



Farmers' beliefs about bovine tuberculosis control in Northern Ireland

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ABSTRACT

Beliefs can play an important role in farmer behaviour and willingness to adopt new policies. In Northern Ireland, bovine tuberculosis (bTB) is one of the most important endemic diseases facing the cattle industry. An observational study was conducted on 192 farms in a high bTB incidence area during 2010–2011 in order to obtain a better understanding of farmers' beliefs in relation to bTB control. The views of farmers who had experienced a recent confirmed or multiple reactor bTB breakdowns (cases) were compared to those of farmers who had no recent reactors or restricted herd tests (controls). Data were obtained from a face-to-face questionnaire assessing farmers' agreement to 22 statements.

All participating farmers found bTB control important and most were keen to learn more about bTB biosecurity measures and were in favour of the cattle-related bTB control measures as presented in the questionnaire (isolation of skin test inconclusive animals, use of the gamma-interferon test and pre-movement testing). The majority of farmers would allow badger vaccination and culling on their own land with an overall preference for vaccination. Highest disagreement was shown for the statements querying a willingness to pay for bTB control measures. There was agreement on most issues between case and control farmers and between different age groups of farmers although case farmers showed more support for additional advice on bTB biosecurity measures ($P = 0.042$). Case farmers were also more in favour of allowing badger vaccination ($P = 0.008$) and culling ($P = 0.043$) on their land and showed less concern for public opposition ($P = 0.048$).

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Introduction

Bovine tuberculosis (bTB), caused by *Mycobacterium bovis*, is a chronic disease with a wide variety of hosts including humans, cattle, sheep, goats, deer, badgers and possums (Pollock and Neill, 2002). It is one of the most important endemic diseases currently facing Government, the veterinary profession and the farming industry in both the United Kingdom and Ireland. The control programme for bTB in Northern Ireland has significant financial consequences with an estimated cost of £23 million² in 2010/2011³.

The historic existence of small fragmented farms, the strong reliance on rented pasture, the high level of cattle movement between and within herds and an infectious reservoir in the Eurasian badger (*Meles meles*) are believed to contribute to the maintenance and spread of bTB in Northern Ireland. Current bTB control measures in Northern Ireland are based on annual tuberculin testing using

the approved single intra-dermal comparative cervical tuberculin skin test (SICCT). Animals found to be positive are slaughtered and a post-mortem examination is carried out to look for visible lesions and to culture *M. bovis* (Abernethy et al., 2006).

A retrospective observational case-control study was undertaken to address the role of possible biosecurity practices in Northern Ireland alongside known cattle-related and badger-related risk factors in relation to bTB. Part of this study, which is reported here, specifically evaluated the beliefs of farmers about bTB and control of the infection. Decisions made by farmers, which are influenced by their attitudes and beliefs, can be important in relation to adoption of new policies and are therefore of interest to Government (Edward-Jones, 2006; Collier et al., 2010). Particular attention was paid to any differences in views between farmers who had experienced a recent bTB breakdown in their herd and those with herds with no recent bTB breakdown history, and also between various age groups of farmers as age can be a significant factor in farmers' attitudes to animal disease management (BVA, 2005; Ellis-Iversen et al., 2011; Sayers et al., 2013; Toma et al., 2013).

Materials and methods

A retrospective, observational case-control study was conducted from November 2010 to June 2011. Three Divisional Veterinary Office (DVO) areas in County Down, Northern Ireland with high bTB incidence were allocated as the study area (Fig. 1).

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² £1 = approx. US\$1.62, €1.25 at 8 September 2014.

³ See: <http://www.niassembly.gov.uk/Documents/Official-Reports/Agriculture/2011-2012/PolicyandLegislation.pdf> (accessed 9 September 2014).

