

# **Bovine Tuberculosis: The Government's approach to tackling the disease and consultation on a badger control policy**

Response from  
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## **Introduction**

I.1 Defra recently proposed a new policy to control tuberculosis (TB) in cattle. As part of the proposed policy, Defra plans to issue licences to groups of farmers/landowners, allowing them (or their appointees) to cull badgers under a set of defined conditions. These licencing conditions are largely derived from the results of the Randomised Badger Culling Trial (RBCT), which we designed, oversaw and analysed.

I.2 We fully appreciate the economic hardship and stress that TB places on cattle farming communities, and agree that current measures appear insufficient to control this disease. Although national trends are difficult to interpret, it appears that the cattle-based controls currently being applied may have halted, but not reversed, the exponential increase in cattle TB. Our own work confirms that badgers are a source of infection for cattle<sup>1,2,3</sup>, and we understand farmers', and Defra's, wish to address this source. Nevertheless, careful consideration of our own and others' scientific data raises serious concerns that Defra's proposal could result in culls which risk increasing cattle TB rather than reducing it.

<b><i>Question 1: Comments on the options, costs and assumptions made in Defra's Impact Assessment</i></b>
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## **1.1 Effects of RBCT culling**

1.1.1 A principal finding of the RBCT was that badger culling can both reduce and increase the incidence of cattle TB<sup>1,2</sup>. Culling reduces badger numbers<sup>4</sup>, which would be expected to lower transmission of infection from badgers to cattle. However, these reductions in badger density also prompt changes in badger behaviour<sup>5,6</sup> (termed perturbation) which appear to increase opportunities for transmission of infection both among badgers<sup>7,8</sup> and from badgers to cattle<sup>1,2,3</sup>. These effects of perturbation probably undermined the reductions in cattle TB achieved inside proactive culling areas (where badger numbers were substantially reduced across large areas<sup>4</sup>), and elevated TB risks for cattle where smaller reductions in badger numbers were achieved<sup>4,5,8</sup> (on adjoining un-culled lands, and where culling was localised around TB-affected farms). To deliver overall reductions in cattle TB, a cull needs to achieve substantial reductions in badger numbers while minimising the effects of perturbation<sup>9</sup>. Defra accepts this conclusion (e.g. "*minimising perturbation, and/or its negative consequences, is central to risk management*" Consultation Document Annex D, paragraph 47).

1.1.2 Based on findings from the RBCT and related work, the ISG concluded that a badger cull could deliver net reductions in cattle TB only if it was conducted in an efficient, coordinated manner, simultaneously across large areas, and sustained for several years<sup>10</sup>. Culling which was small-scale, patchy or discontinuous would be likely to increase the incidence of cattle TB<sup>9</sup>. These conclusions have been supported by independent review of our work<sup>11</sup>, as well as by recent modelling<sup>12</sup>.

1.1.3 Analyses of data accumulated since publication of the ISG final report have revealed ongoing, but diminishing, benefits after RBCT culling ended<sup>13,14</sup>. However, these updated estimates of culling effects do not alter the conditions required for a cull to deliver net reductions in cattle TB, beyond somewhat reducing the predicted size of the area that would need to be culled<sup>14</sup>. The requirements for culling to be efficient, coordinated, simultaneous and sustained are unaffected<sup>14</sup>.

## **1.2 Differences between Defra's proposal and recommended characteristics of a beneficial cull**

1.2.1 We note that Defra's prediction of a 16% overall reduction in cattle TB over a nine-year period is extrapolated directly from RBCT findings<sup>14</sup>. This extrapolation assumes that Defra's proposed culling method would achieve the same outcomes as those of proactive culling as conducted in the RBCT. We have repeatedly cautioned that the outcomes of the RBCT reflected the methods used, most recently noting that "*the effects described here relate only to culling as conducted in the RBCT, i.e. deployment of cage traps by highly trained staff in coordinated, large-scale, simultaneous operations, repeated annually for five years and then halted*"<sup>14</sup>. It should not be assumed that farmer-led culling, conducted primarily by shooting free-ranging badgers, would achieve the same outcomes as RBCT proactive culling.

