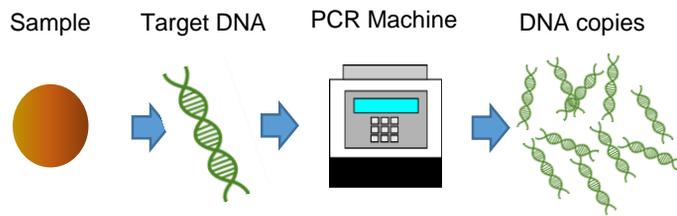


PCR tests for bovine TB

What is PCR?

Polymerase Chain Reaction (PCR) is a technique used in molecular biology whereby small amounts of target DNA are amplified by a chain reaction, which produces thousands or millions of copies. Quantitative PCR (qPCR) is a modified version of this technique where the amount of DNA can be quantified during the process.

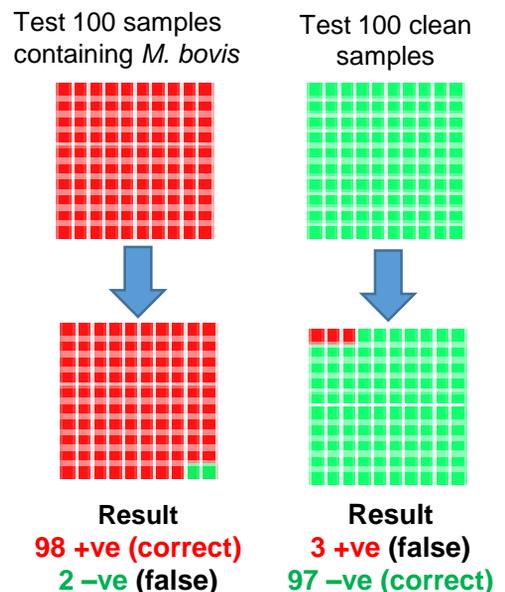


How can PCR be used to test for bovine TB?

Bovine TB is caused by the bacterium *Mycobacterium bovis* (*M. bovis*). If *M. bovis* is present in an environmental sample this will result in the presence of small amounts of DNA. PCR amplifies these tiny amounts of DNA, producing a quantity which is detectable. Researchers first trialed PCR to test for *M. bovis* in soil around badger setts and latrines [1], with later studies testing badger faeces to try to identify infected social groups [2].

How accurate is the PCR test?

M. bovis DNA breaks down rapidly when the bacterium dies (within 10 days [1]). So a positive PCR result, if accurate, indicates that live or recently deceased bacteria are present in the sample. A recent DEFRA study [3] found that the Warwick University PCR test had a sensitivity of 98% and a specificity of 97% when testing samples spiked with *M. bovis*. This means that for every 100 samples containing the bacteria, 98 would test positive and two would be false negatives. For every 100 samples containing no *M. bovis*, 97 would test negative, but three samples would be **false positives**.



Can PCR be used to identify infected badger groups?

PCR analysis of badger faeces can potentially identify infected social groups, but there are a number of limitations. Not all badgers in a social group will be infected and not all infected badgers will be shedding *M. bovis* in their faeces. This means that you may need to collect large numbers of samples to identify that a group has TB (5 to 50 in a recent study [4]), which is difficult and time consuming. PCR testing of 20 samples per social group in the summer identified 83% (4/5) of known infected groups at Woodchester Park in Gloucestershire [4]. However, testing large numbers of samples increases the risk of false positive results. Testing 20 samples per group would likely result in a 40% (2/5) chance that an uninfected group would falsely test positive for TB.



Can PCR be used to identify potentially infectious areas of a farm?

PCR testing can be applied to a wide range of samples including slurry, faeces, soil, or water, potentially identifying areas of the farm which are a source of infection. As the PCR test does not have a perfect level of accuracy, a positive PCR result can occur even when no *M. bovis* is present. DEFRA's position on PCR testing is that "*Private use of such tests is an option to inform biosecurity management decisions although anyone doing so should bear in mind the reliability of the tests and that Defra will not take official action on the basis of the results*" <http://www.tbhub.co.uk/tb-facts/research/update-methods-finding-tb-infection-badger-faeces/>

This factsheet has been created as part of a Knowledge exchange project in collaboration with the regional TB eradication groups. If you would like to know more about this or other TB related topics please contact a.robertson@exeter.ac.uk

References

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