

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

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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 a long-standing infection that causes a very gradual thickening of the intestines reducing the nutrients the cow can absorb, resulting in weight loss, diarrhea and eventually death. It 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 challenges with Johne's disease are that vaccines (which aren't available in Canada) reduce shedding but don't prevent the disease, and that diagnostic tests do not work well in the early stages of infection. Current diagnostic tests have poor sensitivity, which means that infected animals are often not detected. For a few years after they were initially infected. During this period they can periodically shed MAP at low levels, allowing other cattle in the herd to become infected. 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 response and (b) skin testing with purified MAP proteins and measurement of blood interferon and immunoglobulin levels can be used to detect MAP infection in calves.

What They Did:

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

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

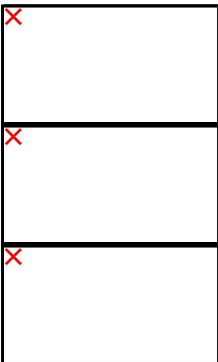
What They Learned:

Unfortunately, there were numerous complications with this project, in particular issues importing the specific strain of MAP and not being able to multiply the MAP strain in the lab once they did receive it, there were additional challenges when half of the calves designated for this trial contracted salmonella and the trial had to be delayed. As a result of the delays, and inability to get the planned strain of MAP to grow properly, researchers were unable to show that either the vaccination or skin test were able to aid in the detection or prevention of Johne's disease in beef cattle.

What it Means:

Despite good planning and a properly laid out research design, sometimes research just doesn't work out. This is one of those times. The conclusions from this trial are not necessarily that vaccination with MAP is ineffective but that learning from the complications faced in this trial, more research needs to be done into determining the effectiveness these methods to treat and detect MAP infection in calves.

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