ORGANIC FARMING RESEARCH FOUNDATION

Final Project Report

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Title: ***Identifying and Testing Alternative Parasiticides for Use in the Productiuon of Organic Lamb***

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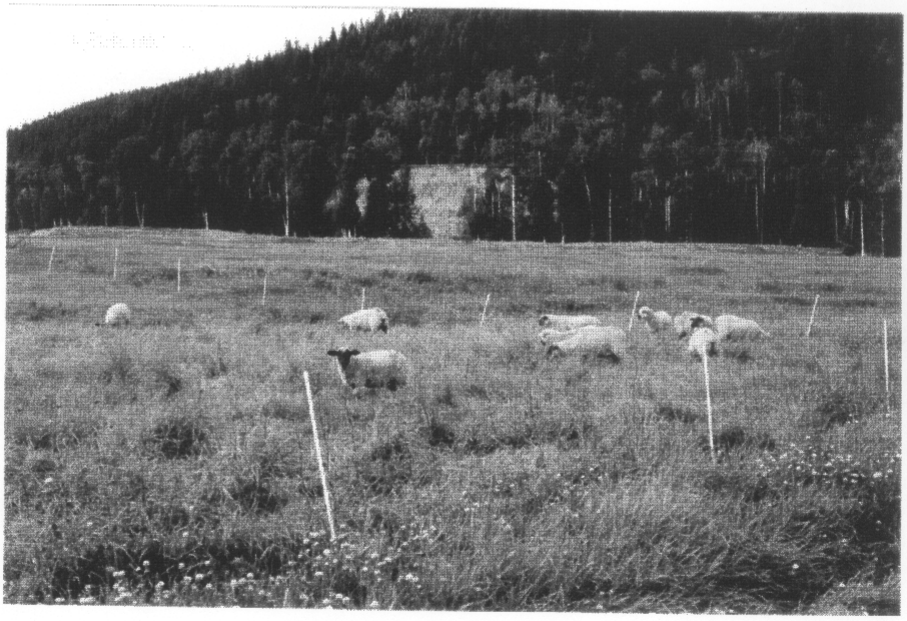
Study of Alternative Parasitides for Organic Lamb Production



Dragon Mountain Farm

Quesnel, British Columbia
August - October 1998

Alternative parasiticides for organic lamb production

Dragon Mountain Farm grown and sold certified organic lamb in the commercial marketplace since 1993. We have had keen interest from retailers and wholesalers for our product and have consistently under-supplied the market. We have been troubled by an increasing problem with internal parasites that we have not been able to control through grazing management alone. The management standards of the Certified Organic Association of British Columbia allow us to worm our ewes with conventional products up to the third trimester of gestation. However, this does little to alleviate the worm problem in the offspring, as the worm load in the ewes is always highest during lambing and lactation. Grazing management is the most important tool in controlling internal parasites, and much worldwide research has been done on this. To date, we have not found a practical and effective grazing rotation pattern that will alleviate this problem. Just as our well-managed organic garden will sometimes need to be sprayed with Bt, we are looking for an effective worming method to complement other management strategies.

Objective

To evaluate the anthelmintic (worming) properties of four different substances that have been suggested to us through articles or by other producers. By monitoring fecal samples and recording rates of gain in the test animals, we wanted to see if any effect could be found.

