

Exploring the species diversity of gastrointestinal nematodes in western Canadian beef cattle

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Introduction

The objectives of this study were to explore herd level species diversity of gastrointestinal nematode (GIN) communities in calves from western Canada and the effects of anthelmintic treatment on their relative species abundance in feedlot steers. Coinfection with multiple GIN species is common in cattle. Exploring the GIN diversity is important to understand parasite epidemiology and particularly the response to control programs; however, research is limited in Canadian beef cattle.

Materials and Methods

Forty-three western Canadian cow-calf operations from 4 provinces were enrolled in the cross-sectional study of investigating herd level GIN species diversity. Individual fresh fecal samples were collected from 15-20 calves ($n = 844$ in total) from each herd between November 2016 and February 2017. Information on deworming status of sampled calves was provided by producers at fecal sample submission. To determine the effects of anthelmintic treatment on the relative species abundance of GIN, a randomized controlled trial was conducted in a research feedlot facility. Two hundred and thirty-four auction market-derived, weaned, fall-placed steers were equally assigned to three treatment groups: control; injectable ivermectin (IVM); combined treatment of injectable IVM and oral fenbendazole. Each group had replicates of 6 pens. Pre- and 14 days post-treatment fecal samples were collected from individual feedlot steers. To isolate third stage GIN larvae from individual coprocultures, fecal samples from calves and steers were pooled by herd and by pen, respectively. Species and relative proportions of GIN larvae were determined using a next generation deep amplicon ITS-2 rDNA nemabiome sequencing.

Results

Ostertagia ostertagi was the predominant GIN species in most cow-calf operations while *C. oncophora* was the second most abundant species. Interestingly, in most of the dewormed cow-calf herds, the relative abundance of *C. punctata* or *C. oncophora* was greater than that of other GIN species. The relative abundance of *C. punctata* was noticeably higher in one province (Manitoba) compared to that of other provinces. In feedlot steers, *O. ostertagi* was predominant in the control group pre- and posttreatment and in the IVM group pre-treatment. However, *C. oncophora* was predominant in the IVM group post-treatment. There was a marked increase in the relative proportion of *H. placei* in steers post-IVM treatment. No larvae were recovered from post-treated steers that received the combined IVM and fenbendazole treatment.

Significance

These results confirm that *O. ostertagi* is generally the most abundant GIN in the western Canadian beef operations sampled here. The regional and post-deworming predominance of *C. punctata* is noteworthy and must be explored further. *Cooperia punctata* is traditionally more abundant in more southern, tropical regions and has the potential for significant production impacts. Differing anthelmintic susceptibility is likely an important risk factor for the GIN species diversity in these cattle from western Canada.