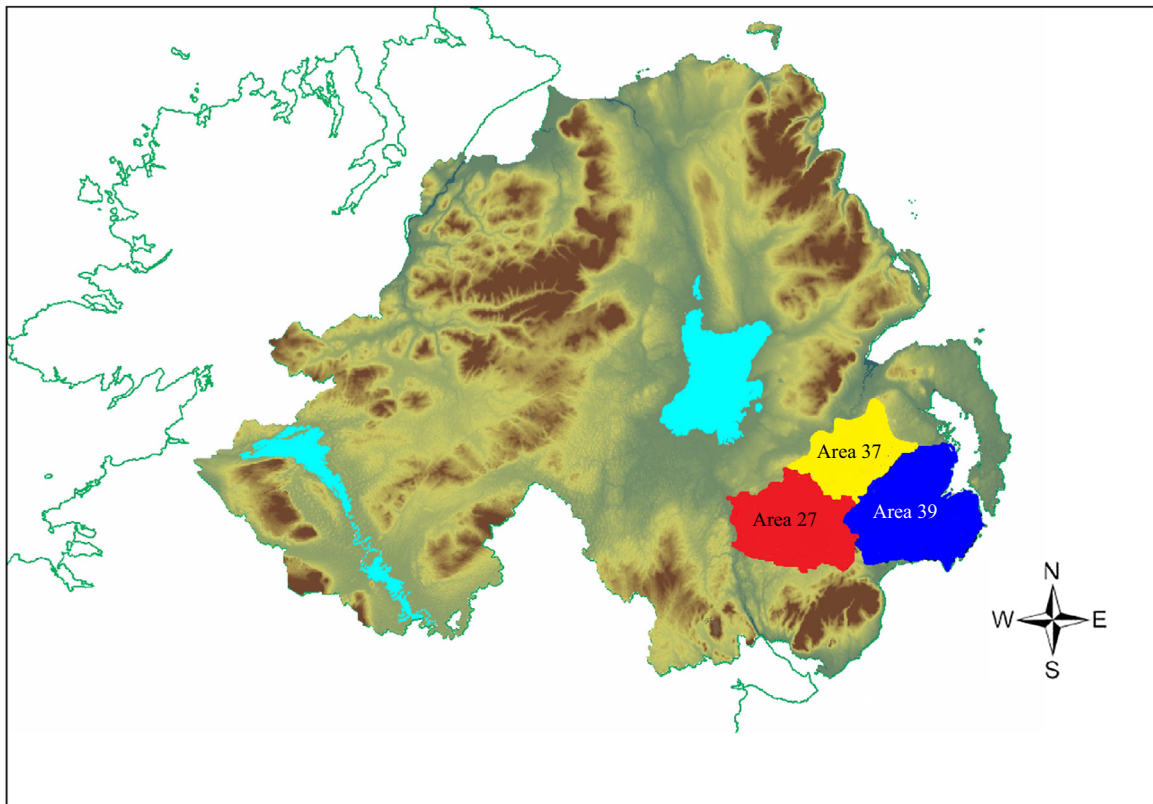


Fig. 1. Map of the study area. The three Divisional Veterinary Office areas enrolled into the study are highlighted.

The overall study population in this area consisted of 2575 registered herds. After excluding all herds with less than 10 animals, 1917 herds were left. Case herds were defined as those that had a confirmed bTB breakdown during 2008 and 2009 (either confirmed reactors or confirmed animals that had visible lesions at routine slaughter) or, if unconfirmed, had two or more reactors.

As herd size is a well-recognised risk factor for bTB breakdown (Griffin et al., 1996; Olea-Popelka et al., 2004; Green and Cornell, 2005; Reilly and Courtenay, 2007; Carrique-Mas et al., 2008), cases were selected by stratified random sampling based on herd size category and DVO area. Subsequently control herds (herds within the study area with no reactors or restricted herd tests in the period 2007–2009) were group matched with the cases by herd size and DVO area.

In total 547 invitations to participate were sent to 294 case farms and 253 control farms. Farmers received two phone calls and a reminder letter to stress the importance of their participation in the study.

Seven farms, which were initially selected as control herds, changed to being case herds as they had a confirmed bTB breakdown between the time of selection and the time of the survey. The end result was a participation of 192 farms (117 case herds and 75 control herds); overall participation rate was 35.1% (37.4% for case herds and 32.4% for control herds). In order to assess possible response bias and effects on matching, a comparison between farms that participated and the rest of the study population was conducted by location and herd size. There was no significant difference between study population and participating farmers in relation to location (DVO area), but there was a significant difference in relation to herd size ($P=0.016$ for cases and $P<0.001$ for controls).

The farmers' beliefs about bTB and its control were evaluated by means of a face-to-face questionnaire conducted by trained interviewers; the questionnaire was pre-tested using eight farms and amended accordingly. The data collection started in November 2010 and was completed in June 2011. The questionnaire consisted of presenting farmers with 22 statements in relation to bTB control. Details of the questions/statements included in the questionnaire are outlined in Appendix: Supplementary Table S1.

The level of agreement to the 22 statements provided was measured using the Likert scale (Likert, 1932). The farmer's age was recorded within four categories (Fig. 2). The questionnaires were entered on a SQL Server database and data were checked for accurate entry.

Statistical analyses were carried out using SPSS Statistics (2010; IBM SPSS Statistics for Windows Version 19.0). To analyse farmers' beliefs, hypothesis testing of differences in level of agreement between case/control and age was carried out using binary logistic regression analyses based on the agreements/non-agreements to the presented statements. In order to complete this, farmers' responses were dichotomised

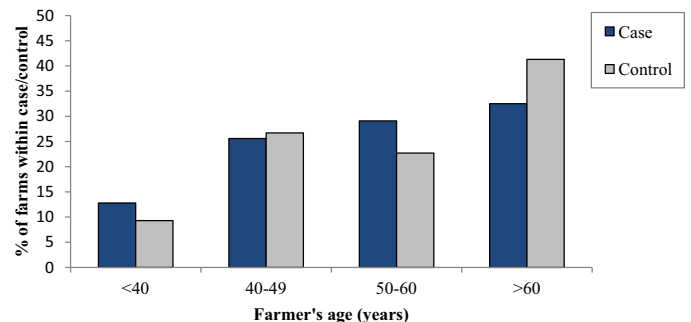


Fig. 2. Age distribution of farmers participating in the current study.

into two categories: 'agree' and 'disagree'. These analyses were adjusted for herd size based on the background analysis showing a significant difference in herd size between participating farms and farms in the study population. Significance was set at the 5% level.

Principal component analysis was performed on the data, but there were too many components to be meaningful.

Results

Results summary

The detailed results of the responses to the questionnaire are summarised in Appendix: Supplementary Tables S1 and S2. All farmers considered bTB control to be 'important' to 'very important' (Q22). Most farmers believed that the current bTB controls were 'adequate' (62.0%) and that they had enough information to help them control bTB in their herd (81.8%). However, 45.3% of farmers said they would welcome an advisory visit on biosecurity

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