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**BOW**  
GROUP

## Common Sense and Bovine TB

Why the Government should abandon badger culling trials in favour of vaccination



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## Executive Summary

- The Government is choosing the wrong method for tackling bovine Tuberculosis (bTB) in England. Recent, large badger culling trials (11,000 badgers) have demonstrated projected efficiency in reducing bTB in cattle of just 12-16% (depending on the model) over 9 years.
- Badger culling has been demonstrated to lead to perturbation - a social fracturing that actually helps to spread bTB outside the affected area.
- In contrast, trials of vaccinating a proportion of the wild badger population with BadgerBCG has shown to reduce the incidence of positive serological TB test results by almost 74%.
- Just 15% of badgers carry bTB and poor biosecurity likely plays a much bigger role in the spread of bTB. Serious lapses, whereby landowners have been re-tagging and transporting infected cattle, are of deep concern.
- Compensation payouts for bTB should be linked to fulfilment of biosecurity best practice.
- Simple, cost effective measures are available to physically separate badgers from cattle and can reduce the incidence of infection.
- The population of foxes is likely to increase in areas where badgers are culled, leading to additional problems for farmers. Foxes also impact adversely on a number of species, including hares, a UK BAP species in decline.
- Badger culling is likely to be more expensive than the Government would hope, when additional policing, the resulting spread of bTB and the delay to research of other, more effective methods of reducing the disease are taken into account.
- Badger culling is deeply unpopular, with The Bow Group's own, independent market research confirming that 81% of people are opposed to the Government's plans.
- The architect of the Randomised Badger Culling Trial (RBCT), Lord Krebs, is also opposed to further culls, as are many leading scientists, conservationists, wildlife experts, the media and celebrities.
- The Government should establish a working group on vaccination and invest in this method of reducing infection in the wild badger population.

## Foreword by Dr Brian May CBE

This carefully researched paper, for perhaps the first time, clearly explains the reasons why current Government policy to cull badgers in an attempt to control bovine TB in cattle is based on false assumptions and faulty reasoning.

The fact that the Bow Group is firmly housed within the body of the Conservative Party debars any suggestion that there might be political reasons for the arguments that are so forcefully made here. It becomes clear that the current determination of the Government to adopt a policy of violence against the very creatures that farming has infected with disease has been strongly influenced by perceived loyalties to certain sections of farming and business interests in the countryside. It is equally clear that claims that this is an issue that only affects farmers are also false. The future of our countryside and the wild animals that inhabit it affects every one of us who live in these islands - everyone who cares what kind of a Britain our grandchildren will inherit.

The arguments laid out in this paper have nothing to do with sentiment. They reveal the simply shocking misrepresentation of the facts that have been laid before the farmers of this country by union representatives and the Government they elected. The truth is that, despite all the appealing exclamations that *'something has to be done'*, the current thing that is being done, which will require farmers to dig deep in their pockets, will probably fail to improve the bovine TB problem, and may well make it worse.

This is based on the available empirical evidence being offered by the entire scientific community, except some those employed by the Government at this time.

In the two years I have been involved in seeking the truth about cattle, badgers and bovine Tuberculosis, I was at one time almost convinced that I was wrong. I too was, for a moment, taken in by the picture painted by those who have been 'itching to go out and kill badgers' since long before the present Parliament was elected. It was a picture of badgers coughing and sneezing and falling down dead in front of cows, who were bound to be infected by the festering carcasses of small wild animals. "All we want is healthy cows and healthy badgers," was the argument, which has been used even by David Cameron himself as recently as last month. But nothing could be further from the truth. The truth is that badgers deal very well with the disease that they have caught from cows. They live normal lives for the most part, and can even have healthy offspring while their bodies are fighting the infection. And claims that most badgers in TB hotspots are infected are completely unsupported by evidence and are in blatant conflict with the conclusions of the RBCT report, which noted that most badgers, even in areas with the highest rates of infection by cows, were NOT infected by the disease.

The Government is heading towards licensing the shooting, with high-powered rifles, in the dark, thousands of healthy wild animals, in a scheme that cannot succeed in helping the farmer. This paper details the path towards the only course of action that can succeed in eradicating bovine TB: vaccination.

This is a battle that must be won, to save our wild animals, and to equip Britain with an evolving humane and viable farming industry in the coming years. The decision to cull must be reversed before irreparable damage is done.

Dr Brian May CBE

Mar 2012

## The Bow Group

The Bow Group is a leading think tank based in London. It is the oldest centre-right think tank in the United Kingdom and celebrates its 60th Anniversary this year. Founded by a group of recent graduates including Geoffrey Howe and Norman St. John Stevas, its past chairmen have included Michael Howard, Christopher Bland and Norman Lamont.



Since its foundation, the Bow Group has been a significant source of policy ideas and many of its papers have had a direct influence on Government policy and the life of the nation. Many of the Bow Group's alumni currently sit in Parliament, including five former officers who were elected at the 2010 General Election. The Bow Group Council is presided over by Lord Howe and chaired by Cllr. Ben Harris Quinney MSc.

If you would like to write for the Bow Group, please contact the Research Secretary, Richard Mabey at [research@bowgroup.org](mailto:research@bowgroup.org).

## Dr Brian May

Dr Brian May CBE is perhaps best known as a leading rock musician who penned lyrics and played guitar for Queen. He is also a scientist with a PhD from Imperial College, who has co-authored with Sir Patrick Moore.



A Conservative voter his whole life, he states that he didn't vote Conservative in May 2010 due to the Party's policies on badger culling and other animal welfare issues, an area in which he works a great deal, including founding the charity Save Me ([www.save-me.org.uk](http://www.save-me.org.uk)).

## A note about this paper

The scientific information in this paper has been carefully researched and verified, independently, by leading experts in the field of bTB.

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## Key Quotes

“[The badger cull trials] will be difficult to police, difficult to carry out; there’s no end of difficulties”.

*Rt Hon David Cameron MP*

“Badger culling is unlikely to contribute usefully to the control of cattle TB in Britain, and [we] recommend that TB control efforts focus on measures other than badger culling.”

*The Independent Scientific Group on Cattle TB*

“You may think that culling is the answer and it sounds easy to start with but it can very well make things much worse. Survivors will carry the disease into areas that have hitherto been unaffected. There's good scientific research available to show that culling badgers can make things worse and not better.”

*Sir David Attenborough*

“Badger vaccination could help reduce the prevalence and severity of bovine TB in a badger population and thereby reduce the rate of transmission to cattle.”

*Defra report*

“It was a mistake to imply it was possible to have a science-led policy. The science base is relatively minimal, and essentially a political decision had to be made. The government have dug themselves into a hole. My personal opinion is not to cull.”

*Science advisor to Defra, in The Guardian*

“A vaccination programme, if proven effective, offers considerable potential and a much more publicly acceptable way of tackling this issue.”

*Marina Pacheco, CEO, Mammal Society*

“It sticks in my throat to condemn a species to death when such a policy, predicated on a hypothesis which has been discredited by a valid scientific experiment, would not even deliver the result that the ‘users’ of the policy (cattle farmers & their customers) desire.”

*Graeme Archer, columnist, Daily Telegraph*

“The Government’s position is very hard to understand. There is strong evidence that badger vaccination works, and that mass culling doesn’t. On the contrary, it can lead to an increase in TB because it causes badgers to migrate. So even while intelligent and effective solutions exist, the Government is opting for a remedy that is both deeply unpopular, and which stands a very good chance of making the problem worse.”

*Zac Goldsmith MP*

“Ministers have ignored scientists' advice that a cull will have a marginal effect on bovine TB and presents a serious risk to taxpayers if farmers are unable to cull for 4 years. ...Natural England estimate that up to 130,000 badgers could be killed, wiping them out in some areas, and breaching international wildlife treaties.”

*Mary Creagh MP, Shadow Defra Minister*

## Introduction – Why the Government should abandon badger culling trials in favour of vaccination

In July 2011, the Government announced plans for new badger culling trials to take place in England in autumn 2012. The culling is an attempt to control the spread of bovine Tuberculosis (bTB), which, in 2010-11, cost the taxpayer £91m.<sup>1</sup>

Badgers are regarded as carriers of the disease and it's thought that contact between cattle and badgers can result in infection and bTB 'breakdowns', leading to movement restrictions and compensation. The culling scheme, announced by the Department for Environment, Food and Rural Affairs (Defra) under the stewardship of Rt Hon Caroline Spelman MP, anticipates allowing farmers to form their own collectives for 'free shooting' of badgers in areas where cattle are affected by bTB.

The culls have been planned for areas of more than 150km<sup>2</sup> in West Somerset and West Gloucestershire and Defra anticipates a further ten cull sites each year.

The decision originates from a Defra consultation conducted from Sep - Dec 2010, which presented six options to Government, ranging from continuing 'with the current [coalition] policy – culling is not permitted except in exceptional circumstances or if there is new scientific evidence' up to issuing licenses to allow farmers to take matters into their own hands.<sup>2</sup>

This Bow Group Target Paper is designed to tie together the practical, financial and environmental issues surrounding the Government's proposals, concluding that badger culling is ineffective, costly and inhumane.

It discusses the results of the previous Randomised Badger Culling Trial (RBCT) and the costs of committing to and completing the proposed culls. It also assesses the benefits of vaccination and improvements in biosecurity as an alternative paradigm, citing research into badger vaccine trials and biosecurity methods.

Much of the research cited in this paper is Defra's own, commissioned and conducted during and after previous badger culling trials.

Public opinion polls, the Bow Group's own market research and leading TB experts have given clear signals that the Government's approach is wrong and this paper explains why. It goes on to recommend alternative courses of action in tackling the problem of bovine TB.

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<sup>1</sup> Bovine TB Eradication Programme for England, Defra 19 Jul 2011, available here: [www.defra.gov.uk/publications/files/pb13601-bovinetb-eradication-programme-110719.pdf](http://www.defra.gov.uk/publications/files/pb13601-bovinetb-eradication-programme-110719.pdf)

<sup>2</sup> Bovine Tuberculosis: The Government's approach to tackling the disease and consultation on a badger control policy, Summary of consultation responses, Defra 19 Jul 2011, available here: [archive.defra.gov.uk/corporate/consult/tb-control-measures/bovinetb-summary-responses-110719.pdf](http://archive.defra.gov.uk/corporate/consult/tb-control-measures/bovinetb-summary-responses-110719.pdf)

## The badger and the law

The European Badger (*Meles meles*) is a species common to much of Europe, covering the whole of the UK, Ireland and every mainland European country from Portugal to the west of Russia, excluding northern parts of Norway, Sweden and Finland. The range of *M. meles* includes northern borders of the Middle East and the southern Caspian Sea coastline.<sup>3</sup>

The species has long been persecuted, with badger baiting becoming a popular sport in the 18<sup>th</sup> and 19<sup>th</sup> centuries, before it was outlawed in Britain in 1835, with the *Cruelty to Animals Act*,<sup>4</sup> which came about following lobbying by the Royal Society for the Prevention of Cruelty to Animals (RSPCA), founded in the previous year.

Badgers are protected by the *Protection of Animals Act 1911*<sup>5</sup> and listed in the *Convention on the Conservation of European Wildlife and Natural Habitats* (the *Bern Convention*), which came into force on 1 Jun 1982, to protect European Wildlife and Natural Habitats. The convention aims to conserve wild flora and fauna, protect their habitats, monitor vulnerable species and assist with legal and scientific issues.<sup>6</sup>

Cruel treatment to and causing the death of a badger constitute offences under the *Protection of Badgers Act 1992*<sup>7</sup> – these offences include tampering with a badger sett and even possession of a badger (other than for the purpose of nursing an injured animal back to health). Convictions for such offences stretch to six months in jail, a fine of up to £5,000 and community service.

