# A Relative Comparison of Diagnostic Tests for Johne's Disease

**Hendrick S.,** *DVM*[1]; **Duffield T.,** *DVM, DVSc*[1]; **Kelton D.,** *DVM, MSc, PhD*[1]; **Leslie K,** *DVM, MSc*[1]; **Lissemore K,** *DVM, MSc*[1]; **Archambault M,** *DVM, MSc, PhD*[2]
[1]*Department of Population Medicine, University of Guelph, Guelph, Ontario*
[2]*Animal Health Laboratory, University of Guelph, Guelph, Ontario*



## Introduction

Prevention and control of Johne's disease would be much improved if diagnostic tests were able to reliably determine the infection status of subclinically infected cows both rapidly and economically. Serology-based tests offer the convenience of quick diagnosis at a low cost, but their precision and accuracy remain questionable. The objective of this study is to evaluate a commercially available milk ELISA test relative to other diagnostic tests, and determine if it offers any improved test characteristics.

## Materials and Methods

Herds with a suspected high prevalence of Johne's disease were enrolled in this trial. Fecal and serum samples were collected from all milking and dry cows from 32 dairy herds in southwestern Ontario. Serum samples were tested in duplicate for antibodies with an IDEXX enzyme-linked immunosorbent assay (ELISA) (Animal Health Laboratory (AHL), Guelph, ON, CAN). Cows with a corrected optical density (OD) ratio greater than 0.25 were considered positive for Johne's disease. Milk samples preserved with bronopol were collected at the following Dairy Herd Improvement (DHI) test day. These milk samples were sent to Antel Bio Corporation (Lansing, MI, USA) for an in-house milk ELISA test. Cows with a corrected OD of greater than 0.1 were considered positive for Johne's disease. Cows identified as positive on either the serum or milk ELISA test had their corresponding fecal samples tested. Feces were tested with all three of the following: traditional fecal culture (Antel Bio Corp.), an IDEXX fecal PCR probe (AHL), and radiometric fecal culturing using the BACTEC culturing system (AHL).

## Results and Conclusions

Some 2148 serum samples were evaluated, with 286 of these being positive (13.4%). Only 1699 cows were milking on DHI test day, with 124 of these samples testing positive on milk ELISA (7.3%). The kappa statistic between the milk and serum ELISA for the 1699 cows tested was 0.45 (0.38, 0.52). Three hundred twenty six cows were identified as positive on one or both of the ELISA tests. Of the ELISA-positive cows (either milk or serum), 144 were positive on traditional fecal culture (44.2%), while only 62 were identified positive on fecal PCR (24.1%). The BACTEC culture results of the ELISA-positive cows are still pending. Fecal samples totalling 686 from ELISA-negative cows are still being traditionally cultured at this time. In total, complete fecal cultures from nine herds (874 cows) will be analysed. Preliminary statistics were calculated for 257 cows having milk, serum, fecal PCR and fecal culture results. The positive predictive value (PPV) for the milk ELISA in reference to fecal culture was 61.3%, and the PPV for the serum ELISA as compared to fecal culture was 45.2%. The kappa statistic between fecal PCR and fecal culture was 0.57 (0.47, 0.68). The milk ELISA test appears to be a reasonable approach to predicting fecal shedding status. The performance of the fecal-based tests (i.e., culture and PCR) remain superior, but the convenience and economics of the milk ELISA may make it a more favorable screening test.