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GASTROINTESTINAL PARASITISM IN ORGANIC BEEF CATTLE IN THE MARITIMES

Final Research Report E2007-23

INTRODUCTION

Parasites are among the most economically damaging diseases of conventional beef cattle, even at very low infection levels. These parasites are commonly **gastrointestinal nematodes** (**GIN**), which affect the stomach and intestines of their host, taking nutrients away from the animal. Organic management standards do not permit the preventive use of conventional drugs (anthelmintics) for controlling parasites. A review is needed of the pattern, causes and treatment of these parasites under organic management.

GIN infections have been shown to depend on both management practices and weather conditions. Knowledge of the life cycle of these parasites is important to understand their patterns of infection. The adult female parasites lay eggs (Figure 2) in the intestines of the host (i.e. cattle) that are then excreted with the faeces. The eggs hatch and develop through successive moults to the third-stage infective larvae (L3, see figure 2). The L3 larvae migrate into the surrounding grass where they are picked up by cattle and continue development in the stomach or intestine through successive moults to adulthood. Often these infections are 'subclinical': there are no obvious symptoms but productivity may decline.

Glossary of Terms	
epg	Eggs per gram of faeces, an indicator of parasite burden in the host animal and of pasture contamination
FEC	Faecal nematode egg count
GIN	Gastrointestinal (GI) nematodes, wormlike parasites of the stomach and intestines
L_3	The third developmental stage of parasite larvae, also called "infective larvae" that appear on pasture forage

Beef cattle (S. Fernandez)

OBJECTIVES

- To determine whether gastrointestinal parasitism occurs similarly in organic cattle as in conventionally-raised cattle
- To describe the patterns of parasite eggs in the manure (**faecal contamination**)
- To measure the number and seasonal pattern of L3 larvae in the pasture (**pasture infectivity**)
- To determine the kinds of parasites present and their seasonality

WHAT WAS DONE

GIN loads were surveyed on four organic beef farms in 2006, three in New Brunswick and one in Nova Scotia. Samples (faeces and pasture) were shipped to the Ontario Veterinary College for analysis. Ten yearling calves (8-14 months of age at turnout) were randomly selected from each herd for monthly sampling throughout the study. Faecal samples from those animals were taken by collecting a handful of fresh manure from each calf.

Collecting a faecal sample for further analysis (P. Schofield)

Analysis of these samples for **faecal nematode egg counts (FEC)** allowed us to indirectly measure the parasite burden in the animals and establish the level of **pasture contamination**. FEC is measured as the number of parasite **eggs per gram (epg)** of faeces. The GIN were identified to genera level by culturing a portion of the faecal samples and differentiating the resulting larvae using a microscope.

Grass samples were taken monthly from paddocks where the cattle were grazing and were analyzed to identify the numbers and kinds (genera) of nematode infective larvae. This is reported as **pasture infectivity**, expressed as number of GIN at the L_3 larval stage per kg of dry forage (L_3 kg DM^{-1}).

The weather conditions for the period of the study were summarized from data provided from the nearest Environment Canada meteorological station to each farm (Figure 1).

WHAT HAPPENED?

Peaks in **pasture contamination** were found in mid-grazing season in most cases (Table 1). At least in Farms B, C and D, this was most likely as a consequence of the animals' intake of L3 that had overwintered on pasture, as shown with the first grass sampling.

