

Bovine tuberculosis: Defra consultation on proposals to help eradicate the disease in England

Defra is currently consulting on its latest plans regarding the management and control of bovine tuberculosis. As an organisation actively involved in research on the control of bovine tuberculosis, ZSL recognises the impact that this disease has upon farmers' lives and livelihoods, and seeks a sustainable, evidence-based solution to the problem. ZSL's response to the consultation questions is provided below. You can also access the consultation document at https://consult.defra.gov.uk/bovine-tb-2020/eradication-of-btb-england/supporting_documents/2021%20bTB%20Consultation_.pdf

Q1a. Do you support the proposal to introduce mandatory post-movement testing of cattle moving from higher TB risk regions of Great Britain (the HRA, Edge Areas on six-monthly surveillance testing and Wales) into those parts of the Edge Area where herds are on annual surveillance testing?

a. Yes

Q1b. Please give reasons for your answer. Where available, please provide supporting evidence.

ZSL is aware of multiple scientific studies showing that most cattle herds become infected with *Mycobacterium bovis* from other cattle¹⁻⁴. On this basis, ZSL supports any reasonable measures to reduce cattle-to-cattle transmission of *M. bovis*.

Q2a. Do you agree with the assumptions and the assessment of costs and benefits in the Regulatory Triage Assessment on introducing post-movement testing to parts of the Edge Area?

c. I don't know/ I don't have enough information

Q2b. Please give reasons for your answer. Where available, please provide supporting evidence.

ZSL's expertise relates primarily to wildlife, and it therefore has no specific information to provide on this point.

Q3a. Do you agree that Defra should revise the current policy for using the more sensitive IFN- γ test in the HRA and Edge Area, so that in addition to persistent breakdowns, use of the test is mandatory where the below criterion is met?

- TB breakdowns in the HRA and six-monthly testing Edge Area counties that occur within 18 months of the herd regaining TB free status following a previous OTFW breakdown.

a. Yes

Q3b. Please give reasons for your answer. Where available, please provide supporting evidence.

As noted in response to Q1b, ZSL supports any reasonable measures to reduce cattle-to-cattle transmission of *M. bovis*, including improving the detection and removal of infected cattle. ZSL particularly welcomes Defra's plan to stop targeting IFN γ testing of cattle at areas subjected to badger culling, as this conflation of improved cattle controls with badger culling is likely to lead to over-estimation of the impact of culling on cattle TB.

Q4a. Do you agree with the proposal to cease the issuing of new Badger Disease Control (intensive cull) licences after 2022?

b. Yes

Q4b. Please give reasons for your answer.

ZSL welcomes Defra's proposal to cease issuing new badger cull licences, although it has concerns that waiting until 2022 will undermine its objective of transitioning to badger vaccination, potentially compromising TB eradication, wildlife conservation, and animal welfare.

ZSL welcomes Defra's proposal to cease issuing new badger cull licences for three reasons. First, ZSL is aware that Defra's policy aims to eradicate TB, an aim which can never be achieved by killing badgers. While culling may, under specific circumstances, temporarily reduce the incidence of TB in cattle⁵, incidence rises again a few years after culling stops⁶. This increase is likely to reflect both the continuation of cattle-to-cattle transmission while badger-to-cattle transmission is reduced, and also the failure of culling to eradicate *M. bovis* from local badger populations. Culling has been shown to increase opportunities for badgers to interact with one another⁷⁻⁹, which probably explains why it is also associated with increased prevalence of *M. bovis* infection in badgers^{10,11}. Hence, culling as practised in England cannot eradicate *M. bovis* from badger populations, and therefore cannot prevent all badger-to-cattle transmission. By contrast, badger vaccination has no similar impact on badger behaviour¹² and, in principle, could contribute to TB eradication if combined with strong control measures targeting cattle.

Second, ZSL is deeply concerned that the mass slaughter of native wildlife is not an appropriate way to tackle an issue of human-wildlife conflict – especially when alternatives are available – for a nation which aims to show international leadership in wildlife conservation. Our own analyses¹³ indicate that badger vaccination is cheaper, more humane, less environmentally damaging, and potentially more effective than badger culling. Free shooting of badgers – the most widely-used culling method – has been found to be inhumane^{14,15}, and culling has broad impacts on agricultural ecosystems¹⁶⁻¹⁸.

