



OAHN FINAL REPORT

Project #: 05B

Project Title: SEROPREVALENCE OF BORRELIA BURGdorFERI AND ANAPLASMA PHAGOCYTOPHILUM INFECTION IN ONTARIO HORSES

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Start date: **End date:**

Executive Summary

The overall prevalence of *B. burgdorferi* exposure for all of Ontario was 14% (80/564), with pronounced regional variability. The prevalence in horses appears to be highest in Eastern Ontario, where 27 of 115 (24%) samples tested positive. The prevalence in Southern Ontario was 15% (40/269); Central Ontario was 10% (14/146) and in Northern Ontario the prevalence was found to be 6% (2/33). Half of the horse owners surveyed reported that they regularly check their horses for ticks, however; of that, 15% reported that they have found a tick on their horse. The majority of the horses (47%) were reported to live outside 24/7 on grassland, particularly in the summer months during tick season.

Introduction

Lyme borreliosis and anaplasmosis are diseases caused by infection with *Borrelia burgdorferi* and *Anaplasma phagocytophilum* respectively and both organisms are transmitted in Ontario by the deer tick, *Ixodes scapularis*. Whilst the distribution of *B. burgdorferi* and *A. phagocytophilum* infection in the Ontario canine population is becoming better known as it aligns with the distribution of the tick, the distribution of these infections in the horse is only speculative. Horses continue to be diagnosed with Lyme disease, with and without supporting evidence, resulting in potential misdiagnoses and health risks as well as inappropriate antibiotic treatment with tetracycline. The potential for antimicrobial resistance to tetracycline in Ontario horses carries a greater risk as horses with suspected Lyme disease are often treated for 30 days or more.

Anaplasmosis is a new and emerging disease in Ontario with only one case officially diagnosed. The distribution of *A. phagocytophilum* is assumed to resemble that of the dog and thus affecting the eastern counties predominantly however since horses live in environments different from dogs and are exposed to ticks for longer periods of time, there might be areas of the province that are more problematic for horses. As the climate continues to change, the distribution of *I. scapularis* is estimated to cover a large proportion of the province. Seroprevalance of these tick borne infections in the horse can provide

insight into the tick distribution presently and can be used as an indirect indication of tick spread when monitored over time. Risk factors for seropositivity and/or the development of Lyme disease/anaplasmosis has not been determined in Ontario for horses. Although environmental conditions will play an important role, there may be other contributing factors such as age, breed, sex or tick control methods that contribute to the development of infection and potentially disease.

Objectives

The overall goal of the project was to unite equine veterinarians and the equine industry in a project with applicable outcomes that will improve the health of the Ontario herd overall. The specific objectives were:

- To determine the seroprevalence of *B. burgdorferi* and *A. phagocytophilum* in Ontario horses
- To determine risk factors associated with seropositive test results for *B. burgdorferi* and *A. phagocytophilum* as well as attitudes towards these tick-borne diseases and management practices used by horse owners/barn managers to mitigate them.

Materials and methods

Equine veterinarians from across Ontario were asked to participate in the study through a letter developed by the team. The letter stipulated the type of sample required (serum) and that the project team was seeking horses that don't travel, who live outside or are outside for a minimum of 6 hours a day in a field with access to or near wooded areas.

A number of samples will be taken from horses residing in counties in southern Ontario.

A total of 118 veterinary clinics/equine veterinarians agreed to participate and supplies to sample as many as 10 horses were shipped to each location. Therefore, potentially as many as 1200 horses could be sampled.

The supplies were accompanied by a questionnaire determining attitudes towards Lyme and anaplasmosis, methods of tick control, previous horses diagnosed with either disease or suspected of disease and their associated clinical signs. Risk factors for seropositivity/disease development will be determined with this information.

Results

As mentioned above, our objectives were to 1) to identify the prevalence of *B. burgdorferi* and *A. phagocytophilum* seropositivity in Ontario horses; 2) identify geographic risk factors; and we also 3) compare an in-clinic SNAP test to a Lyme multiplex assay.

Veterinary clinics (n=80) from across Ontario enrolled to participate in the study. Blood serum samples from 564 horses were submitted along with a questionnaire which evaluated demographics, clinical history and farm management of each horse in the study.

Sera were examined with an IDEXX SNAP 4Dx test, and by an equine Lyme multiplex assay at Cornell University.

The SNAP test detects antibodies to *B. burgdorferi* and *A. phagocytophilum*, and is marketed for use in dogs, however; the test is not species specific. The antigen for *B. burgdorferi* can distinguish between natural infections and response to vaccination as well as detect coinfections.

The multiplex assay detects outer surface protein specific antibodies produced by the *B. burgdorferi* bacteria. Three main outer surface proteins (Osp) A, C and F, correlate to the various infection stages. OspA is associated with very early infections or a response to vaccination, OspC is detected during acute infection, and OspF is an indicator of a chronic infection.

The overall prevalence of *B. burgdorferi* exposure for all of Ontario was 14% (80/564), with pronounced regional variability.

The prevalence in horses appears to be highest in Eastern Ontario, where 27 of 115 (24%) samples tested positive. The prevalence in Southern Ontario was 15% (40/269); Central Ontario was 10% (14/146) and in Northern Ontario the prevalence was found to be 6% (2/33). The agreement level between the two tests was found to be low, with the highest level of agreement found between the SNAP test and OspF ($\kappa=0.28$). On the SNAP test, approximately 5% (27/564) of the samples were positive for *B. burgdorferi*, and 1% (6/564) were positive for *A. phagocytophilum*, of which 3 horses were coinfecting. Outer surface protein F (OspF) was the most frequently found antibody on the multiplex assay at 8% (45/564), while the overall prevalence with the multiplex assay was approximately 12% (65/564).

Half of the horse owners surveyed reported that they regularly check their horses for ticks, however; of that, 15% reported that they have found a tick on their horse. The majority of the horses (47%) were reported to live outside 24/7 on grassland, particularly in the summer months during tick season. As a common host for ticks, it was not surprising that the most prominent wildlife was found to be deer, and least prevalent were opossums. Further investigation of these distribution and risk factors for *B. burgdorferi* and *A. phagocytophilum* exposure will aid in the continued monitoring and prevention of the disease.

Communications

This research project was presented at the Annual General Meeting of the Ontario Association of Equine Practitioners (OAEP).

An abstract was published on the March edition of the AHL-Newsletter (<https://www.uoguelph.ca/ahl/sites/guelphlabservices.com.ahl/files/ANwsl21-1-Mar2017.pdf>) and had been accepted as an oral presentation in the Canadian Animal Health Laboratorians Network (CAHLN), June, 2017.