<table>
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<tr>
<td>Authors(s)</td>
<td>Dolan, Leonard A.; Lynch, Kevin</td>
</tr>
<tr>
<td>Publication date</td>
<td>1992-02</td>
</tr>
<tr>
<td>Series</td>
<td>Selected Papers, 1990-1991</td>
</tr>
<tr>
<td>Publisher</td>
<td>University College Dublin. Centre for Veterinary Epidemiology and Risk Analysis</td>
</tr>
<tr>
<td>Item record/more information</td>
<td><a href="http://hdl.handle.net/10197/8809">http://hdl.handle.net/10197/8809</a></td>
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Badgers and Bovine Tuberculosis

L.A. Dolan and K. Lynch

Introduction

Tuberculosis has been identified in badgers in every county in Ireland during the 1980's, and therefore, it is endemic in the national badger population. It is widely accepted that badgers can transmit Tb to cattle but the mode of spread and its extent have not been resolved. The badgers are infected with the bovine strain of Tb but in recent years research workers in Great Britain have concluded that Tb is self-sustaining in badger populations and that badgers are an ideal maintenance host for the disease. Badgers therefore do not need to be constantly re-infected from the cattle.

The sample of badgers examined in Ireland during the 1980's were mostly those snared, under licence from the Wildlife Service, in areas that had high levels of Tb in the associated cattle. Seventeen per cent of these badgers showed evidence of Tb on, mainly, gross post-mortem examination. Additional laboratory examination of the non-visible lesion badgers would be expected to increase this figure by approximately one third.

The initial research projects carried out in Ireland showed that there was a substantial drop in the level of Tb in the cattle herds when the associated badger groups were culled, (O'Connor and O'Malley, 1989). In order to accurately quantify these findings a project commenced in the eastern part of Co. Offaly (East Offaly Badger Research Project) whereby badgers would be systematically removed from an area of 600 km² over a 3 - 5 year period and the effect on the disease levels in the associated cattle and those in a surrounding control area would be monitored and compared.

The widespread distribution of Tb in the national badger population represents such a substantial reservoir of infection that an overall solution is required. This might include the development of a vaccine for badgers or for both badgers and cattle.

Background

Tb was first reported in badgers from Switzerland in 1957. In 1974 it was reported from Great Britain and in 1975 from Ireland. In the 1970's a comprehensive badger research programme was commenced in Great Britain including the setting up of a study area in Gloucestershire where they monitored the dynamics of the disease in a tuberculous badger population.

The main findings of their research programme are that (1) Tb is endemic in their badger population, (2) that it is self-sustaining and (3) that badgers are an ideal maintenance host for Tb. In their study area Tb followed a cyclic pattern in the badgers regardless of badger density and that this cyclic pattern was mirrored in the disease level in the associated cattle population (Cheeseman et al., 1989).

They also undertook experiments to demonstrate whether or not badgers could transmit Tb to cattle. Two trials were carried out, one with artificially infected badgers and one with naturally infected badgers. The infected groups were housed with non infected badgers and calves and in each case transmission occurred to both species. In the case of the calves they did not become reactors to the tuberculin test for a period of 6 months from first exposure (Little et al., 1982).
The British government commissioned two major reports on the relationship between badgers and bovine Tb, the first was the Zuckerman Report (1980) and the second, the Dunnet Report (1986). Both reports concluded that badgers could transmit Tb to cattle and the latter report concluded that badgers were the primary source of Tb for cattle. The main interim proposal from the latter report, given the very low level of disease in their cattle population, was that badgers should only be trapped on the breakdown farm, otherwise badger removal was uneconomic. This recommendation could be changed if there was a significant increase in the level of bovine Tb. In 1990 there were only 104 confirmed herd breakdowns in Great Britain (MAFF Report, 1991).

A report produced by the conservation and wildlife groups in Great Britain, under the title Wildlife Link Badger Working Group (1984) also accepted that badgers could transmit Tb to cattle. However, they expressed strong reservation about the policy of badger removal being pursued by the Ministry of Agriculture and Food at the time.

Transmission of infection

The earthworm forms the main part of the badgers diet. Earthworms are found mainly on pasture, therefore, they attract the badgers, regularly, onto the same lands as those grazed by the cattle. It has also been discovered that 60 - 70% of badger setts are in hedgerows in Ireland as compared with 13% in Great Britain. This means that badgers in Ireland live and feed in very close proximity to cattle and cattle can often gain access to the badger setts and latrines. It has been estimated that there are 250,000 badgers in Ireland (Smal, 1992). This number is the same as that estimated as being present in Great Britain which has three times the land area.

