The persistent efficacy of doramectin pour-on against biting and sucking louse infestations of cattle

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Abstract

A repeated-exposure challenge model was used to evaluate the pour-on formulation of doramectin in preventing the establishment of louse infestations in cattle. Twenty calves cleared of preexisting biting and sucking louse infestations were randomly and equally allocated to either a doramectin-treated or untreated control group, with five replicates per group. Doramectin pour-on was administered topically at a dose rate of 500 μg/kg body weight. Every 14 days, from a pool of seeder calves with infestations of at least 50 biting and 50 sucking lice each, 10 calves were selected and 1 was placed in each replicate pen. Every week during the 112-day study, 9 predilection sites on the doramectin-treated and untreated calves were examined to estimate the louse population density. A calf met the infestation criterion for a louse species when two or more live lice were counted on two or more body regions for two consecutive count days. Because only 4 of 10 untreated calves acquired Solenopotes capillatus infestations, the persistent efficacy of doramectin against S. capillatus was not evaluated. Bovicola bovis and Linognathus vituli infestations in the untreated calves developed shortly after exposure to infested seeder calves. The acquisition of B. bovis and L. vituli infestations in the doramectin-treated group was delayed for 77 days and 105 days, respectively. ©2000 Elsevier Science B.V. All rights reserved.

Keywords: Protective efficacy; Doramectin; Cattle; Lice; Cattle: Anoplura; Cattle: Mallophaga

1. Introduction

The biting louse, Bovicola bovis, and three sucking louse species, Linognathus vituli, Solenopotes capillatus, and Haematopinus eurysternus, are widely prevalent in cattle of

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North America (Lloyd, 1998). Of these four species, B. bovis is the most common species infesting cattle, but mixed louse infestations are typically encountered (Geden et al., 1990). Louse infestations have been implicated in hide damage from rubbing (Baker and Oornadzi, 1978) and decreased weight gains in cattle (Gilney et al., 1985). Besides these performance losses, heavy louse infestations in cold weather may predispose cattle to stress-related illnesses such as respiratory disease (Campbell, 1988).

The pour-on formulations of the endectocides provide a broad spectrum of activity against both nematode and arthropod parasites of cattle as well as ease of dose administration. The pour-on formulation of doramectin (Dectionmax™ Pour-On, Pfizer) has demonstrated efficacy against gastrointestinal nematodes (Conder et al., 1998) and persistent efficacy against experimental infections of Ostertagia ostertagi and Cooperia oncophora for up to 35 days and 28 days after treatment, respectively (Molento et al., 1999). As described by Rooney et al. (1999), doramectin pour-on has also been shown to be highly efficacious against grubs and mites, and is 100% effective in eliminating B. bovis, L. vituli, S. capillatus, and H. eurysternus infestations of cattle. Treatment of cattle for louse infestations in the fall or winter is a common management practice and coincides with the seasonal rise in lice populations. Typically, this is carried out upon entry into the feedlot or in conjunction with seasonal cow-calf, stocker, and dairy heifer health management procedures.

By eliminating louse infestations with a topical application of a pour-on endectocide and with no further exposure during the fall and early winter, treated cattle would be expected to remain louse-free. Cattle management practices, however, often result in the commingling of treated and untreated infested cattle after the fall and/or winter processing. Pour-on endectocide formulations with persistent efficacy against lice would be advantageous in preventing reinfection of treated cattle during the winter and early spring. As reported by Clymer et al. (1998), the pour-on formulation of ivermectin has demonstrated persistent efficacy against the biting louse for up to 7 weeks after treatment. For optimal control of cattle lice populations, it was appropriate to evaluate how long after treatment with doramectin pour-on cattle would be protected from louse infestation when repeatedly exposed to infested weaner cattle.

The purpose of the study reported in this paper was to evaluate the persistent efficacy of doramectin pour-on in preventing the establishment of louse infestations when topically administered to louse-free calves that were repeatedly exposed to calves infested with B. bovis and one or more of the three sucking louse species, L. vituli, S. capillatus, and H. eurysternus.

