

Bovine TB

Badger control policy: value for money analysis 2016

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Summary

Background

The 2011 Impact Assessment¹ on licensed badger control to address tuberculosis (TB) in cattle found that the costs were likely to marginally outweigh the financial benefits but with considerable uncertainty. This was particularly the case with policing costs where the weight given to such considerations was a matter of judgement for Ministers.

At the time no alternative option offered better value for money in the short to medium term, against a situation where the incidence of TB in cattle continues to rise, along with the costs to both government and farmers of dealing with it.

Piloting industry-led controlled shooting of badgers in Gloucestershire and Somerset in 2013 as a method of controlling TB in cattle was considered worthwhile to test assumptions around effectiveness, humaneness and safety and to improve our understanding of the potential long term cost-effectiveness of the approach.

Since 2013 licensed badger control has continued in Gloucestershire and Somerset, and was extended to Dorset last year. From this we have gained valuable evidence to inform decisions on next steps for the policy. Extending to **seven** additional areas this year maintains momentum on the wider implementation of the policy, whilst further solidifying our evidence base.

Costs and benefits of extending the current approach to a further seven areas

- The future costs to government are estimated at around **£1.16m** per new area for licensing and monitoring, training and guidance, policing, and purchase of equipment, over four years.
- Industry costs are uncertain and have been estimated at around **£0.87m** per area over four years.
- The total quantified benefits are estimated at **£2.59m** (range between **£0.69m** and **£4.16m**) per area over four years in the central case, based on the impact of badger control as observed in the RBCT.
- Therefore, in the central case the benefits are expected to be greater than the costs by around **£0.56m** per area, but with considerable uncertainty.

¹ Measures to address bovine tuberculosis in badgers: impact assessment. November 2011
<https://www.gov.uk/government/publications/measures-to-address-bovine-tuberculosis-in-badgers-impact-assessment>

Uncertainties

- The need for policing has been a feature of the policy to date due to the need to maintain public safety. It is likely that extending to seven new areas will require a similar level of policing, at least in their initial year. However, police forces have consolidated their command and control structure for operations this year to reduce costs. It is a shared goal of Defra and the Home Office that policing should become business as usual for local police forces and attract no additional costs. Over time, following further successful badger control operations without security incident, we expect policing costs to disappear.
- The costs per area to government and industry presented here are lower than those observed in the three badger control areas to date. Costs to government have fallen due to more cost-effective monitoring and policing. Costs to industry are expected to fall as lessons learnt over the last three years lead to efficiencies and improvements in operational delivery.
- The range in the quantified benefits takes account of scientific uncertainty around the impact of an effective cull in line with the Randomised Badger Culling Trial (RBCT). Any changes to the way badger control is delivered, the size of the control area, density of cattle or the baseline levels of TB will add further uncertainty which could mean greater or lower quantified benefits than those estimated here.

Analysis of the costs and benefits of extending badger control in 2016

Defra's 2011 Impact Assessment set out the expected costs and benefits of licensed badger control to reduce TB in cattle. Since 2013, licensed badger control has taken place in areas of Gloucestershire, Somerset and Dorset (since 2015) using a combination of controlled shooting and cage trapping and shooting. Based on this experience, this annex sets out an assessment of the costs and benefits of extending the policy to **seven** additional areas in 2016. Except where stated, all quantified costs and benefits per control area are presented in "present value" terms, which is calculated using a discount rate of 3.5% in line with HM Treasury Green Book guidance.

The benefits of badger control

The benefits of badger control are the net reduction in the level of TB in cattle herds within and around control areas. They are estimated based on the impact of culling observed in the RBCT over 11 years from the start of badger control². These benefits are valued by the

² Evidence on the effect of removing badgers on the incidence of TB in cattle from the three licensed areas is not yet available to inform this assessment.

savings in disease control costs to farmers and Defra (i.e. taxpayers) through avoided cases of TB in cattle (breakdowns³).

