

# Investigating the impact of Pre-movement testing for bovine Tuberculosis on GB cattle movement



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## Legislation detail:

**Early 2006;** Phase I required that cattle >15 months of age leaving farms in "high risk" areas of in England & Wales must have tested negative for bTB within 60 days prior to being moved.

**Early 2007;** Phase II extended this requirement to all cattle >42 days leaving farms in "high risk" areas of in England & Wales

**Pre-movement testing in England and Wales only applies to farms in PTI 1 and 2**

## Background:

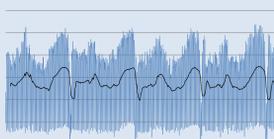
- Bovine Tuberculosis (bTB) is endemic in the UK
- The last ten years has seen an increase incidence and bTB has emerged in previously low risk areas
- Recent legislation requires testing prior to movement off farms (in "high" risk areas) of England and Wales
- The Scottish Executive introduced pre and post movement testing in 2005.
- Each GB parish is assigned a parish testing intervals (PTI), based on incidence rates, which denotes how often annual herd testing is conducted on farms in the parish and can be 1 or 2 (high risk), 3 or 4 years.

## Project Overview

The aim of this poster is to illustrate our approach to identifying changes in behaviour associated with Pre-movement testing within cattle movement data

### Epidemiology

Exploratory analysis informed the first round of farmer interviews. More complex modelling then follows on detailed themes gained from the farmer interviews



### Psychology

A combination of interview and questionnaire are being used to gain farmers opinion and attitude to changes that may have occurred. This then informs subsequent data analysis and hypothesis testing

## Data considerations

Numerous factors may affect the observed number of cattle movements and the impact of PrMT on a particular farm:

- **Varying impact of PrMT with bTB "sensitivity"**
  - Farms in PTI 1 & 2 must have annual herd tests every 1 & 2 years, respectively. Farms in PTI 3 & 4 must test every 3 & 4 years, respectively, and are exempt from pre-movement testing. Any effects of legislation may therefore vary between areas with PTIs.
  - We have selected 8 regions (Fig 1) within GB associated with varying PTI's to identify region-specific changes
- **Varying at- risk population**
  - The at risk population (denominator) is dynamic. Each November, Animal Health reassesses the PTI status of each parish (Fig 2).
  - There are greater numbers of farms in high risk (PTI 1 and 2) categories in recent years
  - There has also been a decline in the number of cattle farms in GB in recent years.
- **Strong seasonal patterns**
- **Other legislation and market forces**

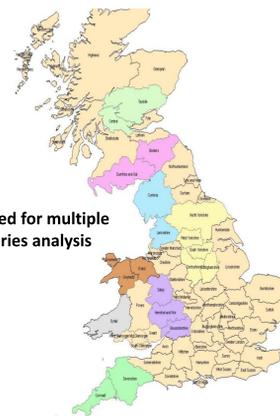


Fig1. Regions used for multiple baseline time series analysis

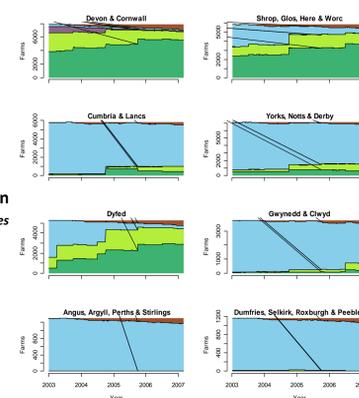


Fig 2. Number of farms in each PTI in each study region  
Dark green=PTI 1, Light green=2, Maroon=3, Blue=4, Red= farm closures

## Results

Interviews with farmers were conducted (from three regions of differing bTB incidence: Devon, Shropshire, Lancashire). Farmers suggested a range of potential changes since pre-movement testing, such as:

1. Less movements of cattle off the farm
2. Testing multiple animals at one time resulting in less frequent movements, but with larger batch sizes
3. Farmers in areas of low bTB incidence may be more confident in buying cattle from areas with high bTB prevalence

### Example of quantitative analysis:

Poisson regression time series analysis was used to explore changes in the weekly count of the farms moving animals directly to other farms at the time of introduction of Phase I of PrMT (with the total number of farms used as an offset). A multiple baseline approach was used to determine whether different regions and PTI areas (of farm of origin) were affected by the intervention similar or different ways. Variables representing trend, seasonality, bank holidays and interaction terms were also included. The model fit the data reasonably well (Fig 4) and suggests:

- There may be an effect on farm-to-farm movements. This effect varies by region and PTI (Fig 3).
- Where a step change is evident, this is often followed by a change in slope in the opposite direction, suggesting short-term impact.

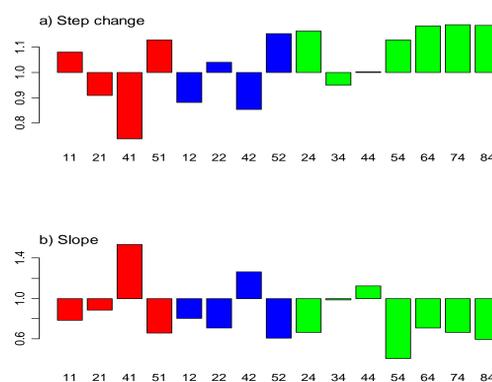


Fig 3. Relative risk of farm-to-farm movements associated with "PrMT" and "PrMT days" for each region-PTI combination (for farm of origin). The x-axis indicates the region-PTI combination; e.g. "21" is region 2, PTI 1.

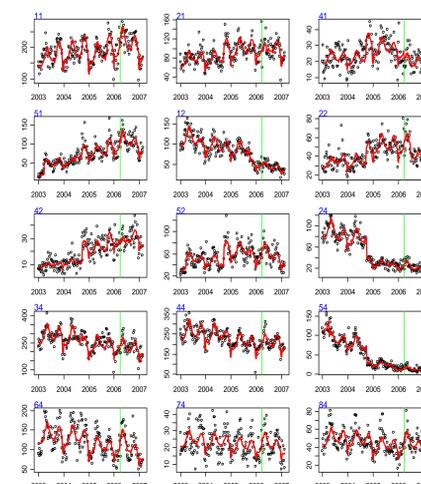


Fig 4. Model fit for each region-PTI combination  
Points=movement data, red line=model fit, Green line=Introduction of PrMT in England

## Where do we go from here...

- We are developing novel methods to investigate the intensity of movement events ( $\lambda_{ij}$ ) between all pairs of premises  $i$  and  $j$ . This spatio-temporal point process approach will enable exploration of covariates associated with time (e.g. season, policies), the origin location (e.g. PTI), the destination location and the movement events (e.g. distance).
- A postal questionnaire has been sent to farmers investigating factors impacting on farmers decisions to trade cattle. The theory of planned behaviour framework is being used in the analysis.

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