2. Materials and methods

2.1. Study site

The study was conducted at Research and Development, Inc., in southwestern Wisconsin, near Viroqua. The study began on December 3, 1996, (day of treatment, Day 0) and ended on March 25, 1997, for a duration of 112 days.
2.2. Cattle, management, and housing

Crossbred, 5 to 10 months old, beef calves were acquired from auction sale barns in Wisconsin. After arrival at the research site, all calves received vaccinations for IBR, BVD, BRSV, and PI3 intramuscularly (BoviShield®4) and an intranasal IBR and PI3 (Nasalgen®). These calves were visually assessed for louse populations and those with biting and sucking louse infestations were identified as potential seeder or principal calves for use in the study. On Day −28, 29 calves with an estimated density of at least 25 B. bovis and 25 sucking lice each, were topically treated with dichlorvos, a short-acting organophosphate with no residual activity, to eliminate the louse infestations. These calves were given a second dichlorvos application on Day −14. On Day −14 (before dichlorvos treatment), Day −7, and Day −1, each calf was visually examined for louse populations. On Day −1, 20 louse-free calves (male castrate and female) weighing 136 to 232 kg were selected for the study. Throughout the study these calves (principals) were housed in concrete-floored pens with chopped straw/cornstalk bedding in an enclosed barn. The area of each pen was 8.5 m² (3.7 m × 2.3 m) with feeder space of 0.5 m per calf. Solid plywood partitions prevented physical contact between calves in adjacent pens. Supplemental heat was provided via a duct system to maintain the temperature in the barn between 4 and 7°C. Calves had ad libitum access to water and alfalfa hay throughout the study and a concentrate mix of ground corn, soybean meal, and salt/trace mineral was fed daily at a rate of 0.1 to 0.5% body weight. Seeder calves (male, male castrate, and female) were housed in open-front sheds with access to outdoor pens at the research site.

2.3. Study design and treatments

The 20 calves selected were randomly and equally allotted to either a doramectin or untreated group and 10 pens with 5 replicates per treatment group. Each pen contained three calves [two principal calves (either doramectin-treated or untreated) and one seeder calf] for the duration of the study. On Day 0 (day of treatment), calves were either left untreated or given doramectin pour-on, which was administered topically from the withers to the tailhead at a dose rate of 500 μg/kg (1 ml/10 kg) body weight. After treatment calves were placed in their respective pens. Ten seeder calves, with infestations of at least 50 B. bovis and 50 sucking lice each, were randomly selected from the pool of seeder calves and one was placed in each pen. Thereafter, seeder calves were replaced with 10 other seeder calves that were randomly selected from the pool of seeder calves every 14 days (Days 14, 28, 42, 56, 70, 84, and 98), for a total of eight seeder calf groups. Except for seven seeder calves that were used twice, all other seeder calves entered a pen only once.

2.4. Lice counts

Doramectin-treated and untreated calves were examined weekly throughout the study to estimate the louse population density on each calf. Seeder calves were assessed for louse populations on the day of entry into a replicate pen. A direct light source illuminated nine designated body region sites, and live lice were counted by using a hair-parting technique.
to expose the skin over the entire area within a region. These body regions included the
known predilection sites for each of the three sucking louse species and the biting louse
(Watson et al., 1997). The nine regions and the areas examined were the topline (5 × 15 cm),
poll (5 × 15 cm), withers (5 × 15 cm), around the right eye (10 × 15 cm), around the left
eye (10 × 15 cm), right cheek (5 × 10 cm), left cheek (5 × 10 cm), muzzle (5 × 25 cm), and
dewlap (5 × 15 cm).

2.5. Statistical analysis

For each louse species on each observation day, counts were summed for all nine re-
regions for each calf and an arithmetic mean calculated for the treatment group. For anal-
ysis, these summed louse counts were transformed to the natural log (louse count + 1). A
repeated-measures mixed model was used to analyze louse species counts to test for treat-
ment differences. Each calf met the infestation criterion for a louse species when two or
more live lice were counted on two or more body regions of that calf for two consecutive
count days, with louse infestation met on the second of these two consecutive count days.
This definition for confirming a calf as being louse infested was based on the following ra-
ationale. Two consecutive counting days were used to avoid confirming a doramectin-treated
calf as being infested when a newly transferred louse may not have yet received a lethal
dose of doramectin. Furthermore, a calf with a louse count of two live lice in two or more
body regions would have an estimated louse density of at least four lice, which suggests
that the louse population was established and likely to be self-sustaining.

