A calfhood vaccine and early detection test for Johne’s disease

Project Title:
Evaluation of a Low Dose Vaccination of Calves and Early Immune Response for MAP

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Background:
Johne’s disease is caused by Mycobacterium avium subspecies paratuberculosis (MAP), and results in economic losses due to reduced feed efficiency, early culling, and depressed milk production. Presently, Johne’s disease control measures are based on management measures to avoid infection.

The major challenge with Johne’s disease is the detection of early shedders of the bacteria. Current diagnostic tests have poor sensitivity, which means that infected animals are often not detected. This makes efforts to eliminate the disease through test-and-cull strategies in herds ineffective.

Objective:
To determine whether (a) treating newborn calves with low doses of MAP will stimulate a protective immune responses, and (b) skin testing with purified MAP proteins and measurement of blood interferon and immunoglobulin levels can be used to detect chronic MAP infection in calves.

Calfhood Vaccination:
Johne’s-free calves will be vaccinated by feeding a small amount of milk replacer to calves containing a K-10 strain of MAP. Various doses will be used to induce a range of immune responses. At two months of age, half of the calves will be challenged with a known infective dose of K-10 MAP in milk replacer. Blood samples will be drawn every two weeks throughout the study for interferon and immunoglobulin detection. Fecal cultures for MAP will be performed monthly. Each calf will have two intradermal skin (ID) tests completed 90 days after low dose vaccination, and two months after experimental infection. All calves will be necropsied at six months of age and a series of tissues will be collected for culture and histologic evaluation.
Early MAP Detection:

A skin test containing purified MAP proteins will be tested in 400 calves from beef and dairy herds with a history of Johne’s disease. Calves will be tested repeatedly for the first few months of life. Skin thickness at the injection sites will be measured 72 hours later. Blood will be drawn for immunoglobulin and interferon levels. Calves will be followed into production and fecal cultures will be submitted four times per year for three conses.

Implications:

Effective detection of subclinical MAP infected animals and herds would be of tremendous value in reducing the prevalence of bovine Johne’s disease.

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