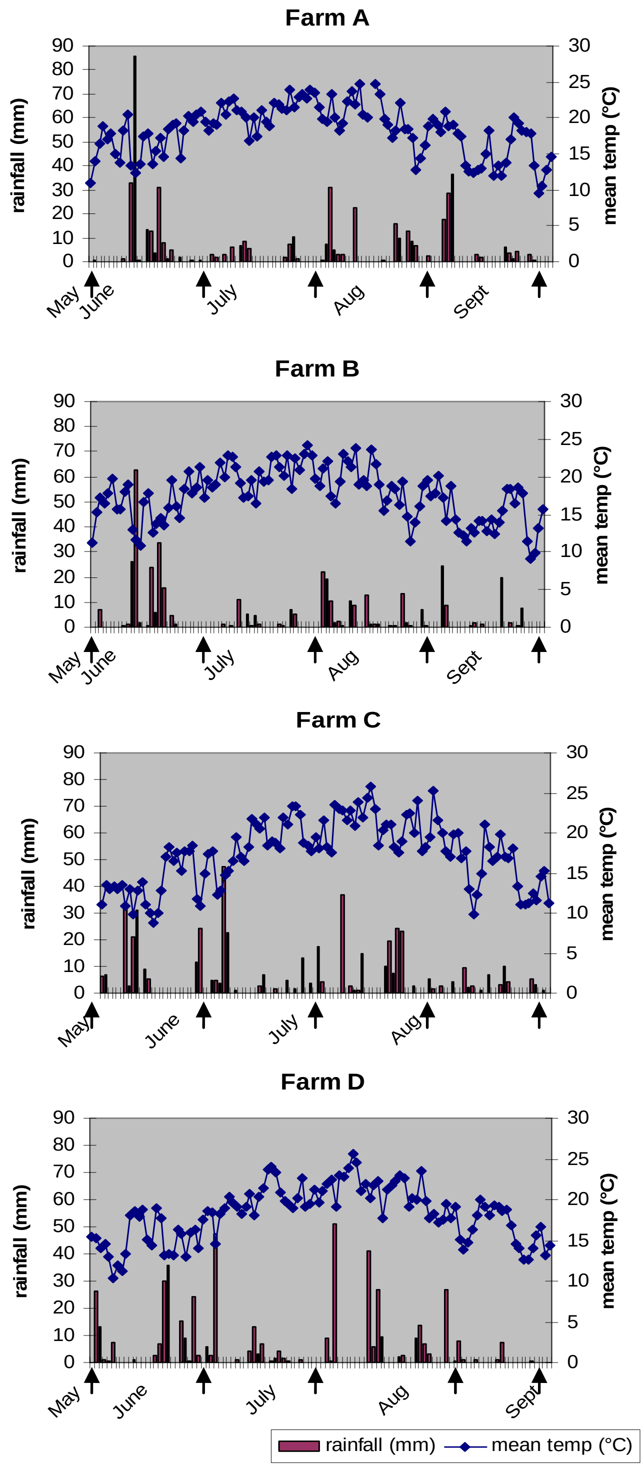

Figure 1. Meteorological data for weather stations near each farm, courtesy of Environment Canada (2006). Arrows indicate sampling dates.

In the case of Farm A, the increase in FEC throughout the grazing season was likely due to the output of parasite eggs by mature animals grazing together with the calves. There is evidence that cows contribute to the increase in parasite load in calves. On this farm, the patterns of pasture contamination are typical of first-year grazing calves found in studies on conventional herds. Having never been exposed to GIN larvae before, the calves are infected once turned out together with previously infected animals, which cause FEC levels to climb throughout the season as they ingest new generations of larvae.

Natural immunity in cattle does not usually develop until the second year on pasture, which causes a gradual decrease in FEC as the animal ages. This trend is seen in Farms C and D. This is possibly because the calves, born in the spring of 2005, were out on pasture while suckling and began to develop immunity before they were weaned. Distinct differences in management practices between farms, such as calving season, seemed to contribute most to variations in FEC over the grazing season.

Table 1. Mean values for pasture contamination (calves' monthly averages), and pasture infectivity (farm monthly averages) for GIN study sites, 2006

	May	June	July	Aug.	Sept.
Farm	**Pasture contamination**				
	------(eggs per g faeces)-----				
A	2	4	68	53	87
B	46	25	36	34	25
C	32	253	126	58	24
D	210	302	58	90	36
	Pasture infectivity				
	-----------(L_3 per kg dry forage)-----------				
A	0	0	0	53	58
B	8	22	11	111	n/d*
C	293	10	466	387	538
D	9	26	580	600	463

*n/d= no data

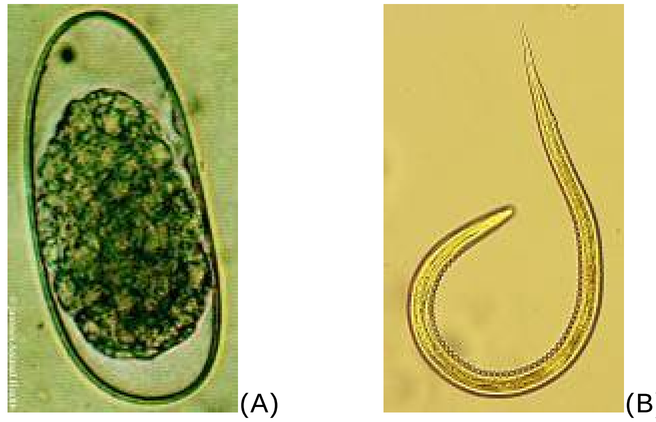

Figure 2. Eggs (A) and L_3 larvae of hair worm (B) under the microscope (courtesy of the UN Food and Agriculture Organization)

Pasture infectivity was highest at the end of the grazing season for most sites (Table 1). The calves picked up overwintered larvae at turnout, larvae were ingested with grass and new generations of parasites occurred. This resulted in more parasite eggs being excreted and, in turn, to an increase in the number of infective larvae on pasture.

As shown in Figure 3, the most prevalent parasite genus in the faeces and in the forage was *Ostertagia* sp. (brown stomach worm), followed in most cases by *Cooperia* sp. (small intestinal worm). Other parasite genera present were: *Haemonchus* sp. (barber pole worm), *Trichostrongylus* sp. (hair worm), *Oesophagostomum* sp. (nodular worm); and *Nematodirus* sp. (thick-necked worm).

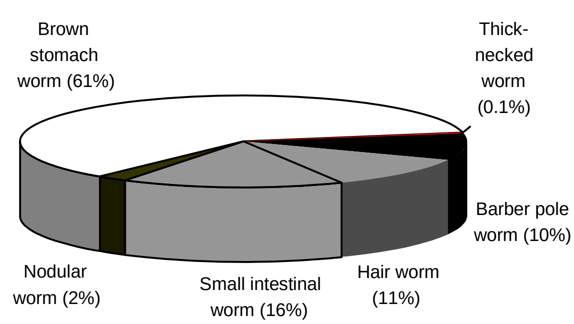

Figure 3. Parasite types by genera

THE BOTTOM LINE...

The animals on all farms suffered from subclinical parasitism. Organic herds follow similar patterns of gastro-intestinal nematode contamination and larval infectivity as conventional herds in other parts of Canada.

Management practices such as calving date and grazing strategies have a strong influence on the level of infection.

Grazing yearlings on a Maritime organic farm (M. Graves)

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CREDITS

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