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SARE Project Interim Report / Grant Number FNE04-527: 1. Measuring the Effectiveness of Treating Lambs with Garlic at Various Rates for Internal Parasites using the FAMACHA[©] System

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2. PROBLEM / GOALS

The newly implemented organic standards require producers to use natural materials to treat parasites in sheep and lambs. In keeping with these standards I applied for and received a 2003 SARE Grant to test and measure the effectiveness of three treatments. I found that garlic juice was the most effective treatment. I also became familiar with a new process, the **FAMACHA[©]** System, for determining infection levels of the parasite *Haemonchus Contortus* infections in lambs. This is a system that uses a visual observation of the redness of the interior of the eyelid using a specially developed eye color chart to determine the degree of infection due to *Haemonchus Contortus*. *H. Contortus* being the blood sucking parasite that causes anemia that is observable in the color of the inner eyelid tissue. This system was developed in Africa where parasites have developed severe resistance to anthelmintics. I had the opportunity to attend a training session for the use of the **FAMACHA[©]** system this fall and am excited by how quick and simple it is for determining infections as apposed to the fecal sample process.

I designed and implemented a controlled experiment that used the **FAMACHA[©]** System to study the parasite rise in lambs and attempted to measure the effectiveness of various dosages of garlic juice to determine the optimum worming rate. This process would identify the naturally genetic resistant lambs for breeding stock replacements and reinforce my findings from my 2003 SARE project.

3. FARM PROFILE

The Noon Family Sheep Farm is a Maine Organic Farmers and Gardeners Association (MOFGA) certified organic sheep farm. We have about 52 ewes, 3 rams, and have been raising sheep since 1970. Our original sheep were indirectly from the UVM flock dispersal. We direct market lamb at 3 select fairs and festivals through our lamb barbecue food booth and also sell hay, yarn, sheepskins, wool, and lamb at the farm. This is a part-time operation except at the fairs and during haying season. We own ~75 acres that we purchased in 1974 and lease an additional 30 acres of hay land. We have about 8.5 acres of pasture, and about 15 acres of our own hay land that we rotate the sheep onto after haying. Our fencing is mostly electric, permanent and portable. The sheep harvest most of the second and third crop of hay directly. The balance of our farm is in managed forest and wetland. The 30 acres of hay leased from a neighbor is mostly sold in the field to support machinery and operating costs of hay production. This project will use our own flock as a laboratory. We have been keeping breeding and health records on our animals for over twenty-five years and it will be relatively easy to add in the parasite data as it is collected. All lambs and sheep are assigned numbers at birth sequentially and ear tagged. We have a sheep handling facility that is permanent and includes squeeze pens and chutes that make the physical handling of the sheep quite efficient. Lambs are weaned early and strip graze on pasture separately from the Ewes.

4. COLLABORATORS / PARTICIPANTS

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5. METHODS and Project Activities

Lambing occurred between Feb. 7th and March 14th. 72 lambs were born. April 16 lambing data was entered into the computer. May 1st all lambs were weaned by removing ewes from the barn and moving to the dry lot to dry off. Lambs remained in the barn and continued on their diet of organic grain and hay. May 6th I drenched all the ewes with 2 oz. of 1:3 garlic water. ***This year (2005) I intend to use FAMACHA© System on the ewes before I drench and to include them in the test. I intend to also check their eyelids when they lamb as there is a documented rise in parasite infection at that time.*** May 13th ewes had moved out to pasture and lambs were moved to the dry lot. They continued to have free choice organic grain, hay, salt and mineral mix and water and were given access to pasture. On May 19th the lambs began to eat grass on the pasture. Having learned so much about the life cycle of H. Contortus, I decided to be very careful about the lamb pasture. I purchased two rolls of flexinet and began to practice strip grazing with my lambs. This involved moving the fence forward daily onto new grass and moving a back fence as well to keep them off the grazed areas. The ewes never had access to the lamb pasture in the spring.