Methods

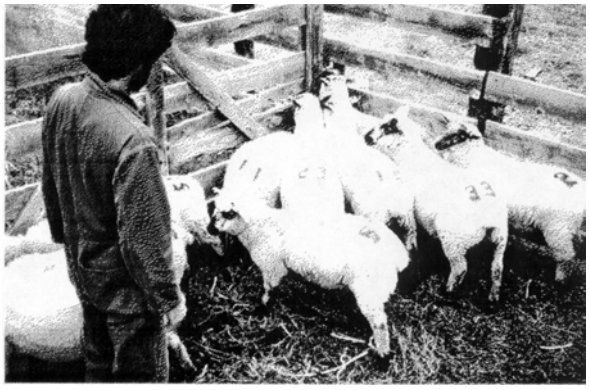
On July 24, 1998, we weaned lambs, which ranged in age from three to four months of age, from our ewes. About ten days later, we selected 15 test lambs from this group. Post-weaning is when the lambs seem to be most susceptible to worm infestation or at least when the effects are most noticeable, probably due to the stress of weaning. We chose from the less thrifty lambs in the flock with weights ranging from 56 to 66 pounds. These lambs were randomly divided into five groups as follows: GROUP 1 - CONTROL: Three lambs receiving no treatment at all.
GROUP 2 - HERBAL: Three lambs receiving a commercially prepared herbal wormer from Hoeggers Supply. This contains wormwood, gentian, fennel, psyllium, and quassia. It was fed as per manufacturer's instruction at a rate of 1-1/2 teaspoons morning and night for three consecutive days When mixed with grain, it was readily consumed by the lambs.
GROUP 3 - GARLIC: Three lambs receiving three crushed garlic cloves each that were administered with a bolus gun to ensure that it was consumed.
GROUP 4 - DIATOMACEOUS EARTH (DE): Three lambs receiving DE at the recommended rate of 2 percent by weight of feed ration They were fed this daily throughout the trial with rolled barley.
GROUP 5 - PYRETHRUM: Three lambs receiving a drench containing pyrethrum. The recommended rate was 3.5 mg/kg of body weight of 0.8 percent pyrethrum This concentration of pyrethrum was not available, so we calculated the rate using Trounce insecticide, which contains 0.2 percent pyrethrum, to obtain the same dosage. These lambs received one Initial dose and two subsequent doses.

The sample size made it practical for us to test several agents. We were looking for strong indicators to point towards further investigative possibilities.

These lambs were pastured together on second-crop grass, clover, and alfalfa pasture. The DE group (Group 4) was kept alongside, but separated by electric fence to enable administration of the daily dose of DE and grain. The other groups also received the same one half pound of barley per day to keep the rations even. Each lamb was painted to identify its group and given an individual number. Each lamb was weighed and had a sample taken before the first treatment and was weighed and sampled four more times throughout the test period, which ended on September 21, 1998. The lambs were moved every week to clean pasture to avoid recontamination.

On August 11, one of the DE lambs appeared very ill with diarrhea. He had maggots in his taggy wool, so he was sheared and externally treated with fly spray. We added another lamb to Group 4 at this point in case the sick one didn't recover. The sick lamb recovered quickly, so we then put him back on test. From this point, we carried four lambs in Group 4.Initially we thought the diatomaceous earth was responsible for his illness as the product seemed dusty and unappetizing; however, there was no reoccurrence in any of the lambs, and they consumed the grain mix readily.

On August 23 and September 7, the herbal mixture, the garlic, and the pyrethrum were re-administered to the target groups The DE, of course, was ongoing.



Data Analysis

For this trial of several organic ovine anthelmintics, the diagnostic test used was the fecal flotation test. Fecal samples were mixed with Fecasol, a commerical brand of flotation solution with a specific gravity of 1.2. Containers used were the Fecalyzer brand of diagnostic systems. Eggs were floated for 10 minutes; this time allowed a sufficient number of eggs to rise to the surface while reducing the amount of deterioration observed.

Observations were carried out using a standard light microscope. Slides were scanned first with the 4x objective for *Trichostrongyloidea* (Nematocera) eggs The objective was then switched to lOx for scanning of Moniezia (Tapeworm) eggs and roundworm eggs Haemonchus, Ostertagia and smaller Trichostrongylus species were counted as roundworms. The number of roundworms visible in several microscopic fields was recorded; and if sufficient numbers were present, they were recorded as "numerous." At the beginning of the trial, the number of visible roundworm eggs needed to record a "numerous" result was 20 - 30 eggs. As the trial progressed, and the roundworm densitv increased, the number needed to record a "numerous" went up to 30-50, or even higher! After roundworms, the objective was switched to 40x for a quick scan to determine presence of Eimeria species.