1.2.2 We wish to highlight two key differences between Defra's proposed culling approach and the characteristics of a cull that might be expected – on the basis of RBCT findings – to deliver overall reductions in cattle TB.

1.2.3 First, Defra's proposal includes no requirement for culls to be conducted rapidly and simultaneously across the designated area. Most RBCT proactive culls were commenced simultaneously across the entire area and were completed within two weeks<sup>4</sup>. However, a minority of culls were commenced on different dates in different sectors, and prolonged over periods of 1-7 months<sup>7</sup>. These non-simultaneous culls were followed by even greater increases in the prevalence of infection among badgers than were the simultaneous culls<sup>7</sup>. Culls not conducted simultaneously would therefore be expected to deliver smaller reductions in cattle TB than would simultaneous culls, all else being equal<sup>9</sup>.

1.2.4 Second, Defra's proposal states no specific mechanism to ensure that culls are sustained. This raises concerns because, if some of the farmers/landowners in an area were to abandon culling, operations could become both patchy and unsustainable – conditions which are likely to increase cattle TB rather than reduce it<sup>2,10</sup>. The extent to which farmers/landowners could sustain widespread culling is thus a critical determinant of whether Defra's proposal would result in higher or lower TB incidence in cattle. In the absence of any means of enforcing sustained culling across the designated area, there are several reasons why some participants might choose to abandon culling early, most notably:

- Defra's own estimates predict that the monetary costs of culling for farmers outweigh the corresponding benefits (Consultation Document Appendix F, paragraph 6.3). Any reductions in cattle TB are likely to take several years to emerge<sup>10</sup>, leaving farmers with long periods experiencing only costs. Such conditions provide little financial incentive to sustain culling.
- Conducting efficient, coordinated culls across large areas (minimum 150 sq km, averaging 245 commercial holdings in south-west England<sup>15</sup>) is a complex, time-consuming task<sup>4,10,16</sup> which is consequently expensive. Although Defra has assumed that the cost of shooting free-ranging badgers would be less than one-tenth that of cage trapping, projections of badger removal rates calculated by the Game Conservancy

Trust<sup>16</sup> suggest that culling by shooting would require comparable effort\*. Farmers may therefore lack sufficient incentive to maintain culling, given the many other demands on their time and finances.

- RBCT culling attracted protest from animal rights activists<sup>4</sup>. Farmers and their families are vulnerable to such activism because they live on the land where badgers would be culled. Unpleasant interactions with activists could discourage sustained culling.

1.2.5 Given these differences, we are concerned that Defra's proposals would not deliver the anticipated reductions in cattle herd breakdowns, with a risk of increasing, rather than reducing, the incidence of cattle TB.

### **1.3 Mitigating detrimental effects on adjoining land**

1.3.1 RBCT proactive culling elevated cattle TB on adjoining lands which were not culled<sup>1</sup>. Defra proposes that landowners could mitigate this effect by culling within geographical barriers to badger movement, or by vaccinating badgers on adjoining land.

1.3.2 We note that increases in cattle TB occurred on land immediately outside RBCT proactive culling areas, even though the boundaries of such areas followed likely geographical barriers to badger movement where available<sup>17</sup>. Such barriers, where present, reduced the magnitude of culling-induced increases in infection among badgers<sup>7</sup>.

1.3.3 In our final report<sup>9</sup>, we considered the potential use of geographical barriers to badger movement as means of avoiding the detrimental effects of widespread culling. We concluded that "*such barriers could contribute to TB control only on a local scale, as few areas exist with appropriate natural boundaries*"<sup>9</sup>. This conclusion is supported by a recent study which revealed few geographical barriers to badger movement in TB-affected areas of Wales<sup>18</sup>, and by new genetic evidence that smaller roads, and smaller rivers such as the upper reaches of the Tamar, appear not to impede badger dispersal<sup>19</sup>.

1.3.4 Although vaccination has been shown to reduce the incidence of detectable infection in badgers<sup>20</sup>, its ability to prevent culling-induced increases in cattle TB on adjoining lands is uncertain. This is because there are currently no data on the extent to which badger vaccination might influence cattle TB incidence.

