

BOVINE TB INFECTION IS NOT AN ISSUE IN CATTLE OR BADGERS IN SCOTLAND

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1. What is bovine tuberculosis (bTB)?

Bovine tuberculosis (bTB) is a disease of cattle, which is caused by an organism *Mycobacterium bovis*. The bacterium is excreted by infected cattle on to the land they graze where it can survive in the soil. It can be passed to other species, including badgers, rats, deer and cats. The chances of a badger in Scotland carrying infection are remote. Even in those areas of England and Wales where tuberculosis in cattle is rampant, the vast majority of badgers (86%) remain clear of infection (1) and only 1.6% are capable of transmitting the disease.

Human tuberculosis is caused by a different organism *Mycobacterium tuberculosis*. Tuberculosis in humans in the UK had been largely wiped out as a result of the BCG vaccination programme. In recent years, some increase has been reported; these are cases where people already carrying TB have come to the UK.

2. Bovine TB in Scotland's cattle. Is it true that Scotland is bTB free?

In Scotland the incidence and risk of bovine TB has historically been very low and there is no evidence of a wildlife reservoir of bovine TB. Recognising the need for confidence, the Scottish Government has, in recent times, introduced a stringent package of measures including tissue sampling at farm visits, an epidemiological risk assessment, tracing cattle, contiguous herd assessments, and two consecutive tests with negative results to retain bTB free status. Scotland is officially free of bovine tuberculosis.

In October 2009 Scotland was added to the long list of European Commission member states and regions to have been declared free of bovine tuberculosis. The commission attributed this to the success of Scotland's livestock industry working in conjunction with the government. In Scotland a stringent testing regime for cattle is adhered to, involving regular testing of tissue samples from herds and testing at post-mortem if signs are observed. Monitoring is carried out by the Scottish Veterinary Service, part of the Scottish Agricultural Advisory Service. These measures have been combined with strict movement controls on cattle – testing them both before and after they are moved, and quarantining suspected cases.

Throughout the 70's and 80's, badgers killed on roads in Scotland were monitored and tested for bovine TB. Only one badger out of 48 tested positive during this period, and the practice was stopped in 1993 as unnecessary.

In Scotland the number of cattle infected with bovine TB is extremely small, and reducing. Out of around 13,000 cattle herds in Scotland, only a single figure number of herds were under restrictions in any one area in the most recent year for which figures are available. These incidents were all traced to imported infected stock from England, Wales or Ireland.

3. *Bovine TB in English and Welsh cattle. What is the extent of the problem and is it changing?*

Tuberculosis in English and Welsh cattle is a serious problem for farmers in some areas, notably in the South West and West Midlands. For example, 26,000 cattle suspected of being infected were slaughtered in 2011 in England costing £90m in compensation. However, the picture has already been improving since controls on cattle movements and more stringent testing were introduced from 2008 onwards.

How has this come about?

Firstly, the skin test system, used for cattle for over thirty years, has not been sufficiently reliable or effective. *It fails to identify between a fifth and a quarter of infected cattle*, so that these cattle remain in the herds and

spread infection to other cattle.

Secondly, during the BSE and Foot and Mouth epidemics TB testing in cattle was disrupted. Subsequently, persistent backlogs in overdue testing developed and this is when bovine TB levels rose sharply. Cattle were moved routinely before testing and so were able to carry infection in to other herds.

Thirdly, evidence emerged in 2011 that infected animals may have been deliberately retained in the herd and healthy animals sent to slaughter in their place. Routine abattoir checks being carried out by several different Trading Standards authorities discovered that ear tags had been swapped from diseased to healthy cattle, resulting in infection being retained in the herds.

Improved Cattle Controls.

Following a period of disarray or absence of TB testing in cattle herds, stricter practices in the management of cattle were introduced in England from 2008 onwards. These included a moratorium on overdue testing and enforced testing before movements of cattle.

The statistics reported by Department of Food and Rural Affairs (DEFRA) scientists have shown a steady fall in the numbers of herds affected by TB in England, from nearly 6k in 2008 to less than 4 ½ k in 2014, clearly indicating the success of these cattle focussed measures.

In 2011, abattoir controls involving DNA tagging of cattle were introduced to combat the retention of infected cattle in herds.