We had an exceptionally cold, bare winter and I think that there was a very low survival rate of the parasite eggs on the pasture. In keeping with my results from 2003, I saw no evidence of parasites during May. We had a lot of rain, about three weeks of it in May and early June. On June 1st I noticed evidence of foot rot in the lambs, caused by the wet conditions, and started to treat them using a foot bath of Copper Sulfate solution. I switched to Zinc after a couple of weeks because a few lambs were appearing sick and I thought it might be copper poisoning. Later I was able, with Help from Dr. Bukowski-Thall, and the Veterinary Lab at U.N.H. to determine that it was actually White Muscle Disease, a condition of selenium deficiency. A number of lambs did manage to grow well and were marketed on 7/11.

Ewes also exhibited foot rot and needed treatment. In early June two ewes developed bottle jaw which is an indication of parasite infection. They were treated with 2 oz. of 1:3 garlic water and recovered. ***I might have caught these ewes earlier if I had checked their eye lids as I intend to do in 2005 using the FAMACHA© System.***

Individual lamb weights and FAMACHA© system parasite load scores were measured and recorded on July 13. Most of the pasture the lambs were moved onto was 2nd crop hay land having been harvested once in June. Total number of lambs included in the test at that time was 55. There was no evidence of any parasite infection. My 2003 data indicated no infection rise until the middle of August, and the life cycle of H. Contortus seems to need more than 20 days for the infective stage to develop on the pasture. I continued to check lambs every 10 days through July and then in August checked the 8/1, 8/7, and 8/16 with no evidence of parasites. I took several fecal samples during this period. The weather was quite cool possibly reducing the viability of the parasites. On 8/16 the ewe lambs were separated from the ram lambs and moved onto a pasture that had been infected by grazing adult rams. There is evidence that exposure is necessary for resistance to develop.

My plan was to treat lambs when they exhibited a **FAMACHA**© system grade of 3 (borderline 4,000+EPG) or greater (worse) they will be assigned to and treated at one of three dosages of garlic juice: Group 1 @ ½ tsp.; Group2 @ 1 tsp.; Group 3 @ 1½ tsp. Groups were assigned by random sampling.

Finally on September 17th I had 5 ewe lambs that looked like grade 3s. I took their fecal samples and counted eggs, treated them by group and re sampled on 9/21;

9/17	treatment group	eggs/gram	9/21 EPG	10/5 EPG	10/8 EPG	11/9
#415	1 (½ tsp.)	4150	9500			
#404	3 (1½ tsp.)	4300	3400			
#432	2 (1 tsp.)	2650	950			
#414	2 (1 tsp.)	2250	3550			
#425	2 (1 tsp.)	7600	9800	19250	10050	0

In 2004 the parasite numbers in lambs did not rise until the warm weather in September and after lambs were exposed to infected pasture. It does not appear that my dosages were strong enough to counteract the rise during those optimal (for parasites) conditions.

On 10/5 only #425 exhibited infection. She tested at 19250 eggs per gram. This is a very dangerous level so I treated her with 3 tsp. garlic and on 10/8 her count was down to 10050. I treated her again but did not have a chance to test later. A count of less than 4,000 eggs per gram is not considered detrimental to production.

On 11/9 I checked all 52 of my ewes and 17 ewe lambs and recorded their eye scores. Two looked like 3 scores and were treated and tested but did not show any H. Contortus eggs in samples and # 425 looked like a 2 and was clean as well. By then we had had many frosts and the daily temperature was usually below 40.

On 11/9/04 and 12/17/04 I checked all sheep and recorded scores. I hope to continue recording every animal's eye score through 2005. However, the sorting chute is not accessible when the snow is deep.

6. RESULTS

Because my result from treatment were somewhat mixed and my sample was so small, I would like to extend my study for another season and expand it to include my ewe flock as well. The ewe flock pasture does not get the intense management of strip grazing. Ewes who exhibit low natural resistance to H. Contortus should be culled. Dr. Settlemire's project indicates that resistance is hereditary. I would also recommend increasing the treatment dosages.

7. CONDITIONS

My results indicate that hard winters and strip grazing can effectively minimize parasite infections from H. Contortus in lambs.

8. ECONOMICS

By using the FAMACHA© system to determine which lambs (or sheep) need testing and treatment, the time involved is greatly diminished in comparison to testing and treating every animal as I did in 2003. Therefore there are still ample funds available in my initial 2004 grant to carry the project through another season and expand it to include the ewe flock.