Despite this long history of legal protection for *M. meles*, investigations in 2009 by the *Sunday Times* and the *BBC* discovered that badger baiting is still practised in the UK and Ireland (where similar laws exist).<sup>8 9</sup> Baiting is widely considered to a cruel and clandestine activity.<sup>10</sup>

Protection is not absolute and Natural England can provide licenses (as can the Welsh Assembly Government and Countryside Council for Wales) in exceptional circumstances. Illegal activities are treated seriously, with the RSPCA and other groups contributing to criminal cases, including the use of forensic and DNA techniques.<sup>11</sup>

As well as being a heavily protected species, *M. meles* is also an iconic species, popular in literature and the national psyche.<sup>12 13 14 15</sup>

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<sup>3</sup> The IUCN Red List of Threatened Species™, Jan 2012

<sup>4</sup> *Cruelty to Animals Act 1835*, Public General Statutes passed in the fifth and sixth year of the reign of His Majesty King William the Fourth

<sup>5</sup> Protection of Animals Act 1911, available via [www.legislation.gov.uk/ukpga/Geo5/1-2/27](http://www.legislation.gov.uk/ukpga/Geo5/1-2/27)

<sup>6</sup> Convention on the Conservation of European Wildlife and Natural Habitats 1979, available here: [conventions.coe.int/treaty/en/Treaties/Html/104.htm](http://conventions.coe.int/treaty/en/Treaties/Html/104.htm)

<sup>7</sup> Protection of Badgers Act 1992, available here: [www.legislation.gov.uk/ukpga/1992/51](http://www.legislation.gov.uk/ukpga/1992/51)

<sup>8</sup> Exposed: The evil world of badger baiting, *Sunday Times* 22 Feb 2009, available here: [www.timesonline.co.uk/tol/news/world/ireland/article5781271.ece](http://www.timesonline.co.uk/tol/news/world/ireland/article5781271.ece)

<sup>9</sup> Badger and deer crime on the rise, *BBC News* 4 Jun 2009, available here: [news.bbc.co.uk/1/hi/scotland/8082232.stm](http://news.bbc.co.uk/1/hi/scotland/8082232.stm)

<sup>10</sup> Griffiths, H.I., Thomas, D.H., Council of Europe, *The conservation and management of the European badger (Meles meles)* 1997 (ISBN 9287134472)

<sup>11</sup> Badgers & the law, available here: [www.rspca.org.uk/allaboutanimals/wildlife/laws/badgers](http://www.rspca.org.uk/allaboutanimals/wildlife/laws/badgers)

<sup>12</sup> Badger Cull: Are we silly to be so sentimental? *BBC* 19 Nov 2010, available here: [www.bbc.co.uk/news/magazine-11380921](http://www.bbc.co.uk/news/magazine-11380921)

<sup>13</sup> Varley, S., *Badger's Parting Gifts* 1992 (ISBN 0006643175)

<sup>14</sup> Lewis, C.S., *Prince Caspian: The Return to Narnia* 1951 (ISBN 0-02-044430-3)

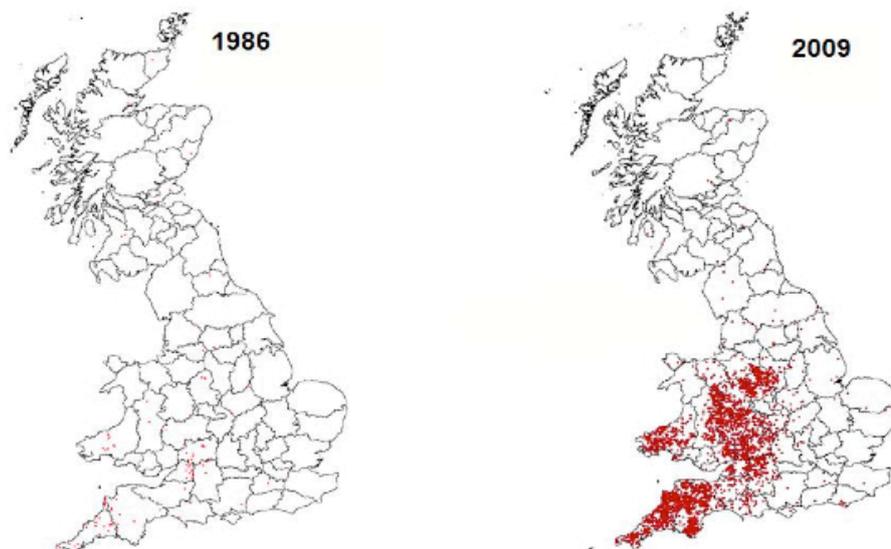
<sup>15</sup> Dann, C., *The Animals of Farthing Wood* 1979 (ISBN 0434934305)

## Tuberculosis in cattle

Tubercle bacillus (TB) is a common, infectious disease caused by various strains of mycobacteria, in humans usually *Mycobacterium tuberculosis*, in cattle usually *Mycobacterium bovis*. It is spread via the aerosol effect (coughing and sneezing) and can be lethal. All but eradicated in humans in Western Europe, with UK incidence rates of 0.015% in 2007, it is still a major problem in developing nations.<sup>16</sup>

Bovine tuberculosis (bTB) is a major problem for the health of British cattle herds.<sup>1</sup> In the 1930s, unpasteurised milk was a public health risk, since tuberculosis could pass from the milk of infected cows into humans.<sup>17</sup> The Government introduced a test and slaughter policy in the 1950s, which, in concert with pasteurisation as routine helped to reduce the risk to human health.<sup>17</sup> TB can be carried by many domesticated species, including cats and dogs, and some governments enforce restrictions to halt the disease in animal populations – for example, ownership of gerbils is forbidden in the state of California.<sup>18</sup>

*M. bovis* is able to pass between animals in close contact and the incidence of bTB has actually increased within British herds in recent years. In the last 25 years, due largely to increased cattle movement, it has spread to become endemic in excess of 39,000km<sup>2</sup> of England, particularly in the south and south-west, with additional 'hotspots' in West Wales and the Peak District.



**Figure 1 - Geographical distribution (point location) of herds sustaining new breakdowns of bTB in 1986 and 2009 (source: Veterinary Laboratories Agency)**

In Nov 2008, the Government established the Bovine TB Eradication Group for England (TBEG)<sup>19</sup> to address the impact of bTB and assess the practical and financial implications of various measures, including biosecurity and vaccination.<sup>1</sup>

<sup>16</sup> World Health Organization (2009). "The Stop TB Strategy, case reports, treatment outcomes and estimates of TB burden". *Global tuberculosis control: epidemiology, strategy, financing*. pp. 187–300. (ISBN 9789241563802)

<sup>17</sup> Measures to address bovine TB in badgers, Defra 30 Nov 2011, available here: <http://archive.defra.gov.uk/foodfarm/farmanimal/diseases/atoz/tb/documents/bovine-tb-impact-assessment.pdf>

<sup>18</sup> 14 CA ADC § 671 Barclays official California code of regulations; Title 14. Natural resources; Division 1. Fish and game commission – Department of fish and game; Subdivision 3. General regulations; Chapter 3. Miscellaneous.

<sup>19</sup> Bovine TB Eradication Group for England, Defra, available here: [archive.defra.gov.uk/foodfarm/farmanimal/diseases/atoz/tb/partnership/eradication-group/index.htm](http://archive.defra.gov.uk/foodfarm/farmanimal/diseases/atoz/tb/partnership/eradication-group/index.htm)

This is important work - in 2010-11, bTB cost the taxpayer £91m in England, approx. 3% of gross output of GB cattle enterprise and 7% in the south-west.<sup>17</sup> The TB research budget has been protected from significant cuts – currently £7.9m in 2011-12.<sup>1</sup>

Sixty years after it began, the regular test/slaughter of cattle still forms a key component of bTB control (as well as observations made at abattoirs) and affected herds are routinely placed under temporary movement restrictions upon discovery of bTB breakdowns. In 2009, evidence of bTB was found in 10% of British herds, leading to the slaughter of 35,000 cattle. In 2010, slightly fewer than 25,000 animals were slaughtered.<sup>20</sup>

Over the next decade, the Government estimates the cost of bTB to be £100m per year, double the cost of the last ten years. Defra has reduced the number of herds it tests for bTB, although the department's statistics show that the disease is on the rise – a 4.4% increase in the number of new incidents in Jan-Aug 2011, compared to the same period in 2010.<sup>21</sup>

## The role of badgers in bTB

While the spread of bTB between individual cows is the biggest cause of an individual infection, the issue is complicated by failing biosecurity (see **Biosecurity**) and because wild badgers can act as reservoirs of the disease.<sup>1 22</sup>

It has long been known that TB can be transmitted between cattle, between badgers and between the two species, and badgers seem an obvious scapegoat, since their territories often overlap with dairy and cattle farms.<sup>1</sup> Badgers can carry *M. bovis*, and confirmed infection rates in non-bovine animals are extremely low – in 2010, there were just 93 incidents across pigs, camelids, sheep, goats and park and farmed deer.<sup>1</sup>

However, underlying levels of *M. bovis* in British badgers are also extremely low. The Food and Environment Research Agency (FERA) has led Road Traffic Accident (RTA) surveys, collecting dead badgers from the roadside to test for *M. bovis*. RTA surveys between Nov 2000 and Dec 2004 in seven counties discovered an average prevalence of just 15%.<sup>23</sup> Other trials within RBCT showed this prevalence to be as low as 11.3%.<sup>17</sup>

Undisturbed, badgers do not migrate a great deal. Their setts are vast, some with dozens of entrances, and are passed down through generations. Each social group defends a territory, usually less than 1km<sup>2</sup>. At high population densities, many badgers never leave the social groups into which they were born.

This means that, if harbouring TB, a stable individual group of badgers is unlikely to pass the disease onto other groups<sup>24</sup> or to cattle herds outside the sett area. In fact, studies have shown that the spread of bTB *between* herds is most likely to occur when cattle are transported around the country.<sup>25</sup>

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<sup>20</sup> DEFRA Bovine TB statistic for Great Britain, 2009, available here: [archive.defra.gov.uk/foodfarm/farmanimal/diseases/atoz/tb/stats](http://archive.defra.gov.uk/foodfarm/farmanimal/diseases/atoz/tb/stats)

<sup>21</sup> Bovine TB in Great Britain - GB national statistics, Defra Nov 2011, available here: [www.defra.gov.uk/statistics/foodfarm/landuselivestock/cattletb/national/](http://www.defra.gov.uk/statistics/foodfarm/landuselivestock/cattletb/national/)

<sup>22</sup> England farmers 'live with' bovine TB slaughters, *BBC* 29 Apr 2011, available here: [www.bbc.co.uk/news/uk-england-13227095](http://www.bbc.co.uk/news/uk-england-13227095)

<sup>23</sup> FERA Badger vaccination Q&A for veterinarians, FERA, available here: [www.fera.defra.gov.uk/wildlife/ecologyManagement/documents/vaccinationFAQs.pdf](http://www.fera.defra.gov.uk/wildlife/ecologyManagement/documents/vaccinationFAQs.pdf)

<sup>24</sup> Cheeseman, C. L., Wilesmith, J. W., Stuart, F. A. and Mallinson, P. J. 1988b. Dynamics of tuberculosis in a naturally infected badger population. - *Mamm. Rev.* 18: 61-72.

