Lymphatic fluid used for first time to detect bovine paratuberculosis

September 19 2014

Credit: citronenrot/Vetmeduni Vienna

Paratuberculosis, also known as Johne's disease, is caused by the bacterium Mycobacterium avium subspecies paratuberculosis (MAP). In Austria, there is a legal obligation to report the disease. Paratuberculosis mainly affects ruminants and causes treatment-resistant diarrhoea and wasting among affected animals. The disease can cause considerable economic losses for commercial farms. The animals produce less milk,

exhibit fertility problems and are more susceptible to other conditions such as udder inflammation.

To date there has been no treatment for paratuberculosis. Affected animals must be reported and sacrificed. The meat of affected animals is not suitable for consumption and must be disposed of.

The disease usually manifests two to three years after the initial infection. In some cases, it can even take up to ten years before the disease becomes apparent. During this time, infected animals shed the bacteria, putting the health of the entire herd at risk.

Lymphatic fluid suitable for early testing

The bacterium MAP enters the body via the intestine and is passed to the animal's macrophages. These immune cells then migrate through the lymphatic fluid into the lymph nodes, the blood and other organs. Laboratory testing currently looks at faeces, milk and blood of animals suspected of being infected. First author Lorenz Khol of the Clinic for Ruminants at the Vetmeduni Vienna, in cooperation with the College of Veterinary Medicine at the University of Florida, developed a possible alternative method for early diagnosis of the infection. For the test, Khol takes fluid from the lymph vessels at the udder of the animals. Just a few millilitres are enough to detect the bacterium using PCR (polymerase chain reaction) in the lymph.

"Taking lymphatic fluid from cattle is not easy, but it can be performed effortlessly with some practice. The longitudinal vessels lie next to the veins under the skin of the udder and can only be punctured during lactation. As the macrophages can be found in the lymphatic fluid first, we believe that an infection can be diagnosed here substantially earlier and more quickly than with today's usual methods," says Khol.

Lymph tests positive more often than faeces, blood or milk

The scientists tested a total of 86 cows from different farms exhibiting symptoms of diarrhoea and weight loss. The lymph analysis yielded significantly more positive results than the analysis using faeces, blood or milk. "This is an indication of the higher sensitivity of our method. After one year, about 70 percent of all animals which were tested positive via lymph-PCR had been culled from their herds. These animals had developed various diseases or a reduced performance that made it necessary to remove the animals from the farm. In comparison, cows with a negative lymph result showed a 27 percent culling rate after one year only.

"The results show that the method is a promising one. We must still improve the technique, however, in order to increase the reliability of the results. The fact that there is no treatment for this disease makes comprehensive early diagnosis especially important," Khol explains.

More information: "Lymphatic fluid for the detection of Mycobacterium avium subsp. paratuberculosis in cows by PCR, compared to fecal sampling and detection of antibodies in blood and milk", by Johannes Lorenz Khol, Pablo J. Pinedo, Claus D. Buergelt, Laura M. Neumann and D. Owen Rae was published in the *Journal Veterinary Microbiology*. DOI: 10.1016/j.vetmic.2014.05.022

Provided by University of Veterinary Medicine—Vienna