

Correlation of carbohydrate larval antigen (CarLA®) antibody response with parasitism in Ontario sheep

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Introduction

Gastrointestinal nematode parasites (GINs) are a significant cause of morbidity, mortality and loss of productivity on North American sheep farms. In light of the rising prevalence of anthelmintic resistance, selection of animals with a superior immune response to GINs has received considerable attention. In New Zealand, measurement of salivary antibody to a carbohydrate larval antigen (CarLA®, AgResearch Inc.) has been used successfully to identify sheep with superior immunity. However, climate and GIN epidemiology in Ontario are different from New Zealand, and sheep are generally not exposed to GINs for several months during housing over winter. To date, CarLA® has not been evaluated in North America. The purpose of this study was to determine whether CarLA® correlates with parasite burden under temperate grazing conditions in Ontario.

Materials and Methods

Replacement Rideau ewe lambs (n=107) were recruited at 4-6 weeks of age from a commercial farm in eastern Ontario with a history of GIN parasitism. The ewe lambs were followed for 2 grazing seasons (2016-2017), including their first lambing and lactation. GIN FEC was monitored using a modified McMaster method with a sensitivity of 8.33 eggs per gram (epg) every 6-8 weeks through the grazing seasons (May-November) in 2016 and 2017, and at mid-gestation in March 2017. In order to prevent morbidity due to GINs, anthelmintic treatment was administered to any animal with a FEC above 500 epg. Salivary CarLA® was measured at the beginning, middle, and end of each grazing season, as

well as at mid-gestation. Data were assessed for correlation between CarLA® levels and between CarLA® and FEC over the two-year study interval.

Results

Mean CarLA® titre gradually increased during the 2016 grazing season, declined over the winter, and rapidly increased during the 2017 grazing season. Fecal egg counts peaked mid-summer (July-August) in both years with a second peak at the end of 2017. CarLA® titre in October 2016 (the end of the first grazing season) was significantly positively correlated with CarLA® titres the following year, with correlation coefficients ranging from 0.2-0.4. Two significant correlations ($P<0.05$) were identified between CarLA® titre and FEC. The first was a weak positive correlation between August 2016 CarLA® and October 2016 FEC. The second was a weak negative correlation between CarLA® and FEC measured in May 2017.

Significance

CarLA® titres measured at the end of a lamb's first grazing season appear to be predictive of subsequent CarLA® titres under Ontario grazing conditions, although titres wane during the winter in the absence of ongoing exposure to infective third-stage larvae. Higher CarLA® titre is correlated with reduced FECs in the periparturient period, suggesting that selection of replacement ewes with elevated CarLA® titre may reduce pasture contamination in the periparturient period.