1.3.5 Assuming that badger vaccination could reduce transmission to cattle, its ability to mitigate perturbation effects would be limited by timing. Culling caused badgers to range more widely<sup>5</sup>, apparently increasing both badgers' contact with cattle and the prevalence of infection in badgers<sup>3,7,8</sup>. Both of these effects are likely to have contributed to elevated cattle TB on land adjoining proactive culling areas. However, if culling and vaccination commenced at the same time (as assumed in a recent Defra-commissioned model<sup>12</sup>) vaccination would only limit the number of new infections among badgers; it would not reduce the propensity of already-infected badgers to encounter more cattle herds. This would limit the mitigating effect of vaccination in the early stages of culling, when detrimental effects are most severe<sup>10</sup>. In contrast, if vaccination commenced some years before culling, lower transmission combined with natural mortality of infected badgers would be expected to reduce the prevalence of infection, so that the expanded ranging prompted when culling commenced

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\*The Game Conservancy Trust<sup>16</sup> estimated that culling all of the badgers in a 2.42 sq km study area would take 397 hours, or 50 eight-hour nights. Using the same data and assumptions, removing 80% of the badgers (roughly the removal rate achieved in the RBCT after accounting for breeding and immigration into the culled areas<sup>4,9</sup>) from 1 sq km would take about 63 hours (roughly 8 eight-hour nights). For comparison, RBCT culling operations involved setting traps over 8-12 nights<sup>4</sup>.

might not substantially increase transmission to cattle. Although Defra acknowledges this difference (Consultation document, paragraph 147), we are not aware of modelling which quantifies the potential benefits of such a staggered approach, nor which compares the costs and benefits of such an approach with vaccination (or culling) alone over similarly prolonged periods.

#### **1.4 Prospects for the eradication of cattle TB**

1.4.1 Defra states that its long-term goal is “*to eradicate the disease in cattle*”, while noting that its first step must be to “*stop the disease getting worse*” (Consultation document, paragraph 4). We recognise that both long- and short-term goals are important, given the United Kingdom’s obligations within the European Union as well as the immediate needs of the farming industry and Defra itself.

1.4.2 We have previously highlighted the potential for cattle-based control measures to achieve substantial reductions in the incidence of cattle TB<sup>9</sup>. Although we welcome the introduction of pre-movement testing and the wider use of the gamma-interferon test, many other potentially effective cattle-based measures have yet to be pursued<sup>9</sup>. These include measures both to limit geographical spread of the disease by infected undiagnosed cattle, and to reduce the reservoir of infection in endemically infected areas. Strategic testing of herds should be complemented by rigidly enforced measures to control animal trade, based on risk of disease spread. We caution that TB eradication is unlikely to be achieved without more vigorously controlling transmission among cattle (which might eventually include use of an effective cattle vaccine).

1.4.3 Several factors potentially influence the ability of badger culling to contribute to TB eradication. Although culling can reduce the number of infected badgers in an area, it also increases the proportion of surviving badgers that are infected<sup>7,8</sup>. No data are available on how this proportion changes as badger populations recover after culling ends; if prevalence remains elevated this could undermine the long-term benefits of culling<sup>14</sup>. Although Defra envisages using badger vaccination as “*an ‘exit strategy’ from culling*” (Consultation document, paragraph 119), it also acknowledges that vaccination would reduce infection more slowly where a high proportion of badgers is infected (Consultation document, paragraph 114), the very circumstances generated by culling. Given the current absence of an oral vaccine licenced for use on free-living badgers, it is also worth noting that culling reduces the trappability of badgers<sup>21</sup>, and so might reduce the vaccine coverage achievable by cage trapping. Given these potential long-term influences, we caution that any culling policy should be evaluated carefully according to its contribution to long-term as well as short-term objectives.

1.4.4 In our view, vaccination of badgers has the potential to reduce transmission of infection both among badgers and from badgers to cattle, which could improve the prospects for the ultimate eradication of cattle TB if combined with stringent cattle-based measures. However, further research is needed before this potential can be fully assessed. Continued research is needed to develop an oral formulation and delivery method suitable for field use, which would make vaccination affordable and practicable. Additionally, data are needed on the consequences of badger vaccination for TB transmission to cattle. Finally, modelling efforts are required which investigate the long-term costs and benefits of various vaccination approaches, in combination with cattle-based measures and perhaps also in combination with culling.