<sup>25</sup> Gilbert, M., et al., Cattle movements and bovine tuberculosis in Great Britain. *Nature*, 2005. 435(26): p. 491-496; and: Carrique-Mas, J.J., et al., Risk of bovine tuberculosis breakdowns

## The Government's plans

The Government is committed to tackling bTB and Defra's advice is that there is no single solution.

In a document published in July 2011, entitled Bovine TB Eradication Programme for England,<sup>1</sup> Defra laid out a set of key measures aimed at reducing bTB. These measures are:

1. Cattle surveillance and control measures to address cattle to cattle transmission.
2. Promoting good biosecurity, to address transmission between cattle, and between badgers and cattle.
3. Control of TB in badgers, to reduce transmission from badgers to cattle in TB endemic areas.
4. Measures to tackle TB in non-bovine farmed species (including pigs, goats, deer, sheep, alpacas and llamas).
5. Advice and support for farmers.
6. A targeted research and development programme.
7. Robust governance, monitoring and reporting arrangements.

Defra's recommendations for curbing bTB in British herds are based on three broad approaches:- a comprehensive approach: tackling TB in cattle, non-bovine farmed animals, and wildlife, addressing all transmission routes to tackle TB in cattle (cattle to cattle and between badgers and cattle) and making best use of all available tools; a risk-based approach: targeting controls on disease risk, based on veterinary advice and discretion, and making the best possible use of resources; and a staged approach: seeking to stop the disease spreading in the short-term, bringing it under control, and ultimately eradicating it.<sup>1</sup>

Defra describes how ongoing work in the areas of cattle testing, movement restrictions, surveillance, guidance for farmers and monitoring is helping the situation, although bTB appears to be still increasing; Defra concludes that tackling *M. bovis* in wild badger is essential.<sup>1</sup> The report recommends 'a carefully managed and science-led policy of badger control'<sup>1 26</sup>

A 2010 consultation on a proposal to issue licenses (under the *Protection of Badgers Act 1992* and the *Wildlife and Countryside Act 1981*) to farmers and/or landowners to cull and/or vaccinate badgers to prevent the spread of bTB was followed by a public consultation, which received almost 60,000 responses on the matter.<sup>2</sup>

In this consultation, six policy options were suggested:<sup>2</sup>

Option 1            To continue with the current policy – culling is not permitted except in exceptional circumstances or if there is new scientific evidence.

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in post-foot-and-mouth disease restocked cattle herds in Great Britain. *Proc. Soc. Vet. Epid. Prev. Med.*, 2005. Nairn, Inverness 30 Mar -1 Apr 2005.

<sup>26</sup> Consultation: Bovine Tuberculosis: the Government's approach to tackling the disease and consultation on a badger control policy, Defra 8 Dec 2010, available here: <http://archive.defra.gov.uk/corporate/consult/tb-control-measures/index.htm>

- Option 2      To introduce a policy of culling badgers, managed and delivered by Government, or contractors acting on behalf of Government.
  
- Option 3      To introduce a policy of vaccinating badgers, managed and delivered by Government, or contractors acting on behalf of Government.
  
- Option 4      The farming industry to deliver culling in line with a set of strict criteria developed by Government in consultation with the industry. Natural England would assess and issue licences to those applicants meeting the criteria.
  
- Option 5      Farmers and landowners encouraged to make greater use of vaccination to tackle TB, using the newly available injectable badger vaccine. It is already possible to apply to Natural England for licences to trap & vaccinate badgers.
  
- Option 6      Issuing licences under the *Protection of Badgers Act 1992* for industry to cull badgers, subject to a specific set of licence criteria. Farmers will also be able to apply for licences to vaccinate badgers. Under this option they will be able to use vaccination either on its own or in combination with culling.

Defra's recommendations led the Government to prefer Option 6,<sup>17</sup> which enables farmers and landowners to decide for themselves which control measures to use. This means that farmers can choose whether or not to trap and vaccinate badgers, trap and shoot them, or shoot them by seeking them out in the open. The Government's reasoning was that Option 6 is cost-effective, since farmers and landowners will be covering the costs of the trials.

However, Option 6 is more expensive than it looks at first glance. Defra's impact assessment suggests that issuing licenses to use a combination of culling and vaccination in one area of 350km<sup>2</sup> is between £3.74m and £6.38m, with a best estimate of £4.56m (including administration of £1.40m, the financial cost to farmers of the initial increase in bTB in neighbouring areas (see **Perturbation**): £0.5m and Government costs of licensing, monitoring and compensation for increased bTB: £3.11m). Policing costs are likely to be much higher than initial estimates, which is accepted in the impact assessment (see **Cost to the taxpayer**).<sup>17</sup>

Currently, the Government's plans include two cull areas of 150km<sup>2</sup> each, in West Gloucestershire and West Somerset, where Defra requires at least 70% cooperation with local landowners. Defra anticipates a further ten cull sites each year and has confirmed that it's likely that, should 'free-shooting' be ruled out after the first year of the trials, farmers and landowners will be legally obliged to trap and shoot.

Either way, it is estimated that 70,000 – 105,000 badgers will be culled,<sup>27</sup> with farmers required to kill at least 70% of the badger population within each culling area, but leading to a net reduction of just 12-16% in the incidence of bTB over 9 years.<sup>1</sup>

Serious concerns have been raised about the safety of landowners and members of the public and a possible increase in wildlife crime, especially an increase in badger baiting. Particular concern was raised in relation to public safety on public footpaths and bridleways within the culling areas.<sup>2</sup>

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<sup>27</sup> Badger Culling Will Go Ahead In 2012, *Guardian* 14 Dec 2011, available here: [www.guardian.co.uk/environment/2011/dec/14/badger-culling-2012](http://www.guardian.co.uk/environment/2011/dec/14/badger-culling-2012)

## Randomised Badger Culling Trial

There has been much badger culling over the last thirty years, but following the recommendations of the Krebs Report,<sup>28</sup> the Randomised Badger Culling Trial (RBCT, also called the Krebs Trial) was designed to test the effectiveness of badger culling as a means of controlling bTB once and for all.

The RBCT (1998 - 2007) was by far the largest trial to be undertaken, as well as the best designed. Countless scientific appraisals were conducted throughout and after the RBCT and much of the research quoted in this paper cites these appraisals.

The trial was funded and managed through the TB Division of the Animal Health and Welfare Directorate and overseen by the Independent Scientific Group on cattle TB (ISG), chaired by Professor John Bourne.

The Krebs trial was great in scope. Thirty, high-risk, 100km<sup>2</sup> areas of England were chosen and grouped into ten sets of three areas (triplets). Within each triplet, the RBCT utilised three broad approaches:

- Badgers were culled in a widespread fashion on all accessible land in one area (proactive culling).
- In the second area, localised culling was conducted in response to a confirmed case of bTB leading to movement restrictions placed on that herd (confirmation via post-mortem examination and/or culture). This reactive culling targeted badgers only in those setts that overlapped land within the farm of the infected herd ('reactor' land).
- The third area received no culling (survey only).

Animals within the RBCT were trapped in baited cages and shot.

Much of the scientific work was halted temporarily in 2001 due to the Foot and Mouth Disease (FMD) outbreak, when field teams were not allowed onto farms. The same teams were also involved in the FMD crisis.

The proactive culling arm of the RBCT led to a modest reduction in the incidence of bTB within the culling areas, but an increased incidence on adjoining lands that were not culled. During the period of culling, the detrimental effect on neighbouring land was sufficient to cancel out the benefits inside the culling areas, leaving no overall effect. However, after culling was halted after 5 years, detrimental effects disappeared more rapidly than beneficial effects, and the overall effect was a small benefit. The net benefits from proactive culling were projected to be greater in larger areas (because the size of the adjoining area would be relatively smaller).

Overall, Defra estimated that culling an area of 150km<sup>2</sup> would lead to a net reduction in bTB of 12% (with a confidence interval of 3-22%) or 16% (with a confidence interval of 8-24%) over 9 years, depending on the assumptions used.<sup>29</sup>

Reactive culling was suspended in Nov 2003, after research published in *Nature* discovered that it actually increased the incidence of confirmed bTB cases in the broader area of the cull

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<sup>28</sup> Krebs JR, Anderson RM, Clutton-Brock T, Morrison WI, Young D, Donnelly CA: Bovine tuberculosis in cattle and badgers. *London: MAFF Publications*, PB3423; 1997.

<sup>29</sup> Bovine TB: The Scientific Evidence, Final Report of the ISG on Cattle TB, available here: [archive.defra.gov.uk/foodfarm/farmanimal/diseases/atoz/tb/isg/report/final\\_report.pdf](http://archive.defra.gov.uk/foodfarm/farmanimal/diseases/atoz/tb/isg/report/final_report.pdf)

by 27% (see **Perturbation**, below).<sup>30</sup>

Subsequent research by the ISG demonstrated a lower population density of badgers in these reactive cull areas and that prevalence of *M. bovis* in badgers in these areas was heightened.<sup>31</sup>

The ISG published its final report in 2007, after years of research, the culling of approximately 11,000 badgers and a cost to the taxpayer of £50m.

The ISG's own conclusion reads, "After careful consideration of all the RBCT and other data presented in this report, including an economic assessment, we conclude that badger culling cannot meaningfully contribute to the future control of cattle TB in Britain."<sup>29</sup>

This report affirms on this basis that killing badgers could actually increase the spread of bTB in areas around the cull, making matters worse.<sup>29</sup>

These facts are accepted in Defra's Nov 2011 impact assessment.<sup>17</sup>

## Perturbation

So when a herd with a confirmed case of bTB had its movement restricted and badgers in the local area culled, why were other herds in the neighbourhood more likely to contract bTB?

The answer is down to an effect known as perturbation. Badgers are intelligent, social animals and even though their huge, complex setts may be retained and reused by the same group for generations, they can migrate into land vacated by their culled neighbours. Immigrant badgers can then be exposed to infection and subsequent movements distribute the infection over a wider area. The effect was described by the ISG.<sup>32</sup>

Socio-spatial organisation of badger populations is shown to degenerate, increasing the overlap between the ranges of groups.<sup>33</sup>

