

Briefing 807

Bovine TB- the facts

Summary

Questions and answers

This paper is summarised from 'Bovine TB – the facts' which is Annex D of 'Bovine tuberculosis in England: towards eradication', 'the Final Report of the government's Bovine TB Advisory Group. The full report can be downloaded from: <http://www.defra.gov.uk/animalh/tb/pdf/tbag-finalreport.pdf>

TB testing

Q1. Is it true that skin test positive animals that show no signs of diseased tissue at post-mortem examination (*known as NVL or no visible lesions*) have never had the infection?

A1. The false positive rate for the skin test is very low (1 in 1000, see also question 2) and so it is very likely that any animal that tests positive is infected, regardless of whether this is confirmed at post-mortem.

Q2. Is it true the skin test only picks up half of all infections?

A2. No. Studies have shown that the test is on average 80% sensitive at standard interpretation rising to 93.5% sensitive at severe interpretation.

Q3. Should skin test positive animals be kept because they have mounted an immune response to the disease and are therefore protected?

A3. Very definitely not. Such animals are infected and can infect others.

Q4. Is it true the skin test is a good herd screening test but a poor individual animal test for bovine TB?

A4. The skin test is best used as a herd test but has value in controlling the spread of disease when used as an individual animal test.

Q5. Does tuberculin from different sources give different results?

A5. We are confident that both the VLA and Lelystad products are effective and reliable.

Q6. If animals test positive to bovine TB using the gamma interferon blood test but show no visible lesions, are they disease free?

A6. A positive gamma interferon result indicates the presence of replicating *M. bovis* organisms. There is evidence that they are more likely to be in the early stages of infection. Therefore, failure to find post-mortem evidence of disease does not mean that the animal in question was free of the infection.

Q7. Negative culture results from the lab must mean no infection is present?

A7. No. Detection of *M. bovis* by culture is affected by many factors including the sampling process, with visibly lesioned animals giving a greater chance of detecting infection. Animals at early stages of disease and latently infected animals do not present with visible lesions at post-mortem and will result in some animals escaping detection

Q8. Does the gamma interferon test give a large percentage of false positives?

A8. No. The risk of the gamma interferon test identifying a false positive animal is 3 in 100, this risk is reduced when the test is applied in a herd known to be TB infected. It is a common misconception that, as 82% of gamma interferon test positive animals do not show post-mortem evidence of TB in the slaughter house or laboratory, they were “false positives”. A failure to find post-mortem evidence of disease does not mean that the animal in question was free of infection.

Compromising factors for TB testing

Q9. Do animals with fluke show a stronger reaction to the skin test and result in false positive reactions?

A9. There is no conclusive evidence to support this. On the other hand fluke, through compromising immunity might make animals more susceptible to infection and/or might make infected animals less likely to react to the skin test (infected animals may therefore be missed).

Q10. Does the use of flukicide reduce the reaction to the skin test?

A10. There is no evidence to support this.

Q11. Is TB testing compromised by the presence of Johne's disease?

A11. Yes. Exposure to Johne's disease can cause cross reactivity when using the skin and gamma interferon tests for bovine TB.

Q12. What is the TB implication of BVD infection in herds?

A12. It is likely that any infective agent that suppresses an animal's immune response mechanism such as occurs in cattle when infected with BVD virus, will increase the likelihood of establishment and progression of any additional disease such as TB. There has been limited work to demonstrate a similar risk for cattle with BVD.

Q13. If the skin test for bovine TB can be compromised by other mycobacteria (e.g. avium, microti), is the gamma interferon test compromised in the same way?

A13. Yes. In cattle, false positive reactions to the gamma interferon test can sometimes be caused by exposure to mycobacteria other than *M. bovis*. However, this is minimised by a comparison of the reaction to avian and bovine PPDs (tuberculin) to try to discriminate between reactions due to environmental mycobacteria and *M. bovis*.

TB in cattle

Q14. Is there is a large amount of undetected infection in cattle herds?

