



Consultation on bovine TB and badgers

**A response from the Badger Trust
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The principle

Q 1

In the light of the evidence presented as part of this consultation, on balance, do you think a policy to cull badgers should be part of the approach to help to control the disease in cattle in high incidence areas?

No. The “evidence” is incomplete, partial and fails to reflect the full range of present knowledge. The consultation failed to incorporate, in full, the advice of the Independent Scientific Group (ISG)¹. In addition, the ISG has noted that the consultation document is “inaccurate in important respects”, contains claims for which there are “no scientific data”, which are “without foundation” and which are “at variance with the scientific findings”².

Ministers had consistently promised to base policy on sound science. In addition, the *Lessons to be Learned Inquiry*³ into foot and mouth disease underlined the importance of using sound science and of using clearly understood and trusted processes for making use of scientific advice. Clearly the policies set out in the consultation are not based on sound science and this, in turn, has resulted in a significant breakdown of trust in the entire consultation process.

Nevertheless, the Badger Trust is keen to take this opportunity of making a substantial contribution to the wider debate over how to best address bovine TB.

The Randomised Badger Culling Trial (RBCT) has shown that, whilst killing badgers reduces bTB outbreaks by 19%, the incidence of the disease increases by 29% around the culling area⁴: the perturbation effect. The ISG has advised that both individual licensing and targeted killing will worsen bovine TB as a result of this perturbation effect. The ISG advises that systematic badger killing, over areas of at least 300 km² for a long period of time will have a modest effect on reducing TB. But the ISG – and the Badger Trust – question the feasibility of such a measure and doubt its cost-effectiveness⁵.

In some quarters – though not those with suitably qualified scientists – it is claimed that the perturbation effect can be overcome by increasing the efficiency of badger killing⁶. This is a theory unsupported by sound science. Indeed, the opposite is true. The study in East Off ally, Eire, for example, achieved greater killing efficiency than the RBCT using snares. Yet the TB reduction was still consistent with the results of the RBCT⁷.

We note that, in its submission to the Citizens Panels, Defra states: “The aim of a cull would be to reduce the badger population so as to reduce the likelihood of contact between cattle and badgers and not to get rid of all badgers. The numbers killed will depend on the area and the population of badgers in that area. We would not be seeking to remove a specific number.”⁸

¹ Bourne, J. (2006), personal comment to the Environment, Food and Rural Affairs Select Committee, 7 Feb 2006, London.

² Summerskill, M. (2005), Letter from the Independent Scientific Group Secretariat, London, 20 January 2006.

³ Anderson, I. (2002) Foot and Mouth Disease 2001: Lessons to be Learned Inquiry.

⁴ Donnelly, C.A. et al (2005) Positive and Negative effects of widespread badger culling on cattle tuberculosis. *Nature*, doi.10.1038/nature04454 (<http://www.doi.org/>).

⁵ Summerskill, M. (2005), op. cit.

⁶ Rowe, J. (2006), personal comment from NFU spokesman, Royal Association of British Dairy Farmers annual conference, Gloucester, 8 March 2006.

⁷ Bourne, J. (26 January 2006), ISG Open Meeting, London.

⁸ Defra (2006), Frequently asked questions, Citizens Panels briefing notes, organized by Opinion Leader Research, London.

This admission is telling. It reveals that far from a policy based on sound science, it is simply guesswork. Defra clearly has no idea how many badgers would need to be killed and it follows that it is unable to predict a specific reduction in bTB as a result of the killing. That, in turn, makes it impossible to achieve a sound cost-benefit analysis.

Similarly, the Defra documents argue that the results of the RBCT are “uncertain”. Again, this is false. The results are robust and perfectly clear, as the ISG has repeatedly pointed out.

The Bern Convention

Britain is a Contracting Party to the Bern Convention. Article 8 prohibits the use of all indiscriminate means of capture and killing and the use of all means capable of causing local disappearance of, or serious disturbance to populations of species, including badgers, named in Appendix III. In particular, it bans the use of traps, snares, gassing, lights and night sights, as specified in Appendix IV.

