Bovine Viral Diarrhoea Virus seroprevalence and antibody titres in UK cattle farms

Lia L. Hoving[1,2], L.E. Green[2], G.F. Medley[2], K. Frankena[1]

[1]Wageningen University, Wageningen, Netherlands, [2] Ecology and Epidemiology Group, Warwick University, Coventry, UK

Introduction

Bovine Virus Diarrhoea (BVD) is an infectious disease caused by the Bovine Viral Diarrhoea Virus (BVDV). BVD is common worldwide and endemic in most countries where studies have been carried out. The aim of this study was to determine age related patterns of BVDV positivity and seroprevalence.

Materials and Methods

- 9190 blood samples from 101 farms located in the South West and West Midlands regions of the UK.
- Analysed for presence of BVDV by antibody ELISA ((n=1000) at Leeds Vet. Lab.; (n=8190) at the Scottish Agricultural Centre).
- Additional information about management practices was obtained by interviewing farmers.
- The outcome variable used in this study is the 'BVDV positivity', defined as the mean antibody concentration corrected for assay variability.

Results

➢Based on diagnosis of the laboratory, the prevalence of BVDV on farm level was 99% and the prevalence on animal level was 65.5%.

➢The positivity of BVDV was higher in older cows (Figure 1).

➢Dairy farms had a higher positivity then mixed dairy farms, but both followed the pattern of the general of increasing antibody concentration with age (Figure 2).

➢Mixed suckler farms followed the general pattern of increasing antibody concentration with age, but the non-monotonic increase in suckler farms is suggestive of time dependant changes in exposure (Figure 3).

➢In both vaccinated groups of cows, the positivity level has an maximum, after which it declines (Figure 4 and 5).

➢A purchased cow had a higher positivity then cows born on farms (Table 1).

➢Samples analysed at the Leeds laboratory had a significant higher positivity than samples analysed at SAC (Table 1).

Table 1 variables in final linear model without interactions

Variable	Class	Estimate	Standard error	P value
Age	2-3 yr	-3,55	1,05	0,00
	3-4 yr	0,00	0,00	0,00
	4-5 yr	3,32	1,04	<0,0001
	5-6 yr	9,80	1,15	<0,0001
	6-7 yr	11,60	1,26	<0,0001
	7-8 yt	13,27	1,50	<0,0001
	8-9 yr	16,79	1,67	<0,0001
	9-10 yr	18,86	1,95	<0,0001
	> 10 yr	16,96	1,91	<0,0001
Type	Dairy	0,00	0,00	0,00
	Mixed suckler	12,64	6,94	0,07
	Suckler	8,46	8,80	0,34
	Mixed dairy	6,62	6,79	0,33
Born on farm	Yes	0,00	0,00	0,00
	No	12,10	2,17	<0,0001
	Unknown	14,58	2,07	<0,0001
Laboratory	SAC	0,00	0,00	0,00
	Leeds	7,82	3,51	0,03

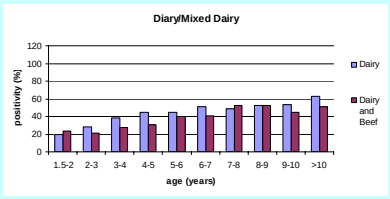

Figure 2 Raw optical density positivity per type of farm and age group

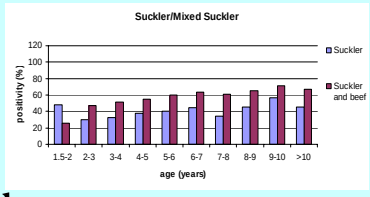

Figure 3 Raw optical density positivity per type of farm and age group

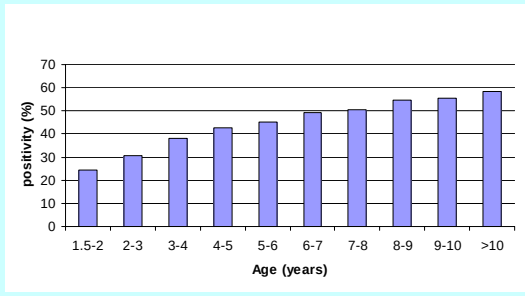

Figure 1 Raw Optical Density Positivity per age group

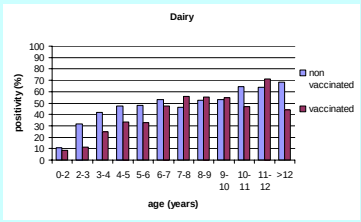

Figure 4 Raw optical density positivity per age group of vaccinated and non vaccinated cattle

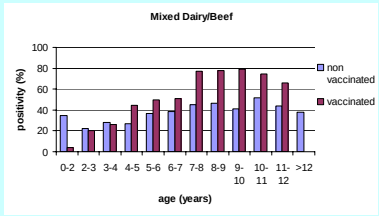

Figure 5 Raw optical density positivity per age group of vaccinated and non vaccinated cattle

Conclusions

- Older cows had a higher BVDV positivity compared to younger cows, this might be explained by the fact that older cows have a greater chance on previous infections.
- The non-monotonic distribution found in suckler farms is possibly caused by transient epidemics (non-persistent), due to the suckling of persistently infected animals.
- Statistical Analysis confirmed the results found in the graphs, but interaction terms should be included in the analysis to get a more realistic model.
- For comparison, a model for the outcome variable seroprevalence should be designed and analysed.

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