Factors affecting the disclosure of TB breakdowns in the slaughterhouse

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INTRODUCTION

The proportion of new bovine tuberculosis (bTB) breakdowns detected by slaughterhouse surveillance is lower in GB than in the Republic of Ireland, where between 27 and 46% of all new breakdowns are disclosed in the abattoir (O'Keeffe & White 1999, Selected Papers, TIU, UCD). In GB in 2010, 22.2% of all Officially TB Free Status Withdrawn (OTFW) breakdowns (those where bTB was confirmed by the presence of TB-like lesions or culture of *M. bovis*) (654/2,947) were detected in the slaughterhouse; the proportion of all new breakdowns was 14.0% (654/4,684) (VLA Surveillance Report, 2010).

METHODS

Data: 18,752 Breakdowns (TB incident in a herd leading to restrictions in cattle movement) in which bTB was confirmed by finding bTB lesions or culture of *M. bovis* (OTFW) between 2002 and 2009

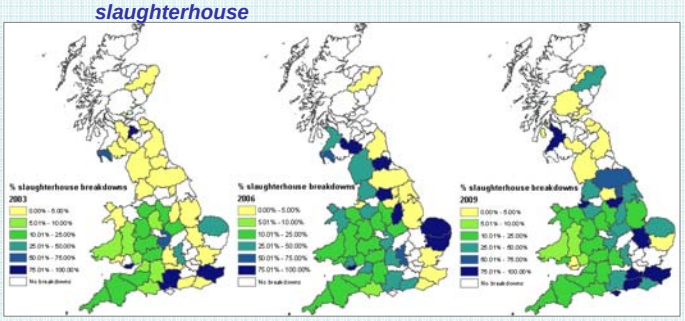
Cases: All breakdowns starting with a culture positive slaughterhouse case (N=2,854, 15.2%)

Controls: OTFW breakdowns detected by skin testing for bTB surveillance and control (N=15,898, 84.8%).

Univariate analyses; revealed an effect of the molecular type of the *M. bovis* isolate (spoligotype) on the odds of disclosure in the slaughterhouse.

Multivariable logistic regression was performed with analysis clustered by breakdown to account for breakdowns where more than one spoligotype was found (11% of breakdowns).