Table 1: Estimated impact of badger control on the number of confirmed new TB incidents (compared to the baseline)

	Pessimistic	Central	Optimistic
Within badger control areas			
- during cull (years 1-4)	-12.4%	-23.2%	-32.7%
- post cull (years 5-11)	-10.9%	-25.9%	-38.4%
Outside badger control areas (up to 2km from the boundary)			
- during cull (years 1-4)	+56.0%	+24.5%	-0.6%
- post cull (years 5-11)	+26.4%	-6.8%	-31.2%

The main control actions involve restricting movements of cattle from the herd, whole herd testing of cattle, slaughter of any cattle that react to the test and repeated testing and slaughter until the herd is cleared. The estimated average cost of a breakdown used in this assessment is **£18 thousand** split roughly equally between farmers and government. In practice there is a wide range in the scale, duration and cost of breakdowns. Many are minor but a small proportion are major, costly to farmers and government, and extremely disruptive to farm businesses. This assessment uses the average cost of a breakdown, but we recognise the range that exists.

Table 2: Estimated average cost of a confirmed new TB breakdown in the High Risk Area of England (£, 2016 prices)

	Government	Farmers	Total
Testing	2,950	3,600	6,550
Slaughter Costs	5,350	5,350	10,700
Restrictions and Isolation	0	550	550
Administration	300	0	300
TOTAL	8,600	9,500	18,100

If the benefits of badger control in a new area are in line with the reduction in the level of TB observed over 11 years in the RBCT, they would be between **£0.69m** and **£4.16m** split between farmers and government. The central estimate is **£2.59m**.

³ This assessment considers only confirmed cases of TB and excludes unconfirmed incidents because analysis of data from the RBCT did not identify any significant effect of badger culling on unconfirmed incidents.

These estimates are based on badger control taking place over an area of 376km² in the high risk area (HRA) of England with a rising baseline of new TB incidents of 1.35% per year. Each incident prevented due to badger control is valued according to the average cost of a breakdown in the HRA. Physical values on the duration and size of breakdowns are taken from the Animal and Plants Health Agency's (APHA) annual surveillance report. Costs to Defra are taken from appropriate financial sources in APHA whilst costs to farmers are estimated using a methodology established by Reading University⁴, inflated using appropriate price indices. All values are expressed in 2016 prices. See **Table 5** for a list of the main assumptions and sources used.

The quantified benefits presented here are higher than those estimated in the Value for Money analysis for extending badger control policy to Dorset⁵. This is the result of a number of changes to the underlying assumptions, mainly due to increases in the area over which badger control takes place and the change in baseline incidence of TB.

Qualitative evidence suggests that bovine TB can cause significant stress and ill health among the farming population. However, the impact of such stress is difficult to quantify or value. Studies looking at the social impacts of bovine TB have found self-reported stress among farmers. For example⁶, from a sample of 50 farmers interviewed in the South-West, 30 said their farm's TB breakdown had affected their own daily life, 20 that of their family or household, 10 their employees. Evidence suggests that a long period of time under movement restrictions is a significant contributor to stress across all farming groups. A standard questionnaire designed to identify psychiatric ill health found that farmers that have been under TB movement restrictions for a long period of time showed significantly higher levels of stress than farmers who had not experienced a TB herd breakdown.

The costs of badger control

The main costs of badger control to farmer-led companies are surveying, preparation and coordination which includes communication, planning, support, management and administration; and delivery of badger control through a combination of controlled shooting and cage trapping and shooting which includes equipment and manpower.

Based on experience over three years [*Redacted – Commercially sensitive*] the total cost to farmers of badger control over four years is estimated at **£865 thousand** per area in the central case.

⁴ Assessment of the economic impacts of TB and alternative control policies - SE3112
<http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=10137>

⁵ Bovine TB: badger control policy value for money analysis. December 2015
<https://www.gov.uk/government/publications/bovine-tb-badger-control-policy-value-for-money-analysis>

⁶ Measures to address bovine tuberculosis in badgers: impact assessment. November 2011 (see paragraph 6.47)
<https://www.gov.uk/government/publications/measures-to-address-bovine-tuberculosis-in-badgers-impact-assessment>

[Redacted – Commercially sensitive] These figures are subject to uncertainty.