Third, ZSL is concerned that the current culling policy fosters attitudes which are not helpful to wildlife conservation in the UK. Among farmers, it encourages the attitude that wildlife (including protected wildlife) has no value. Additionally, the issue potentially fosters hostility

between farmers and conservationists, undermining conservation efforts for other farmland species. Among the general public, it encourages the attitude that farmers are not concerned for wildlife. None of these attitudes is helpful to the conservation and recovery of biodiversity in the UK, much of which occurs on farmland or is influenced by farming practices. As such, it is at odds with the Environment Bill and Agriculture Bill, both of which seek to promote farmers' stewardship of nature.

While ZSL supports the principle of ceasing to issue new badger cull licences, it is concerned about the timetable for this cessation. Having decided to end badger culling and replace it with vaccination, Defra should be mindful of the impact of its interim plan (to continue issuing new licences in 2021 and 2022) on its long-term plan (to replace culling with vaccination). Defra may assume that, because certain forms of badger culling have reduced cattle TB, vaccination will have the greatest impact on cattle TB if conducted after culling. However, as described below, initial culling is likely to undermine the effectiveness of subsequent vaccination, for reasons relating to both badger and human behaviour.

Where culling is performed using cage traps, it is likely to selectively remove badgers willing to enter traps, leading to a situation where surviving animals are more difficult to capture¹⁹ for vaccination. This change is likely to reduce vaccine coverage and hence the effectiveness of vaccination efforts. Moreover, as described above, culling increases the proportion of badgers infected with *M. bovis*^{10,11}. Since vaccination works by protecting individuals not yet exposed to infection, this culling-induced prevalence increase reduces the proportion of badgers that can be effectively vaccinated. For these two reasons, vaccination conducted in the wake of prior culling may be less effective than vaccination conducted in un-culled populations, despite the lower badger density.

Additionally, it is well established in human psychology that commitment to a particular activity increases the more a person invests in that activity. Hence, it is likely that farmers who have invested in four years of badger culling are likely to be more committed to culling and, by extension, less willing to engage with badger vaccination. In areas which have not yet been culled, it may therefore be easier to roll out vaccination (the ultimate plan) now than in the future.

A further challenge is that, with no new licences being issued, the government will be faced with a large and growing area of land where existing cull licences have expired (we estimate 567 km² [roughly the size of the Isle of Man] in 2022 with another 4,752 km² [larger than Somerset] in 2023, with still larger areas added in subsequent years). Farming leaders are currently resisting badger vaccination in the absence of evidence that it is effective in protecting British cattle (although a side-by-side trial has been conducted in the Republic of Ireland²⁰). Defra therefore needs to act urgently to improve the evidence base surrounding badger vaccination, and to mainstream this approach within farming communities. These urgent needs can be achieved only by implementing vaccination on relatively large scales, an aim which can be best achieved in areas which have not been culled.

Importantly, failure to gain acceptance of badger vaccination as an effective alternative to culling is likely to have very serious consequences for both TB control and wildlife conservation. When cull licences expire, some farmers will halt culling but others may

continue unlawfully if they feel that this is the only way to protect their herds. Illegal badger killing on private land is very difficult to detect and police. Any such illegal killing is likely to be patchy, and there is evidence that patchy culling increases cattle TB²¹⁻²³. Maintaining momentum on national TB control and eradication therefore demands avoiding this outcome. Investing in mainstreaming badger vaccination is therefore a priority.

For these reasons, ZSL supports Defra in its aim of ceasing to issue new badger cull licences, but urges Defra to implement this plan more rapidly, promoting wide-scale vaccination (and associated evidence-gathering) in 2021-2 rather than encouraging yet more culling.

Q5a. Do you agree with the proposal that new Badger Disease Control (intensive cull) licences issued in 2021 and 2022, could, after 2 years of culling, be revoked after a progress evaluation by the CVO?

a. Yes

Q5b. Please give reasons for your answer.