***Question 2: Do you agree with the preferred option?***

2.1 We have expressed serious concerns that Defra's preferred option may not achieve the anticipated benefits, and risks increasing rather than reducing the incidence of cattle TB. On this basis we do not agree with Defra's preferred option.

***Question 3: Do you agree that this approach, of issuing licences to farmers/landowners, is the most appropriate way to operate a badger control policy?***

3.1 We consider it unlikely that initiatives led and funded by farmers/landowners would be able to deliver culls of the type required to achieve the anticipated overall reductions in cattle TB. On this basis we do not agree that the proposed licensing of farmers/landowners is the most appropriate way to cull badgers for TB control purposes.

***Question 4: Do you agree with the proposed licensing criteria for culling and vaccination?***

4.1 Strict and enforceable criteria would be essential for farmer-led culling to reduce cattle TB. As outlined under question 1, we consider the proposed licensing criteria to be insufficient because they include no requirement for culls to be simultaneous, and provide no specific mechanism for ensuring that culls are sustained over time across the designated area(s).

***Question 5: Do you agree that the proposed methods of culling are effective and humane?***

5.1 The effectiveness<sup>4</sup> and humaneness<sup>22,23,24,25,26</sup> of culling badgers by cage trapping and shooting were well characterised in the course of the RBCT. In contrast there are no empirical data on either the effectiveness or humaneness of shooting free-ranging badgers.

***Question 6: Do you agree with the proposed use of vaccination, particularly its focus on mitigating the perturbation effects of culling?***

6.1 As outlined under question 1, we consider vaccination to have the greatest chance of mitigating detrimental effects on un-culled land if commenced some years before the start of culling. This is because time is needed for numbers of infected animals to decline due to natural mortality, and for immunity to build up in the population. If culling commences before vaccination has had these effects, then wider ranging by already-infected badgers (which will not benefit from vaccination) would increase disease risks for cattle. However, waiting for the benefits of vaccination to accrue would delay any benefits of culling, and could therefore make other approaches more attractive.

***Question 7: Should anything further be done to encourage the use of vaccination?***

7.1 We consider that more research is required to develop and test affordable and effective vaccination before encouraging its wider use.

***Question 8: Do you agree with the proposed monitoring?***

8.1 If culling is to be undertaken, it is important that everyone from ministers to farmers has realistic expectations of what culling might be expected to deliver and over what timescales. We recognise that, because of the complexity of the proposed culling

arrangements and the uncertainty surrounding their outcomes, detailed monitoring would be essential to assess the impacts of culling. However, we consider insufficient information is given to judge the proposed monitoring programme. We urge Defra to give detailed consideration to the most appropriate ways to monitor the outcomes of any culling intervention, both for badger populations and for cattle TB, and suggest that independent advice be sought on the most informative monitoring approaches. It would be worth exploring what role, if any, culling in former RBCT areas (including both culled and survey-only areas) might play in monitoring effects on cattle TB incidence.

## Conclusions

9.1 In our view, scientific evidence indicates substantial risks associated with the approach proposed by Defra. The proposal to licence groups of farmers/landowners to cull badgers, using the untested technique of free-shooting and without guarantees of simultaneous culls sustained over time, risks delivering poorly-executed culls which, according to scientific evidence from the RBCT and elsewhere, entail a substantial risk of increasing overall cattle TB incidence. We are concerned that proposals to mitigate detrimental effects on adjoining lands, by using geographical barriers or concurrent vaccination of badgers, are unlikely to be practicable or effective on a large scale.

9.2 Defra states that its long-term goal is “*to eradicate the disease in cattle*”. It is disappointing that Defra has produced no comprehensive strategy for achieving this goal. Careful consideration is needed to identify the components of such a strategy, which could contribute simultaneously both to short-term local reductions in cattle TB and to eventual eradication of the disease in cattle. We are concerned that the badger culling programme as proposed would contribute little or nothing to the long-term goal of eradicating cattle TB nationally. However, intensive controls on cattle-to-cattle transmission would be central components of any eradication strategy.

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