A14. There is undoubtedly some undetected infection - no test is 100% accurate and not all animals are tested. Despite this, test and slaughter regimes based on the skin test have been successfully used in other countries to control bovine TB.

Q15. Is it true that a large proportion of cattle are never tested?

A15. At present, 20% of parishes and 32% of herds in GB are tested every year. The frequency of herd tests (1-4 years) is determined by EU legislation, depending on the incidence of infected herds in a particular area. Herd testing frequencies are reviewed nationally on an annual basis and the proportion of herds and parishes tested annually has been increasing over the past few years.

Q16. Do cattle become infectious only in the late stages of TB - once they have developed “open” lesions?

A16. Animals may become infectious very soon after they have themselves been infected (perhaps in days). This may be followed by periods when animals are less infectious with intermittent excretion of tubercle bacilli. These animals can eventually progress to clinical cases.

Q17. Isn't it pointless to test calves for TB as this is a disease of adult cattle?

A17. TB has been diagnosed by skin testing in animals less than 4 weeks of age.

Q18. Why are the genotypes of *M. bovis* geographically clustered in GB if the movement of cattle is the major cause of spread of disease?

A18. Because most cattle movements are local. Only the main strains are quoted in figures and maps but clustering is shown and there is also some mixing which implies cattle movements are not the major cause of spread in endemic areas but are in low incidence areas.

Transmission

Q19. Does cattle to cattle contact only account for 1 - 2% of all TB cases?

A19. No. The extent of cattle to cattle transmission varies depending on area and level of infection.

Q20. Can cattle become infected by badgers and their infected excreta only when out at pasture?

A20. No. Badger visits to farmyards and buildings may pose a comparable disease transmission risk.

Q21. Do cattle regularly give TB to badgers?

A21. With the routine testing of cattle and reactor removal the transmission of TB from cattle to badgers is a low risk, as cattle are unlikely to be shedding large amounts of TB organisms into the environment. This is only likely in uncontrolled cattle TB situations e.g. during FMD when a dedicated testing and slaughter regime was not being carried out.

Q22. Can cattle that stray into a herd for a day cause a TB breakdown in that herd?

A22. Generally accepted principles of disease transmission indicate that it is possible that infected, infectious cattle that stray into the herd can infect others almost immediately. However it is more likely the longer an infected animal is in contact with other cattle and if this contact is close or in confined spaces.

Q23. Is the requirement for the isolation of reactors really necessary?

A23. Reactor cattle are infected with *M. bovis* and thus infectious to other cattle. Development of bovine TB disease may take many months or years but transmission of infection may be immediate. Therefore the strict and immediate isolation of reactors is extremely important.

Infected badgers / badger setts

Q24. Can the badgers in a sett be proven to have TB by testing the soil and faeces?

A24. No. Currently there is no validated test.

Q25. Isn't it relatively easy to identify TB infected badgers on the basis of appearance and behaviour?

A25. No. It is quite impossible. Only in the very late stages of disease do animals show clinical signs and these are non-specific and may reflect diseases other than TB.

Q26. Is it easy to identify TB infected setts?

A26. No. It is impossible to identify infected setts without the capture of animals from that sett and detailed diagnostic tests.

Resistance / susceptibility

Q27. Are some cattle breeds more resistant to bovine TB than others?

A27. There is anecdotal evidence pointing to genetic variation for resistance of cattle to infection of *M. bovis*. However this has not been properly quantified in the the UK.

Q28. Do family lines within the same breed have different levels of susceptibility?

A28. There is no evidence to either support or dismiss this theory

Badgers and bovine TB

Q29. Are 60% of badgers in "Hot Spot" areas infected with TB?

A29. It is not known for certain. Not all badger populations in GB have been tested for bovine TB. However, evidence of *Mycobacterium bovis* infection was found in all Randomised Badger Culling Trial (RBCT) areas.

Q30. How much cattle TB is caused by badgers?