Badger cull licences were originally issued for four years because the Randomised Badger Culling Trial (RBCT) showed that it took four years for increased cattle TB incidence on land adjoining the culled areas (which was most marked in the first year) to be overtaken by more gradual reductions inside the culled areas²⁴. Hence, culls performed for fewer than four years would have potentially caused net increases in cattle TB, rather than reductions. However, analyses of the current farmer-led culls have found little or no evidence of increased cattle TB incidence on adjoining land²⁵, for reasons which are unknown, but could include smaller reductions in badger density and hence weaker effects on adjoining land. If there is indeed no harmful effect on cattle TB from the current licensed culls, the justification for maintaining them for four years no longer applies. ZSL therefore supports the proposal to consider halting culling after two years.

Q6a. Do you agree with the proposal to reduce the initial financial commitment required from the companies prior to application for a Badger Disease Control licence to the cost of three years of culling?

a. Yes

Q6b. Please give reasons for your answer.

The original reason for requiring a financial commitment to the full four years of each cull was to ensure that culls were delivered for long enough to avoid increasing cattle TB. However, if culls may be stopped after two years, there appears to be little justification for requiring a four-year financial commitment.

Q7a. Do you agree with the proposal to restrict SBC licences to a maximum of two years, and to prohibit the issuing of SBC licences for previously licensed areas or areas licensed for Badger Disease Control after 2020?

a. Yes

Q7b. Please give reasons for your answer.

For reasons described above, ZSL supports the principle of ceasing to issue new cull licences, and this applies to Supplementary Badger Control licences as well as to licences for new areas.

The justification for issuing Supplementary Badger Control licences has never been clear. RBCT analyses showed that reductions in cattle TB incidence were greatest in the two years after culling ended²⁶. Continuing to cull (and paying the associated financial, ecological, welfare and societal costs) is therefore not supported by evidence, and the recent Godfray Review indicated that Supplementary Badger Control should be replaced by alternative approaches³.

ZSL therefore supports Defra's plan to prohibit the issuing of SBC licences for previously licensed areas or areas licensed for Badger Disease Control after 2020. While ZSL views a two-year SBC licence as preferable to the current five-year licence, we question the need for such licences to be issued at all.

Q8. Do you have any comments on the proposed revisions to the Guidance (Annex D)?

ZSL's comments are provided in response to Q1-Q7 above and we have no further comments on the revisions highlighted in Annex D.

Please do not hesitate to contact me should you require clarification on any of these issues.

Yours sincerely

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Director General

Literature Cited

¹Donnelly, CA & Nouvellet, P. The contribution of badgers to confirmed tuberculosis in cattle in high incidence areas in England. *PLoS Currents Outbreaks* (2013);

²Crispell, J et al. Combining genomics and epidemiology to analyse bi-directional transmission of *Mycobacterium bovis* in a multi-host system. *eLife* 8, 36 (2019);

