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Visualisation of the Temporal and Spatial Patterns of Tuberculin Reactor Disclosure in the District Electoral Divisions within and surrounding the East Offaly Badger Research Project 1988 - 1995

R. F. Hammond

Introduction
The East Offaly Badger Research Project (EOP), ongoing since 1988, is being carried out to ascertain the effect of badger removal on the levels of bovine tuberculosis in the local cattle population. Since its inception Dr. Leonard Dolan and colleagues have published over successive years comparative figures for reactor disclosure rates for the Removal/Buffer and Control Areas. Dolan et al. (1996) state that "The APT for the Control Area was 1.7 times greater than the APT for the Removal Area in 1991. This figure has now risen to 4.6 times in 1995". Williams and O'Mairtin (1994) reporting on the statistical analysis for the EOP, showed that whilst there was no significant difference in the rate of herd breakdowns between the control and removal area between the years 1988 - 1990 there was a significant difference in breakdown rates in 1991 - 1992 with no significance in subsequent years. Analysis of the tuberculin testing data for the Control and Badger Removal Areas for the number of reactors disclosed at a breakdown has shown that there has been a significant decrease in the number of reactors identified in herds within the Removal Area that had suffered a breakdown. The statistical analysis and annual figures published by the Tuberculosis Investigation Unit show a decline in disease levels, however no visualisation of the time/space pattern of this decline has been carried out to date.

Methodology
The outlines of the East Offaly Badger Research Project and the distribution of the District Electoral Divisions selected for spatial temporal visualisation are shown in Figure 1.

Figure 1. The location of the East Offaly Badger Research Project.
The area of interest covers the whole of East Offaly along with areas of surrounding counties (Figure 1).

Reactor disclosure rates were determined for the District Electoral Divisions from the data contained in a validated data base (O'Keeffe & Crowley, 1996) for the years, 1981 - 1994. For the purpose of this paper only those years relevant to the project have been selected, viz 1988 - 1995. Whilst the statistically analysed data have only concerned those District Electoral Divisions that occur within the boundaries of the EOP, this paper has also included for visual purposes a band of District Electoral Divisions (DED's) approximately two DED's deep outside the defined area (Figure 1).

For each County the DED, Herd Number, Test Date, Number of Reactors and Total Number of Animals were downloaded from the TIU/UCC data set as text files. These files were then parsed, assembled and queried in Microsoft Access® to calculate values for the number of reactors disclosed per thousand animal tests (APT). Relevant DbaseIV® files were created for joining these data into the spatial coverages created within ESRI ArcInfo® to display the data on a yearly base for the period 1988 - 1995. These maps are shown in Figure 2. The thematic classes selected were chosen on the basis of the 1993 APT levels in the Removal Area. This categorisation is different to that selected nationally to prepare the annual national distribution of APT levels published by the Tuberculosis Investigation Unit.

Discussion
The maps produced illustrate the reduction in levels of bovine tuberculosis as expressed on the basis of the number of tuberculin reactors disclosed per thousand animal tests (APT), over the years 1988 - 1995. The distribution patterns mirror the statistical data (O'Mairtin et al., 1997). The map for 1995 shows that there is also an overall reduction in the APT levels in the District Electoral Divisions surrounding the EOP. However, there are still ‘hot spots’, with APT levels greater than 3, both in the Control Area and surrounding DED’s.

References


Figure 2. Visualisation of temporal space patterns of APT for the District Electoral Divisions within and surrounding the East Offaly Badger Removal Project 1988 - 1991
Figure 2. Continued: Visualisation of temporal space patterns of APT for the District Electoral Divisions within and surrounding the East Offaly Badger Removal Project 1992 - 1995