Under Article 9, Contracting Parties may take exception from these prohibitions to prevent serious damage to livestock and in the interests of public health and safety. However, the exception can only be made provided that there is *no other satisfactory solution* and that the exception will not be detrimental to the survival of the population concerned.

Clearly, there are other satisfactory solutions. ISG modelling demonstrates that increased diagnostic sensitivity (either through improved use of the single intradermal comparative cervical tuberculin test – SICCT – or through use of an alternative test) would reduce TB incidence in cattle “without further control of bTB in badgers”⁹.

Other control options include reducing contacts between cattle herds through reduced cattle movements, pre- and post-movement testing, effective use of the gamma interferon blood test and low cost measures to reduce the risk of badger to cattle transmission. None of these measures are yet in place, despite the fact that they have been recommended for many years.

The ISG has demonstrated that only the systematic control of badgers, over areas in excess of 300km² for prolonged periods of time would be effective in reducing the incidence of the disease through badger control. But the Bern Convention, in Appendix III, forbids control measures that are “detrimental to the survival of the population concerned”. To argue that the badger population in bTB regions would not be jeopardised is disingenuous.

Consultees

The Badger Trust regrets Defra’s failure to include a number of key organizations amongst the consultees, including: the Mammal Society, National Trust, Woodland Trust and Compassion in World Farming.

⁹ Donnelly, C. (26 January 2006), personal comment, ISG Open Meeting, London.

Q 2

Comments are invited on the options considered and the costs and assumptions made in the Partial Regulatory Impact Assessment.

The Lessons Learned inquiry, in the wake of foot and mouth disease, emphasized the need to apply “*risk assessment and cost benefit analysis within an appropriate economic model.*”ⁱ

Defra is not using an “appropriate economic model” to justify killing badgers in its partial Regulatory Impact Assessment (partial RIA). In the partial RIA, Defra’s rationale for intervention is:

“20. Veterinary advice is that fundamental principles of infectious disease control need to be employed to reduce the risk of transmission of disease from badgers to cattle. At present, the only method known to reduce the number of infectious badgers is lethal removal. This would permit a balanced approach to bTB control that deals with the principle transmission risks.”ⁱⁱ

This odd statement leaps from identifying the “risk of transmission” as the problem to reducing “the number of infectious badgers” as the solution. It implies that the “fundamental principles of infectious disease control” are simply “lethal removal”. No mention is made of preventative measures, which are also a fundamental principle of infectious disease control.

Thus, it could also be argued that: “The risk of transmission of disease from badgers to cattle should be reduced by the implementation of biosecurity measures.” Defra simply ignores this possibility and leaves it out of its cost benefit analysis.

Research by the Independent Scientific Group, scheduled for completion in December 2005, should indicate what basic biosecurity measures might limit badger to cattle transmissionⁱⁱⁱ. Some early work in this area has already been published, although the small sample sizes involved do not permit assumptions to be made about the effectiveness of preventing badgers accessing cattle feed^{iv}. Studies of farm level risk factors by the ISG should identify predictors for bTB outbreak risk that may, in turn, lead to the development of preventative measures^v. Furthermore, the Science Advisory Council has advised that:

“The adoption of potentially effective precautionary control measures, which involve relatively low costs and are not controversial, need not await the same standard of scientific evidence as those which are costly and/or controversial. However, the effectiveness of such measures should be monitored.”^{vi}

The partial RIA also fails to use cost-benefit analysis to compare badger culling with cattle controls. Thus, the impression given in the consultation is that there is no choice but to kill badgers, thanks to a woefully incomplete presentation.

The partial RIA also fails to provide any medium or long term strategy for badger killing. This complete absence of an “end game” illustrates that Defra is simply pulling ideas out of thin air, rather than basing the strategy on scientific data.