- ³Godfray, HCJ et al. Bovine TB Strategy Review – Report to Rt Hon Michael Gove MP, Secretary of State, Defra. (https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/756942/tb-review-final-report-corrected.pdf, 2018);
- ⁴Akhmetova, A et al. Genomic epidemiology of *Mycobacterium bovis* infection in sympatric badger and cattle populations in Northern Ireland. *BioRxiv*, <https://www.biorxiv.org/content/10.1101/2021.1103.1112.435101v435101> (2021);
- ⁵Donnelly, CA et al. Positive and negative effects of widespread badger culling on cattle tuberculosis. *Nature* 439, 843-846 (2006);
- ⁶Jenkins, HE et al. The duration of the effects of repeated widespread badger culling on cattle tuberculosis following the cessation of culling. *PLOS One* 5, e9090 (2010);
- ⁷Ham, C et al. Effect of culling on individual badger (*Meles meles*) behaviour: implications for bovine tuberculosis transmission. *Journal of Applied Ecology* 56, 2390-2399 (2019);
- ⁸Woodroffe, R et al. Effects of culling on badger (*Meles meles*) spatial organization: implications for the control of bovine tuberculosis. *Journal of Applied Ecology* 43, 1-10 (2006);
- ⁹O'Corry-Crowe, G et al. The effect of reduction in badger density on the spatial organisation and activity of badgers *Meles meles* L. in relation to farms in central Ireland. *Biology and Environment: Proceedings of the Royal Irish Academy* 96B, 147-158 (1996);
- ¹⁰Woodroffe, R et al. Culling and cattle controls influence tuberculosis risk for badgers. *Proceedings of the National Academy of Sciences of the United States of America* 103, 14713-14717 (2006);
- ¹¹Woodroffe, R et al. Bovine tuberculosis in cattle and badgers in localised culling areas. *Journal of Wildlife Diseases* 45, 128-143 (2009);
- ¹²Woodroffe, R et al. Ranging behaviour of badgers *Meles meles* L. vaccinated with Bacillus Calmette Guerin. *Journal of Applied Ecology* 54, 718-725 (2016);
- ¹³Zoological Society of London. Eradicating TB from cattle and badgers – a review of evidence. ([https://www.zsl.org/sites/default/files/media/2018-09/ZSL Eradicating TB Report final 24Sep18.pdf](https://www.zsl.org/sites/default/files/media/2018-09/ZSL_Eradicating_TB_Report_final_24Sep18.pdf), 2018);
- ¹⁴Independent Expert Panel. Pilot badger culls in Somerset and Gloucestershire – Report by the Independent Expert Panel. (<https://www.gov.uk/government/publications/pilot-badger-culls-in-somerset-and-gloucestershire-report-by-the-independent-expert-panel>, 2014);
- ¹⁵British Veterinary Association. BVA calls for change to badger culling method and wider roll-out in England. (http://www.bva.co.uk/uploadedFiles/Content/News_campaigns_and_policies/Policies/Farm_animals/Final%20position%20on%20bTB%20and%20badger%20culling%20AGREED%20at%20Council%202015%20April%202015.pdf, 2015);
- ¹⁶Trewby, ID et al. Experimental evidence of competitive release in sympatric carnivores. *Biology Letters* 4, 170-172 (2008);
- ¹⁷Trewby, ID et al. Impacts of removing badgers on localised counts of hedgehogs. *PLoS One* 9, 4 (2014);
- ¹⁸Central Science Laboratory. The ecological consequences of removing badgers from an ecosystem - ZF0531. (<http://sciencesearch.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=Nonone&Completed=0&ProjectID=10151>, 2007);

- ¹⁹Tuytens, FAM et al. Differences in trappability of European badgers *Meles meles* in three populations in England. *Journal of Applied Ecology* 36, 1051-1062 (1999);
- ²⁰Martin, SW et al. Is moving from targeted culling to BCG-vaccination of badgers (*Meles meles*) associated with an unacceptable increased incidence of cattle herd tuberculosis in the Republic of Ireland? A practical non-inferiority wildlife intervention study in the Republic of Ireland (2011-2017). *Preventive Veterinary Medicine* 179, 105004 (2020);
- ²¹Wright, DM et al. Herd-level bovine tuberculosis risk factors: assessing the role of low-level badger population disturbance. *Scientific Reports* 5, 13062-13062 (2015);
- ²²Donnelly, CA et al. Impact of localized badger culling on TB incidence in British cattle. *Nature* 426, 834-837 (2003);
- ²³Vial, F & Donnelly, CA. Localized reactive badger culling increases risk of bovine tuberculosis in nearby cattle herds. *Biology Letters* 8, 50-53 (2011);
- ²⁴Donnelly, CA et al. Impacts of widespread badger culling on cattle tuberculosis: concluding analyses from a large-scale field trial. *International Journal of Infectious Disease* 11, 300-308 (2007);
- ²⁵Downs, SH et al. Assessing effects from four years of industry-led badger culling in England on the incidence of bovine tuberculosis in cattle, 2013–2017. *Scientific Reports* 9, 14666 (2019);
- ²⁶Jenkins, HE et al. The effects of annual widespread badger culls on cattle tuberculosis following the cessation of culling. *International Journal of Infectious Disease* 12, 457-465 (2008).