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Coxiella burnetii antibodies in cow milk : association with cow and herd level factors

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BACKGROUND

- High prevalence of *Coxiella burnetii* exposure has been reported in humans and cattle in Denmark
- A study in 2008 based on bulk tank milk samples (BTM) from 100 randomly selected dairy herds also reported an increased prevalence compared to previous years
- Animal level prevalence and risk factors associated with the infection have not yet been studied

OBJECTIVE

To identify association of the level of *C. burnetii* antibodies in individual milk samples with cow and herd level factors in Danish dairy cows

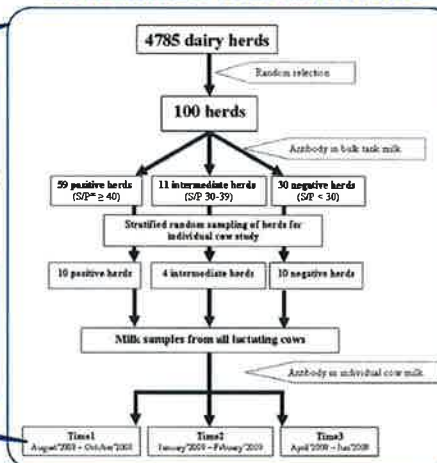
MATERIALS AND METHODS

A cross sectional study with follow up included:

- 24 Danish dairy cattle herds
- 3116 lactating cows

5829 milk samples at three time points

- Milk samples were tested with ELISA and results determined as S/P values
- Milk samples with S/P ≥ 40 were considered positive



Cow level information from

- Danish cattle database

Herd level information from

- Questionnaire interview of the farmers

Statistical Analyses

Estimation of Association

- Logistic regression with random effects

Prevalence estimation

RESULTS

Estimation of association

Cow level factors			
	Odds ratio [OR] (95% CI)		Odds ratio (95% CI)
Breed		Fat content (%)	
Danish Holstein	3.21 (2.17 – 4.74)	0.88 (0.79 – 0.98)	(OR for per unit increases in fat content)
Other (pooled breed)	2.92 (1.86 – 4.58)		
Jersey	1		
Parity		Protein content (%)	
≥ 4	1.40 (1.11 – 1.77)	1.43 (1.22 – 1.69)	(OR for per unit increases in protein content)
3	1.27 (1.02 – 1.58)		
2	1.08 (0.90 – 1.29)		
1	1		
Milk yield (Kg)		Season	
	0.98 (0.97 – 0.99)	Summer	1.55 (1.31 – 1.82)
	(OR for per kg increases in milk yield)	Winter	1.27 (1.08 – 1.50)
		Autumn	1
Herd level factors			
Herd size		Type of stable	
	1.75 (1.03 – 3.00)	Loose housing	4.22 (1.08 – 16.57)
	(OR for per 50 cows increases in herd)	Tie stall	1
Quarantine practice		Hygienic precautions by veterinarian	
No	3.75 (1.19 – 11.86)	No	8.91 (2.00 – 22.23)
Yes	1	Yes	1

Prevalence estimation

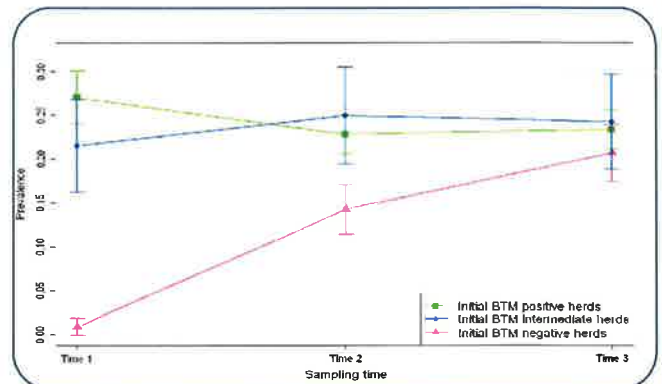


Figure: Cow prevalence of *Coxiella burnetii* antibody positivity at three time points in three strata of initially bulk tank milk antibody positive, negative and intermediate herds

Prevalence in different strata varies significantly in first and second sampling time but not in third sampling time

Significant increases in prevalence among different sampling times is only seen in initially BTM negative herds

CONCLUSIONS

Level of *C. burnetii* antibodies in cow milk samples is significantly associated with:

- Cow level factors – breed, parity, milk yield, milk protein contents and milk fat contents
- Herd level factors – herd size, stable type, quarantine of newly purchased animal and hygienic precaution taken by the veterinarian before entering the stable
- Season

Infection with *C. burnetii* in dairy cattle herds lasts long (at least 11 months) and BTM antibody status of herds may change over time