Finally, the partial RIA fails to include the negative perturbation effects of killing badgers. Once the costs of further herd outbreaks resulting from the perturbation effect are built into the RIA, it is very likely that there will be no cost effective badger killing options remaining.

Q 3

In what circumstances should the Government grant licences to cull badgers for the purpose of preventing the spread of bovine TB under the Protection of Badgers Act, 1992?

The results of the RBCT are unequivocal. The stochastic, spatially patchy killing of badgers by means of individual licensing will only serve to increase the perturbation effect, with a consequential significant negative impact on the spread of bovine TB.

There is no realistic prospect of coordinating the killing in such a way as to achieve a large scale, rigorous, coordinated cull. Thus, this strategy will fail.

Paragraph 65 of the consultation document states licences may be granted to kill badgers “for the purpose of preventing the spread of disease”. There is no evidence that the spread of disease is caused by badgers. On the contrary, evidence from the Central Science Laboratory work at Woodchester Park, Gloucestershire, has demonstrated that over many years bTB is closely confined to the territories of affected social groups¹⁰. The perturbation effect would cause the spread of disease.

The clear cause of any spread over long distances is the movement of untested cattle. In fact the RBCT indicates that killing badgers is likely to make the situation worse, at the very least adjacent to areas of up to about 300 sq km (11 miles square or about 14 miles in diameter) because of the edge effect. The Badger Trust regards any licensing system for culling (which it sees as a premature and disproportionate response) as impractical. Any supposed benefits of killing wildlife (because not only badgers are susceptible to bTB) would be seriously compromised.

A further limitation of individual licensing is the impossible task of ensuring that it is competently and consistently applied with regard to animal welfare. We see no circumstances in which the Government should introduce a licensing system, let alone grant them.

Possibly the worst consequence would be the further prolongation of the bTB crisis in farming. Individual licensing would send out the false message that the sporadic killing of wildlife would be effective, when the opposite is true.

Finally, individual licensing would undermine the Protection of Badgers Act 1992, by creating a culture in which it would be perceived to be legitimate to kill badgers.

Q 4

What qualifying geographic criteria would be appropriate, achievable and reasonably likely to be an effective disease control measure?

The ISG has specified that killing over minimum areas of 300 km² would be required to deliver a modest reduction in bovine TB. However, this applies to each and every TB hotspot, with the consequence that killing over vast TB areas would be required. Simply given the scale of the land area involved, it would make more strategic sense to implement all cattle controls in order to reduce the bTB problem significantly, before badger culling were even considered.

It has been suggested by the NFU that killing could be carried out provided that appropriate geographical boundaries were used to minimize the perturbation effect. Major rivers, coastline and very high ground aside, no such geographical boundaries exist. It has been suggested that

¹⁰ Woodroffe, R. (26 January 2006), ISG open meeting, London.

badgers do not cross motorways, yet dead badgers on these roads indicate that they clearly attempt to on a regular basis.

Q 5

How could farmers ensure sufficient coverage to deliver a sustained cull over a large area?

Paragraph 70 of the consultation document notes that: “it is not clear whether [farmers and regional groups] could deliver a high enough participation rate to ensure an effective cull over a large area”.

It is now clear that effective cooperation is not possible, following the publication of a CLA / NFU survey of members in TB areas. Only 32% of respondents are “definitely” prepared to kill badgers themselves. Those who said they would “probably” get involved should be discounted, since this is certainly not a commitment. Moreover, the survey significantly under-estimated the owners of small areas of land, whilst acknowledging that these individuals are least likely to support a killing strategy.

The Badger Trust does not believe that there is any prospect of farmers, their agents or their limited staff resources undertaking a sustained programme of wildlife killing such as is suggested would be necessary to avoid dangerous perturbation. There would have to be high quality, impartial, and professional supervision to achieve the necessary level of total compliance with any rules over long periods. Any gaps in the programme, in time or space, would immediately compromise any supposed benefits and prevent the delivery of the efficiency required by the Bern Convention.