The interval in days to infestation for each louse species was determined for each calf,
based from the day of treatment to the day of louse infestation. Fisher’s two-tailed exact test
was used to test for differences in the cumulative percentage of louse-infested cattle between
treatments at the end of the study on Day 112. For a definitive conclusion on the protective
efficacy of doramectin pour-on against a louse species, at least six untreated control calves
were required to meet the infestation criterion for that species.

Louse species counts for seeder calves were summed for all nine regions for each calf
for each observation day and an arithmetic mean calculated for each group of seeder calves
entering either untreated or doramectin group pens. A general linear model was used to test
for differences in louse species counts between seeder calf groups on the day of placement
into the untreated or doramectin group pens.

Data were analyzed using PROC MIXED or PROC FREQ, SAS/STAT Software: Changes
and Enhancements through release 6.12, SAS Institute, Cary, North Carolina.

The significance level for all treatment comparisons was set at P < 0.05.

3. Results

3.1. Lice counts – seeder calf groups

In general, calves in each of the eight groups of seeder calves (10 calves/group) had
moderate to high B. bovis, L. vivitul, and S. capillatus population densities and, overall, a
Table 1

<table>
<thead>
<tr>
<th>Day of study</th>
<th>Seeder calves</th>
<th>( P)-value</th>
<th>Principal calves</th>
<th>( P)-value</th>
</tr>
</thead>
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<tr>
<td></td>
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<td>doramectin treated pens</td>
<td>untreated</td>
<td>doramectin treated</td>
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<td>0.1631</td>
<td>0.1</td>
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<td>185.0</td>
<td>0.0994</td>
<td>0.0</td>
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<tr>
<td>35</td>
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<td>0.2</td>
<td>0.6204</td>
<td>0.1</td>
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<tr>
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<td>113.6</td>
<td>0.5489</td>
<td>0.9</td>
</tr>
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<td>56</td>
<td>118.6</td>
<td>84.8</td>
<td>0.2232</td>
<td>0.3</td>
</tr>
<tr>
<td>63</td>
<td>50.7</td>
<td>0.3</td>
<td>0.6319</td>
<td>4.2</td>
</tr>
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<td>70</td>
<td>75.1</td>
<td>4.2</td>
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<td>3.9</td>
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<tr>
<td>84</td>
<td>62.5</td>
<td>3.9</td>
<td>0.6319</td>
<td>5.6</td>
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<tr>
<td>91</td>
<td>72.4</td>
<td>5.6</td>
<td>0.2232</td>
<td>6.8</td>
</tr>
<tr>
<td>98</td>
<td>80.0</td>
<td>13.0</td>
<td>0.5489</td>
<td>44.1</td>
</tr>
<tr>
<td>105</td>
<td>129.3</td>
<td>13.4</td>
<td>0.2232</td>
<td>44.1</td>
</tr>
</tbody>
</table>

\( ^a \) Means of \( B. hovis \) counts for a seeder group of five calves entering either untreated or doramectin group pens on Day 0, 14, 28, 42, 56, 70, 84, or 98. Standard error of the mean \( B. hovis \) count is 39.66.

\( ^b \) Overall test for treatment by day of study interaction \( P = 0.2779 \).

\( ^c \) Significance level of testing the null hypothesis (\( H_0 \)) on mean \( B. hovis \) count (\( H_0 \): seeder group entering untreated group pens = seeder group entering doramectin group pens).

\( ^d \) Significance level of testing the null hypothesis (\( H_0 \)) on mean log (\( B. hovis \) count + 1) (\( H_0 \): untreated group = doramectin group).

Low \( H. eurysternus \) population density (Tables 1–4). Except for Day 0 when the seeder calves entering the doramectin group pens had significantly (\( P \leq 0.0001 \)) greater \( L. vituli \) counts than those calves entering the untreated calf pens, there were no significant differences in louse species counts between any other seeder calf groups.