Now most experts in animal health argue that cattle-based measures (more stringent tests, a moratorium on overdue testing, pre- and post-movement testing of cattle, and DNA tagging of suspected infected cattle) are the effective way to stop the spread of infection to other cattle and to progressively root out infected cattle in the herds. Scotland has maintained a bTB free status though diligent use of the more powerful interferon-gamma test, which can increase accuracy to 93%, combined with stringent pre- and post- movement testing of cattle.

Vaccination of cattle.

The Bacillus Calmette-Guerin (BCG) vaccine, which is used to protect humans against TB, has been shown by government scientists to be effective in controlling TB in cattle. Used in combination with other cattle-based measures, a better testing system and stricter controls on cattle movements, a vaccination programme would achieve progressive removal of bTB from herds year-on-year over a shorter timescale than offered by all other alternatives. The BCG vaccine is ready for licensing for use with cattle, could be implemented quickly and would have a permanent effect.

EU food regulations have until recently been seen as an obstacle to the export of vaccinated cattle to the rest of the EU, as tests used not to be able to distinguish vaccinated from infected cattle. However, this has changed with the scientific development of a test capable of Distinguishing Infected and Vaccinated Animals (DIVA). A marker incorporated in a vaccine can identify a vaccinated animal from a reactor. Once implemented this test would remove the

last obstacle to cattle vaccination as the means to control and ultimately eradicate TB in cattle quickly.

Cattle in Wales

Following the introduction of a strengthened testing regime for cattle, the incidence of tuberculosis in cattle declined sharply in Wales - a 30% decline over a 12 months period was recorded in 2012. The sharpest fall was in the area where the disease is at its worst. In Dyfed, 36% fewer cattle were slaughtered over two years at a saving to the taxpayer of £6.5 million pounds in compensation.

In March 2012 Wales announced that it had scrapped any badger cull plans on the basis of the science in favour of a package of cattle-based measures of which a vaccination programme for badgers is a part.

Cattle in Ireland

In the Republic of Ireland tuberculosis in cattle is a long term, massive problem and remains on the increase, despite the fact that for many years badgers have been eradicated in up to 30 per cent of its land mass. It nevertheless has proceeded with a large scale badger cull. The questions raised include major welfare issues for the badgers and ethical acceptability for the public.

In Northern Ireland where there is no badger culling programme the incidence and prevalence rates of tuberculosis in cattle have been declining for a number of years.

4. Cattle and Badgers

Bovine TB is a disease of cattle. It is caused by an organism *Mycobacterium bovis* which can be transmitted to wildlife, including badgers, rats and deer with inevitable tragic consequences.

The vast majority of badgers are healthy and do not carry bovine tuberculosis. Scientific testing of badgers culled during previous research trials in bTB hotspots in England showed that just 14% of badgers had TB, and just one in a hundred had severe symptoms. (1)

The epidemiology of bovine TB in cattle and badgers

In 1998 the UK government launched a ten year large-scale field trial (The Randomised Badger Culling Trial, RBCT). This was conducted in 30 areas of England, each located in a high-risk area for cattle TB, measuring approximately 100km². The 30 areas were grouped into 10 sets of three; each called a 'triplet'. Within each triplet, one area was subjected to annual culling across all accessible land ('proactive culling'), and in one area the badgers were culled locally on and near farmland where recent outbreaks of TB had occurred in cattle ('reactive culling'). The remaining area received no culling ('survey only'). This was repeated annually for five years.

The scientists found that, while it was underway, proactive culling (killing all badgers) gave a modest reduction in cattle TB inside the culled areas, but an increased incidence in neighbouring areas (the perturbation effect) as a result of expansion of badger ranging behaviour and an increase in prevalence of cattle TB infection among badgers following culling.

In 2007 the Independent Scientific Group, chaired by Professor John Bourne, published its conclusions (2).

Firstly, "*badger culling can make no meaningful contribution to cattle TB control in Britain*", "*indeed some policies are likely to make matters worse*".

Secondly, "*weaknesses in cattle testing regimes mean that cattle themselves contribute significantly to the persistence and spread of disease in all areas where TB occurs, and in some parts of Britain are likely to be the main source*".

Their recommendation, backed by the TB advisory group and the TB eradication group, was that *“Scientific findings indicate that the rising incidence of disease can be reversed and geographical spread contained, by the rigid application of cattle-based control measures alone.”*

In 2010 scientists published the results of monitoring cattle TB incidence up to one year and three years following the cessation of culling. Their findings showed that *“the reductions in cattle TB incidence achieved by repeated badger culling were not sustained in the long term after culling ended, and did not offset the financial costs of culling”*. They concluded that *“badger culling is unlikely to contribute effectively to the control of cattle TB in Britain”* (1).