Q 6

What qualifying disease history would be appropriate?

The Badger Trust is not aware of any evidence to suggest that the history of bTB in cattle or badgers is a suitable guide for determining a badger killing policy. The RBCT selected its areas at random, albeit on the basis of bTB intensity. But the RBCT has not produced any data to suggest at what level of disease badger killing should or should not be introduced.

Q 7

What could be included in the criteria to define those farmers eligible for a licence to cull badgers?

Given that individual licensing is wholly inappropriate and certain to make the disease worse, there is no appropriate answer to this question.

If there were any value in licensing farmers (which we dispute) an essential consideration would be the level of aptitude and skill of the people carrying out the actual work. Their knowledge base of the regulations and the natural history of the wildlife with which they were to deal would have to be assessed. It would also be necessary to establish that they were able to make sound decisions in the matters in hand. These qualities and aptitudes cannot be assumed any more than in other licensing regimes that require them.

A strict protocol would have to be drawn up and subsequently enforced, considering the dangers of gassing and shooting, and the unavoidable cruelty of snaring. There is surely some risk that the cost of licensing, the assurance of licensees’ competence and proper supervision would be prohibitive.

Q 8

Would it be practical for primary herd owners to recruit neighbours and adjoining landowners to achieve, say 75 per cent coverage within 1 km of the boundaries of their holding? If not, what might be achievable and reasonable?

The RBCT achieved cooperation from, on average, 72% of landowners with 68% of the land area, with the killing undertaken by specially recruited, trained and managed personnel. We cannot see this level of efficiency being delivered by farmers with other pressures on their time.

Q 9

Over what size of area could self-coordinated groups of farmers and landowners be expected to manage a cull consistently and effectively for up to 5 years, with a high degree of coverage?

It would be impractical to expect herd owners to recruit neighbours for long-term projects of the required size as shown in the coalescence map. If it were (as is conceded) that it would be too expensive for the state to do the work by trapping it is hardly likely that sufficient farmers would devote time and money on the scale required to meet Government expectations. This would be an expense in addition to that of pre-movement testing. In addition it is now recognised, by the ISG and the Scientific Advisory Committee, at best a marginal effect beside proper movement control and improved frequency and accuracy of all tests. The Badger Trust notes the vague nature of this question. What is 'a high degree of coverage'? Why does the question specify 'up to five years', when the RBCT has not stated that this is the optimum time period?

Those problems aside, it would simply not be possible to secure the level of coordination amongst farmers and landowners required to deliver the cull at an effective level. There would be an insufficient level of commitment and the pressures on time and resources would be too great.

Methods of culling

Q 10

Are there other methods of culling which should be considered?

No.

Our view is that the culling of any wild animal by any methods the government has considered are by their nature cruel. In this case any badger slaughter would be premature and disproportionate to any danger they may represent. All the methods listed in Paragraph 84 are difficult even for skilled professionals (cage traps ruled out on cost grounds – Paragraph 69 of the consultation document) and impossible or at least dangerous if practised by casually recruited groups of amateurs. No doubt expertise would be acquired – at terrible cost of suffering to the badgers – but only if the personnel in each locality was the same throughout the suggested five years, highly unlikely in the present state of farming.

Q 11

Is gassing appropriate for use under licence by groups of farmers, landowners and their agents?

No. Even to discuss gassing, particularly the use of carbon monoxide, is to support the unskilled, random use of petrol vehicle exhausts or diesel exhausts which would kill mostly by the effects of irritants and suffocation, either by breathing difficulties or the presence of carbon dioxide. Any gassing procedure kills many other species besides those being targeted.

Unless closely regulated and supervised – at considerable government expense – no wide-scale licensing system is adequate: licensed vehicle drivers exceed speed limits, licensed gun owners shoot people (one of our own members has been a victim) and licensed victuallers notoriously served after hours for a century.