9. ASSESSMENT

With a greater number of animals in my sample and a revamping of my garlic dilution formula, I hope to come up with a reliable dosage level for treatment on *H. Contortus*. I am also interested in getting enough data to develop a calendar of when the critical infection periods are likely to occur. In this way Farmers will know when to monitor for the parasites. Another aspect of including my ewe flock is to see whether the 2003 lambs with high resistance continue to be resistant and whether there is evidence of heritable natural resistance in my flock.

10. OUTREACH

I held a MOFGA small farm field day last July that was attended by Maine Sheep Breeders and MOFGA folks. I published an article in The Maine Sheep Breeder which is on their web site. I published an article in The Shepherd Magazine. There is an article in the current issue of The Maine Organic Farmer and Gardener. This article will be posted on the MOFGA site shortly. I attended the SARE Conference in Burlington with a poster presentation (and had a terrific time!). I presented at the annual MOFGA Farmer to Farmer Conference in Bar Harbor. Most of this outreach has been focused on the 2003 project as I haven't enough data yet on the 2004 project.

I have also spent considerable time working on my "Whole Year on the Organic Sheep Farm Management Calendar".

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Organic Management Calendar – Jean Noon

Sept. 1-- Ewes are turned into a third crop hay field for flushing. (Very clean of parasites)

Sept. 20-- Ewes sorted and checked using FAMACHA system and dosed with garlic juice if needed. Records kept of ewes that need treatment. Rams are introduced to the flock(s). I usually have 2 rams and separate the group's pastures. Ewe lambs are integrated with ewes this year but sometimes have their own ram.

Nov. 10-- Rams are removed from the flock.

Nov. 15 (or when the ground freezes and ewes begin to need hay and water)--Ewes are brought into the open barn off pasture and are fed hay.

Dec. 20-- Ewes start to get supplemental organic grain, gradually increasing from 1/10 pound to ½ pound per head over a week. Thin ewes are sorted into a separate group and are given more grain. Lambs are in their own group.

Dec.-Jan.-- Sheep are shorn. Six or seven lambing pens (4' x 4') are set up. Sheep are in flock groups of less than 20 to minimize the risk of hernias from pushing. (Without the wool they are less padded) I shear before lambing for cleaner wool, more space and access to grain trough, dryer sheep (they stay in the barn when it snows or rains), so I can see their udders, and because they are more careful to lamb inside, out of the wind.

Feb. 5-- Lambs start to be born. Ewes lamb in the flock group and are moved into a lambing pen for two to three days, then are moved into a pen with up to five other ewes with lambs for a few days before joining the larger groups of lambed ewes. Lambs are given free choice grain in a creep feeder.

April 1-- All lambs have been born. Ewes with Feb. lambs are taken off grain and are fed only hay in early April. Lambs have access to a creep pen with grain and hay.

April 25 to 30-- Feb. and early March lambs are weaned. Ewes are removed from lambs and dried off. Lambs never go with ewes onto the grass.

May 10-- Ewes are moved to permanent pasture. They are rotated very early in the season and then allowed several sections as the grass growth slows. Weaned lambs are moved into dry lot with free choice grain, hay and access to winter cleaned, ungrazed pasture. Lambs' pasture access is moved every day by "strip grazing" with portable fence. The lambs never go on ground that the ewes have been on (since November). Most of the lamb pasture is mowed for hay in early June before their "strip" moves up to it. When the lambs are still small it takes a few weeks before they begin to eat much grass and I provide them with free choice hay and grain while they become accustomed to the new grass diet.

May-Sept -- This year (2004) I purchased two long sections of *Flexinet* and moved one section out on new grass ahead of lambs about 10-24" a day or twice a day as they began to eat more as they grew. The other section was moved up behind the lambs the same distance providing a strip of about 15 feet between sections for the lambs to romp. This worked well for 70 lambs. As lambs reach finish they are retained for replacement or sent to the butcher. I sort out finished lambs every two to three weeks. They usually weigh between 90-105 pounds. I have a permanent sorting set up made of wooden pens with a squeeze and a narrow chute that makes checking sheep and treating feet and using FAMACHA system to check for parasites quite quick and easy. Ewe lamb replacements are moved to a separate pasture and taken off grain as they reach finish. My first trip to the butcher is in mid May.

Sheep and lambs have access to water, shade, feed and salt mineral mix year round. Rams are housed separately except during breeding season.