Figure 1: The proportion of OTFW breakdowns disclosed in the slaughterhouse



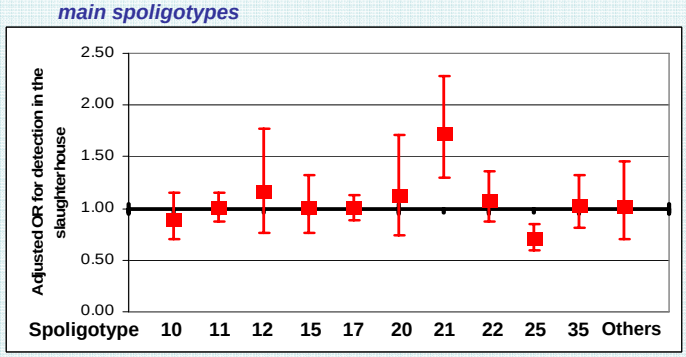
RESULTS

Table 1: Factors that were associated with slaughterhouse disclosure

Factor and level		N Skin	N SLH	OR (95% CI)	P
Year	per year	15,898	2,854	1.04 (1.02-1.06)	0.001
Country	England	12,575	2,393	*Reference*	
	Scotland	108	42	0.58 (0.35-0.96)	0.03
	Wales	3,215	419	0.75 (0.65-0.86)	<0.001
Test Frequency	1 year	12,925	1,970	*Reference*	
	2 years	1,941	438	1.88 (1.63-2.17)	<0.001
	3 or 4 years	1,032	446	3.01 (2.48-3.65)	<0.001
Herd Type	Beef	8,734	1,884	*Reference*	
	Dairy	6,420	781	0.79 (0.7-0.88)	<0.001
	Other	744	189	1.01 (0.82-1.24)	0.94
Season	Winter	4,555	855	*Reference*	
	Spring	5, 285	609	0.59 (0.52-0.67)	<0.001
	Summer	3,032	613	0.92 (0.80-1.05)	0.23
	Autumn	3,026	777	1.35 (1.18-1.53)	<0.001
Proportion of herd moved	No moves	3,949	580	*Reference*	
	<50%	9,240	1,203	0.76 (0.68-0.86)	<0.001
	>50%	2,709	1,071	1.69 (1.47-1.94)	<0.001
Herd size	per 100 herds	15,866	2,851	1.11 (1.08-1.14)	<0.001
Number of additional reactors	No other reactors	3,633	1,638	*Reference*	
	<10 reactors	8,573	780	0.23 (0.21-0.26)	<0.001
	≥10 reactors	3,692	436	0.31 (0.27-0.36)	<0.001
Spoligotype	9	4,699	789	*Reference*	
	21	262	100	1.72 (1.30-2.28)	<0.001
	25	1,382	238	0.71 (0.59-0.85)	<0.001
Time since last test	More than 4 years or none recorded	717	248	*Reference*	
	<90 days	220	485	14.43(10.8-19.14)	<0.001
	3-6 months	1,544	580	2.95 (2.34-3.72)	<0.001
	16-27 months	2,324	245	0.73 (0.57-0.93)	0.01

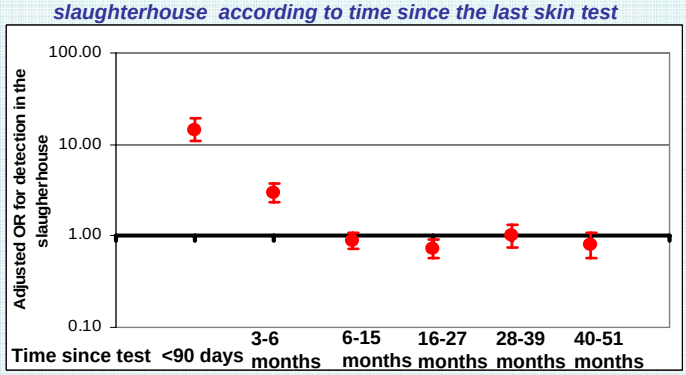
- Breakdowns in Wales were less likely to have been disclosed in the slaughterhouse than those in the England. This may be a result of the increased testing associated with 'TB Health Check Wales'.
- Herds where more than 50% of the herd size was replaced in the year leading up to the breakdown (usually fattening herds) were more likely to be disclosed in the slaughterhouse compared to herds where no inward movements occurred.
- The odds of a breakdown being detected in the slaughterhouse were around 35% higher in autumn compared to winter. This is likely in slaughterhouse submissions, which peak in October and November each year.
- Breakdowns with more than one bTB positive animal (reactor) were less likely to be disclosed in the slaughterhouse compared to breakdowns that only had one reactor or the slaughterhouse case.

Figure 2: Adjusted odds ratios for detection in the slaughterhouse for the main spoligotypes



The reference group was the widespread spoligotype 9. Breakdowns in which spoligotype 21 was isolated were 1.7 (95% CI: 1.3-2.3) times more likely to be detected in the slaughterhouse than at skin testing, whereas those where spoligotype 25 was identified were less likely (OR: 0.7, 95% CI: 0.6-0.9) to be disclosed in the slaughterhouse.

Figure 3: Adjusted odds ratios for detection of a bTB-infected herd in the slaughterhouse according to time since the last skin test



Breakdowns that occurred within 90 days or 3-6 months of a skin test were 14.4 times (10.9-19.1) and 3.0 times (2.3-3.7) (respectively) more likely to be disclosed in the slaughterhouse than those where the herd was not tested in over 4 years or no record existed. Breakdowns occurring between 16-27 months since a test (~2 yearly PTI) were less likely to be disclosed in the slaughterhouse (0.7, 0.6-0.9).

CONCLUSIONS

The factors that determine whether a breakdown is disclosed at skin testing or in the slaughterhouse are diverse and may be interrelated. Some differences within spoligotype merit further investigation, as does a suggestion that slaughterhouse breakdowns have fewer reactors than breakdowns disclosed by surveillance SICCT testing.

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