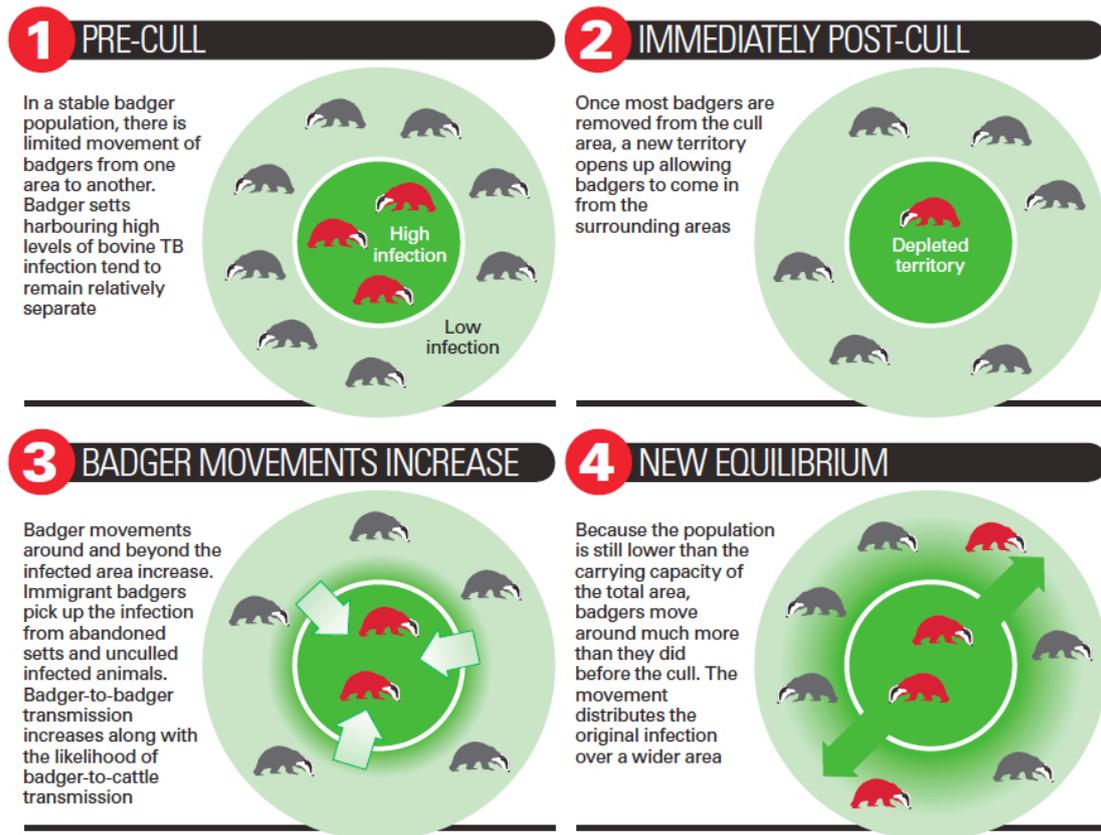
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<sup>30</sup> Donnelly C. A., Woodroffe R., Cox D. R., Bourne J., Gettinby G., Le Fevre A. M., McNerney J. P., Morrison W. I. 2003 Impact of localized badger culling on tuberculosis incidence in British cattle. *Nature* 426, 834–837, available here: [www.nature.com/nature/journal/v426/n6968/full/nature02192.html](http://www.nature.com/nature/journal/v426/n6968/full/nature02192.html)

<sup>31</sup> Woodroffe, R., Donnelly, C.A., Cox, D.R., Gilks, P., Jenkins, H.E., Johnston, W.T., Le Fevre, A.M., Bourne, F.J., Cheeseman, C.L., Clifton-Hadley, R.S., Gettinby, G., Hewinson R.G., McNerney, J.P., Mitchell, A.P., Morrison, W.I. & Watkins, G.H. (2009). Bovine tuberculosis in cattle and badgers in localized culling areas. *Journal of Wildlife Diseases* **45**: 128-143

<sup>32</sup> Woodroffe, R., Donnelly, C.A., Cox, D.R., Bourne, F.J., Cheeseman, C.L., Delahay, R.J., Gettinby, G., McNerney, J.P. & Morrison, W.I. (2006). Effects of culling on badger (*Meles meles*) spatial organization: implications for the control of bovine tuberculosis. *Journal of Applied Ecology*. **43**: 1-10.

<sup>33</sup> Tuytens F. A. M., Delahay R. J., Macdonald D. W., Cheeseman C. L., Long B. & Donnelly C. A. 2000b. Spatial perturbation caused by a badger (*Meles meles*) culling operation: implications for the function of territoriality and the control of bovine tuberculosis. *J. Anim. Ecol.* **69**: 815-828.



**Figure 2 - The "perturbation effect" (source: The Wildlife Trusts)**

A study conducted by the Wildlife Conservation Research Unit (WildCRU) at the University of Oxford, in collaboration with the Central Science Laboratory in York, between Apr 1999 and Sep 2003, examined the impact of culling on badger population demography, social organisation, dispersal and bTB epidemiology. The study compared a reactive culling area and a survey-only area within the RBCT.

The trial identified that, after 34-44% of badgers within social groups were culled, amongst the survivors, overlap between social groups and aggression increased in targeted groups and their neighbours. As a result of this badger migration, TB prevalence increased in groups neighbouring removals, particularly among cubs.

These animals travelled further following culling and dispersal increased significantly. The Oxford study considered the increased stress of social disruption within badger groups also caused immunosuppression and enhanced expression of the disease.

The authors of the report concluded that perturbation should be considered when formulating policy and that culling badgers may be an ineffective approach to controlling bTB levels in cattle.<sup>34</sup>

Even more thorough data emerged from the ISG's reports, which showed the behavioural effects of culling, genetic evidence of consistently increased dispersal<sup>35</sup> and consistent evidence of increased prevalence in both proactive<sup>36</sup> and reactive areas.<sup>31</sup>

<sup>34</sup> Project SE3108: A field study to reveal the effects of perturbation, and to model the epidemiology of TB in disturbed badger populations, Defra 2004, available here: [randd.defra.gov.uk/Document.aspx?Document=SE3108\\_2791\\_FRP.doc](http://randd.defra.gov.uk/Document.aspx?Document=SE3108_2791_FRP.doc)

<sup>35</sup> Pope, L.C., Butlin, R.K., Wilson, G.J., Woodroffe, R., Erven, K., Conyers, C.M., Franklin, T. Delahay, R.J., Cheeseman, C.L., & Burke, T. (2007). Genetic evidence that culling increases

Separate research conducted by Imperial College and published by The Royal Society in 2011 highlights the increase in incidence of bTB in recent decades, despite the culling of a total of approximately 20,000 badgers between 1975 and 1997 even before the Krebs Trial. The research included a case-controlled study involving 1,208 cattle herds and provided evidence that localised badger culling, conducted in the RBCT in response to a confirmed outbreak of bTB, led to increased bTB incidence in nearby herds. Furthermore, Imperial College discovered that the presence of any reactive badger culling within 1km of a herd more than doubled its risk of bTB, even when accounting for other local factors. The research concluded that localised approaches to bTB were ineffective and counterproductive.<sup>37</sup>

Defra's impact assessment report on the forthcoming culls recommends that 'criteria proposed for licensing specify that the area will have boundaries or buffers to mitigate the negative effects in neighbouring areas caused by perturbation of badgers' social groups'.<sup>17</sup>

In other words, in order to contain the additional bTB risk in neighbouring herds, Defra is recommending that culling trials take place in areas where movement of badgers is naturally restricted by geographical features – of course, in reality, natural geographic boundaries are extremely rare in TB-affected areas of Great Britain. Even if badger culling trials were successful, they would not be scalable.

## We've been here before

It is because of the effects of perturbation that Professor Lord (John) Krebs, who was the government advisor responsible for the RBCT in the 1990s and the architect of those early trials, has gone on record to say that culling was "not an effective policy" and that it would be a mistake.<sup>38</sup>

Lord Krebs cites the results of the research he recommended as the reason the proposed culls should not be conducted, stating, "You cull intensively for at least four years, you will have a net benefit of reducing TB in cattle of 12% to 16%. So you leave 85% of the problem still there, having gone to a huge amount of trouble to kill a huge number of badgers. It doesn't seem to be an effective way of controlling the disease."

Lord Krebs is referring to the official figures, which state that culling reduces bTB infection by 12-16% over a total span of 9 years.<sup>29</sup>

Krebs' solution is to tighten the country's biosecurity to reduce the likelihood of cattle coming into contact with badgers and other sources of the disease and to prevent infection being passed between herds. Long-term, the peer recommends continuing to develop vaccines that would become commercially and legally viable – so, Defra has invested more than £30m since 1998, in partnership with the Veterinary Laboratories Agency.

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badger movement: implications for the spread of bovine TB. *Molecular Ecology* **23**: 4919-4929.

<sup>36</sup> Woodroffe R., et al. 2006 Culling and cattle controls influence tuberculosis risk for badgers. *Proc. Natl Acad. Sci. USA* 103, 14 713–14 717, available here: [www.pnas.org/content/103/40/14713](http://www.pnas.org/content/103/40/14713)

<sup>37</sup> Vial F., Donnelly C. A. 2011 Localized reactive badger culling increases risk of bovine tuberculosis in nearby cattle herds. *Biol Lett*, available here: [rsbl.royalsocietypublishing.org/content/early/2011/06/29/rsbl.2011.0554.full.pdf+html](http://rsbl.royalsocietypublishing.org/content/early/2011/06/29/rsbl.2011.0554.full.pdf+html)

<sup>38</sup> Badger culling is ineffective, says architect of 10-year trial, *Guardian* 11 Jul 2011, available here: [www.guardian.co.uk/environment/2011/jul/11/badger-culling-ineffective-krebs](http://www.guardian.co.uk/environment/2011/jul/11/badger-culling-ineffective-krebs)

Krebs says that the best prospect of controlling bTB would be through a cattle vaccine and associated diagnostic test, although immunising cattle against TB is currently prohibited under EU law (see **Irony in Europe**). The difference between when Lord Krebs published his results and recommendations in 1996 and today, is that vaccines are now available for badgers.

Speaking to the Bow Group in Feb 2012, Lord Krebs said, “Defra has said it wishes its policy for controlling TB in cattle to be science-led. There is a substantial body of scientific evidence that indicates that culling badgers will not be an effective or cost-effective policy. The best informed independent scientific experts agree that culling on a large, long-term, scale will yield modest benefits and that it is likely to make things worse before they get better. It will also make things worse for farmers bordering on the cull areas. Furthermore, it is not a credible national strategy. It is hard to imagine that the policy could be deployed over the whole 38,000km<sup>2</sup> of TB affected farmland, which would involve killing perhaps a quarter of the UK badger population, year after year.

“Instead the focus should be on further improvements to bio-security and vaccination. The long-term aim must be a cattle vaccine with a marker to distinguish vaccinated from the infected cattle.”

## Would widespread badger vaccination work?

Injectable Badger Bacillus Calmette-Guérin (BadgerBCG) is identical to the BCG vaccinations with which British school children were immunised aged 13 between 1953 and 2005.

BCG injections were so effective in British children during this time that cases of TB in the human population disappeared.<sup>39</sup> In fact, by 1988, the number of reported incidences of TB had fallen to such low levels that, statistically, 12,000 children would need to be immunised in order to prevent one case of TB.

Despite a budget of less than £1m per year (a total of £16m since 1994), an injectable BadgerBCG was licensed in Mar 2010 and is now available on prescription.<sup>1</sup>

Defra admits that ‘Laboratory and field studies have demonstrated that vaccination of badgers by injection with BCG significantly reduces the progression, severity and excretion of TB infection.’<sup>1</sup> However, the report continues: ‘While we would expect vaccination of badger populations to result in reduced transmission of TB to cattle, we currently have no direct experimental evidence on this, other than from computer modelling. Therefore the precise contribution badger vaccination could make to reducing disease in cattle is unknown. Determining this in a scientifically robust way would require large-scale field trials and be very costly.’<sup>1</sup>

However, field trials of the BadgerBCG vaccine have been taking place for years – such trials were the policy of the previous Government - and there is clear evidence that deployment of the vaccine is effective in reducing bTB in badgers.