### 3.2. Lice counts – untreated and doramectin groups

Arithmetic mean louse counts for the untreated and doramectin groups are shown in Tables 1–4. The estimated biting and sucking louse density for each of the 20 calves selected for the study was zero on Days -14, -7, and -1. The untreated control calves had significantly (\( P \leq 0.0002 \)) greater \( B. hovis \) and \( L. vituli \) counts compared to those in the doramectin-treated calves from Day 7 through Day 112. \( B. hovis \) counts in the untreated calves reached a maximum count of 168.5 on Day 28, while in the doramectin-treated calves, the maximum count of 13.4 was reached on Day 112. \( L. vituli \) counts in the untreated calves reached a maximum count of 44.1 on Day 42 and steadily declined to the end of the study. In the doramectin group, the highest mean count of 2.7 was reached on Day 112. In the untreated calves, \( S. capillatus \) counts rose steadily throughout the study from 0.1 on Day
Table 2
Arithmetic mean *Linognathus vituli* counts of untreated and doramectin-treated calves and seeder calves entering either untreated or doramectin group pens

<table>
<thead>
<tr>
<th>Day of study</th>
<th>Seeder calves&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Principal calves&lt;sup&gt;b&lt;/sup&gt;</th>
<th>P-value&lt;sup&gt;c&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>untreated pens</td>
<td>doramectin pens</td>
<td>untreated</td>
</tr>
<tr>
<td>-10</td>
<td>115.0</td>
<td>426.8</td>
<td>≤0.0001</td>
</tr>
<tr>
<td>7</td>
<td>54.2</td>
<td>71.4</td>
<td>0.8083</td>
</tr>
<tr>
<td>14</td>
<td>153.4</td>
<td>44.0</td>
<td>0.1263</td>
</tr>
<tr>
<td>21</td>
<td>144.8</td>
<td>104.2</td>
<td>0.5674</td>
</tr>
<tr>
<td>28</td>
<td>57.4</td>
<td>82.0</td>
<td>0.7287</td>
</tr>
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<td>35</td>
<td>8.2</td>
<td>113.8</td>
<td>0.1397</td>
</tr>
<tr>
<td>42</td>
<td>41.8</td>
<td>63.6</td>
<td>0.7585</td>
</tr>
<tr>
<td>49</td>
<td>14.2</td>
<td>30.8</td>
<td>0.8149</td>
</tr>
<tr>
<td>56</td>
<td>8.6</td>
<td>2.7</td>
<td>≤0.0001</td>
</tr>
</tbody>
</table>

<sup>a</sup> Means of *L. vituli* counts for a seeder group of five calves entering either untreated or doramectin group pens on Day 0, 14, 28, 42, 56, 70, 84, or 98. Standard error of the mean *L. vituli* count is 49.95.

<sup>b</sup> Overall test for treatment by day of study interaction *P*=0.0069.

<sup>c</sup> Significance level of testing the null hypothesis (*H<sub>0</sub>* on mean *L. vituli* count (*H<sub>0</sub>*: seeder group entering untreated group pens = seeder group entering doramectin group pens).

<sup>d</sup> Significance level of testing the null hypothesis (*H<sub>0</sub>* on mean log (*L. vituli* count +1) (*H<sub>0</sub>*: untreated group = doramectin group).

7 to 17.9 on Day 112. Doramectin-treated calves had zero *S. capillatus* counts from Days 7 through 56 and, thereafter, the counts were less than 7. *Solenopotes capillatus* counts were significantly (*P* ≤ 0.05) greater in the untreated calves compared to doramectin-treated calves on Days 42, 49, 63, 70, 77, 105, and 112. *Haematopinus eurysternus* counts were less than 1 and zero at each observation day for calves in the untreated and doramectin groups, respectively. There were no significant differences in *H. eurysternus* counts between the two groups during the study.

3.3. Days to infestation – *B. bovis* and *L. vituli*

*Bovicola bovis* infestations were established in 9 of 10 untreated calves on Day 14 and all calves were infested on Day 21. The first calf in the doramectin group with an established *B. bovis* infestation was on Day 84. A second calf met the infestation criterion on Day 105, and at the end of study, 5 of 10 calves in the doramectin group were infested. The difference between the treatment groups in the cumulative percentage of calves infested with *B. bovis* was significant (*P*=0.033) on Day 112. Two of 10 untreated calves were infested with *L. vituli* on Days 14 and 21, 8 calves on Days 28 and 35, and on Day 42 all calves were infested.
Table 3

<table>
<thead>
<tr>
<th>Day of study</th>
<th>Seeder calves</th>
<th>Principal calves</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
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<td>doramectin pens</td>
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</tr>
<tr>
<td>0</td>
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<td>42</td>
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<tr>
<td>49</td>
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<td>56</td>
<td>11.8</td>
<td>6.6</td>
<td>0.0199</td>
</tr>
</tbody>
</table>

* Means of S. capillatus counts for a seeder group of five calves entering either untreated or doramectin group pens on Day 0, 14, 28, 42, 56, 70, 84, or 98. Standard error of the mean S. capillatus count is 185.02.

