

New blood test for the detection of bovine TB

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A new blood test to detect Mycobacteria in blood has been developed by a team at The University of Nottingham led by Dr Cath Rees, an expert in microbiology in the School of Biosciences and Dr Ben Swift from the School of Veterinary Medicine and Science.

The researchers have used this new method to show that cattle diagnosed with bovine tuberculosis (bTB) have detectable levels of the bacterium *Mycobacterium bovis* (*M. bovis*) in their blood which causes this disease.

'Evidence of *Mycobacterium tuberculosis* complex bacteraemia in intradermal [skin test](#) positive cattle detected using phage-RPA' has been published online in the peer reviewed medical journal *Virulence*.

Dr Rees said: "This test delivers results within 48 hours and the frequency in which viable mycobacteria were detected in the blood of skin test positive [animals](#) changes the paradigm of this disease."

This new, simple and inexpensive [blood test](#) detects very low levels of mycobacteria in blood using a bacteriophage-based technique developed by The University of Nottingham. The group has patented an improved version of the method that delivers results in just six hours. More recently 'proof of principal' experiments have shown that this is even more sensitive. This is currently licenced to a spin out company, PBD Biotech Ltd.

Bovine TB is a zoonotic infectious disease caused by *M. bovis*. The UK has struggled to eradicate bTB and control measures continue to be a

significant economic burden on the agricultural industry.

Routine testing for Bovine TB uses the Single Intradermal Comparative Cervical Tuberculin (SICCT) skin test for *M. bovis* infection and all healthy cattle are regularly tested this way. However, it is known that this test is only 90 per cent sensitive at best and misses many infected animals.

Dr Cath Rees said: "The data we are getting has taken the scientific community by surprise. In our paper we show that when blood samples from skin test negative cattle were tested for *M. bovis* cells, all the samples proved negative. However using just a 2ml blood sample, viable *Mycobacterium tuberculosis* complex bacteria (MTC) were detected in 66 per cent of samples from skin test positive animals. When the carcasses were inspected, it was found that the highest number of bacteria were detected in the animals with visible TB lesions (VL) and 85 per cent of these VL animals were *M. bovis* positive.

"More excitingly, using our new more sensitive six-hour method, this figure is even higher - all animals with visible lesions were MTC positive, and even 26 out of 28 animals where the lesions were not yet visible also were positive suggesting that *M. bovis* is commonly found in the circulating blood of infected animals."

Difficulties in detecting, growing cultures and achieving sensitive detection using the current skin test, which looks for the animal's an immune response, are a major barrier to understanding and diagnosing bTB infection. Early results indicate that *M. bovis* can be detected before the animal becomes SCCIT-positive.

Dr Rees said: "Using our bacteriophage-based test the hope is that we can help improve herd control by finding animals at the early stages of infection and helping farmers control outbreaks of bTB more rapidly."

Working with the United States Department of Agriculture, Agricultural Research Service, National Animal Disease Center, the Nottingham group has set up the first animal trial using the blood test to detect *M. bovis* in the blood of experimentally infected animals to determine exactly how soon this test can detect infection.

Dr Rees said: "The test also offers the potential for new, better tests for other farm animals. We are directly detecting the bacteria and so the method will work using blood samples from any animal species - so far we have detected mycobacteria in the [blood](#) of cattle, sheep and horses, but it could also be used for deer, goats or llamas.

"Not only that, we can detect any type of mycobacteria, we have use the same method to detect other diseases, such as Johne's disease, not just bTB."

More information: Benjamin M. C. Swift et al, Evidence of Complex bacteraemia in intradermal skin test positive cattle detected using phage-RPA, *Virulence* (2016). [DOI: 10.1080/21505594.2016.1191729](https://doi.org/10.1080/21505594.2016.1191729)

Provided by University of Nottingham

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