<td>12.1</td>
</tr>
<tr>
<td>October, 2 wk post-trt</td>
<td>96.3</td>
<td>3.8</td>
</tr>
</tbody>
</table>

<sup>a</sup>0 = no oocytes; 1 = 1 to 200 oocytes/g of feces; 2 = 201 or above/g of feces.

<sup>b</sup>Pre-trt = pretreatment; post-trt = posttreatment.

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**TABLE 5. EFFECT OF TREATMENT, YEAR, AND COW AGE ON PREGNANCY**

<table>
<thead>
<tr>
<th>Source</th>
<th>Probability level</th>
<th>CV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>.579</td>
<td>—</td>
</tr>
<tr>
<td>Year</td>
<td>.189</td>
<td>—</td>
</tr>
<tr>
<td>Treatment x yr</td>
<td>.076</td>
<td>—</td>
</tr>
<tr>
<td>Age of cow</td>
<td>.004</td>
<td>—</td>
</tr>
<tr>
<td>Treatment x age</td>
<td>.056</td>
<td>—</td>
</tr>
<tr>
<td>Year x age</td>
<td>.032</td>
<td>—</td>
</tr>
<tr>
<td>Treatment x yr x age</td>
<td>.143</td>
<td>—</td>
</tr>
<tr>
<td>Model</td>
<td>—</td>
<td>40.429</td>
</tr>
</tbody>
</table>
the trial. Average EPG for calves pretreatment in May was 21.2 ± in yr 1, 47.3 ± in yr 2, and 80.0 ± in yr 3. The EPG for yr 3 was higher (P < .01) than that for yr 1 or 2. Calf EPG (Table 6) 2 wk after calves were dewormed averaged 23.9 for treated calves and 86.1 for untreated ones (P < .01). By October, EPG for May treated and untreated calves were 61.1 and 60.5, respectively. There were no year differences in calf EPG in October. Adjusted calf weaning weights averaged 199.4 kg for treated and 198.4 kg for untreated calves. Although adjusted calf weaning weight for calves from dewormed cows averaged 200.6 vs 197.2 kg from untreated cows, this difference was not significant. Several studies have shown that performance of dewormed nursing calves is significantly affected by deworming. The economic implications of deworming were low, presumably because the level of infection was low. Calves and yearlings may need to be dewormed more than once during the grazing season to show optimum response.

**Implications**

Albendazole (methyl 5-propylthio-1 H-benzimidazol-2-yl carbamate) was effective as an anthelmintic. Levels of internal parasites in beef cows and calves were lowered by Albendazole, even though initial infection levels were low. Performance, as measured by weight gains in cows and calves and rate and time of pregnancy in cows, was not significantly affected by deworming. The economic benefit of deworming was low, presumably because the level of infection was low. Calves and yearlings may need to be dewormed more than once during the grazing season to show optimum response. Fecal egg counts were lower for older cows.

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