



Biosecurity and presence of *Coxiella burnetii* antibodies in Danish dairy herds

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Aim and introduction

During recent years in Denmark higher rates of antibodies to *Coxiella burnetii* have been detected in animals and humans than previously reported. A study in 2008 based on bulk tank milk samples from 100 randomly selected dairy herds showed results that support the hypothesis of an increase in the prevalence of positive dairy herds compared to previous years. Danish dairy farmers are aware of the potential zoonotic problem and are therefore concerned about the risk of introducing the infection to their herds.

The aim was to study biosecurity procedures in relation to the prevalence of *Coxiella burnetii* antibodies in bulk milk in a random sample of 100 Danish dairy herds.

Material and methods

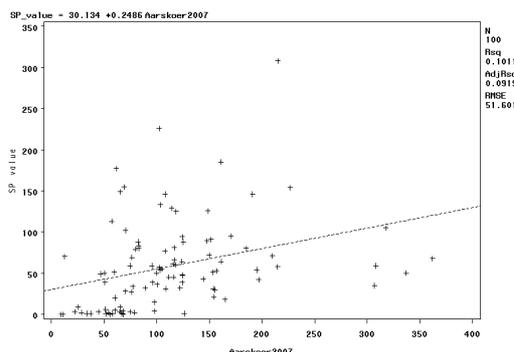
A random sample of 100 herds among 4785 milk producing dairy herds was selected for the study. The only inclusion criterion was that the herd was delivering milk to a dairy plant at the time of selection by February 2008.

A letter of introduction and encouragement to participate was sent to the farmers from the Danish Dairy Board, and a follow up telephone call was made to ask for the farmers participation. The managers of included farms were interviewed by telephone about their labour and management routines with focus on biosecurity procedures. This included the housing systems and interior design, animal trading habits, contact with other herds (including common pasture and animal shows), farmer contact with other farmers, routine biosecurity procedures for veterinarians and other farm consultants and other visitors to the farm. The health conditions of the herd during the 12 months prior to the study was also informed by the farm manager.

Bulk milk from each herd was sampled and examined for the level of *Coxiella burnetii* antibodies using the commercial CHEKIT Q fever Antibody ELISA Test Kit (IDEXX, Liebefeld-Bern, Switzerland) based on *C. burnetii* inactivated phase 1 and phase 2 antigens. All samples were tested in duplicates, and the optical density (OD) of the samples were averaged. The results were expressed as S/P values and estimated as the ratio between OD of the sample (S) and OD of a positive control (P) included in the test kit. Both the numerator and denominator were corrected by subtracting the OD of a negative control included in the test kit. Samples with S/P \geq 40% were considered positive and samples with S/P < 40% was considered negative.

Bivariate and multivariate relationships between the herd S/P value and biosecurity routines were analysed in SAS using cross tabulations and logistic analysis.

Figure 1. Scatter plot of herdsize versus bulk milk S/P values



Results

Table 1. Relative risk and Fisher's exact test for bivariate associations of biosecurity variables and S/P herd status.

Variable	Category	Relative risk	P-value*
Housing	Loose	2.41	<0.0001
	Tying		
Herd size	Large	2.28	<0.0001
	Small		
Buy from other herds	Yes	1.61	<0.01
	No		
Herd health agreement with vet	Yes	1.65	<0.01
	No		
Farmer visit other herds	Yes	4.36	<0.02
	No		
Other farmers visit the herd	Yes	Can not be estimated	<0.001
	No		
Veterinary biosecurity	Yes		0.10
	No	1.34	
Inseminator biosecurity	No	1.41	0.20
	Yes		

Table 2. The final model of multivariate logistic analysis (proc genmod) using backward elimination of the variables listed in Table 1

Variable	P-value
Herd size	0.005
Buying cattle from outside	0.088
Other farmers visit the herd	0.003
Veterinary biosecurity procedures	0.039

Discussion and conclusion

Previous studies have shown that farm management systems influence the seroprevalence of *Coxiella burnetii* in cattle. Capuano *et al.* (2001) studied that prevalence is higher in permanently housed or partially housed herds than if kept permanently in pasture. Prevalence was found higher in the head rearing relatively older animals (Sheep and Cow) than in the herds with younger animals (Copuano *et al.* 2004). This statement was also supported by the findings of McCaughey *et al.* (2010). They also found that prevalence of *Coxiella burnetii* increase with the increase of age of the animal. They also found that that large dairy herd have higher prevalence compared to small beef herds. In their study breed of the animal was also identified as an important risk factor for *Coxiella burnetii* infection in cattle.

The present study clearly indicates the well known fact that risk of infection increases with increasing herd size and generally with increasing "amount" of contact with other farms and consultants. Biosecurity procedures are of utmost importance to maintain the herd free of infection.

Literature Cited: 1) Capuano, F., Landolfi, M.C., and Monetti, D.M. (2001) Influence of three types of farm management on the seroprevalence of Q fever as assessed by an indirect immunofluorescence assay. *Veterinary Record* 149, 669-671. 2) Capuano F, Parisi A, Cafiero MA, Pitaro L, Fenizia D: *Coxiella burnetii*: What is the reality? *Parassitologia* 2004, 46 (1-2):131-134. 3) McCaughey, C., Murray, L.J., McKenna, J.P., Menzies, F.D., McCullough, S.J., O'Neill, H.J., Wyatt, D.E., Cardwell, C.R., and Coyle, P.V. (2010) *Coxiella burnetii* (Q fever) seroprevalence in cattle. *Epidemiology and Infection* 138, 21-27.