Identifying pre-clinical MAP infected cattle

**Project Title:**
Identifying Mycobacterium avium subsp. paratuberculosis (MAP) exproteome components recognized during early infection to develop diagnostic and vaccine targets

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**Background**

*Mycobacterium avium* subspecies *paratuberculosis* (MAP) causes Johne’s disease (JD), a chronic infectious disease of ruminants. Infection normally occurs in the neonatal period when calves ingest an infectious dose of MAP but clinical, irreversible and ultimately fatal disease does not occur until years later. In the meantime, animals with preclinical JD may look healthy while still shedding MAP in their feces, transmitting the disease to new animals.

There are no effective vaccines or treatments, and diagnostic tests fail to identify many infected animals in the pre-clinical state. A reliable, sensitive, specific diagnostic test that accurately identifies MAP carriers in the early stages of infection would greatly help efforts to control the disease.

One potentially promising approach involves identifying cell mediated immune responses (CIMR) and antibody responses. It is known that CIMR declines and antibody responses increase at the time that animals enter the clinical stage of the disease, but CIMR tests are not specific enough for diagnosing JD in the early stages.

**Objectives**

The main objective of this study is to identify proteins secreted by MAP that can elicit a MAP-specific CIMR.

**What they will do**

These researchers have identified two proteins secreted by MAP that induced strong CIMR in calves one-month after MAP infection. This indicates that systematic screening of the proteins secreted by MAP is the best approach to identify novel targets for a CIMR-based test to detect early-stage JD. In this study, the researchers will identify the rest of the proteins secreted by MAP and
generate recombinant versions. The ability of each protein to elicit a mucosal T-cell response will be determined, and the presence of these T-cells in blood will be determined.

**Implications**

The availability of well characterized MAP specific epitopes which induce CMIR early in infection would improve test sensitivity and specificity and facilitate effective management interventions to control MAP in beef herds.

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