Identification of parasite eggs was made using W.J. Foreyt's *Veterinary Parasitology Reference Manual, Third Edition.*

Limitations of Diagnostic Methods

The fecal flotation tests were used to determine presence or absence of parasite infestation of lambs tested. Due to the fluctuating amount of feces available (not all samples had a full quotient; for example, some had scant diarrhea), several samples would still test positive for infestation, but when placed on a graph, would show a lower egg count. One scant sample was further diluted by accidental spillage and refilling, yet still showed parasite presence (September 21, 5-1).

Observations

All groups showed presence of roundworms at the beginning of the trial. All groups also showed a higher level of roundworm presence at the end of the trial. The only samples showing extremely low levels of infestation were the three random flock samples tested on September 14 (these had been dewormed with a commercial anthelmintic).

Chart 1 shows worm counts for roundworms These are average counts for the lambs in each group. In doing the count, 25 in one slide was considered very numerous; it's evident we are dealing with a significant infestation. Overall, no pattern or improvement can be seen in any one of the samples from the different testings. In fact, the Control group, Group 1, received no treatment at all for worms and ended up with the lowest count overall for this particular type of parasite. It should be noted, however, that even this rate is an unacceptable level of infestation.

Rate of Gain

Actual weight gain averaged for each group is plotted in Chart 2. These lambs were all gaining at a slower rate than the expected rate of gain for a lamb with no infestation (lamb treated with Ivomec). The test groups show the same curve as the control group. After September, the high worm counts take their toll as the lambs actually began to lose weight. It should be noted that drought conditions at this point were a contributing factor as pasture quality dropped as well. Also note that the October 6 weight was recorded two weeks after these lambs all went off test and were treated with a commercial wormer.

GROUP 1 - CONTROL: This group performed as well as or better than the groups receiving alternative wormers.
GROUP 2 - HERBAL: This group receiving the herbal preparation showed no improvement throughout the study. While much anecdotal evidence exists about its effectiveness, we have not seen any measurable data to contradict the findings in our study.
GROUP 3 - GARLIC- This group initially had the best rate of gain from the five groups. Perhaps garlic stimulates the appetite, but it showed no effect on fecal worm counts or overall performance.
GROUP 4 - DIATOMACEOUS EARTH: This group receiving DE showed no improvement throughout the study DE is the most commonly touted natural wormer and is often advertised as a natural worm control agent Our findings support those of previous ones in that no effectiveness could be measured.
GROUP 5 - PYRETHRUM: We feel our findings are the least conclusive here. While no effectiveness was demonstrated in our study, we feel pyrethrum should be re-trialed with a purer product, perhaps at a stronger rate. Our dosage was basically an educated guess; and while no positive results were seen, it perhaps was not fully explored. Working closely with a veterinarian to determine the proper product and dosage should be pursued before this product is ruled out.

Overall, these lambs were subject to a heavy parasite challenge; and while it would perhaps be unrealistic to expect these alternative wormers to eradicate the problems, if they were at all effective, some positive dip in count numbers or improvement in rate of gain should have been observed.

We pastured these lambs together so that they were subjected to the same conditions .As these lambs were moved to fresh pasture regularly, we don't think that cross-reinfection was a significant problem. If there were any effectiveness at all in these alternative wormers, it should have been demonstrated by either rate of gain or fecal egg counts.