* Overall test for treatment by day of study interaction P=0.0984.

* Significance level of testing the null hypothesis (H0) on mean S. capillatus count (H1: seeder group entering untreated group pens = seeder group entering doramectin group pens).

* Significance level of testing the null hypothesis (H0) on mean log (S. capillatus count + 1) (H1: untreated group = doramectin group).

In contrast, only one calf in the doramectin-treated group became infested and that occurred on Day 112. In addition, the difference between treatments in the cumulative percentage of calves with *L. vituli* infestations was highly significant (*P* ≤ 0.001) on Day 112. Based on the interval in days from when a louse infestation first occurred, the acquisition of *B. bovis* and *L. vituli* infestations in the doramectin-treated calves was delayed for a period of 77 days and 105 days after treatment, respectively.

### 3.4. Days to infestation – *S. capillatus* and *H. eurysternus*  

The first calf in the untreated group with a confirmed *S. capillatus* infestation was on Day 28. On Day 42, another calf became infested with *S. capillatus*. After Day 42, no further *S. capillatus* infestations established in the untreated calves until the end of the study, and then only four calves were infested with *S. capillatus*. Only one calf in the doramectin group became infested with *S. capillatus* and that occurred on Day 98. *H. eurysternus* infestations did not establish in calves in either group at any time during the study.
<table>
<thead>
<tr>
<th>Day of study</th>
<th>Seeder calves</th>
<th>Principal calves</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>untreated pens</td>
<td>doramectin pens</td>
<td>H. eurythraeus count</td>
</tr>
<tr>
<td>-1/0</td>
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<td>0.2456</td>
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*Means of H. eurythraeus counts for a seeder group of 5 calves entering either untreated or doramectin group pens on Day 0, 14, 28, 42, 56, 70, 84, or 98. Standard error of the mean H. eurythraeus count is 15.40.

Overall test for treatment by day of study interaction P = 0.1974.

Significance level of testing the null hypothesis (H0) on mean H. eurythraeus count (H0: seeder group entering untreated group = seeder group entering doramectin group pens).

Overall test for treatment by day of study interaction P = 0.3906.

Significance level of testing the null hypothesis (H0) on mean log (H. eurythraeus count + 1) (H0: untreated group = doramectin group).

### 4. Discussion

The repeated-exposure challenge model proved to be an adequate experimental method for evaluating the persistent efficacy of doramectin pour-on solution in preventing the establishment of louse infestations. The housing of the untreated and doramectin-treated calves in small pens and repeated-exposure to infested seeder calves maximized the opportunity for louse transfer from seeder calves to either untreated or doramectin-treated calves. To expose the untreated and doramectin-treated calves to seeder calves with high louse populations throughout the study, these seeder calves were replaced every 14 days; therefore avoiding declining louse populations in the seeder calves during the study.

Shortly after commingling seeder calves with untreated calves, B. bovis and L. vituli infestations established on untreated calves, confirming that calves cleared of preexisting infestations were susceptible to reinfestation. Bovicola bovis and L. vituli populations in the untreated calves peaked at 28 days and 42 days, respectively, and then both louse populations demonstrated a gradual decline to the end of the study, which is consistent with seasonal louse population trends (Watson, 1984). In contrast, in calves given doramectin
pour-on solution, *B. bovis* counts were less than or equal to 1 for 70 days after treatment and, thereafter, gradually rose to the end of the study. For *L. vituli*, counts remained very low throughout the study and there was no clear indication of a rise in *L. vituli* counts in the doramectin-treated calves until the end of the study.

Although each of the seeder calf groups harbored high *S. capillatus* populations, the untreated calves acquired *S. capillatus* infestations at a much slower rate than the acquisition of *B. bovis* and *L. vituli* infestations. The slower rate of *S. capillatus* transfer from the highly infested seeder calves to untreated calves may be explained by the distribution of *S. capillatus* infestations in cattle and louse movement. The predilection areas for *S. capillatus* are generally limited to the head area of cattle where they typically form colonies that are clustered together. Additionally, upon visual examination of these areas, *S. capillatus* show restricted movement over the skin and hair, especially when compared to *B. bovis* and to a lesser extent *L. vituli*. These characteristics of *S. capillatus* and findings in this repeated-exposure study suggest that an experimental infestation model may be a more appropriate method to evaluate endectocides for preventing the establishment of *S. capillatus* infestations.

