Implications of Calf-to-calf Transmission of *Mycobacterium avium* subspecies *paratuberculosis* (MAP) for Johne's Disease Management

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Johne's disease (JD) is a chronic, progressive, inflammatory disease caused by *Mycobacterium avium* subspecies *paratuberculosis* (MAP). In the subclinical phase, cows have decreased milk production, increasing their risk of being culled. JD is usually transmitted through ingestion of MAP-contaminated material, such as contaminated feed and milk. A common assumption is that only cows are infectious and only calves are susceptible; this has lead to one of the reasons for separating calves from their dams and placing them in calf barns. The potential risk of calf-to-calf transmission is largely overlooked in current JD prevention and control programs; however, recent research has confirmed that calves can actively shed the bacterium. Therefore, placing calves together may not completely eliminate the spread of MAP. The aims of this study are to: 1) quantify the extent to which transmission of MAP occurs between penmates; and 2) determine onset and duration of MAP shedding after infection. We hypothesize that infectious calves will infect susceptible penmates and this will be detected in fecal and blood samples.

Materials and Methods: The challenge experiment involves 32 newborn calves obtained from MAP-negative heifers. Calves are randomized into 7 groups of 4 calves, 2 of which are inoculated, and 2 sentinel calves. During the 3 mo of group housing, blood, fecal and environmental samples will be collected 3 times a week, and extensive tissue sampling at the end of the trial to confirm and identify the extent of transmission. This study is currently underway.

Implications: The results obtained from this study will not only add to our understanding of MAP transmission, but also generate new knowledge regarding patterns of shedding and immune responses between penmates. Due to the increase in group-housing scenarios due to the development of new technologies, it is important to understand how transmission changes in these environments. With a better understanding of transmission in calves, more effective protocols can be implemented in order to mitigate or minimize the spread of MAP.