



INFLUENCE OF HERD-LEVEL RESPIRATORY INFECTIOUS AND MANAGEMENT FACTORS ON COWS' ACUTE PHASE PROTEINS SERUM AMYLOID A AND HAPTOGLOBIN CONCENTRATIONS

K. Raaperi, K. Käärmees, A. Aleksejev, A. Viltrop, T. Orro

Institute of Veterinary Medicine and Animal Sciences, Estonian University of Life Sciences, Tartu, Estonia

Correspondence e-mail: Kerli.Raaperi@emu.ee

OBJECTIVES

The aim of the study was to investigate the effect of herd-level respiratory infection statuses – bovine rhinotracheitis virus 1 (BHV1), bovine viral diarrhoea virus (BVDV), bovine respiratory syncytial virus (BRSV) and *Mycoplasma bovis* antibody status - and various management-related variables on the non-specific inflammatory status of cows, measured by acute phase proteins serum amyloid A (SAA) and haptoglobin (Hp) concentrations.

METHODS

To estimate herd and cows infection status, serum samples were collected from cows from 99 Estonian dairy farms. All cow samples (5174 in total) were analyzed for BHV-1 antibodies with BHV-1 gB ELISA kit, HerdChek* (IDEXX), 20 cow samples from each farm for *M. bovis* antibodies with BIO K 260 ELISA test (Bio-X Diagnostics) and 10 samples for BRSV antibodies with Svanovir* BRSV-Ab (Svanova) kit. The herd BVDV status was established by testing 10 heifers serum samples with PrioCheck BVDV Ab test kit (Prionics AG). Other herd data was recorded by a questionnaire. SAA and Hp were measured from 10 randomly selected samples from each farm using ELISA test (Phase SAA Assay, Tridelta Development Ltd.) and haemoglobin-binding assay, respectively. For statistical analysis linear random-intercept models with farm as a random effect were composed with StataIC 11.

RESULTS

Cows from herds with a prevalence of BHV-1 antibodies among cows > 50%, herds with presence of BRSV antibodies among cows, herds with higher milk yield and herds kept in cold barns had higher SAA concentrations. Cows' SAA concentrations were found to be lower if a veterinarian was permanently employed by the farm.

Cows with *M. bovis* antibodies and from herds with presence of BVDV and heifers kept separately from cows from 6 months until pregnancy had higher Hp concentrations.

Table 1. Random-effects linear regression model for risk factors associated with serum amyloid A (SAA) concentration in cows (herds n=96)

	Coefficient*	SE	p-value	95% CI	Wald test p-value
Age in years	0.03	0.03	0.243	-0.02; 0.08	
BHV-1 prevalence among cows					
0 (n=38)	0				0.002
1-50% (n=26)	-0.0055	0.18	0.975	-0.35; 0.34	
>50% (n=32)	0.56	0.19	0.003	0.19; 0.93	
Veterinarian employee of the farm					
No (n=75)	0				
Yes (n=21)	-0.58	0.18	0.002	-0.93; -0.22	
Type of the cow-house					
Warm barn (n=76)	0				0.09
Cold barn (n=19)	0.34	0.18	0.058	-0.012; 0.69	
Barn with warm and cold sections (n=1)	-0.67	0.65	0.304	-1.95; 0.61	
BRSV prevalence among cows					
0 (n=18)	0				0.003
1-50% (n=23)	0.52	0.20	0.011	0.12; 0.92	
>50% (n=55)	0.67	0.19	0.001	0.29; 1.04	
Herd last year milk production (t)	0.012	0.06	0.043	0.004; 0.24	
Intercept	-0.0003	0.39	0.999	-0.76; 0.76	

*Estimates are in a logarithmic scale

Table 2. Random-effects linear regression model for risk factors associated with haptoglobin (Hp) concentration in cows (herds n= 95)

	Coefficient*	SE	p-value	95% CI	Wald test p-value
Age in years	-0.0008	0.0004	0.026	-0.002; -0.0001	
<i>M. bovis</i> antibodies in animal level					
Negative (n=666)	0				
Positive (n=276)	-0.0033	0.002	0.032	-0.006; -0.0003	
Haemolysis in sample					
No haemolysis (n=774)	0				0.000
Slight haemolysis (n=118)	-0.014	0.002	0.000	-0.018; -0.0096	
Medium haemolysis (n=50)	-0.028	0.003	0.000	-0.035; -0.022	
Housing system for heifers					
Together with cows (n=33)	0				0.05
Some period in a separate building (n=15)	0.0003	0.002	0.895	-0.004; 0.005	
In separate building from 6 months until pregnancy (n=47)	-0.004	0.002	0.030	-0.007; -0.004	
BVD present in a herd					
No (n=77)	0				
Yes (n=18)	-0.004	0.002	0.053	-0.008; 0.00005	
Intercept	0.09	0.002	0.000	0.09; 0.09	

* Estimates are in inverse square root scale (negative estimate means higher concentration of Hp)

CONCLUSIONS

Results of present study show an impact of herd's infectious disease status and various management factors on the general health of cows, as measured by inflammatory status.

ACKNOWLEDGEMENTS

This research was supported financially by the Estonian Ministry of Education (Research project 8-2/T9001).