

Polymerase Chain Reaction (PCR) testing for *M. bovis*

The Animal & Plant Health Agency (APHA) has validated a PCR test which can detect the bacterium responsible for bovine TB, *Mycobacterium bovis* (*M. bovis*) directly from tissue samples collected at post-mortem inspection.

The major advantage of this method is that a result is typically available within **three weeks**, whereas traditional microbiological culture (the 'gold standard' method) takes 6-22 weeks.

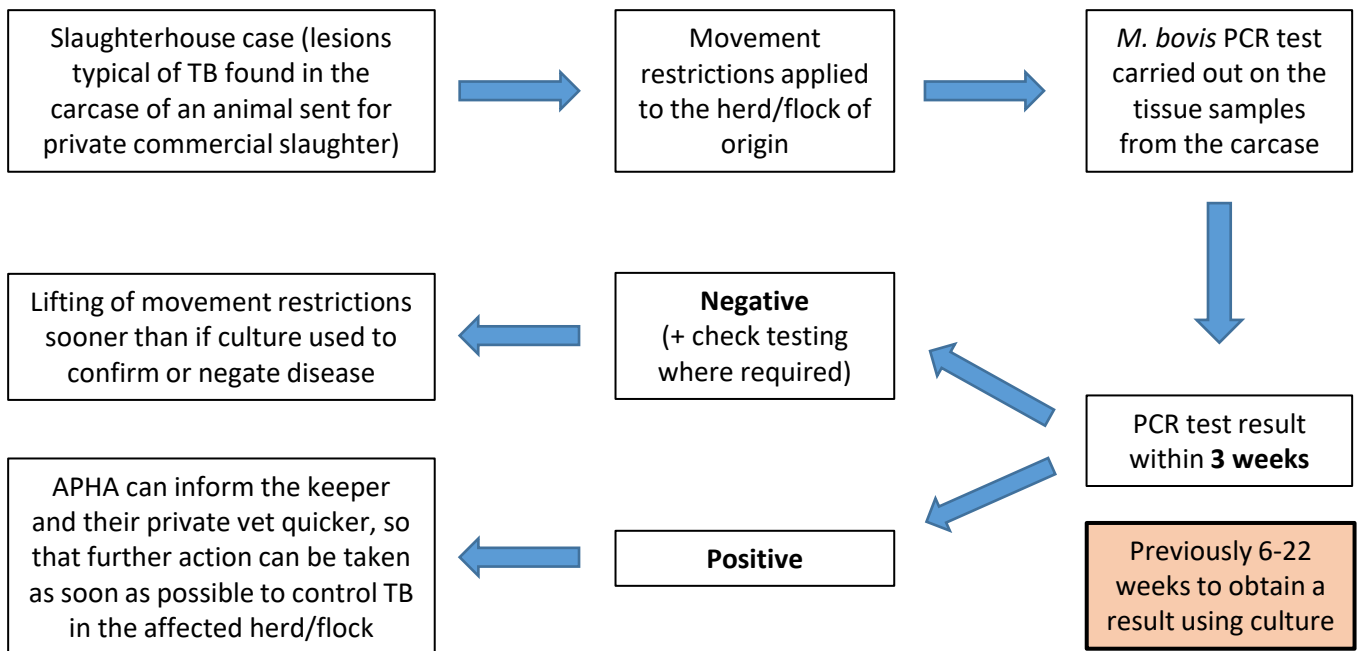
PCR test 3 weeks



Culture 6-22 weeks



The *M. bovis* PCR test has advantages for the management of TB slaughterhouse cases by APHA



How is APHA's *M. bovis* PCR test used?

The *M. bovis* PCR test is used in Great Britain (GB) for tissue samples from carcases of:

- TB slaughterhouse cases in cattle and non-bovines i.e. animals routinely sent for private commercial slaughter that have suspected lesions of TB at routine meat inspection;
- Non-bovine animals such as camelids, goats, pigs, sheep and farmed deer that are removed as TB test reactors, direct contacts or clinical TB suspects, and cases where TB lesions are identified on diagnostic post-mortem examination in a veterinary laboratory; and
- Domestic pets (cats and dogs) and exotic species of animals (e.g. in zoological collections) submitted to APHA for laboratory investigation.

After a period of operation and review of the test's performance, APHA will consider wider use of the PCR test e.g. for routine detection of *M. bovis* in post-mortem samples taken from skin and blood test positive cattle.



What is PCR?

Polymerase chain reaction (PCR) is a molecular-based laboratory technique. It involves detecting small amounts of the genetic material (DNA) contained within all living organisms, by making millions of copies of a specific sequence of the target DNA, a process called amplification.

Tissue sample taken at post-mortem inspection



Target DNA extracted



Amplification using a PCR machine



DNA copies



Each *M. bovis* bacterium contains unique DNA which carries the genetic instructions for its development, function, growth and reproduction. PCR can identify tiny amounts of the DNA present within these bacteria and **amplify** it to produce a quantity which is then detectable.

How accurate is the PCR test?

In a validation study carried out by APHA, the *M. bovis* PCR test has been shown to produce equivalent results to the traditional microbiological culture method, for both bovine and non-bovine tissue samples.

Benefits of the PCR test

The current “gold standard” for bTB diagnostic testing from tissue samples is traditional microbiological culture which takes 6-22 weeks to obtain a result. PCR test results are typically reported to the keeper within three weeks.

Instead of relying on culture results for confirmation or negation of *M. bovis* infection, PCR testing is now carried out on tissue samples taken from bovine and non-bovine slaughterhouse cases. If negative, herd movement restrictions can be lifted sooner without having to wait for culture results. In Wales, a clear herd test may be required before restrictions can be revoked.

The PCR test is cheaper to run per sample than microbiological culture. The process is semi-automated and exploits laboratory robotics to facilitate high throughput, whilst also minimising contamination and maximising traceability of samples.

Limitations of the PCR test

Whole genome sequencing (WGS) can't be used directly on the PCR product as it requires DNA obtained from a pure microbial culture. This means that APHA can't rely exclusively on the PCR test for case management and epidemiological analyses of TB breakdowns. To allow full investigation of the breakdown and identify the probable source of infection, subsequent culture is carried out on PCR test positive samples to allow WGS to be performed.

Find out more about the *M. bovis* PCR test on the TB hub <https://www.tbhub.co.uk/>

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