To envisage a self-regulating system in the countryside, out of sight of anyone, perhaps at night, and carried out by the kind of casual labour (“agents”) available for such work is optimistic if not naïve.

The Badger Trust notes that a humane gassing technique that will deliver appropriately high levels of CO to all parts of complex setts is as yet unknown. Such methods are being tested by Defra using controlled environments, but it is most unlikely that field trials will demonstrate that the methods are consistently humane. The historic use of gas has resulted not only in hypoxia but also brain damage, and it is impossible to see how this risk could be avoided given the infinite variety of sett structures.

Furthermore, there is no chance of the methods being consistently and humanely applied by operatives.

Q 12

Would there be a need for training of licensees? If so, what form should this take?

There is a world of difference between training and actual delivery. Training would of course be necessary, but this is irrelevant. More importantly, it will not be possible to effectively monitor the application of the training in the field environment, with so many potential operatives and with such a large scale cull.

Q 13

How could this training be best provided?

Again, this question is irrelevant. A more pertinent question would focus on whether training guarantees that the methods will be consistently applied. In the absence of constant and comprehensive supervision, they will not. That, in turn, makes gassing unacceptable.

Q 14

Would permitting shooting of free running badgers (under licence) be practical and acceptable?

No. As Dr Chris Cheeseman from the Central Science laboratory pointed out in his evidence to the Environment, Food and Rural Affairs Select Committee, shooting is extremely dangerous, ineffective in a woodland environment and ineffective at the sett¹¹.

The shooting of free-running badgers is a skilled task of marksmanship requiring a high level of training and personal responsibility, particularly as it would have to be done in poor light and in difficult terrain. The dangers to people and property from overshoot are considerable. It is unlikely that a 12-bore shotgun would be either suitable or humane at a distance of more than about 30 metres, and a high velocity centrefire rifle would be required.

The type of weapon & bullet are laid down in the Badger Protection Act, 1992 at 2 (1) d:

“A person is guilty of an offence if he uses for the purpose of killing or taking a badger any firearm other than a smooth bore weapon of not less than 20 bore or a rifle using ammunition having a muzzle energy not less than 160 ft lb and a bullet weighing not less than 38 grains”.

Q 15

What features should be included in the design and use of the body snare? Are there particular features which should be avoided or included?

The Badger Trust deplores any suggestion of snaring for any purpose. The various types differ only in their relative cruelty: they are all cruel, the more so on strong mammals such as foxes, deer and badgers which rarely die quickly.

We note the analysis of the Irish Four Areas Trial, by the ISG. That Trial used snares and the ISG observed that “no consideration was given to badger welfare”¹².

Q 16

What inspection intervals for checking snares would meet welfare considerations and be practical?

The use of snares is in itself beyond any consideration of animal welfare. This question again raises the issue of supervision and monitoring. It is impossible to implement a snaring strategy that would assure the highest standards of welfare not only for badgers, but also for other wild and domestic animals that might be caught in snares.

¹¹ Cheeseman. C. (7 February 2006), evidence to the Environment, Food and Rural Affairs Select Committee, London.

¹² ISG (2004), ISG commentary on the published analysis of the Irish (Four Areas) Trial, London.

Q 17

What skills and competences for culling are required to ensure body snares are safely and effectively deployed.

Competence in the setting of snares, body snares or otherwise, is only part of the issue. Motivation to do the job properly cannot be assumed when operatives are out of sight and unsupervised.

Q 18

Is there a need for training for farmers or licensees? If so, what form should this take?

See Question 12.

Q 19

How could this training be best provided, assist in monitoring a cull of badgers and be practicable?

See Question 13.

Q 20

What methods of disposal would be suitable to minimise risk of disease transmission?

There is an unacceptable assumption in the question that all badgers culled pose a risk of infection. That is plainly not the case, according to the Road Traffic Survey by Defra and the RBCT results. However, in the event of a cull being authorized, all carcasses should be examined post-mortem to establish key information about infection, age and sex, for subsequent analysis for post-hoc assessment of cost benefit.

