**2009F023R Age dependent susceptibility of Mycobacterium**

**avium subsp paratuberculosis infection in calves**

**UCVM, Jeroen De Buck**

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Background: Johne’s disease (JD) is a chronic infectious enteritis caused by MAP bacteria. JD is estimated to cost the Canadian dairy industry $15-90 million annually due to lost milk production, premature culling and reduced slaughter value. Herd level prevalence in AB ranges from 28 – 57 % the highest in the country. The exact age dependent susceptibility of calves to JD has not scientifically been determined.

Objectives:

* Determine the age cut-off got susceptibility to infection with a high dose of MAP
* Determine the age cut-off got susceptibility to infection with a low dose of MAP
* Determine the onset of detectable humoral and cellular immune response against MAP depending on age and infection dose
* Determine shedding regimes depending on age and infection dose

Methods: 50 calves were inoculated with MAP at 5 different ages (2 wk, 3 mo, 6 mo, 9 mo, and 12 mo) with 6 calved not inoculated (negative control). Within each of the 5 age groups containing 10 calves, 5 calves were infected with a high dose (5 x 109 CFU) and 5 with a low dose (5 x 107 CFU). Calves were euthanized at 17 mo and 21 tissue samples were taken from each calf and scored for macroscopic lesions. Blood serum samples were analyzed for MAP antibodies.

Outcome:

* Animals up to 1 year of age are susceptible to MAP infection. Both the high and low dose inoculation resulted in the same proportion of calves infected with MAP in all age groups. Additionally, 2 of the control calves also had MAP positive tissue samples
* A humoral immune response was detected in about 50 % of the calves inoculated. A humoral response was detected early after infection in the subclinical stage. Calves inoculated at a younger age had a delayed humoral immune response; calves older than 6 mo up to 1 yr are still susceptible to MAP infection. A cellular immune response was present in all age a dose groups, however calves inoculated with a high dose showed a response earlier than low dose calves.
* Calves start shedding intermittently soon after inoculation with MAP, with a peak in the first 6 months after inoculation. Calves inoculated with a high dose shed more frequently than low dose calves.

Recommendations: Calves infected at a young age with shed MAP into the environment and may be a source of contamination for pen mates. As calves who received a high dose of MAP shed more frequently and contribute more to environmental contamination it is important to reduce infection pressure on farm as much as possible. Additionally, cattle up to 1 year of age are still susceptible to MAP infection and infection should be prevented at all ages.

Benefit to Industry: knowledge was gained about the infection of MAP and could be used by Canadians to improve the existing control programs as these primarily focuses on calves 6 mo and younger.

KTT:

* 1 PhD Student, 26 undergraduate students, 4 lab technicians
* 8 manuscripts prepared for submission to scientific journal
* 8 abstract presentations at various conferences