Development of a Bulk-tank Surveillance Program for Johne's Disease in New York Dairy Farms

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Introduction

Johne's disease in dairy cattle is caused by *Mycobacterium avium* subsp *paratuberculosis* (MAP). Diagnostic testing is an important tool to identify infected animals, however individual animal testing is expensive and labor intensive. A screening test to reliably identify herds with a significant MAP problem would be of great value to the industry. To evaluate the value of a bulk-milk screening test, we collected data on MAP infection status based on 1) fecal culture of cows in the herd, and 2) contemporary environmental samples, and compared these two estimates of MAP infection status to a bulk-milk MAP ELISA titer.

Materials and Methods

Between June 2007 and January 2009, we enrolled 99 farms in this study. These herds were selected from the New York State Cattle Health Assurance Program (NYSCHAP) Johne's Module participants. Herds enrolled in this program are encouraged to participate in annual fecal culturing. The cost of testing is subsidized by the state of New York. Herd managers make their own decision in terms of the extent of fecal or serological testing for Johne's disease that is appropriate to support control in their herd. The fecal and serological testing results were used in this study to evaluate the ability of a bulk-milk MAP ELISA test to identify herds with important Johne's disease problems. Detection of antibodies against MAP, the causative agent of Johne's disease, was done using the IDEXX-Pourquier milk ELISA. To evaluate the usefulness of this milk ELISA for Johne's disease detection at herd level, ELISA results were compared to MAP herd status as determined by 1) culture of concurrently collected six environmental samples and 2) historical fecal or serological culture results of any animals in the herd during a one-year period before sampling of the bulk tank.

Results

The relationship between bulk milk ELISA S/P and percent fecal-positive cows that were lactating at the time of bulk-tank sampling was determined. Regression results where ELISA S/P was used as a predictor for percent fecal-positive showed a statistically significant association. Predicting fecal culture-positive prevalence, bulk-milk ELISA explained 45% of variation (R-squared) with a regression coefficient of 0.002 (SE 0.0003, *P*-value <0.0001). In comparison, when the environmental MAP load was used as a predictor variable for the percent fecal-positive cows, the percent explained variability was 10%, and the environmental load had a regression coefficient of .0036 (SE 0.0014, *P*=0.011), indicating a prediction of the percentage of lactating cows that are MAP infected that is much less reliable, compared to bulk-tank ELISA S/P.

Significance

The value of bulk-milk ELISA testing lies especially in predicting herd prevalence of MAP fecal shedders. The bulk-milk ELISA results appear reliable in predicting whether a herd has a significant MAP prevalence or not. Herds with an estimated fecal MAP prevalence over 3% would be advised to perform further diagnostic evaluation of individual animals. Based on the animal testing results, further management practices would be advised to reduce MAP transmission in herds. Subsequently, bulk-milk ELISA testing may be used to monitor herd status over time.