Tuberculous badgers may pass on infection by contaminating the pasture, drinking water or feedstuffs with urine, sputum or sinus discharges which contain *Mycobacterium bovis*. There could also be direct contact with cattle, especially, when the badgers are at the terminal stages of the disease.

Tuberculosis in Badgers

In the Republic of Ireland licences to snare badgers were obtained from the Wildlife service, from the mid 1980's, in order to investigate the association of tuberculous badgers with the continuing problem of bovine Tb. The postmortem results for the badgers which were examined from each county, during the 1980's were collated and Tb was identified in badgers from all 26 counties during that period. Tb has also been identified in badgers in Northern Ireland.

A total of 3909 badgers were subjected to, mainly, a gross post-mortem examination between 1980 and 1989 and 664 (17%) of these showed evidence of infection (Figure 1).

Figure 1. Tb in badgers in Ireland by county (1980 - 1989)
The greater majority of these badgers had been snared in areas with high levels of Tb in the associated cattle. The remainder were road casualties or were found dead on farmland. The post-mortem examinations were carried out at the Regional Veterinary Laboratories and additional laboratory tests were done at the Central Veterinary Laboratory at Abbotstown.

The locations of the tuberculous lesions found in these badgers were similar to those found in badgers in Great Britain (Figure 2). Tb is primarily a respiratory disease in badgers and this is reflected in the fact that 60% of the lesions identified involved the lungs and/or the associated glands in the chest and head (Dolan, 1991).

![Figure 2. Site of tuberculous lesion/s in a sample of 455 badgers at post mortem examination (1980/89)](image)

**East Offaly Research Project**

A project was proposed to systematically remove badgers, over a 3-5 year period, from an area of 600 km² involving the eastern part of Co. Offaly and including small parts of Counties Meath, Kildare and Laois. The study area is comprised of three parts (1) a central project area (2) a buffer zone and (3) a control area (Figure 3). Badgers are systematically trapped in the former two areas and the disease levels in the cattle in the central project area are compared with those in the surrounding control area. The project commenced in January 1989 and at the end of 1991 the disease levels in the cattle, as measured by the number of reactor animals per 1,000 animal tests (APT), had fallen by 32% while in the surrounding control area the APT had risen by 56% (Table 1).

**Figure 3. The project, buffer and control areas in the East Offaly Badger Research Project.**

A total of 700 badgers were trapped in the project area in 1989 and 13 per cent had gross lesions of Tb. In 1990, 197 badgers were trapped and 12 per cent were positive; in 1991, 117 badgers were trapped and 11 per cent were positive.

In 1992 a more in depth study is being undertaken to analyse the effects, over time, of the badger removal on the expected disease patterns in the project and control areas. Also, the association between tuberculous badgers and herd breakdowns will be studied using Geographical Information Systems (GIS).
Table 1. The number of reactor cattle identified, the A.P.T. and the number of tests per animal in the East Offaly Badger Research Project Area (1989-1991)

<table>
<thead>
<tr>
<th>Area</th>
<th>Year</th>
<th>Total Reactors</th>
<th>% Reactors Change</th>
<th>Reactor animals per 1,000 tests (APT)</th>
<th>% Change</th>
<th>No. of tests per animal</th>
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<tr>
<td>Project</td>
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<td>321</td>
<td></td>
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<td></td>
<td>1.67</td>
</tr>
<tr>
<td></td>
<td>1989</td>
<td>343</td>
<td></td>
<td>3.34</td>
<td></td>
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<tr>
<td></td>
<td>1990</td>
<td>286</td>
<td></td>
<td>2.97</td>
<td></td>
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<tr>
<td></td>
<td>1991</td>
<td>176</td>
<td>- 45</td>
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<td>- 32</td>
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<tr>
<td>Control</td>
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<tr>
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<td>829</td>
<td></td>
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<tr>
<td></td>
<td>1990</td>
<td>789</td>
<td></td>
<td>3.18</td>
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<tr>
<td></td>
<td>1991</td>
<td>966</td>
<td>+ 34</td>
<td>4.51</td>
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References


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