For example, in 2008, a vaccination field trial led by The Food and Environment Research Agency (FERA), involving a population of more than 800 badgers in a high-risk area of Gloucestershire, demonstrated a 73.8% reduction in the incidence of positive serological TB test results in wild badgers.<sup>40 41</sup>

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<sup>39</sup> Styblo K, Meijer J. (1976). "Impact of BCG vaccination programs in children and young adults on the tuberculosis problem". *Tubercle* 57: 17–43, available here: [www.sciencedirect.com/science/article/pii/0041387976900155](http://www.sciencedirect.com/science/article/pii/0041387976900155)

<sup>40</sup> Report of GCP (veterinary) study on wild badgers 2009, Defra 2009, available here: [randd.defra.gov.uk/Document.aspx?Document=SE3250b.pdf](http://randd.defra.gov.uk/Document.aspx?Document=SE3250b.pdf)

The cost of the trial was under £500,000 and savings are being made in subsequent trials. Defra has also committed to a programme of commercial training courses for badger vaccinators, with the first course run in Oct 2010.<sup>1</sup>

Further to that work, vaccination programmes continue - in 2010, FERA vaccinated 541 badgers across 93 premises, covering an area of approximately 9,000 ha. Last year, 628 badgers were vaccinated across 86 premises, covering 8,400 ha.<sup>23</sup>

Badger vaccination trials sponsored by the Government took a step back however, when in Jun 2010, it reduced the plans to vaccinate badgers from six areas to just one.<sup>42</sup>

Despite this, badger vaccine trials continue in the charitable sector. In May 2011, the National Trust began the largest ever field trial of BadgerBCG (conducted by FERA) over a 20km<sup>2</sup> area of the Killerton Estate near Exeter. Individual badgers are trapped, vaccinated and visibly tagged to ensure that they are not vaccinated again in the same study.

Mark Harold, Director for the National Trust's South West region, says, "This programme will show how badgers vaccination can be deployed over a large area, and will pave the way for more widespread use of vaccination as an effective alternative to culling.

"We're in a unique position as a major landowner to help find a solution to the blight of bovine TB that costs millions and affects farmers' livelihoods. We recognise that both cattle to cattle transmission of bovine TB as well as badgers infecting cattle need to be tackled.

"Whilst a vaccine for cattle is some way off, and there are wider regulatory issues making this difficult, giving the badgers a vaccine to stop the spread of bovine TB is a practical way forward and the recent evidence is that it works and is effective."<sup>43</sup>

Full results of the National Trust-led vaccination programme will be available by 2014.

The National Farmers' Union (NFU) and the Badger Trust have also been working together on vaccination trials in Shropshire and Derbyshire. Trials began in 2011 and are resuming in the spring of 2012.<sup>44</sup>

FERA is confident that the use of BadgerBCG reduces the severity of the disease in those that become infected after vaccination, limiting the potential for transmission to cattle. It is considered safe for people and badgers and only a proportion of a susceptible population of badgers requires the immunisation to significantly reduce the spread of the disease within groups and therefore transmission to cattle.<sup>23</sup>

Since the perturbation effect is caused only by permanent loss of individual badgers from a social group, extraction of individuals for the purpose of vaccination (a maximum of 12 hours – and not out of the animals' territories) would not lead to perturbation. FERA has identified

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<sup>41</sup> Chambers B. et al (2010). "Bacillus Calmette-Guérin vaccination reduces the severity and progression of tuberculosis in badgers", *Proc. R. Soc. B* 22 Jun 2011 vol. 278 no. 1713 1913-1920, available here: [rsob.royalsocietypublishing.org/content/278/1713/1913.full.pdf+html](http://rsob.royalsocietypublishing.org/content/278/1713/1913.full.pdf+html)

<sup>42</sup> Changes to badger vaccine deployment project, Defra 24 Jun 2006, available here: [www.defra.gov.uk/news/2010/06/24/tbbadger-vaccine/](http://www.defra.gov.uk/news/2010/06/24/tbbadger-vaccine/)

<sup>43</sup> The National Trust South West Blog, *National Trust* 20 Apr 2011, available here: [www.ntsouthwest.co.uk/2011/04/new-programme-to-demonstrate-badger-vaccination-as-effective-alternative-in-bovine-tb-control/](http://www.ntsouthwest.co.uk/2011/04/new-programme-to-demonstrate-badger-vaccination-as-effective-alternative-in-bovine-tb-control/)

<sup>44</sup> NFU and Badger Trust work on joint TB vaccination project, NFU 15 Nov 2011, available here: [www.nfuonline.com/Media\\_centre/2011/NFU\\_and\\_Badger\\_Trust\\_work\\_on\\_joint\\_TB\\_vaccination\\_project/](http://www.nfuonline.com/Media_centre/2011/NFU_and_Badger_Trust_work_on_joint_TB_vaccination_project/)

that the routine trapping and sampling of badgers at its Woodchester study site for more than 30 years has not led to perturbation.<sup>40</sup>

If vaccination can lead to a 73.8% (4-fold) reduction in the incidence of positive serological TB test in badgers and the natural prevalence of bTB is just 15%, a widespread vaccination programme could significantly reduce the overall disease burden.

Badgers have a life span of 3-5 years, with an annual population turnover of 30%. Theoretically, therefore, the number of individual infected badgers would decrease by 30% annually over the course a successful vaccination programme and the proportion of infected badgers would reduce to a lower still percentage over 5 years, since new infections would be rare and the small percentage of infected animals would die out naturally. Annual vaccinations are recommended to protect new cubs.

In 2010, FERA conducted some research aimed at investigating the impact of badger vaccination on bTB levels in cattle, comparing vaccination with culling.<sup>45</sup>

Their model used four potential strategies:- do nothing, badger culling (150km<sup>2</sup>), badger vaccination (150km<sup>2</sup>) and culling in a core area (150km<sup>2</sup>) with a ring of vaccination around it (150km<sup>2</sup>), over five years. The results demonstrated that vaccination would prevent fewer breakdowns than culling and carried no risk of the negative effects associated with culling.

FERA predicted that in both the ring and the core areas, several years of culling would actually increase prevalence of bTB in badgers due to perturbation, an effect demonstrated empirically by the RBCT. The proportion of TB-infected badgers dropped from the offset and continued to do so using the vaccination-only model.

The paper was also clear that the only way to see a reduction in bTB in cattle through a programme of badger culling is to combine it with a vaccination programme of the same size around the cull. However, with this approach, the vaccine would be less effective in an area subject to culling-derived perturbation where a higher proportion of the badgers are infected.<sup>45</sup>

If badger vaccination alone results in positive outcomes without any of the negative impacts associated with culling, then it is obvious that more emphasis should be placed on vaccination as a means to address bTB in cattle. Gordon McGlone, CEO of Gloucestershire Wildlife Trust, says, "We now have the prospect of a [vaccine] solution. Our worry is that culling badgers will take things in the wrong direction."

The only current method for immunising badgers is via injection; however, Oral Badger BCG is being developed in collaboration with other countries, including the Republic of Ireland and New Zealand and Defra has invested £6m on this research since 2005.<sup>1</sup> It is possible that an oral vaccine could be available here as soon as 2015, resulting in potential cost reductions for vaccination programmes.

On the subject of vaccination, Defra contradicts itself: Despite the supposed lack of scientific evidence that BadgerBCG works and its own investment in the vaccine, in its impact assessment on the 2012 culling trials, Defra recommends that, as well as using natural boundaries to stop badgers relocating, the vaccine is deployed in rings around the trial zones in order to mitigate the effects of perturbation.<sup>17</sup>

Vaccines are available commercially, there are private companies offering vaccination as a service and scientists, landowners, charities and wildlife groups are investing in and deploying BadgerBCG. However, there isn't even a working group dedicated to badger or

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<sup>45</sup> Comparing badger (*Meles meles*) control strategies for reducing bovine bTB in cattle in England, Defra Nov 2010, available here: [archive.defra.gov.uk/food-farm/animals/diseases/tb/documents/8control-strat-report.pdf](http://archive.defra.gov.uk/food-farm/animals/diseases/tb/documents/8control-strat-report.pdf)

cattle vaccines (the TBEG focuses on culling and does not include any representation from vaccination).

So strongly do pro-vaccine supporters believe in this solution that following the release of the trial sites in Jan 2012, charity The Wildlife Trusts announced a plan to begin vaccinating badgers with injectable BadgerBCG within the trial areas.<sup>46</sup>

## Irony in Europe

Cattle in the UK are routinely vaccinated against diseases, but the use of TB vaccines is banned under EU law (*Directive 78/52 EEC, 1977*).<sup>47</sup> This is because, ironically, the bovine BCG vaccine interferes with the mandatory tuberculin skin test. Cattle that had been vaccinated would technically fail the test, meaning they couldn't be declared Officially TB Free (OTF) for trading and the EU has also imposed a ban on trading non-OTF cattle (*Directive 64/432/EEC, 1964*).<sup>48</sup>

Defra is approaching this conundrum in three ways – developing a test that can differentiate between the vaccine and the tuberculin skin test, working with the EU to change legislation that permits the trade of cattle that have had the test and continuing research into a bovine BCG, so that when the law changes, immunisation is ready.

In late 2011, following years of research into bovine BCG<sup>49</sup> since the Krebs report was first published, Defra submitted a candidate vaccine to the Veterinary Medicines Directorate for 'marketing approval', which is the first step towards the availability of a vaccine for use in the market. A further £9.3m has been budgeted over the next 4 years for research into a cattle vaccine.<sup>50</sup> Field studies in Ethiopia<sup>51</sup> and Mexico<sup>52</sup> have demonstrated the protective effect of cattle vaccination to be between 56% and 68%.

However, Defra believes that an opportunity to change EU legislation to permit the use of a bovine BCG would not be available until 2015, with application in the field unlikely until 2017. Defra's own report states "We are continuing to invest heavily in research, in particular to develop a cattle vaccine and an oral badger vaccine. However, these are still many years away and we cannot predict with any certainty when they might be ready to deploy."<sup>1</sup>

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<sup>46</sup> Wildlife Trusts to vaccinate in pilot badger cull areas, Wildlife Trusts 19 Jan 2012, available here: [www.wildlifetrusts.org/news/2012/01/19/wildlife-trusts-vaccinate-pilot-badger-cull-areas](http://www.wildlifetrusts.org/news/2012/01/19/wildlife-trusts-vaccinate-pilot-badger-cull-areas)

<sup>47</sup> Council Directive 78/52/EEC of 13 Dec 1977 establishing the Community criteria for national plans for the accelerated eradication of brucellosis, tuberculosis and enzootic leukosis in cattle, available here: [eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31978L0052:EN:HTML](http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31978L0052:EN:HTML)

<sup>48</sup> Council Directive 64/432/EEC of 26 Jun 1964 on animal health problems affecting intra-Community trade in bovine animals and swine, available here: [eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31964L0432:en:NOT](http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31964L0432:en:NOT)

<sup>49</sup> SE3212 Testing TB vaccines in cattle, available here: [randd.defra.gov.uk/Document.aspx?Document=SE3212\\_2831\\_FRP.doc](http://randd.defra.gov.uk/Document.aspx?Document=SE3212_2831_FRP.doc)

<sup>50</sup> Cattle vaccination, Defra 6 Feb 2012, available here: [www.defra.gov.uk/animal-diseases/a-z/bovine-tb/vaccination/cattle-vaccination](http://www.defra.gov.uk/animal-diseases/a-z/bovine-tb/vaccination/cattle-vaccination)

<sup>51</sup> Ameni, G., Vordermeier, M., Aseffa, A., Young, D.B., Hewinson, R.G. 2010. Field evaluation of the efficacy of *Mycobacterium bovis* Bacillus Calmette-Guérin against bovine tuberculosis in neonatal calves in Ethiopia, *Clin. Vaccine Immunol.* 17: 1533-1538

<sup>52</sup> Lopez-Valencia G., Renteria-Evangelista T., Williams Jde J., Licea-Navarro A., Mora-Valle Ade L., Medina-Basulto G. (2009). Field evaluation of the protective efficacy of *Mycobacterium bovis* BCG vaccine against bovine tuberculosis. *Res Vet Sci.* 2010 Feb; 88(1):44-9. Epub 2009 Jun 28

## Biosecurity

One of Lord Krebs' original recommendations was to improve biosecurity on farms to limit the damage of bTB within herds and to contain it within geographical areas. This would have the effect of preventing its spread to other farms and wildlife in other areas.