The pilot zones of culling of badgers in England 2013 on

In October 2012 more than 30 eminent animal disease experts warned in an open letter *“the complexities of TB transmission mean that badger culling risks increasing cattle TB rather than reducing it”*, and is a *“costly distraction”*. Lord John Krebs, one of the UK’s most eminent scientists and the architect of the 10-year randomized controlled trial of culling of badgers, said *“The scientific case is as clear as it can be; a cull is not the answer to TB in cattle”*. (3)

Despite this, through 2013 and 2014 in England ministers enacted licensed culling of badgers in two pilot zones in Somerset and Gloucestershire where cattle TB is a problem. Two and a half thousand badgers were killed at a cost of over £6,500 per badger to the public purse. Most of these badgers (85%) were estimated to be completely bTB free, and Defra’s own data suggests just 1.6% would have been capable of passing on the disease.

In the light of results following the second year of culling, The British Veterinary Association withdrew their support for further badger culling for reasons of animal suffering and cruelty. They said *“BVA believes that it has not been demonstrated conclusively that controlled shooting can be carried out effectively and humanely”* (4)

The Born Free Foundation summarises the impact of the local ‘pilot’ culls: *“In Somerset, the figures show that the number of cattle slaughtered because of positive TB tests within the cull zone fell from 246 to 208 in the 12 months before and after the cull, a fall of 20%. However, a similar fall was seen in a ‘comparison zone’ where no culling took place. In Gloucestershire, the numbers of cattle slaughtered actually rose within the cull zone after the first year of badger culls, whereas in the ‘comparison zone’ numbers fell. The numbers of cattle herds affected within the cull zones rose after the first year of culls in both Somerset and Gloucestershire.”*(5)

At the same time, DEFRA’s own figures show a steady decline of TB in cattle following the introduction of a range of improved measures for testing cattle and for herd breakdown management since around 2008 and particularly since 2010 when cattle testing frequencies were increased and multiple tests were introduced on suspect non-reactors (to tackle the problem that the test leaves one quarter to one fifth of infected cattle in the herd). (6)

The results give credibility to the scientists’ warning that culling badgers would very likely make things worse.

In 2015 scientists at Queen Mary University London successfully ran a computer simulation of the complex factors involved in the spread of bovine TB. It provides further compelling evidence that frequent testing of cattle has the most significant effect in eradicating the disease without culling badgers, and that culling badgers alone is ineffective. (7)

However, instead of amending its bTB strategy to follow the evidence, the government persevered with the non-scientific approach of badger culling by introducing a third badger cull zone during 2015 in Dorset.

In summary Bovine TB is a disease of cattle. It leaked out of cattle herds into environment in the first place, creating a reservoir of bovine TB in the wider environment including in soil, deer, rats, cats and badgers. Any part badgers play in the complex process of bovine TB transmission is minor compared to cattle to cattle transmission. One quarter to one fifth of bTB infected cattle remain in the herd because of the poor effectiveness and specificity of the traditionally used 'skin test'. Experts in bovine TB control and wildlife experts are united in their views that the effective approach to bovine TB control is a package of cattle-based measures, including a stringent testing system, a moratorium on overdue testing, pre- and post-movement cattle testing, effective breakdown management, cattle tracing, DNA tagging of suspected infected cattle and a cattle vaccination programme. Badgers are innocent participants in this insidious disease, being used as scape-goats by a government induced intensive farming industry, which has only itself to blame. Vaccination of both badgers and cattle can play an important part of a remedial strategy.

5. *Welfare issues and public opinion*

The badger culling pilots provoked a large reaction from the public; more than 150,000 people signed a petition to the government and polls registered 70% of the public as being opposed to a cull of badgers. A campaign was run by coalition of groups (9) with Brian May providing a high profile media presence.

Scientists and the public agree that, even if a reduction of 12% in the rate of increase of cattle TB were to be obtained by culling badgers, it would be neither morally acceptable nor practically sustainable.

The pilot culls have failed to achieve their target numbers. And have been shown to cause severe suffering, some badgers taking long periods of time to die after being shot. And let's not forget – ***almost all badgers shot are healthy animals and don't have TB***. The government has refused to test shot badgers for TB or to disclose facts about their suffering .

