Comparing *Neospora caninum* serology results with pregnancy success and subsequent congenital infection in a South Dakota commercial cow calf herd

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Introduction

A 300-cow spring-calving commercial beef herd in northeastern South Dakota experienced an unusually high rate of reproductive failure in a group of home-raised and -bred first-calf heifers during the 2015 spring calving season. In the course of a small-scale case-control investigation, *Neospora caninum* seropositivity was associated with reproductive loss in individual animals. As a result, the herd embarked upon a prospective serologic monitoring program to better understand the dynamics of *Neospora* infection in the herd, including incidence rates in replacement heifer groups, correlation with pregnancy, and incidence of congenital infection.

Materials and Methods

Two years of home-raised and -bred replacement heifer groups were tested for *Neospora caninum* serostatus at the time of their fall pregnancy checks in 2015 and 2016. (2014-born heifers n=113; 2015-born heifers n=60). Similarly, resident adult cows (n=202) were tested at the time of their fall pregnancy check in 2016. Serostatus of 2014-born heifers and 2016 resident adult cows was compared to serostatus of any heifers subsequently born to those dams. Serum samples were submitted to the South Dakota Animal Disease Research and Diagnostic Laboratory for *Neospora caninum* ELISA testing. Percent inhibition values greater than 30 were considered positive. Pregnancy was determined through ultrasound and follow-up palpation.

Results

For 2014-born heifers, 18.5% were seropositive for *Neospora*; seropositive heifers were significantly more likely to be open at their fall pregnancy exam than seronegative heifers (relative risk = 2.54; 95% CI=1.43-4.49). For 2015-born heifers, 16.4% were seropositive; seropositive heifers were more likely to be open at their fall pregnancy exam than seronegative heifers (relative risk = 1.49; 95% CI=0.59-3.74). For the resident adult cows at the fall 2016 pregnancy exam, 15.8% (32/202) were *Neospora*-seropositive. For this population, seropositive cows were more likely to be pregnant than were seronegative cows (relative risk for being open = 0.72; 95% CI=0.23-2.28). Of 108 mother-daughter pairs for which serologic data was available over the 2 years, seropositive mothers were significantly more likely to have a seropositive daughter compared to seronegative mothers (relative risk = 13.43; 95% CI=6.04-29.86).

Significance

For this particular beef herd, *Neospora*-positive heifers were found to be at higher risk of reproductive failure compared to serologically negative heifers, although statistical significance was demonstrated in only 1 of 2 years of bred heifer crops. *Neospora*-positive adult cows were found to be more likely (though not statistically significant) to be pregnant compared to seronegative cows, suggesting the possibility of age- or immune-related protection against reproductive failure. The seropositive cows that retained their pregnancies showed a significantly higher risk of giving birth to a congenitally-infected calf compared to seronegative cows. In this herd, culling *Neospora*-positive replacement heifers would be expected to positively influence herd reproductive performance; however, using *Neospora* serologic status to make culling decisions in the older cows may be counterproductive to herd reproductive performance. This work demonstrates the potential utility of serologic profiling for *Neospora* as 1 component in reproductive decision-making in a commercial cow-calf herd.