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ST. PAUL, MINNESOTA
UNITED STATES OF MINNESOTA

Detecting Johne's Disease Heavy Shedders in Dairy Cows

LA Espejo and SJ Wells. University of Minnesota, Department of Veterinary Population Medicine, St. Paul, MN 55108.

Cows that shed high concentrations of *Mycobacterium avium* subsp. *paratuberculosis* (Map) in feces into the environment (heavy shedders) play an important role in the transmission of Johne's disease to susceptible cattle. In addition, economic losses due to decreased body weight and milk production are also associated with heavy fecal shedding. Heavy fecal shedding can be identified through bacterial culture of feces, though this method is costly and requires a long period of incubation prior to detection. Other methods of detection are available, including pooling of fecal samples and use of direct fecal PCR, though efficacy for detection of heavy fecal shedders within pooled samples has not yet been demonstrated.

The objective of this study was to identify alternative cost-effective methods to identify heavy shedders in dairy herds. Fecal samples were collected from dairy cows in 7 herds participating in the Minnesota Johne's Disease Demonstration Herd Project. Samples were collected at both group and individual levels: pooled environmental fecal samples from pens in which cows were located as well as individual cow fecal samples. Pooled environmental and individual cow samples were tested using bacterial culture and direct fecal PCR at the Minnesota Veterinary Diagnostic Laboratory. In addition, at the laboratory, individual cow fecal samples were pooled in groups of 5 and 10 individual samples per pool and tested using both assays. The outcome of interest was heavy shedding cows (greater than 50 colonies per tube using bacterial fecal culture).

Preliminary results indicated that the apparent cow-level prevalence of Map using bacterial culture of feces was 4.8%, and the apparent prevalence of Map heavy shedding cows was 0.9%. Compared to results from bacterial culture of individual cow fecal samples, the sensitivity for detection of at least one heavy fecal shedding cow in pens using environmental samples was 100% for fecal culture and 25% for fecal PCR. The sensitivity for detection of at least one heavy fecal shedding cow in pools of 10 cows per pool was 100% for fecal culture and 80% for fecal PCR. The sensitivity for detection of at least one heavy fecal shedding cow in pools of 5 cows per pool was 100% for fecal culture and 88% for fecal PCR.

In summary, bacterial culture of feces was more sensitive than fecal PCR to detect groups of cows with at least one heavy fecal shedder using pooled environmental fecal samples. The direct fecal PCR is an alternative method to bacterial culture on pooled fecal samples for detection of heavy shedders.