

The Epidemiology of Over-Wintering of Gastrointestinal Parasites in Ontario Sheep Production Systems

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Background: Gastrointestinal nematode (GIN) parasitism is a severe and increasingly important production-limiting disease on sheep farms. Major sheep-rearing countries have developed integrated strategic parasite control programs based on climate and type of animal management (eg. SCOPS – United Kingdom; WormWise® - New Zealand). Central Canada is substantially different from other countries in that flocks frequently use out-of-season lambing rather than just spring lambing, and winter conditions are more severe, thus influencing the epidemiology of GIN both in adult ewes and on pasture. This project will improve understanding of factors that affect these two potential major sources of gastrointestinal nematodes responsible for parasitic infection in sheep: over-wintering of hypobiotic larvae in adult ewes and the subsequent periparturient egg rise (PPER) which contaminates spring pasture, resulting in infection of naïve lambs; and over-wintering of infective L3 larvae on pasture from contamination in the previous grazing season.

Objectives:

1. Determine both group-level and individual-level factors that affect parasite over-wintering and periparturient egg rise (PPER) in ewes
2. Determine if strategic timing of anthelmintic treatment reduces PPER in ewes
3. Determine factors affecting the over-wintering survival of GIN, including *Haemonchus contortus*, on pasture under central Canadian conditions
4. Determine if over-wintered L3 *H. contortus* larvae on pasture are capable of establishing a patent infection in naïve lambs

Methods: Over-wintering in ewes will be investigated by selecting six flocks on an accelerated lambing system. On each of these flocks, 20 pregnant and 20 non-pregnant (control) ewes will be selected. Both blood and fecal samples will be collected following a pre-determined time-line for three lambing seasons (Winter – Spring – Fall). Nutritional and lamb productivity information will also be collected. In the second year, a Clinical Trial will be performed on three of these farms; pregnant ewes will be treated with different dewormers on the 120th day of gestation. Fecal samples will then be collected on the day of treatment and at two other time-points, to determine the suppressive effect of the anthelmintic drugs on the PPER.

The effect of winter climate on survival of infective GIN larvae, including *Haemonchus contortus*, will be studied on three farms across Ontario. One acre plots of pasture grazed that season by infected sheep will be assessed from the fall after removal until the spring before turn-out. Data recorders will monitor, at hourly intervals, air and soil temperature, air humidity and soil moisture. Presence and type of GIN larvae will be assessed by larval pasture and soil sampling at monthly intervals. Infectivity of larvae present on pasture in the spring will be assessed by grazing naïve tracer lambs.

- Results:** We have currently completed sampling for two lambing seasons (Winter and Spring) on three different farms and there seems to be substantial differences in Fecal Egg Counts between the two groups (pregnant and not pregnant), especially during the Spring time. No free-living parasitic larvae were isolated in the soil and pasture samples collected. Adult *Haemonchus* worms were found in the gastro-intestinal tracts of some of the tracer lambs, indicating that larvae surviving over the winter were then capable of establishing an infection.
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