[Redacted – Commercially sensitive]

The main costs of badger control to Natural England are for processing licence applications and monitoring of compliance; the main costs to APHA relate to training and mentoring and advice; and local police forces incur costs in relation to maintaining public order and safety. All of these costs are met by taxpayers.

Costs to Natural England are based on the total cost of their licensing team, divided by the expected number of licensed areas per year. Total costs are estimated at **£300 thousand** per area over four years in the central case.

Costs to APHA are based on actual and expected costs in 2015 and 2016 respectively. The expectation is that cost per area decreases as the number of licensed areas increases due to economies of scale. Therefore, the total cost is divided by the number of areas expected to be licensed in any year. The total costs to APHA are estimated at **£165 thousand** per area over four years in the central case.

Finally, Defra incurs additional costs related to equipment such as airwaves. This is expected to cost **£85 thousand** per area over four years in the central case.

Table 3: Estimated cost to government per licensed area (*£thousands*)

	Year 1	Year 2	Year 3	Year 4	Present Value
APHA	70	40	35	30	165
Natural England	180	55	40	30	300
Defra (equipment)	55	15	10	5	85
TOTAL	305	110	85	65	550

The need for policing has been a feature of the policy to date due to the need to maintain public safety. It is likely that extending to seven new areas will require a similar level of policing at least in their initial year. For the central case, we estimate that policing will cost **£610 thousand** per area over four years. These costs are based on actual and expected costs of policing in 2015 and 2016 respectively, and also assume that the Home Office and Defra achieve the shared goal of business as usual policing by 2019, coinciding with the fourth year of badger control in the seven new areas (please see **Sensitivity Analysis** section for more detail).

Overall, we estimate that the total cost to government and farmers per area is around **£2.03m** over 4 years in the central case.

Total costs and benefits

The total quantified benefits are estimated at **£2.59m** (range between **£0.69m** and **£4.16m**) per area over four years in the central case, based on the impact of badger control as observed in the RBCT. This compares with an estimated total cost of **£2.03m** per area.

In the central case the benefits are expected to be greater than the costs by around **£0.56m** per area, but with considerable uncertainty. Should the benefits be at the upper end of those observed in the RBCT then they would exceed the estimated costs by around **£2.13m**, yet costs would exceed benefits by around **£1.34m** should benefits be at the lower end of those observed in the RBCT.

Sensitivity analysis

This analysis of the costs and benefits of extending badger control to an additional seven areas in 2016 is subject to a number of uncertain assumptions. The following sensitivity analyses have been carried out to test the dependence of the overall economic assessment to the key assumptions made.

Policing

The need for policing has been a feature of the policy to date due to the need to maintain public safety. It is likely that extending to seven new areas will require a similar level of policing, at least in their initial year. However, police forces have consolidated their command and control structure for operations this year to reduce costs. It is a shared goal of Defra and the Home Office that policing should become business as usual for local police forces and attract no additional costs. Over time, following further successful operations without security incident, we expect policing costs to disappear. This ambition is factored into our central scenario.

However, in the scenario that we continue to incur policing costs over the next four years and potential efficiency gains are not fully realised, we estimate that this would reduce the net benefit per licensed area to **£0.26m** in the central case.

Extending badger control to further areas: costs to government and farmers

[Redacted – Commercially sensitive] We expect the cost per area to farmers to decrease as badger control is extended into more areas (economies of scale) and due to efficiency savings being realised due to the experience of farmers and badger control companies in existing areas.

Similarly, increasing the number of licensed areas in any year provides opportunities for economies of scale for a number of activities undertaken by government. For some activities (e.g. licensing) the costs per area are lower the greater the number of areas licensed. Therefore, assumptions over future implementation of the policy can affect the costs per area.