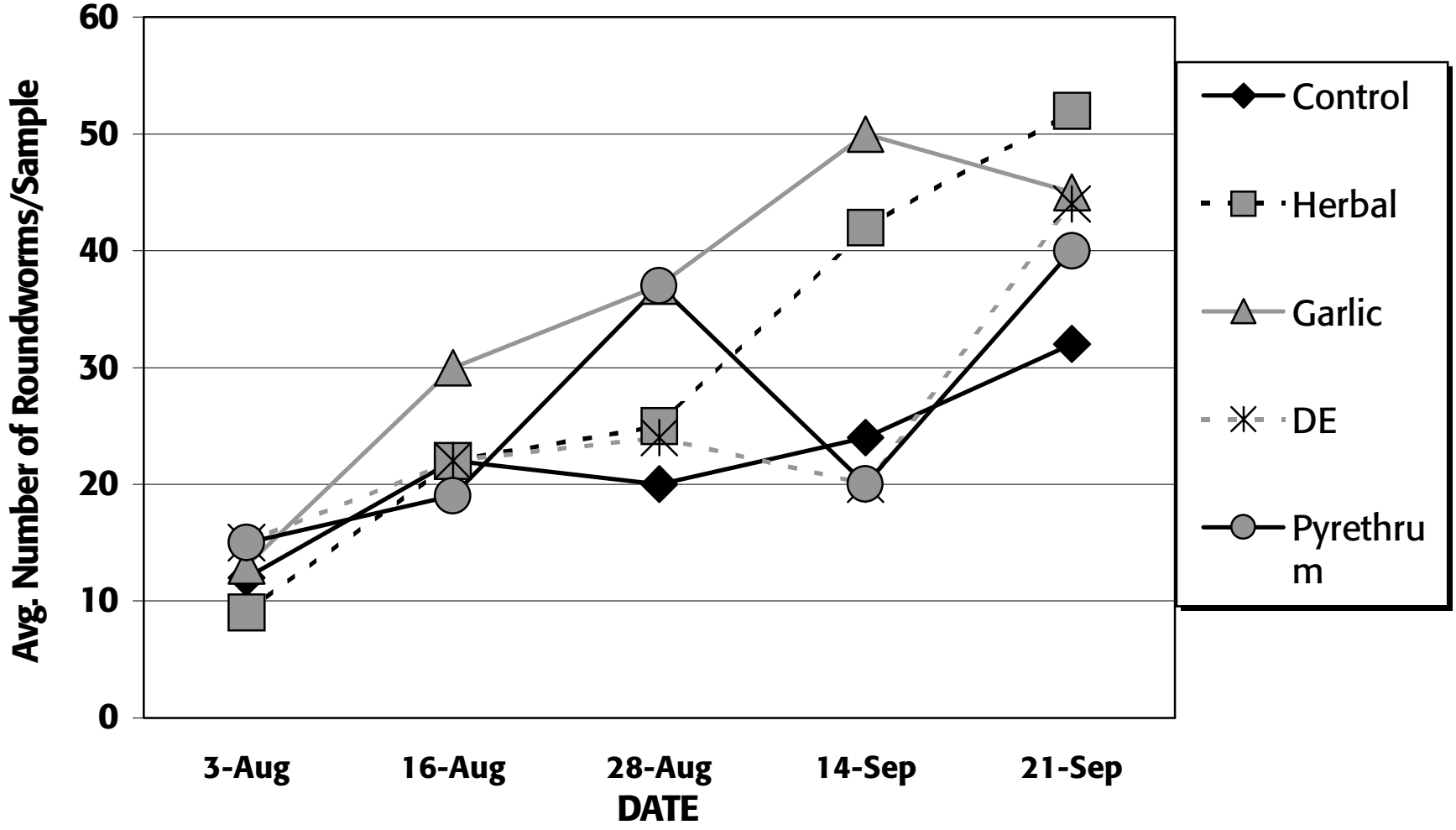
Conclusion

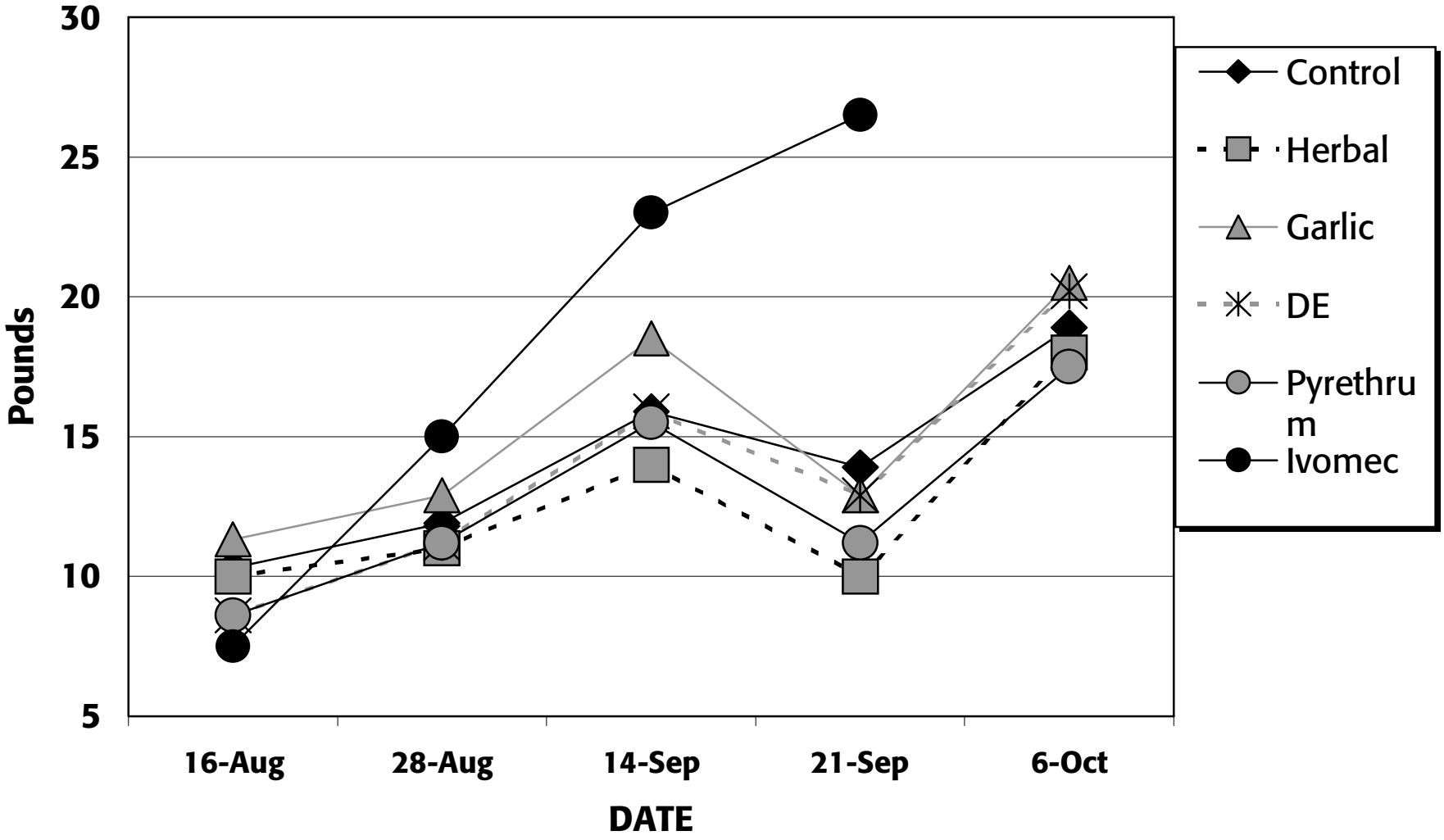
Our study failed to show any effectiveness in any of the tested alternative wormers. At this point, none of them show any usefulness as part of a management strategy in dealing with internal parasites in sheep. As these substances are commonly recommended among organic livestock producers, it is disappointing that no anthelmintic properties could be demonstrated.

However, our study has been extremely useful to us. We feel that it stresses the need to systematically assess the usefulness of any alternative wormer. If there are substances out there that could be part of a livestock management plan for dealing with internal parasites, we need to measure their effectiveness objectively.

In Britain, where much of the organic management research has been done on sheep, commercial wormers are still allowed, where necessary, in the organic standards. While we research and test certifiable, safe, effective alternatives, the British model is probably the most sensible approach.

We are extremely interested in communicating with any producers or researchers who are keen to pursue this line of inquiry.


60
50
40
30
20
10
0
Avg. Number of Roundworms/Sample
3-Aug
16-Aug
28-Aug
14-Sep
21-Sep
DATE
Control
Herbal
Garlic
DE
Pyrethrum


30
25
20
15
10
5
Pounds
16-Aug
28-Aug
14-Sep
21-Sep
6-Oct
DATE
Control
Herbal
Garlic
DE
Pyrethrum
Ivomec