

***Mycobacterium avium* ssp *paratuberculosis*: what the bison industry can learn from wildlife research** - Dr. Taya Forde, PhD Student Veterinary Faculty, Calgary

Wood bison have a certain level of notoriety in Canada as carriers of infectious diseases. Due to historical contact with cattle, the bison in Wood Buffalo National Park and surrounding area represent one of only two remaining reservoirs for bovine tuberculosis, and the only reservoir of bovine brucellosis in Canada. They are also highly susceptible to anthrax, with reported mortalities occurring in wood bison in Canada nearly every year. These important, notifiable diseases tend to take the spotlight in terms of disease monitoring for this species. However, there may be other diseases that have been given less attention in the past that could also have an important impact on the long-term viability of wood bison. It is important, for example, to consider the risk of disease transmission when moving animals between herds or to new locations. Wood bison translocation has been essential for establishing new free-ranging herds within their historical range, which is an important conservation goal for this subspecies.

One disease that could be important for bison health is Johne's disease, caused by *Mycobacterium avium* ssp *paratuberculosis* (Map). Johne's disease has been well described in plains bison, and has resulted in significant production losses in infected herds in the US. Infected animals gradually develop intestinal thickening that leads to weight loss and occasionally diarrhoea, and these individuals eventually succumb to the disease. Since weight loss is very non-specific, clinical diagnosis of this disease can be challenging. Please see the fall issue of Bison Link for more information about Johne's disease.

Although bison are susceptible to cattle strains of Map, a 'bison-type' strain has also been described by Whittington and others in plains bison, and unique strains were found by Sibley and others in wood bison in northern Canada. These strains are more difficult to culture in the lab than cattle strains. Since bacterial culture is one of the most common diagnostic techniques, the detection of Map may be more challenging in bison than it is in other species. Our project focuses on optimizing diagnostic tools for Map detection in bison samples in order to study the occurrence and distribution of Map in free-ranging wood bison herds across northern Canada. Although our research focuses on wood bison, these tools could equally be applied to detecting Map in commercial plains bison.

The most common diagnostic tools used for detecting Map are: bacterial culture (growing the bacteria from feces or tissue), polymerase chain reaction (PCR) (detecting bacterial DNA in feces or tissues), and serum ELISA (which detects antibodies against the bacteria from blood samples). Culture is the "gold standard" for Map diagnosis, although it is expensive (about \$50/test) and requires 2 months to obtain results. PCR can be performed at about half the cost of culture, and results are available within a day. ELISA is also rapid and relatively inexpensive, although this test misses many positive cases, especially when the animal is in the early stages of infection.

So far we have shown that a commercially available serum ELISA kit (IDEXX) can be used to detect antibodies against Map in bison. We have also validated the use of a PCR technique to detect Map DNA directly from fecal samples (thus enabling detection of Map without the need to culture), and have received accreditation for the use of this technique through the USDA. We

are currently working towards optimizing a culture technique for growing the Map strains found in wood bison, and will then compare the sensitivity of the three diagnostic tools.

To perform test comparison, we will be using “paired” samples - feces, tissue (small intestine and lymph node) and serum- that were collected from the same animals. Partners from the Department of Environment and Natural Resources, Government of the Northwest Territories have been collecting these samples since 2007, and we also partnered with Alberta Fish and Wildlife to collect samples during the commercial hunt on the Hay Zama herd this past January, 2011. Once all diagnostic tools are optimized, we will be testing wood bison samples from a number of herds across northern Canada, including the Mackenzie Bison and Grand Detour herds in the Northwest Territories, the Nordquist and Liard herds in British Columbia, the Hay Zama herd in northern Alberta, as well as bison from Wood Buffalo and Elk Island National Parks.

We hope that our research will provide wildlife managers with important information on the distribution of Map, which may assist in future decisions for source herds for translocations. We also hope that the diagnostic tools that we optimize for bison can be used for future disease monitoring in both wood bison and plains bison, and that these tools be made accessible to the commercial bison industry. Currently, little is known about the prevalence of Map in commercial bison in Canada. We hope that our research will be of interest and of benefit to the Canadian bison industry.

If you would like more information about Johne’s disease or about our project, please contact Dr. Taya Forde, PhD student (tforde@ucalgary.ca, 403-210-6788) or Dr. Karin Orsel, (Karin.orsel@ucalgary.ca, 403-210-6127) at the Veterinary Faculty in Calgary.