

Bovine tuberculosis and *Fasciola hepatica* infection

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Introduction

Bovine tuberculosis (bTB) is an important disease of cattle in GB now affecting over 4% of cattle herds each year. bTB is largely confined to the south-west of England and Wales with a distribution that overlaps with that of liver fluke (*Fasciola hepatica*). There is evidence that helminth infection may bias the immunological responses towards a Th2 (eosinophilic) type and may reduce the sensitivity of immunological diagnostic tests for tuberculosis in humans (Elias, et al. 2001) and in cattle (Flynn et al. 2007).

This poster uses data from 400 cattle exposed to *Mycobacterium bovis* that reacted or did not react to the tuberculin skin test.

Results

- bTB was confirmed by culture and histology in 110/200 (55%) of reactors and in 23/200 (11.5%) of in-contacts taken from naturally occurring bTB incidents
- The overall liver fluke prevalence (by ELISA) was 74.7%: 83.1% in dairy and 68.4% in non-dairy cattle
- 14.7% (54/377) of the animals had received a flukicide within the previous 12 months (Dairy 17%, Non Dairy 13%)
- There was no difference between the proportion of reactors (87%) and in-contacts (82%) that were serologically positive for liver fluke (P=0.19)
- There was a lower risk of confirmed TB in the presence of liverfluke antibodies across all classes of animal, although only significantly so for dairy reactors. In general the odds of confirmed TB were lower in dairy animals (Figure 1) than in non-dairy

Methods

In a study of diagnostic test performance in commercial herds, cattle were taken from the West and South West England in 2000-05. There were 200 randomly selected reactors to the bTB single intradermal comparative cervical tuberculin (SICCT) test and 200 purposively selected non-reactor in-contacts.

Blood samples taken at selection were tested by ELISA for antibodies against *Fasciola hepatica*, and all animals were subject to detailed post mortem (Liebana et al 2008). Statistical associations between the presence of antibodies to liver fluke and confirmed infection with bTB were calculated separately for dairy and non-dairy animals using logistic regression, with errors adjusted for farm-level clustering

Figure 1 Association between antibodies against *F. hepatica* & confirmed bTB in reactor & in-contact animals

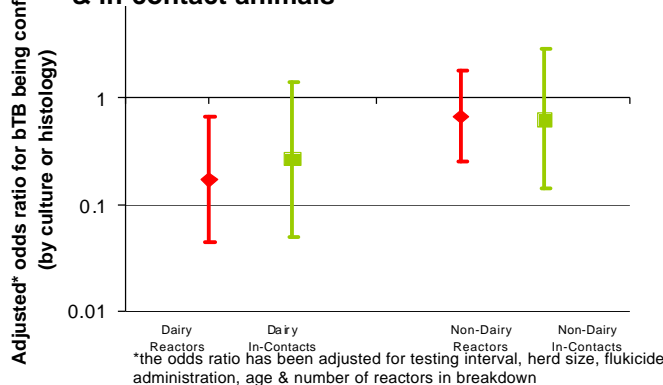


Table 1: Factors affecting the confirmation of bTB in dairy and non-dairy animals; by multivariable logistic regression

Factor	DAIRY ANIMALS N=167		NON-DAIRY ANIMALS N=233	
	Odds Ratio (and 95% confidence interval)	P	Odds Ratio (and 95% confidence interval)	P
Liver fluke ELISA result	Positive/negative	0.24 (0.09-0.64)	0.76 (0.34-1.72)	0.52
Flukicide given in past 12 months?	Yes/No	6.11 (1.89-19.7)	1.69 (0.62-4.63)	0.31
Was it a reactor?	Yes/No	10.12 (0.55-183)	85.2 (9.84-737)	<0.001
Herd Size	(per 100)	0.71 (0.52-0.95)	1.01 0.86-1.19)	0.88
Age	(months)	0.99 (0.97-1.00)	1.00 (0.99-1.01)	0.35

ALSO ADJUSTED FOR PM LOCATION, SEASON, REGION AND TEST INTERVAL (ALLP > 0.10).

Conclusion

The risk of an animal having confirmed TB decreased in the presence of liver fluke antibodies but increased if flukicide had been given in the past year. This was true in both classes of animal, although only significantly so in dairy cattle. This suggests that dairy cattle that have been exposed to liver fluke but untreated are more likely to give false positive reactions in the SICCT, and are thus less likely to have infection with *M. bovis* confirmed despite being classified as reactors. Liver fluke antigens are potent stimulators of T-helper (Th2) responses (Dalton 1998). Possibly infection with liver fluke modulates the inflammatory response to the SICCT leading to a lower positive predictive value of the test. These findings merit further investigation as the literature suggests that sensitivity is decreased (Flynn et al. 2008; Elias et al., 2001). As flukicides have milk withholding periods, treatment of dairy cattle exposed to liver fluke is often delayed until after lactation unless there is severe disease, this may explain why the risk was significant in dairy cattle. Adhering to a fluke control programme in areas where this parasite is endemic could have positive side-effects on bTB surveillance with regard to the ability of the skin test to detect TB-infected cattle in a herd.

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