An Estimate of the Proportion of Beef Cattle Herds with *Mycobacterium avium* subspecies *paratuberculosis*-Infected Cattle and Associated Risk Factors

David R. Smith, *DVM, PhD[1];* **Thomas J. Schomer,** *DVM[2];* **Susanne Hinkley,** *DVM, PhD[1];*
Sharon Clowser, *BS[1];* **Judith A. Galeota,** *BA[1];* **James C. Weiss,** *DVM[2];* **Kathleen J. Akin,** *DVM[3]*
[1] *Department of Veterinary and Biomedical Sciences, University of Nebraska–Lincoln, Lincoln, NE*
[2] *Bureau of Animal Industry, Nebraska Department of Agriculture, Lincoln, NE*
[3] *Veterinary Services, Animal Plant Health Inspection Service, United States Department of Agriculture, Lincoln, NE*

Introduction

Mycobacterium avium subspecies *paratuberculosis* (MAP), the agent of Johne's disease, spreads through beef cattle herds with little awareness by beef cattle producers. The objectives of this study were to accurately estimate the proportion of beef cattle herds with 5% or more of the adult herd infected with MAP, and to identify herd-level practices and conditions associated with Johne's disease herd status so that veterinarians could help beef cattle producers accurately assess and/or modify their risk for introducing MAP into, and allowing it to spread within, their herds.

Materials and Methods

One thousand five hundred Nebraska cattle producers, selected at random from a list of 5,000 producers with herds of 100 cows or more, were asked to volunteer their cattle herds for testing. Nebraska Department of Agriculture (NDA) staff concurrently collected samples of blood and feces from a sample size from each participating herd sufficient to assure 95% herd-level sensitivity and greater than 99.9% herd-level specificity, assuming 5% prevalence of infection within MAP infected herds. A serial testing strategy was used to classify herds according to Johne's disease status. ELISA serology was conducted on serum upon arrival to the Nebraska Veterinary Diagnostic Laboratory (NVDL). Fecal samples were stored at 39°F (4°C) until ELISA serology results were available, and feces from ELISA-positive cattle were then set-up for culture. The culture of MAP from at least one animal classified the herd as Johne's disease-positive. Failure to culture the organism from any ELISA-positive cattle classified the herd as Johne's disease-negative. For each herd, NDA staff completed Johne's disease risk assessments designed by the National Johne's Disease Working Group.

Results

Seventy-three beef cow herds from 42 Nebraska counties underwent herd-testing and risk assessment. Nebraska Department of Agriculture (NDA) staff were not aware of the Johne's disease status of the herd at the time they collected samples or completed risk assessments. In total, the herds tested represented 20,865 adult beef cows. The median herd size was 209 adult cattle; herds ranged in size from 94 to 1,700 adult cattle. A total of 15,402 cattle were tested by ELISA serology. Of these, 421 (2.7%) cattle tested ELISA positive. There was at least one ELISA-positive animal in 68 of the 73 herds (93%). The feces were culture-positive for MAP from 18 of the 421 ELISA-positive cattle. These 18 cattle originated from nine herds. Therefore, nine of 73 herds (12.3%, 95% CI: 5.8%, 22.1%) were classified as Johne's disease-positive herds. The variable that best explained Johne's disease herd status was a score of greater than zero for the presence of Johne's disease clinical or suspect cattle in the calving area (odds ratio (OR) =14.0, relative risk (RR)=8.4, p=0.003). Among herds with Johne's disease suspect cattle present in the calving area, this factor was attributable to 88.1% of the risk (95% CI: 58%-97%) to have Johne's disease. Among the entire population of study, having a Johne's disease suspect present in the calving area was attributable to 58.8% of the risk (95% CI: 39%-64%) for herds to have Johne's disease.

Significance

We concluded that MAP infected cattle are present within an important proportion of Nebraska beef cow herds. Also, educating cattle producers about the risk of leaving Johne's disease suspect cattle in the calving area (or among pre-weaned calves) might have a great impact on reducing the prevalence of the disease in beef cattle herds.