Q 21

Do the proposals for monitoring the impact on wildlife (paras 93-95) look at the right issues? If not, what else do you think should be monitored?

The proposals are extremely optimistic. The ISG has noted that despite the use of several methods for assessing badger populations, none is reliable or precise. Killing badgers on a large scale would pose a more significant problem. Randomised surveys would need to be organized to assess the overall level of compliance with culling requirements. But it would never be possible to build up a precise picture of badger distribution and density. This, in turn, will make it impossible to clarify the cause of continued outbreaks of bTB. Farmers will inevitably claim that not enough badgers have been killed and a survey to confirm the claim will rapidly erode resources. Furthermore, population assessments will need to secure the consent of landowners and/or farmers in many areas, posing significant logistical challenges which are not costed or discussed in the consultation document.

Conclusion

The Badger Trust believes that eradicating bovine TB is not feasible with the tools currently at our disposal, including badger culling.

Instead, we want to see the effective control of bovine TB through cattle-based measures, including pre- and post-movement testing, the isolation of bought-in cattle and the more extensive use of gamma interferon.

The Badger Trust believes that Defra has failed to adequately utilize the RBCT data and has, instead, focused on the Irish Four Areas Study which reported a maximum reduction in bTB of up to 96% through culling badgers. The Badger Trust notes that a more careful analysis by the ISG has revised this headline figure down to a mean of 54%. And there are significant doubts about the rigour of the Irish study that led the ISG to speculate that it has exaggerated the benefits of badger killing.

For example, the Irish study lacked a scientific “control”; badger culling had been taking place in the study areas long before the study started; the study only showed a reduction in the likelihood of a bTB outbreak in the fifth and final year of the experiment; and no data have been published about variables in the herds themselves, including previous bTB history, herd size and the absolute number of herds with breakdowns before and after the study.

Most importantly, the scientists involved in the Irish study concluded that “widespread badger removal is not a viable strategy for the long-term control of tuberculosis in the Irish cattle population”¹³.

Papers from Defra indicate that bovine TB is a welfare issue for badgers. Yet the Central Science Laboratory’s long term study of bTB in badgers shows that this is not the case¹⁴. Even in bTB hotspots, on average 88% of badgers do not have the disease. Most that do have bTB live and breed normally for many years. bTB is not even an important cause of death in badgers. Only around 2-3% develop advanced infection. It can hardly be argued that it is in the interests of badger welfare to exterminate more than 95 healthy badgers in order to remove two or three unwell ones.

Badger populations are self-regulated by food availability and environmental conditions. There is absolutely no evidence to suggest that badger populations are “exploding”. Indeed, droughts since 2002 have reduced badger numbers in some places by causing starvation¹⁵. Furthermore, bTB is not correlated to the density of badgers¹⁶.

The Badger Trust wishes to emphasise that not killing badgers is not the same as doing nothing. We want to see rapid research into how to minimise the risk of badgers transmitting bTB to cattle. This area of research has been neglected because Government vets have been obsessed with killing badgers to solve the problem. Defra’s own Science Advisory Council says: “The adoption of potentially effective precautionary control measures, which involve relatively low costs

¹³ Griffin, J.M. et al (2005) The impact of badger removal on the control of tuberculosis in cattle herds in Ireland, Preventive Veterinary Medicine, Elsevier.

¹⁴ Cheeseman, C. (16 January 2006) Interview on Farming Today, BBC Radio 4, Birmingham.

¹⁵ For example, long term studies of 50 badger setts at Wytham Woods in Oxfordshire found that badgers only produced 12 cubs in the drought conditions of 2003 – the lowest number for 28 years. In the previous dry year, 2002, the badgers only managed to produce 15 cubs.