A30. It was reported by the Independent Scientific Group on Cattle TB (ISG) that results from the Randomised Badger Culling Trial (RBCT) showed at least 40% was due to badgers.

Q31. Do badgers infected with TB suffer?

A31. Infected badgers are able to reproduce and raise young successfully and live for several years. However, the disease will have a progressively increasing negative effect on the physical well-being of the badger.

Q32. Will TB in badgers die out if disease is controlled in cattle?

A32. We don't know for certain. Modelling suggests that if disease in cattle is reduced then disease in badgers will also be reduced. On the other hand, there is evidence that TB is a self-sustaining infection within the badger population and once introduced, the infection persists within that species without the need for input from other infected species such as cattle.

Q33. Are there many more badgers in England and Wales now than in the 1990s?

A33. This is not known for certain. A national survey in the 1980s estimated that the overall badger population was about 250,000. In the 1990s estimates indicated a likely increase to around 300,000.

Badger culling

Q34. Was the risk of perturbation¹ and subsequent effects sustained after proactive culling in the RBCT had stopped?

A34. Initially this appears to be true - the trend for the beneficial effect of culling to increase over time from the start of culling appears to be increasing after culling for at least the two years since proactive culling in the RBCT stopped. The spread of TB after culling outside the culled areas due to perturbation effects have decreased since the end of culling

Q35. Did the results of the RBCT demonstrate that reactive badger culling has no role in bovine TB control in GB?

A35. Reactive, localised culling was stopped in November 2003 as results from showed an increase in new TB incidents throughout the whole of the reactively culled areas caused by perturbation of the badger population.

Q36. Badger vaccine will not be ready for several years?

A36. An injectable badger vaccine is expected to be fully licensed in spring 2010. The earliest projected date for the availability of an oral badger vaccine is 2014.

Q37. Isn't it pointless to start a badger vaccination programme before infected badgers are removed?

A37. No, there is a good case for starting a vaccination programme even though a proportion of animals are infected. The key objective is to reduce transmission risks – between badgers and from badgers to cattle. Although desirable, there is no need to vaccinate all badgers or stop them becoming infected to have an impact on transmission.

Q38. Will cattle vaccine ever be allowed, due to international trade regulations?

A38. The Government is currently investigating the scope and potential timetable for making changes to EU trade regulations which would allow vaccination of cattle against bovine TB.

Q39. Is vaccination the “magic bullet” for TB control?

A39. No - a combination of control measures that is most likely to be successful.

Other species

Q40. Are other wild mammals a TB risk to cattle?

A40. The greatest TB risk to cattle in wild mammals is from badgers which are the main wildlife host.

Q41. Are wild deer as much a risk to cattle as badgers?

¹ Perturbation - culling increased ranging by badgers which spread TB by increasing contact rates between badgers and between badgers and cattle

A41. Wild deer in GB are generally considered a sentinel or “spillover” host of infection in cattle rather than the source of disease in cattle. Overall TB prevalence in wild deer is low and the ecology and behaviour of wild deer makes it unlikely that they would have any close direct contact with cattle.

Q42. Are pigs a dead-end host of *M. bovis*?

A42. Currently pigs are considered spillover hosts in Great Britain. Pigs become infected only when the prevalence of infection in the natural hosts is relatively high.

TB control / eradication

Q43. Can TB be eradicated from cattle through extra cattle measures without addressing the wildlife reservoir?

A43. The international evidence shows clearly that bovine TB in cattle cannot be eradicated by cattle controls alone when there is a secondary reservoir of infection from wildlife.

Q44. Can tuberculin testing and slaughter of cattle eradicate the disease in cattle?

A44. Yes - where there is no transmission from wildlife to cattle

Q45. Did the gamma interferon test make a significant contribution to the eradication of bovine TB in Australia?

A45. The gamma interferon test was introduced into the programme at a late stage and did not make a significant contribution.

Q46. Is pre-movement testing a waste of time and money?

