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“Strategies for the control
and eradication of Bovine
Tuberculosis in badgers in
Ireland”

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ABSTRACT

The objective of this study is to differentiate between the varying methods that are currently in use for the control and eradication of *Mycobacterium(m.) bovis* in the European badger (*Meles meles*) in Ireland. Over the course of this paper it is hoped to examine both the successful and unsuccessful approaches that have been undertaken and to also consider the proposed solutions for the future. It has been widely reported, but never conclusively, that badgers are reservoirs for *m.bovis* and that they are infecting cattle nationwide and in turn having quite a detrimental effect on both herds and indirectly on farmer's livelihoods. Badgers have been a protected species in the Republic of Ireland since 1976. The first ever Bovine Tuberculosis control began in Northern Ireland in 1935.(Abernethy et al. 2006) It is hoped by the end of this paper, to pinpoint the most progressive and reliable form of control that, going forward, can hopefully sustain the badger population so as to avoid damaging a protected species and simultaneously ensuring stability in cattle herds.

INTRODUCTION

The first bovine tuberculosis (TB) programme intent on full eradication was implemented in Ireland in 1954(Corner et al.2007). This was in response to elevated levels of TB found in cattle. The effects of this problem were far from localized with the UK experiencing a 40%incidence rate amongst its cattle at this time. (Sharp,2006). Immediate action was required and materialized in the form of the "East Offaly Project"('1989-2005). This intensive study programme encompassed 107 herds which were located in the "Project area". In the surrounding areas badger testing began and the results were staggering with a total of 837 TB positive badgers found in 1989 alone. The chosen methods to eliminate this problem varied from proactive culling to reactive culling and 3 defined areas-Removal area, Buffer area and Reference area-were set up

within and around the perimeter of the project area. These methods proved successful in their own right and so were followed up by the “Four areas project”. This project encompassed 4 counties, Donegal, Monaghan, Kilkenny and Cork and was carried out from (1997-2002). A total of 2969 badgers were involved and 19% found to be infected.(Corner et al 2007). As per the original east offaly project once again badger removal was seen to be the most effective treatment. In addition to these well practiced controls, there has also been the proposal of badger vaccination following the success of the reduction of rabies that resulted from mass vaccination (Selhorst et al, 2001; Vos et al,2001 as cited by Delahay et al.2003).

METHODS OF CONTROL

Throughout varying field studies similar control methods were implemented. This repetition led to corresponding results in relation to success rates and failure rates concerning said methods. The primary control methods used were “Proactive culling” and “Reactive culling”. Proactive culling involved an intense removal process that occurred 2-3 times P/A throughout the first 5 years of the study to substantially decrease badger levels. This form of culling was used in “Removal Areas” and”Buffer areas”. Removal areas were areas which expressed high incidence levels of the disease and these areas were then surrounded by Buffer areas which served to counteract any possible migration of badgers form the removal areas. (Corner et al, 2007; Griffin et al.2004) Reactive culling occurred in “Reference areas” and this reactive culling was used in response to a herd breakdown. (Corner et al.2007; Griffin et al.2004). These methods have been used in studies in the U.K.(Sharp. 2006) as well as the aforementioned East Offaly Project and the Four Areas Project (Corner et al.2007;Griffin et al.2004).

PROPOSED METHODS OF CONTROL

As stated above there are a variety of control methods both currently available and operational. Due however to the complexity and magnitude of this problem new solutions are currently under consideration. A proposal that is currently being viewed as a possible future solution is the vaccination of the badgers. There are of course many natural constraints that must be taken into consideration to allow such a strategy to be viable. What has been put forward, are an array of possible techniques that would allow for an effective vaccine to be administered to an infected badger. The proposed methods for vaccination range from, injection, aerosol spray, ingestible bait or orally administered vaccines. (Delahay et al. 2003). Currently, in New Zealand, where Possums are the main TB reservoirs, bait stations have been set up that when a Possum enters and begins feeding an automated aerosol spray of vaccine is activated. (S.Norton, unpublished, cited by Delahay et al. 2003). This project is currently still in the trial period but does pose some hope in respect of viable, safe, vaccine administration.

As with any proposal in the trial stages there are innumerable limitations, constraints and other variables that may stall the process. The vaccine, which would have to provide long term immunity, would have to be safe to non infected animals and species that are not within the target range. There is also the limitation of being unable to control dosage such that should a badger enter a feeding station or eat some vaccinated bait that should it consume large amounts unknowingly that it would experience no ill effects. It has been proposed to counteract this particular problem of over dosing with the addition of anti-nutrients or CTA (conditioned taste aversion) agents being added to the bait or vaccine. In doing so it would be hoped to deter non targets from further consumption and preventing the target species from ingesting too many vaccines. (Massei et al,2003, cited by Delahay et al.2003). With all these factors taken into consideration it does appear to be quite a complex and exhaustive proposal, but, if successful it is probable that the

results will be more than satisfactory and may facilitate to control if not eliminate *m.bovis* in badgers.

RESULTS

In relation to the proposed control method of vaccination, this proposal is still in the trial stages and so there has been no conclusions presented as yet. The current studies however have provided us with a wide array of partially correlating results. The Four Area project, on studying the prevalence of disease in all four counties, over the course of a year, found that 19.0% of badgers tested, out of a pool of 2696 badgers, tested positive for TB. Proactive culling proved to be the most successful method of control and this success was reflected in the long term decrease in TB incidences in cattle(Corner et al. 2007). Corner et al, also noted that reactive culling in fact had little impact if not a detrimental one on incidence rates. This increase may have been due to migration of badgers from setts based near culling sites and as culling was not as intensive in these reference areas, allowing for the badgers to drift and so increasing the surface area of infection. Unfortunately these results though showing patterns in respect of increasing and decreasing prevalence are not enough to establish a set link between badgers and cattle. Further evidence to close the link between these two species and disease transmission is the discovery of identical *M.bovis* strains in both cattle and badgers (Grange et al.1990 cited by S.J.More & M.Good 2005).

CONCLUSION

As mentioned above it was found that proactive culling in fact returns the highest success rate in relation to lowering the incidence of TB amongst cattle in a set region.(Corner et al.2007 & Griffin et al 2004). It has also been found that reactive culling has little or no impact on both badger population and incidence of disease. (Corner et al.2007& Griffin et al 2004). The challenges that lie ahead on this particular topic are plentiful unfortunately. For example, it has been found that when samples are being taken on site to test for TB positivity in badgers, they are in fact only 41% accurate in comparison to

post mortem samples which can be analyzed to a 100% accuracy rate(Goodger et al 2004 cited by Delahay et al 2003). These figures imply that we can only obtain precise results after culling and so could be yet another obstacle in relation to vaccinating and the possibility of vaccinating non-infected badgers. This factor again is building on the complexities around a vaccine that will not damage non-infected badgers. To conclude, after mass field studies on badgers and comparative cattle testing, some 44million tests between 1988 and 1991(Downey,1992 as cited by Griffin et al 2004), it appears that the only currently available suitable mechanism for the control of TB amongst badger populations is proactive culling which will unfortunately have a highly detrimental effect on our protected badger population.

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