The most likely explanation for the untreated calves not becoming infested with *H. eurysternus* is that few seeder calves had *H. eurysternus* infestations. *Haematopinus eurysternus* were observed on only 2 to 4 calves in each group of 10 seeder calves entering pens on Day 0, 14, 28, 42, 56, or 70, therefore minimizing the opportunity for *H. eurysternus* transfer to either untreated or doramectin-treated calves. Previous work (Larry Smith, personal communication, 1999) suggests that *H. eurysternus* transfer from seeder calves, with high *H. eurysternus* population densities, to untreated controls in this repeated-exposure model may be an adequate experimental method to evaluate the protective efficacy of doramectin pour-on against this louse species.

In a repeated-exposure study evaluating the persistent efficacy of ivermectin pour-on against *B. bovis* infestations, it was concluded that ivermectin was 100% effective in preventing infestations for a period of 35 to 49 days after treatment (Clymer et al., 1998). In that study, a different group of ivermectin-treated cattle was exposed to *B. bovis* infested calves for a 14-day period beginning at 21, 28, or 35 days after treatment. Louse counts were performed on treated cattle on Day 7 and Day 14 after exposure to the seeder calves. Infested seeder calves were removed from the pens after the Day 14 counts and then the treated calves were examined for *B. bovis* 7 days later. Geometric mean *B. bovis* counts in these groups ranged from 0.0 to 0.3 at 7 and 14 days after exposure to *B. bovis* infested calves. 7 days after removing the seeder calves from the pens, *B. bovis* were not found on treated cattle. Because calves in our study were continually exposed to infested seeder cattle, one should be cautious in comparing the results between the two studies. However, comparing the *B. bovis* counts in the ivermectin- and doramectin-treated cattle from Day 21 through Day 49, louse assessment days common to both studies, the results are similar. From 21 days through 49 days after treatment, doramectin-treated calves had an arithmetic mean *B. bovis* count of less than 1. If the seeder calves had been removed from the doramectin group pens on Day 56, 63, or 70, the *B. bovis* populations in the doramectin-treated calves may have declined to zero. However, the objective in this study was to follow the progression of biting and sucking louse infestations in the untreated and doramectin-treated groups over the duration of the winter season.
Because of the convenience of a topically administered dose and efficacy against nemato
dodes, grubs, and biting and sucking lice of cattle, pour-on formulations of the endectocides
have gained wide acceptance by cattle producers for use in parasite control programs. The
optimum program for treatment and control of louse infestations is to treat all cattle in a herd
at the same time to eliminate the opportunity for untreated cattle to reinfect the herd. The
therapeutic efficacy of doramectin pour-on solution would ensure that biting and sucking
louse infestations are eliminated in treated cattle. If doramectin pour-on treated cattle come
into contact with untreated infested cattle or cattle of unknown infestation status throughout
the late fall and early winter, the risk of reinfection with B. bovis and L. vivitl would be
minimal during this period.

References

doramectin pour-on against naturally-acquired, gastrointestinal nematodes of cattle in North America. Vet.
Parasitol. 77, 259–265.
changes, effects of housing type on infestations of calves, and sampling efficiency. J. Econ. Entomol. 83, 1435–
1438.
Gibney, V.J., Campbell, J.B., Bosler, D.J., Caistor, D.C., Deutscher, G.H., 1985. Effects of various infestation
levels of cattle lice (Mallophaga: Trichodectidae and Anoplura: Haematopinidae) on feed efficiency and weight
gains of beef heifers. J. Econ. Entomol. 78, 1304–1307.
Persistent efficacy of doramectin pour-on against artificially induced infections of nematodes in cattle. Vet.
Parasitol. 82, 297–303.
Watson, D.W., Lloyd, J.E., Kanar, R., 1997. Density and distribution of cattle lice (Phthiraptera: Haematopinidae,
Watson, D.W., 1984. The dynamics and distribution of cattle lice populations on naturally infested steers. M.S.