The Association Between *Neospora caninum* Serological Status and Culling in Ontario Holsteins

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Introduction

Neospora caninum is a protozoan parasite that is an important cause of abortion in cattle. To determine the economic impact of *N. caninum* on the dairy industry it is necessary to consider both the direct effect of infection, such as abortion, and potential indirect effects such as altered milk production, reproductive performance and culling. One study involving a large California dairy herd showed that seropositive first lactation cows are at greater risk of being culled than seronegative first lactation cows. However, it is unclear whether this increased risk of culling applies to all parity groups and all dairy herds with seropositive animals. The objective of the present study was to determine if *N. caninum* serological status in Ontario Holsteins is associated with time until culling and risk of being culled.

Materials and Methods

In summer 1998, sera were collected from cattle in 59 herds that participated in the Ontario Sentinel Herd Project. However, it was not until the summer or fall of 1999 that these sera were analysed for *N. caninum* antibodies using a kinetic enzyme-linked immunosorbent assay (ELISA). Twenty-one producers were informed of the test results in summer 1999 because they had been selected as part of a *N. caninum* case-control study. The remaining 38 producers were informed of the test results in summer 2000. Due to these circumstances, one-to-two-year time period existed in which producers were unaware of the *N. caninum* serological status of their cows. Serological data for each animal was combined with Ontario Dairy Herd Improvement (DHI) records collected at the time of bleeding and culling.

Results and Discussion

Sera from a total of 3592 cows were collected and tested. The resulting data set contained 3412 Holstein cattle from 56 herds. Herd seroprevalence ranged from 0-68.3%, with an average of 10.5%. In the two year time period a total of 1572 (46.1%) animals were culled without producer knowledge of *N. caninum* serological status. Out of 359 (51.3%) *N. caninum*-positive animals, 184 were culled. Average time from bleeding to culling was 289 days (95% CI, 280-299 days) for seronegative cows and 296 days (95% CI, 269-323) for seropositive cows. Survival analysis using Cox proportional hazards models was used to determine if risk of being culled was different between seropositive and seronegative cows. Models included the following variables: serological status, lactation category, actual 305-day milk production, days in milk and linear score (Table 1).

In contrast to data from the California herd, these data illustrate that *N. caninum* serological status was not associated with earlier culling, nor does it increase the risk of being culled in Ontario Holstein herds after adjusting for the effects of lactation category, actual 305-day milk production, days in milk, and linear score at time of bleeding.

Table 1. Risk ratios and p-values for various models using Cox proportional hazards regression.

Variable Serological	All cows	Herd Sero-prevalence 1-9%	10-20%	>20%
p-value	0.16	0.45	0.29	0.88
Risk ratio	1.12	0.863	1.168	1.019