A46. No. Pre-movement testing helps to reduce the risk of spreading bovine TB through cattle movements, especially to areas that are currently free of disease.

Q47. Isn't TB in cattle just an economic problem - not an animal health one?

A47. The Government's strategy for controlling bovine TB is to work with stakeholders to reduce the economic impact of the disease whilst maintaining public health protection and animal health and welfare.

Q48. Does a badger vaccine against bovine TB offer the best prospect of eradicating TB in the UK?

A48. Yes – when used in conjunction with cattle control measures. Bovine TB is unlikely to be eradicated from the UK unless the secondary wildlife reservoir is addressed and badger vaccines currently offer the best prospect for tackling this.

Q49. Is the UK an OTF country?

A49. No, the UK is not an OTF country. EU Council Directive 64/432/EEC provides for Member States to determine officially TB free (OTF) status on a country, region, or herd basis. Because of the incidence of TB here, UK is not designated as an OTF country. However, most herds in UK are (at any particular time) OTF and so able to trade freely

Public health

Q50. What is the public health risk of TB in cattle and other species in the UK?

A50. For the majority of the population, the risk of people contracting TB from cattle in Great Britain is considered very low. At present, less than 1% of all confirmed cases of TB in humans are due to infection with *M. bovis*. The majority of these cases are considered to be due to reactivation of latent disease contracted before widespread milk pasteurisation or from infection contracted abroad. There is somewhat greater risk in some occupations where there is direct exposure to infected animals.

Q51. Does raw milk give you immunity against bovine TB?

A51. No. Unless milk is pasteurised it is possible that it could be a source of infection

Q52. Are TB infected camelids (llamas and alpacas) a significant public health risk?

A52. There is a low risk to the public in general but many owners of these animals are not aware of the zoonotic risks associated. Camelids are not regularly tested for TB compared to cattle. Educating owners and making them aware is something that needs to be taken forward by both industry and Government.

Husbandry and biosecurity

Q53. Will supplementing cattle feed with trace elements and/or selenium prevent a TB outbreak?

A53. No but deficiencies of trace elements should be corrected as a matter of good husbandry practice.

Q54. Do cattle only become infected by badgers through close contact? Close the barn doors, put up electric fencing around silage clamps and you will resolve the problem...

A54. TB is mainly a respiratory disease, caught by breathing in the bacteria and direct transmission can occur through, for example, nose to nose contact. However, there is also evidence that indirect transmission is possible, for example through contact with infected saliva, urine, droppings, pus from TB abscesses etc. It is difficult to identify the relative importance of each route of transmission of the disease and for this reason emphasis should be put on efforts to reduce the risk of cattle and badgers coming into both direct and indirect contact

Q55. Does growing maize increase the risk of a TB breakdown in your herd?

A55. There is anecdotal evidence that badgers are attracted to maize and maize silage and in areas where maize is grown it often forms a major part of their diet, but there is no evidence to suggest that reducing the amount of maize / changing from maize to grass silage can reduce bovine TB to an extent that would justify what would be significant changes to farm management practices.

Q56. Does ensiling kill the TB bacterium?

A56. The ensiling process does, with time (6-12 weeks), kill the *M. bovis* bacterium.

Q57. Do iron rich soils cause bovine TB in cattle?

A57. No. Iron rich soils have not been shown to have a causal role in bovine TB.

Q58. Is there a risk from spreading slurry on land used by cattle?

A58. Yes - slurry has the potential to spread bovine TB but this is highly unlikely under the conditions existing in the UK as a result of current cattle controls. The risk is mitigated by the dilution effect of slurry, the pH and the storage process, plus spreading on land and exposure of organisms to the environment.

Q59. Is cleansing and disinfection of buildings/yards used by reactor cattle a waste of time?

A59. Cleaning and disinfection is a key part of TB risk reduction and in the control of other infectious diseases

Q60. Are newly calved cows more prone to give a false positive reaction to a TB test?

A.60. No.

Alan Spedding, 15 April 2009

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