¹⁶ Cheeseman, op. cit.

and are not controversial, need not await the same standard of scientific evidence as those which are costly and/or controversial.”¹⁷

Because the traditional skin test for bTB is missing up to one in three infected animals¹⁸, this leaves infection to amplify in the herd, leading to further breakdowns. It is also possible for infected animals to be sold on to other farms, spreading the infection further. This is why bTB has spread so much over the last few years. Research has confirmed that cattle movements “substantially and consistently outweigh all other variables for predicting bTB outbreaks”¹⁹.

The Badger Trust notes that in Northern Ireland, a reduction of bTB outbreaks of 40% has been achieved in just one year by “very strict application of an annual skin testing regime, giving no opportunities to delay herd tests and testing herds contiguous to breakdown herds”²⁰. The authors of this paper add that: “In Britain ... herd testing is not being used optimally as a bTB surveillance tool, compared, for example, to its use on an annual basis in Rol and NI.”

We now understand bTB in cattle better than before. Once infected, cattle begin the “nasal shedding” of bacteria very early, before the bTB skin test identifies the infection. Cattle are also “exquisitely sensitive” to small amounts of bTB. There is a clear correlation between large herd sizes and the likelihood of bTB, because the disease spreads to more animals and is harder to eradicate in larger herds using the skin test²¹. Gamma interferon, a blood test for use alongside the skin test, identifies this hidden infection.

In conclusion, we note that the consultation takes little note of the public’s interest in badgers. Badgers are central to our natural and cultural heritage. They have lived in Britain for 500,000 years, and once shared these islands with prehistoric lions, hyenas and elephants. The Anglo-Saxons named more than 140 places after badgers and those names are still in use today. A badger sett in Derbyshire is mentioned in the Domesday Book. From *Wind in the Willows* to the poetry of John Clare and Ted Hughes, badgers have been an inspiration to countless writers. Today, badgers give pleasure to thousands of people who watch them at organized events or who are privileged enough to see them in their own gardens.

Intensive farming practices have already made many of our once common species rare, from wildflowers, through butterflies and birds. The Badger Trust exists to ensure that badgers are not made rare, too. HRH The Prince of Wales recommends farming in a “virtuous circle”, as with the Duchy Originals range of products: “I wanted to demonstrate that it was possible to produce food of the highest quality, working in harmony with the environment and nature, using the best ingredients and adding value through expert production.”²² The Badger Trust fully supports this commitment to sustainable farming which, clearly, could not involve exterminating vast numbers of badgers.

ⁱ Anderson, I (2002), op. cit.

ⁱⁱ Defra (2005), Partial Regulatory Impact Assessment, consultation document.

¹⁷ SAC (September 2005), Independent review of research on bovine tuberculosis (bTB), Report and recommendations, SAC-TB (05) 4 Final report.

¹⁸ Bourne, J. (26 January 2006), ISG Open Meeting, London.

¹⁹ Gilbert et al. (2005). Cattle movements and bovine tuberculosis in Great Britain. *Nature* 435, 491-496; 26 May 2005.

²⁰ Wilesmore, T. and Taylor, N. (September 2005), A review of the international evidence for an interrelationship between cattle and wildlife in the transmission of bovine tuberculosis, University of Reading.

²¹ Bourne, J. (26 January 2006), ISG Open Meeting, London.

²² www.duchyoriginals.com/duchy_philosophy.htm

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- iii An investigation of potential badger/cattle interactions and how cattle husbandry methods may limit these, Defra research contract SE3029, unpublished.
- iv Garnett, B. T., Delahay, R.J. and Roper, T. J. (2002). Use of cattle farm resources by badgers (*Meles meles*) and risk of bovine tuberculosis (*Mycobacterium bovis*) transmission to cattle by badgers. Proceedings of the Royal Society Series B: Biological Sciences Vol. 269, No. 1499. Cover Date 22 July 2002.
- v Gettinby, G. (25 January 2006), personal comment at ISG Open Meeting, London.
- vi SAC (September 2005), Independent review of research on bovine tuberculosis (bTB), Report and recommendations, SAC-TB (05) 4 Final report.

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