This means implementing measures to:

- Limit contact between cattle and local wildlife, particularly badgers
- Frequently conduct bTB testing and subsequently slaughter infected cattle
- Eliminate the spread of bTB between herds

One of Defra's recommendations is to keep badgers away from cattle.<sup>1</sup> The Central Science Laboratory (CSL) in York conducted an experiment to assess whether it was possible to reduce contact between badgers and cattle within farmyard buildings and what the likely cost of such measures would be. The research, between Nov 2005 and Oct 2009, was in response to a theory by the same group (following a trial between 2003 and 2005) that visits to farm buildings by badgers could be important in transmitting *M. bovis*.<sup>53</sup>

CSL's research team excluded badgers from farm buildings in which cattle and cattle feed were housed using solid metal gates, gates with adjustable metal panels, solid metal fencing, feed bins and electric fencing. The team monitored badger activity using motion-triggered, infrared cameras for at least 365 nights on each of the farms in the study.

Comparing with controls, CSL discovered that badgers were not able to access buildings if exclusion measures were used. When consistently employed, these measures were 100% effective in preventing badgers accessing buildings.

CSL noted that badger exclusion measures needed to be individually tailored to fit each potential entrance point and that the variation in outlay and upkeep for farms of different sizes would vary. However, its calculations revealed that farms could exclude badgers from cattle with 100% certainty for between £604 and £12,482 (a mean of £4,045). This cost would apply in the first year, with farms paying only for maintenance in subsequent years.

To put that figure into context, the cost of a single cattle herd breakdown was estimated to be around £27,000 in 2009. In 2010-11, this cost was re-evaluated at £30,000.<sup>54</sup> While 10% of British farms every year are subjected to a breakdown in the worst effected areas, it is fair to conclude that the mean cost to farms in these areas is £3,000 per annum.

In the west and south-west of England, 23% of farms were subjected to breakdowns in 2010, putting the per-farm mean annual cost in that region at around £6,900.<sup>55</sup>

CSL concluded that methods of physical separation could be highly effective in eliminating contact between badgers and cattle, which in turn could lead to reduced disease transmission risks.<sup>53</sup>

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<sup>53</sup> An experiment to assess the cost-effectiveness of farm husbandry manipulations to reduce risks associated with farmyard contact between badgers and cattle - SE3119 2009, available here: [randd.defra.gov.uk/Document.aspx?Document=SE3119\\_8676\\_FRP.doc](http://randd.defra.gov.uk/Document.aspx?Document=SE3119_8676_FRP.doc)

<sup>54</sup> Judge J, McDonald RA, Walker N, Delahay RJ (2011) Effectiveness of Biosecurity Measures in Preventing Badger Visits to Farm Buildings. *PLoS ONE* 6(12): e28941. doi:10.1371/journal.pone.0028941, available here: [www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0028941](http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0028941)

<sup>55</sup> Next steps to tackle bovine TB in England, Defra 19 Jul 2011, available here: [www.defra.gov.uk/news/2011/07/19/next-steps-to-tackle-bovine-tb-in-england-2/](http://www.defra.gov.uk/news/2011/07/19/next-steps-to-tackle-bovine-tb-in-england-2/)

Defra is currently in the process of awarding research funds to examine the proportions of infectious badger-cattle contact that occurs indoors and outdoors.

Whether or not badgers are coming into contact with cattle, if infected animals are moving around the country or between herds, it is clear that bTB will continue to spread. Around 40% of all cattle move each year and a report published in *Nature* in 2005, following research conducted by the Environmental Research Group Oxford Ltd. (ERGO), concluded that the movement of animals between farms is a critical factor in the increase in bTB.<sup>56</sup>

Defra itself admits that “cattle controls... are not working”<sup>1</sup> and a number of reports have suggested that farmers appear to have broken rules surrounding biosecurity.<sup>57</sup>

This has been well documented in Wales. A report published by the Welsh Assembly Government in Oct 2008, detailing the 2006-7 biosecurity Intensive Treatment Areas (ITA) across approximately 100km<sup>2</sup> of high-risk Carmarthenshire and Pembrokeshire border country, reveals that in some cases, veterinarians regard biosecurity as “appalling”.<sup>58</sup> In one example, a farmer claiming to own a ‘closed herd’ was buying cattle from his sister, whose herd contained cattle that had been tested as TB-positive.

The ITA trial was voluntary, allowing farms to participate if they so wished. In total, 107 cattle farms volunteered – 86 of these were eligible and received 2 biosecurity risk assessment visits during the 15 months of the ITA. However, where participation was not in the farmers’ interest (e.g. those with high numbers of cattle movements), they did not volunteer, which de-normalised the results.

Steve Clark, spokesman for the Badger Trust Cymru, said, “Cattle movements have been shown to be the cause of the vast majority of TB outbreaks. If farms whose business practices put them most at risk are allowed to simply opt out of disease control measures, bovine TB will continue to spread. That is a completely unacceptable burden on taxpayers.”

The ITA report concludes that farmers could be given financial incentives to implement biosecurity measures. Steve Clark disagrees, “Why should taxpayers be expected to pay farmers to take common sense measures to control the spread of bovine TB amongst cattle? Given that taxpayers also compensate farmers for this disease, it's a double whammy. Instead, minimum standards of biosecurity should be a legal requirement, with deductions made from European farm payments if the standards are not implemented.”

In England in Apr 2011, it emerged that cattle farmers in the South West and Midlands had been illegally swapping ear tags.<sup>59</sup> This meant that they might have been retaining animals infected with bTB in their herds, while sending healthy but less-productive animals to slaughter in their place.

Despite the risk of six months in jail and fines up to £5,000 for spreading TB or 10 years’ imprisonment and unlimited fines for fraud, Defra themselves admitted that they were

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<sup>56</sup> Gilbert, M., A. Mitchell, D. Bourn, J. Mawdsley, R. Clifton-Hadley and W. Wint (2005). Cattle movements and bovine tuberculosis in Great Britain. *Nature*. **435**, 491-496.

<sup>57</sup> "Appalling" biosecurity on farms is the true cause of bovine TB spread, says Badger Trust Cymru 2008, available here: [www.nfbg.org.uk/\\_Attachments/Resources/277\\_S4.pdf](http://www.nfbg.org.uk/_Attachments/Resources/277_S4.pdf)

<sup>58</sup> Enticott, G. (2008), Evaluation of the South West Wales Biosecurity Intensive Treatment Area, Cardiff University, available here: [new.wales.gov.uk/depc/publications/environmentandcountryside/animalhealthandwelfare/diseasesurveillancecontrol/bovinetb/reportofbiosecuritytreatarea/evaluationoftheswwalesareae.pdf?lang=en](http://new.wales.gov.uk/depc/publications/environmentandcountryside/animalhealthandwelfare/diseasesurveillancecontrol/bovinetb/reportofbiosecuritytreatarea/evaluationoftheswwalesareae.pdf?lang=en)

<sup>59</sup> Farmers accused of cheating on TB slaughter rule by swapping cattle tags, *Guardian* 31 Mar 2011, available here: [www.guardian.co.uk/uk/2011/mar/31/farmers-cheating-tb-swap-tags](http://www.guardian.co.uk/uk/2011/mar/31/farmers-cheating-tb-swap-tags)

investigating serious breaches.<sup>60</sup>

Obviously, retaining cattle that has tested positive to bTB in a herd is likely to increase the risk of TB spreading to other animals and to local wildlife. If that herd is moved, the risk extends to other herds.

Another investigation revealed that a TB-positive animal from Cornwall had been transported to an agricultural show in Warwickshire, which potentially spread the disease to many other cows and herds at the show and subsequently to the farms to which they returned.

At the time, the Minister of State for Agriculture and Food, Rt Hon Jim Paice MP, said, "I am absolutely appalled any farmer would deliberately break the law in this way. The vast majority of farmers with TB in their herds are doing the right thing, and it's reprehensible that anyone should be trying to get around the tough measures that are helping to control TB in cattle. Anyone doing this sort of thing will be caught and have the book thrown at them. We are introducing this extra safeguard to minimise spread of this devastating disease to other herds and wildlife."

In a written Ministerial Statement, Paice, said, "Anyone who retains TB test positive cattle increases the risk of disease spread within their herd, to their neighbours' herds, and to wildlife. We are moving quickly to introduce new measures to prevent this occurring in future."<sup>61</sup>

Defra immediately announced that cattle testing positive for bTB would also be DNA tagged, with random testing or where fraud is suspected.<sup>60</sup>

The Badger Trust was suspicious of this reaction by Defra, stating that, "Defra's sudden, massive and expensive response to the scandal of farmers switching ear tags to foil bTB controls suggests these crimes are widespread rather than local."<sup>62</sup> The charity subsequently wrote to the Prime Minister, the Deputy Prime Minister, the Secretary of State for Environment, Food and Rural Affairs and the Minister of State for Agriculture and Food to demand answers.

However, compensation payouts for bTB are the same, regardless of biosecurity measures, or lack thereof.

## Effect on the ecosystem

Whenever a species is selectively extracted from its habitat, there is a consequence to the ecosystem. What happens when you destroy a large proportion of a population of badgers in a specific area of British countryside?

CSL conducted a survey of selected species in four of the ten RBCT triplets between 2000 and 2007. They were attempting to identify what effects a reduced badger population would have on the local ecosystem, comparing proactive badger cull areas with matched no-cull areas.

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<sup>60</sup> Cattle testing positive for TB to be DNA tagged, Defra 31 Mar 2011, available here: [www.defra.gov.uk/news/2011/03/31/cattle-bovine-tb](http://www.defra.gov.uk/news/2011/03/31/cattle-bovine-tb)

<sup>61</sup> House of Commons Written Ministerial Statements 31 March 2011, *Hansard* 31 Mar 2011, available here: [services.parliament.uk/hansard/ByDate/20110331/writtenministerialstatements/part006.html](http://services.parliament.uk/hansard/ByDate/20110331/writtenministerialstatements/part006.html) and here: [www.theyworkforyou.com/wms/?id=2011-03-31a.109.2](http://www.theyworkforyou.com/wms/?id=2011-03-31a.109.2)

<sup>62</sup> Badger Trust demands answers on cattle TB frauds, Badger Trust press release 7 Apr 2011, available here: [www.badgertrust.org.uk/\\_Attachments/Resources/498\\_S4.pdf](http://www.badgertrust.org.uk/_Attachments/Resources/498_S4.pdf)

From pre-cull to the second year post-cull, CSL estimated that fox densities increased on average by 92% in proactive areas, while declining by 60% in no-cull areas. This heightened fox population remained while badger numbers remained low.

Other species fluctuated considerably, with some species declining as a result of the increase in fox numbers. Species suffering a decline included hares, whose young (leverets) are predicated by foxes. This species is of conservation concern under the UK BAP.<sup>63</sup> The exact mechanism for the increase in fox numbers is unclear, but it is likely to relate to a reduction in competition for breeding sites and foxes using abandoned badger setts.

