Patterns of Atypical Scrapie in Great Britain

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Introduction

The fatal neurological disease, scrapie, was the first-recognised transmissible spongiform encephalopathy (TSE). It may be linked to the occurrence of other TSEs such as BSE; therefore, scrapie eradication has become a priority in both the United Kingdom and elsewhere. In GB, this led to the National Scrapie Plan.

Since 2002, approximately 100 cases of 'atypical' scrapie have been detected, mainly through abattoir surveying, including in sheep considered scrapie resistant. Similar forms of atypical scrapie are known from other countries, and it appears to represent a previously unknown TSE infectious agent, distinct from both classical scrapie and BSE[1].

Its appearance has led to continued concerns over scrapie eradication, and emphasises the need for continued surveillance.

The data

The AMLS and SAMS databases provide sheep movements data for GB. We used these data, and the June Agricultural Survey for GB, to identify demographic risk factors for atypical scrapie. The data also allow consideration of the directed network of movements between GB farming premises[2].

Schematic of sheep movement network. Farm Market

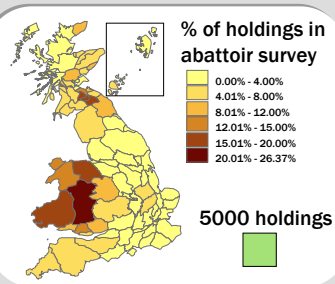
The abattoir survey

97 cases of atypical scrapie from 2002 to 2005 were traced to holding of origin. Most were detected by active surveillance at the abattoir. These cases could be traced in 78 cases back to 76 different premises.

The abattoir survey however varies in intensity countrywide (Fig 1.).

This bias must be corrected for.

Figure 1: Survey bias



Community analysis

As well as by region, we classify farms according to 'community'. Members of a community trade sheep amongst themselves more often than between. They may be of geographical nature, or represent sectors of an industry. We use Newman's 'Q' algorithm[3].

Incidence according to five large identified communities is shown in Fig. 3.

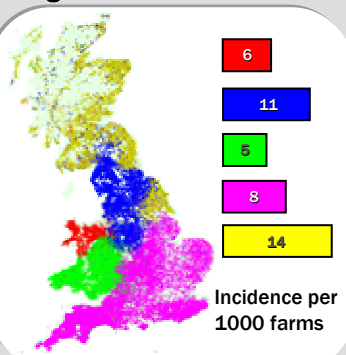
Incidence

Correcting for sampling intensity, atypical scrapie cases are concentrated in the North East of England and Scotland (Fig. 2). Risk factors for atypical scrapie were identified through paired comparisons of atypical scrapie farms with control farms in the same county.

Farms with atypical scrapie had significantly higher

- Flock size according to the June 2003 agricultural census.
- Number of batches of sheep moved off farm in 2003.
- Total number of sheep moved off-farm in these movements.
- Number of batches of sheep moved in 2003, both directions.
- Total sheep moved either on-or off farm in 2003.

Figure 3: Communities

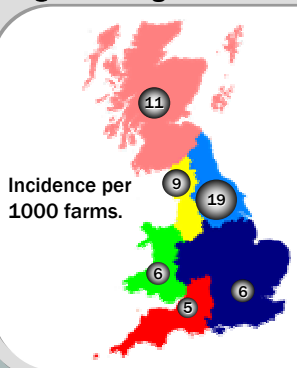


Interactions amongst farms with scrapie

Farm-to-farm movements: Chi-square tests were used to test for deviations from random mixing for atypical, and non-reporting farms. Atypical-atypical farm moves did not deviate from expectation and no direct farm-farm links were present in 2003.

Farm-market-farm movements: Connections through markets cannot be readily identified without individual identification of livestock. However, of possible connections amongst farms from the matched pairs analysis, no departure from random mixing was found in atypical scrapie farms.

Figure 2: Regional incidence



Implications

Our results indicate demographic risk factors for atypical scrapie similar to those known for classical scrapie[4]. There is no evidence for associations between atypical scrapie farms, but as yet a small number of cases are known. Though atypical scrapie appears to have higher incidence in some areas, our study provides no evidence that atypical scrapie is transmissible.

References: [1]Le Dur, A. et al. (2005). Proc. Nat. Acad. Sci. 44: 16031–16036. [2]Kiss, I.Z. et al. (2006). J. Roy. Soc. Int. 3: 669–677. [3]Newman, M.E.J. (2004). Phys. Rev. E 66: 066133. [4]Sivam, S.K. et al. (2006) Vet. Rec. 158, 501–506.

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