Cost of breakdowns

There is a wide range in the scale, duration and cost of TB breakdowns. Many are minor but a small proportion are major, costly to farmers and government, and extremely disruptive to farm businesses. The average cost used in this assessment is lower than in the analysis published in 2015 due to lower levels of cattle slaughtered per breakdown.

Increasing the estimated average cost of a breakdown by 10% would increase the quantified benefits to **£2.85m** per area. This would lead to an overall net benefit of **£0.82m** in the central case.

Conversely, reducing the estimated average cost of a breakdown by 10% would decrease the quantified benefits to **£2.33m** per area leading to an overall net benefit of **£0.30m** in the central case.

Baseline incidence of TB

Future levels of TB in the absence of badger control are uncertain. For example, the 2011 Impact Assessment analysis assumed a rising baseline incidence of 3% per annum based on epidemiological modelling by the former Veterinary Laboratories Agency (now part of APHA). However, latest statistics suggest signs that the rate of increase in incidence has slowed perhaps due to the effect of stricter cattle measures introduced over the last 6 years.

Assuming no changes to the incidence of TB in the absence of badger control (the baseline) would reduce the quantified benefits to **£2.43m** per area. This would lead to a net benefit of **£0.40m** in the central case.

Increasing the annual increase in the incidence of TB in the baseline to 2% would increase the quantified benefits to **£2.67m** per area. This would lead to a net benefit of around **£0.64m** in the central case.

Increasing the annual increase in the incidence of TB in the baseline to 3% (as per the 2011 Impact Assessment) would increase the quantified benefits to **£2.80m** per area. This would lead to a net benefit of **£0.77m** in the central case.

Perturbation

The RBCT suggested that badger control could lead to a relative increase in TB incidence (OTFW⁷) in cattle herds in the areas outside the licensed area due to the disruption of badger social groups – the so-called ‘perturbation effect’. The impact of perturbation is uncertain, with the central case using evidence of its effect from the RBCT. However, having hard boundaries to control areas, low cattle herd densities and biosecurity measures on farms around the licensed area could mitigate any negative effect.

⁷ This stands for “Officially TB Free Status Withdrawn”.

Assuming no perturbation effect leads to an increase in the quantified benefits of badger control to **£2.69m** per area. This leads to an overall net benefit of **£0.66m** in the central case.

Assumptions and data sources

Table 5: Key assumptions and sources

Variable	Value	Source
Costs		
Training and mentoring costs to APHA per area	n/a	APHA advice based on experience to date, and the costs of activities in 2015 and 2016.
Natural England licensing and monitoring costs per area	n/a	Natural England accounts, divided by number of areas licensed in a given year
Equipment (e.g. cage traps, airwaves)	n/a	Based on volumes and unit costs observed in licensed areas to date.
Policing	n/a	Based on the average cost of policing per area in 2015 and 2016
<i>[Redacted – Commercially sensitive]</i>	n/a	<i>[Redacted – Commercially sensitive]</i>
<i>[Redacted – Commercially sensitive]</i>	n/a	<i>[Redacted – Commercially sensitive]</i>
Benefits		
Area size	376km ²	Based on the average size of the new badger control areas
Per annum change in TB breakdowns (baseline)	1.35%	Annualised change in 2014 compared to 2011 base, from the National Statistics
Breakdowns per km ² in control area	0.15	Measures to address bovine tuberculosis in badgers: impact assessment. November 2011 (see footnote 1)
Breakdowns per km ² surrounding control area	0.10	
Average cattle slaughter per breakdown	7	Bovine TB surveillance in Great Britain, 2014. August 2015 (Based on England data)
Average days under restriction per breakdown	272	https://www.gov.uk/government/publications/bovine-tb-surveillance-in-great-britain-2014
Cost of breakdown to government	£8,600	Expressed in 2016 prices. Based on method outlined in a study conducted by the University of Reading in 2004 (see footnote 4).
Cost of a breakdown to farmers	£9,500	
Miscellaneous		

Table 5: Key assumptions and sources

Variable	Value	Source
Discount rate for present values	3.5%	The Green Book: appraisal and evaluation in central government. Last updated October 2015 https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government

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