Unlike badgers, foxes are widely considered to be a predator of agricultural livestock,<sup>64</sup> often held responsible for the loss of lambs, piglets and poultry. Foxes can also have a major impact on endangered bird species, particularly on ground-nesting seabirds.<sup>65</sup>

A badger cull, as opposed to a vaccination programme, in addition to not reducing bTB, is likely to have a negative impact on the ecosystem, adding to one set of problems with another.<sup>66</sup>

Animal welfare campaigners and charities are keen to emphasise that badger culling is likely to be inhumane. The ISG's final report on the RBCT suggested that, within the group that was trapped, while injuries sustained by badgers were relatively low in number (1,119 badgers were recorded to have sustained injuries between 2000-2005 - a total of 8.4%), concern was expressed about the cubs of breeding female badgers culled. These infants would be underground and most likely die of starvation or dehydration.<sup>29</sup> The RBCT included a three-month closed season to attempt to limit the effect.

'Free shooting' of badgers is also likely to be inhumane. Badgers are large creatures that live in social groups and exhibit complicated brain functions<sup>67</sup> and can certainly experience pain in a similar way to humans.<sup>68</sup> While badgers have not been observed using tools, related species have.<sup>69</sup>

Inaccurate marksmanship and use of shotguns mean that a badger may not be killed on the first shot. A fatally wounded badger could take hours or even days to die. During Defra's 2010 consultation, respondents expressed concern at the lack of scientific evidence on either the effectiveness or humaneness of shooting free-ranging badgers.<sup>2</sup>

The RSPCA has expressed concern that local extinction of the badger could result, writing to Defra that, "Monitoring badger populations will be very important. Whether culling might, contrary to the Bern Convention, be detrimental to the survival of a population is a real concern."<sup>2</sup>

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<sup>63</sup> UK BAP priority terrestrial mammal species, UK Joint Nature Conservation Committee 2010, available here: <http://jncc.defra.gov.uk/page-5170>

<sup>64</sup> Macdonald, D.W. (1984) A questionnaire survey of farmers' opinions and actions towards wildlife on farmlands. *Agriculture and the environment*. (D. Jenkins, ed.) pp171-177. ITE Monks Wood, Huntingdon.

<sup>65</sup> Seymour, A. S., Harris, S., Ralston, C. and White, P. C. L. (2003) Factors influencing the nesting success of Lapwings (*Vanellus vanellus*) and behaviour of red fox (*Vulpes vulpes*) in Lapwing nesting sites. *Bird Study* 50; 39-46

<sup>66</sup> The ecological consequences of removing badgers from an ecosystem - ZF0531 2007, available here: [randd.defra.gov.uk/Document.aspx?Document=ZF0531\\_6288\\_FRP.doc](http://randd.defra.gov.uk/Document.aspx?Document=ZF0531_6288_FRP.doc)

<sup>67</sup> Pease, Alfred Edward (1898). *The badger; a monograph*. London: Lawrence & Bullen, Ltd.

<sup>68</sup> Don E. Wilson & David Burnie, ed (2001). *Animal: The Definitive Visual Guide to the World's Wildlife (1st ed.)*. DK Publishing. pp. 86–89. ISBN 978-0789477644

<sup>69</sup> Rosevear, Donovan Reginald (1974). *The Carnivores of West Africa*. London: Trustees of the British Museum (Natural History). ISBN 056500723x.

## Cost to the taxpayer

*The Guardian* newspaper has called the proposed cull trials a “zero-cost, zero-sense policy”. The first half of the statement couldn’t be further from the truth – even though farmers will be using their own equipment on their own land, the actual cost of culling is likely to be high.<sup>70</sup>

If Defra is correct in assuming that ‘free-shooting’ will be the most common method applied by farmers and landowners, the smallest costs are the administration and preparation of the trials, the culling itself, the scientific studies and tests that will follow. Farmers and landowners are expected to pay for their own materials, but estimates of Government costs suggest that free-shooting will cost around £300 per km<sup>2</sup>. The NFU’s estimates, based on ‘testing the market’, would be £250 - £317 per km<sup>2</sup>.<sup>71</sup>

Defra’s impact assessment<sup>17</sup> suggests that the cost of each cull is between £3.74m and £6.38m (per 350km<sup>2</sup> area – NB, not per 350m<sup>2</sup> as in Impact Assessment), with a best estimate of £4.56m. This is broken down as follows:

- Administration costs	£1.40m
- Perturbation in neighbouring areas	£0.50m
- Licensing, monitoring and compensation for initial bTB increase	£3.11m
- Total	<b>£4.56m</b>

It is clear that a large part of this cost relates to perturbation. However, these official figures appear conservative. For one thing, if ‘free-shooting’ is ruled out after the first year of the trials (meaning that farmers and landowners will be legally obliged to cage trap and shoot for the remaining period of their licenses), total costs will rise to around £2,500 per km<sup>2</sup>.<sup>72</sup>

The Welsh Assembly Government has estimated, in its similar trial cost assessments, that the cost of culling would be approximately £2,830 *per badger*.<sup>72</sup>

Defra’s impact assessment says, ‘There are considerable uncertainties around the central estimates.’ For one thing, Defra requires that landowners should cull 70% of badgers in each area, but it is unclear how culling would be monitored and by whom to ensure this figure is reached.

Any badger culling costs will have to be considered in the context of budget spent in this area already. In England, where trials have been completed exhaustively before, costs have amounted to around £50m.

The cost of policing the trials is also likely to be high. Public opinion is strongly biased against culling and demonstrations and activism are likely to stretch resources, at a time when, post-Olympics, police budgets will be struggling to grant officers long-awaited holiday leave. The trials will last for more than six weeks, and will include evenings, nights and weekends, when police overtime is most expensive.

In a Written Answer on 20 Feb 2012, Jim Paice MP hinted that the cost of policing is somewhat open-ended. An initial estimate, developed between the Association of Chief Police Officers (ACPO) and the Home Office, of £0.5m per area per year (£8m total), is also

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<sup>70</sup> David Attenborough: a badger cull could worsen TB in cattle, *Guardian* 14 Jul 2011, available here: [www.guardian.co.uk/environment/2011/jul/14/david-attenborough-badger-cull](http://www.guardian.co.uk/environment/2011/jul/14/david-attenborough-badger-cull)

<sup>71</sup> Badger cull: Ball now firmly in farmers’ court, *Farmers Guardian* 3 Jan 2012, available here: <http://www.farmersguardian.com/home/business/badger-cull-ball-now-firmly-in-farmers'-court/43884.article>

<sup>72</sup> Badger culling: Q&A, *BBC* 4 Jun 2010, available here: [www.bbc.co.uk/news/10227556](http://www.bbc.co.uk/news/10227556)

likely to be conservative.<sup>73</sup>

In addition to the above, the Summary of costs in the impact assessment itemises the following:

- Licensing	£377,000 / area (4 yrs, highest in yr 1)
- Coordination	£20,000 / area / yr
- Culling using cage trapping	£2,500 / km <sup>2</sup> / yr
- Culling using controlled shooting	£300 / km <sup>2</sup> / yr
- Culling using a combination of methods	£1,000 / km <sup>2</sup> / yr
- Vaccination	£2,250 / km <sup>2</sup> / yr
- Monitoring	£737,000 / area / yr
- Policing	£500,000 / area / yr

Using the most basic assumptions, including that a vaccination programme would place no extra demands on the police, it's easy to see that culling areas would need to be larger than 400 km<sup>2</sup> in order to cover the additional policing costs.

According to scientific studies mentioned in this paper, perturbation causes an increase in cases of bTB in neighbouring areas when badger culling is permitted. It will therefore be impossible to eradicate bTB in British herds by culling alone – moreover, culling will only serve to worsen the spread of the disease, reducing any potential savings.

Ultimately, badger vaccination is a cheaper method. During current small scale studies, Gloucestershire Wildlife Trust has undertaken to keep accurate records of costs.<sup>74</sup> These are summarised as follows (Yr 1 costs to show licensing etc.):

- Equipment and training	£6,958
- Certificate of competence (5 vaccinators) (since reduced)	£2,065
- Consumables (incl. vaccine)	£405
- Staff costs	£4,640
- Year 1 total	<b>£14,069</b>
- Total annual costs over years 2-5	£29,212
- Average annual cost	<b>£8,656</b>

This is equivalent to an average of £51 per hectare, or £765,000 per 150km<sup>2</sup>.

The Trust also calculated the costs of vaccination for their 66 ha farm holding to be approx. £2,856.<sup>74</sup> These costs are, in fact, higher than they would be, should the Government adopt a large vaccination programme (DEFRA's figures for vaccination are half).

A British private sector group, Brock Vaccination, comprises former government experts in Gloucestershire, Devon and Shropshire offering a professional service of badger vaccination to landowners nationwide. Brock Vaccination has identified economies of scale when vaccine programmes are more widespread.

It estimates the cost of vaccinating badgers to be £34 per hectare, or £510,000 across a 150km<sup>2</sup> area. Cost depends on badger density, ease of access to land and accurate estimates follow badger activity surveys.

Long term, it is reasonable to assume that a widespread and sustained badger vaccination programme could increase immunity in the badger population and significantly reduce the proportion of infected badgers within 5 years, saving the Government a greater burden.

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<sup>73</sup> Bovine Tuberculosis: Disease Control [95074], *Hansard* 20 Feb 2012, available here: [www.publications.parliament.uk/pa/cm201212/cmhansrd/cm120220/text/120220w0001.htm](http://www.publications.parliament.uk/pa/cm201212/cmhansrd/cm120220/text/120220w0001.htm)

According to Gloucestershire Wildlife Trust, further savings could be made through mass-production and distribution of traps, a free Advisory Service (which would also make uptake easier) and improvement in FERA's licensing process, which is seen as a potential barrier to uptake.<sup>74</sup> Costs of vaccination programmes will also reduce with oral vaccines.

The greatest cost of culling, however, will be the delay in finding a long-term solution to the problem of bTB. Despite £30m already spent on developing vaccinations, many of these trials have been pushed to the back burner to accommodate the culling trials, meaning a permanent immunisation of the country's badger and/or cattle populations is in danger of being hindered for years. Despite these costs, badger culling will only reduce bTB by between 12-16% over 9 years,<sup>29</sup> saving the Government a maximum of between £12m and £16m pa.

However, even if a culling or vaccination programme were so successful that it eradicated bTB in the badger population and eliminated transmission of the disease from badgers to cattle, Britain would still have a major problem with bTB.

## The weight of public opinion

Public opinion is firmly opposed to the cull.

The Government's own consultation in Dec 2010, aimed at gauging the public reactions to a potential badger cull, revealed from almost 60,000 responses that 69% of people were completely opposed to a cull. 31% of people were in favour of a cull and vaccination programme, while 0.015% (just 9 people) wanted a cull with no vaccination.<sup>2</sup>

An opinion poll commissioned by the BBC and conducted by GfK NOP from 3-5 Jun 2011, indicated that 63% of Britons in both town and country oppose killing badger to curb bTB. The majority opposed culling in every age region, every age group and both genders. In the same poll, 31% were in favour and 6% undecided. Interestingly, the poll revealed that the issue was not necessarily a town vs. country issue – the cull-opposing majority was 57% in urban areas, 59% in rural areas and 68% in mixed urban/rural areas, where support for the cull was just 26%.<sup>75</sup>

More than 100,000 signatures were handed into the Government in Oct 2011 to protest the plans, gathered by the RSPCA, the League Against Cruel Sports and the campaign group 38°.<sup>76</sup>

Independent, national market research commissioned by the Bow Group in Feb 2012 reveals that almost half of people of voting age consider that the Government does not consider the interests of Britain's wildlife at heart. Only 10% of people believe it does.