Wildlife experts have warned of likely dangers, including shooting of lactating sows leading to the starvation of dependent cubs, shooting of pregnant females, and the risks of shooting in darkness resulting in maiming and consequent suffering.

The British Veterinary Association has withdrawn support for the government badger culls because of the unacceptable suffering.

Police Forces have raised concerns about potential danger to human life arising if people are out in the countryside whilst shooting is underway in the dark.

Vaccination for badgers

Scientists have shown that a badger vaccination programme achieves a critical level of protection when 60% of individuals have been vaccinated, making it a practical possibility. Of course it has to be accompanied by an effective programme of cattle-based measures.

New evidence from a four-year field study has shown that BCG vaccination reduces the risk of bovine tuberculosis infection in unvaccinated badger cubs in vaccinated groups, as well as in badgers that received the vaccine {Health and Veterinary Laboratories Agency (AHVLA) and the Food and Environment Research Agency (FERA), in an area in Gloucestershire where TB is highly prevalent in the badger population}. Wales has been vaccinating badgers on a large scale since 2013 as one part of a programme which also includes improved cattle testing and breakdown management. The chief veterinary officer for Wales, Professor Christianne Glossop, reported in July 2015 that incidents of TB in cattle have fallen by 28% and 94% of herds are now TB free.

CONCLUSION

“There is no evidence of bovine Tb infection in Scotland in wildlife or in cattle herds. On the very few occasions bovine TB has been identified in cattle it has been caused by cattle imported from parts of England where bovine TB persists. The Scottish Government’s positive advances in cattle controls have significantly reduced the threat to the health of wildlife in Scotland and have increased the confidence of both the conservation and farming communities.”

The key to success in Scotland lies in having strong and systematically applied cattle-based measures over a period of years; these include a stringent testing system (using the more powerful interferon-gamma test), pre and post movement cattle testing, cattle tracing, tracking of suspected infected cattle and a moratorium on importing cattle from known bTB areas in England.

The introduction of stronger cattle-based measures in England a few years ago has been followed by a steady decline in the spread of TB in cattle.

UK wide, a cattle vaccination programme would be the most effective tool to achieve a speedy and permanent solution. However this is currently resisted for the reason that flesh-based food products cannot be exported to EU countries unless they can be tested negative for TB. At present, a vaccinated cow would produce TB antibodies, indistinguishable on testing from a TB infected cow, hence preventing export. Recent technical advances however make it possible to incorporate a marker in a vaccine which would distinguish a vaccinated animal from a reactor. This would meet food standards regulations and make possible cattle exports to the EU market.

- (1) Jenkins, HE, Woodroffe, R and CA Donnelly (2010) *The duration of the effects of repeated widespread badger culling on cattle tuberculosis following the cessation of culling*. PLoS ONE, February, 5 (2).
- (2) Bourne, FJ (2007) *Final Report of the Independent Scientific Group on Cattle TB*. <http://archive.defra.gov.uk/foodfarm/farmanimal/diseases/atoz/tb/isg/index.htm>
- (3) The Observer 14:10:12 *Culling badgers could increase the problem of TB in cattle* (Letter, p42)
Top scientists launch attack on ‘mindless’ badger cull (p1)
- (4) British Veterinary Association (15:04:15) *Final Position on bTB and badger culling*
- (5) 5.1 Born Free Foundation (19:10:15) *Are farmers deliberately being misled about badger culls?*
5.2 APHA (Animal & Plant Health Agency) *Report of the incidence of bovine tuberculosis in cattle in 2013-14 in the areas of Somerset and Gloucestershire exposed to the first year of industry-led badger culling. Annual surveillance report for the period January to December 2014*. Commissioned by DEFRA.
- (6) DEFRA (October 2015) *Monthly publication of national statistics on the incidence of TB in cattle to end July 2015 for great Britain*.
<https://www.gov.uk/government/statistics/incidence-of-tuberculosis-tb-in-cattle-in-great-britain>
- (7) Evans, Matthew & Moustakas, Aristides (2015) *Coupling models of cattle and farms with models of badgers for predicting the dynamics of bovine tuberculosis* Stochastic Environmental Research and Risk Assessment.
- (8) If you want to know more about the situation relating to the proposed badger cull trial or bovine TB in England, Wales and Northern Ireland please follow this link
<http://www.badger.org.uk/content/what.asp>.
- (9) If you want to know more about the public campaigns please follow these links
<http://www.badgertrust.org.uk>
<http://www.badgerprotectionleague.com>