The research indicates strong opposition to the badger cull (81% in total strongly opposed to mildly opposed) with just 3.4% strongly in favour of the cull.<sup>77</sup>

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<sup>74</sup> Nature Reserves Badger Vaccine Deployment Programme 2011, Gloucestershire Wildlife Trust Oct 2011, available here: [wt-main.live.drupal.precedenthost.co.uk/sites/wt-main.live.drupal.precedenthost.co.uk/files/Gloucestershire%20Vaccination%20Programme.pdf](http://wt-main.live.drupal.precedenthost.co.uk/sites/wt-main.live.drupal.precedenthost.co.uk/files/Gloucestershire%20Vaccination%20Programme.pdf)

<sup>75</sup> UK public opposed to badger cull, opinion poll suggests, *BBC* 8 Jun 2011, available here: [www.bbc.co.uk/news/science-environment-13684482](http://www.bbc.co.uk/news/science-environment-13684482)

<sup>76</sup> RSPCA: On the fourteenth day of Christmas a badger cull is confirmed, *politics.co.uk* 14 Dec 2011, available here: [www.politics.co.uk/opinion-formers/rspca-royal-society-for-the-prevention-of-cruelty-to-animals/article/rspca-on-the-fourteenth-day-of-christmas-a-badger-cull-is-co](http://www.politics.co.uk/opinion-formers/rspca-royal-society-for-the-prevention-of-cruelty-to-animals/article/rspca-on-the-fourteenth-day-of-christmas-a-badger-cull-is-co)

<sup>77</sup> The political impact of the proposed badger cull trials - Study report (AGR poll), *The Bow Group* Feb 2012, available here: [www.thebowgroup.org](http://www.thebowgroup.org)

The media is divided on the cull, with much of the mainstream media opposed. As far ago as May 2008, professional statistician, Orwell Prize political blogging winner and *Telegraph* and *Guardian* columnist Graeme Archer said in *ConservativeHome*, "it sticks in my throat to condemn a species to death when such a policy, predicated on a hypothesis which has been discredited by a valid scientific experiment, would not even deliver the result that the 'users' of the policy (cattle farmers & their customers) desire."<sup>78</sup>

Other papers, including *The Independent*,<sup>79</sup> *The Guardian*,<sup>80</sup> *Daily Mail*<sup>81</sup> and *The Telegraph* have expressed opposition,<sup>82</sup> even the *Financial Times* has hinted at it.<sup>83</sup> *The Mirror* is opposed<sup>84</sup> and according to the *Mirror* and a BBC report, the Shadow Environment Secretary has written to 25,000 Labour supporters, asking them to lobby their MPs on the subject. Labour has also launched an online petition, called Can The Cull.<sup>85</sup>

In the plotline of the long-running Radio 4 soap *The Archers* in Jan 2012, Ambridge residents voted to vaccinate their badger population, rather than participate in a cull.<sup>86</sup>

Trade publications aimed at the farming community largely retain an unbiased viewpoint, remaining factual and quoting both advocates and opponents of the cull.<sup>87</sup>

In early Feb 2012, it emerged that the culling trials could even be unlawful and result in legal proceedings. The Badger Trust has launched proceedings against Defra on the sanctioning of badger culling trials on several grounds, including cost and the fact that culling would in fact likely spread bTB further.<sup>88</sup> Defra declined to comment.<sup>89</sup>

## Conclusions

Bovine tuberculosis needs to be tackled. In 2010/11, it cost the taxpayer £91m (compared to

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<sup>78</sup> Save the badger (response to "Badgers: time for a cull?") *ConservativeHome* 12 May 2008, available here: [conservativehome.blogs.com/centreright/2008/05/alex-wrote-this.html](http://conservativehome.blogs.com/centreright/2008/05/alex-wrote-this.html)

<sup>79</sup> Majority objected to badger cull before policy was approved, *Independent* 29 Jul 2011, available here: [www.independent.co.uk/environment/nature/majority-objected-to-badger-cull-before-policy-was-approved-2327913.html](http://www.independent.co.uk/environment/nature/majority-objected-to-badger-cull-before-policy-was-approved-2327913.html)

<sup>80</sup> Badger culls don't stop tuberculosis in cattle – the evidence is clear, *Guardian* 11 Aug 2011, available here: [www.guardian.co.uk/environment/blog/2011/aug/11/badger-cull-dont-stop-bovine-tb](http://www.guardian.co.uk/environment/blog/2011/aug/11/badger-cull-dont-stop-bovine-tb)

<sup>81</sup> 'A black day for badgers': Cull will see 30,000 mammals wiped out in bid to combat bovine TB, *Daily Mail* 20 Jul 2011, available here: [www.dailymail.co.uk/news/article-2016470/UK-badger-cull-30k-mammals-wiped-bid-combat-bovine-TB.html](http://www.dailymail.co.uk/news/article-2016470/UK-badger-cull-30k-mammals-wiped-bid-combat-bovine-TB.html)

<sup>82</sup> Badger cull: the doubts remain, *The Telegraph* 16 Dec 2011, available here: [www.telegraph.co.uk/earth/countryside/8961393/Badger-cull-the-doubts-remain.html](http://www.telegraph.co.uk/earth/countryside/8961393/Badger-cull-the-doubts-remain.html)

<sup>83</sup> Spelman faces backlash on limited badger cull, *FT* 4 Jul 2011, available here: [www.ft.com/cms/s/0/86c6eef2-a670-11e0-ae9c-00144feabdc0.html#axzz1lDop3tjj](http://www.ft.com/cms/s/0/86c6eef2-a670-11e0-ae9c-00144feabdc0.html#axzz1lDop3tjj)

<sup>84</sup> Labour leads badger cull opposition, *Mirror* 19 Aug 2011, available here: [www.mirror.co.uk/news/latest/2011/08/19/labour-leads-badger-cull-opposition-115875-23355107/](http://www.mirror.co.uk/news/latest/2011/08/19/labour-leads-badger-cull-opposition-115875-23355107/)

<sup>85</sup> Labour - Can The Cull, available here: [campaignengineerroom.org.uk/can-the-cull](http://campaignengineerroom.org.uk/can-the-cull)

<sup>86</sup> The Archers 25 Jan 2011, *BBC Radio 4*, temporarily available here: [www.bbc.co.uk/iplayer/episode/b01b1g9d/The\\_Archers\\_25\\_01\\_2012/](http://www.bbc.co.uk/iplayer/episode/b01b1g9d/The_Archers_25_01_2012/)

<sup>87</sup> Reaction to badger cull announcement, *Farmers Guardian* 19 Jan 2012, available here: [www.farmersguardian.com/home/latest-news/reaction-to-badger-cull-announcement/44305.article](http://www.farmersguardian.com/home/latest-news/reaction-to-badger-cull-announcement/44305.article)

<sup>88</sup> Badger Trust gives DEFRA notice of legal challenge, Badger Trust 9 Feb 2012, available here: [http://www.nfbg.org.uk/\\_Attachments/Resources/638\\_S4.pdf](http://www.nfbg.org.uk/_Attachments/Resources/638_S4.pdf)

<sup>89</sup> Badger Trust announces cull legal challenge, *Farmers Guardian* 9 Feb 2012, available here: <http://www.farmersguardian.com/home/livestock/badger-trust-announces-cull-legal-challenge/44744.article>

metal theft - £770m).

However, badger culling is impractical and not scalable. Exhaustive research conducted before and during the Randomised Badger Culling Trial (RBCT) demonstrates an efficiency in reducing the incidence of bovine TB (bTB) of just 12-16% over 9 years. Were culling to be conducted nationally, at best it would reduce the cost to the taxpayer of bTB from £100m pa to £84m pa.

Furthermore, culling has been scientifically proven to lead to perturbation, an effect by which badger social groups are fractured and individuals spread. This actually increases the risk of bTB in herds neighbouring the cull area by 27%.

Cattle vaccination is in its early stages of development, with inoculation of cattle herds currently banned under EU law and no hope of reprieve until 2017. However, bovine BCG is undergoing testing in preparation for market availability and a change in the law.

Vaccination of wild badger populations (within which, by the highest estimates, only 15% of badgers carry bTB), however, is a step that landowners can take now. Trials of vaccinating a proportion of the wild badger population with BadgerBCG has shown to reduce the incidence of positive serological TB test results by almost 74%. Because of the 3-5 year lifecycle of *M. meles*, it is considered that vaccinating only a proportion of the wild badger population could have a major impact on bTB within 5 years.

Costs of vaccination are also lower, when taking into all factors, including the additional burdens of policing and perturbation, inevitable under culling plans.

Cattle housed indoors can be separated from badgers using physical measures, such as metal gates and electric fencing, for an average of just over £4,000 per farm in the first year, with much smaller maintenance costs in subsequent years. This compares to an average cost of bTB to British farms in bTB areas of £3,000 per farm pa, with south-west farms spending an average of £6,900 pa on breakdowns.

Biosecurity measures have been shown to be lacking, with some farmers breaking regulations and not containing infected cattle. An improvement in the enforcement of cattle movement restrictions and tougher sentences for offenders would go some way towards tackling the primary reason for bTB spread – cattle movement.

Badger culling is also incredibly unpopular, with national polls averaging between 66% and 81% against the cull and almost 100% in favour of vaccination. Media outlets have mirrored this opinion and there is even a legal challenge against the trials.

The species is protected legally and since illegal badger baiting remains popular, concerns have been raised that the cull could see an increase in wildlife crime. Culling is inhumane and also likely to disrupt local ecosystems, potentially leading to local extinction.

On 20 Mar 2012, the Welsh Assembly Government scrapped its plans to cull badgers, focusing instead on vaccination.<sup>90</sup>

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<sup>90</sup> Welsh badger cull scrapped in favour of vaccination, *BBC* 20 Mar 2012, available here: [www.bbc.co.uk/news/uk-wales-politics-17435827](http://www.bbc.co.uk/news/uk-wales-politics-17435827)

## Nine recommendations

We recommend that the Government revisits the scientific results of the RBCT and reassesses Defra's consultation report:

1. The Government should adopt Defra's 'Option 1', retaining the legal *status quo* for the badger and not issue licenses for culling.
2. The same investment planned for culling trials should be invested in widespread badger vaccination programmes organised by wildlife groups and coordinated by Defra in the south-west.
3. Efficiencies should be made in the certification process for vaccinators, to reduce the cost of licensing for the purposes of badger vaccination.
4. Landowners should be supported to improve biosecurity on farms, with guidance issued regarding physical methods of badger-cattle separation. It should be made clear to farmers that investment in metal gates and electric fencing is 100% effective and considerably cheaper than the cost of a breakdown – prevention is better than cure.
5. Breaches of biosecurity laws should be fully investigated and penalties for such crimes improved to serve as a deterrent.
6. The size of compensation payouts to landowners *in lieu* of bTB breakdowns should be linked to efforts to maintain good biosecurity on farms, including exclusion of wildlife and best practice on-farm and in-transit.
7. A Government/industry working group should be established to take forward badger vaccination, with representation from Defra, scientists, landowners (incl. the National Trust), the private sector, wildlife groups and others. This group should share resources and best practice.
8. Defra should complete the development of a cattle vaccine this year and secure change within the EU to permit commercial deployment.
9. TB research should continue to be protected from significant cuts and development of an oral vaccine for badgers should continue.

We believe that continuing with current proposals could prove extremely costly to the Government, in terms of both public finances and public opinion.

## Contributors and Acknowledgements

The author wishes to thank, amongst others, the following people for their help and guidance in compiling this paper: Dr Brian May CBE, Lord John Krebs FRS, Dr Gordon McGlone OBE FSB, Dr Chris Cheeseman, The Badger Trust, Lucy Borde MRes, Zac Goldsmith MP. Principle author: Graham Godwin-Pearson BSc (Hons).

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