

Perspective

Updated Prevalence of *Coxiella Burnetti* in Central and Eastern European Dairy Herds-Mini Review

Attila Dobos^{1,2*}¹Department of Veterinary Forensics and Economics, University of Veterinary Medicine, Hungary²Ceva-Phylaxia Veterinary Biologicals Co. Ltd., Hungary***Corresponding author: Attila Dobos**

Department of Veterinary Forensics and Economics, University of Veterinary Medicine, Istvan u. 2, Budapest H-1078, Hungary.

Email: attila.dobos@ceva.com

Received: December 26, 2023**Accepted:** January 19, 2024**Published:** January 26, 2024**Abstract**

Positive correlation was found between herd size and percentage of *C. burnetii* positive results (with PCR and/or ELISA tests) from bulk tank milk in Central and Eastern European dairy herds.

Our previous study was to assess the prevalence of *Coxiella burnetii* in dairy herds in Central and Eastern European countries based on ELISA and PCR tests. A total of 370 bulk tank milk samples were collected in 2019 originating from Croatia ($n=13$), Czech Republic ($n=138$), Hungary ($n=126$), Serbia ($n=24$), Slovakia ($n=53$) and Slovenia ($n=16$) [1].

We extended our research to collect more bulk tank milk samples from these countries. Samples were collected between January 2020 and August 2023 from 126 dairy herds from four Central and Eastern European countries (Hungary, $n=87$; Czech Republic, $n=24$; Slovakia, $n=10$ and Croatia $n=5$). Samples were also taken randomly from dairy herds of different sizes that were not vaccinated against Q fever, these were herds not investigated previously. No further samples were collected from Serbia and Slovenia.

Forty ml samples were taken from the bulk milk tanks. Lactosera were tested with commercial ELISA kits (ID Screen® Q Fever Indirect Multi-species, IDVet Inc., Grabels, France; IDEXX Q Fever Ab Test, IDEXX Europe B.V., Hoofddorp, the Netherlands) according to the manufacturers' instructions. Real-time PCR assay specific for the IS1111 element was used to detect the presence of *C. burnetii* in the milk samples.

123 out of the 126 (97.91%) bulk tank milk samples showed positivity tested with ELISA and/or PCR, and the IS1111 element of *C. burnetii* was detected in 74 out of the 126 samples (58.73%) by real-time Polymerase Chain Reaction (PCR).

C. burnetii specific ELISA revealed 100.00% positivity in all examined countries, the same as in our previously published studies in herds that consisted of at least 250 milking cows [1,4], but PCR positivity (58.73%) was higher compared with our last results (44.05%). Only PCR positivity was not found without ELISA positivity in any of the samples. In the present study, detection of *C. burnetii* specific antibodies showed higher positivity than the PCR assays in all countries, ranging between 91.60-100.00% (Croatia, Czech Republic, Hungary, Slovakia). Previous publications reported lower ELISA positivity of bulk tank milk samples from Europe, ranging between 25-37.9% (Greece, Ireland, Portugal) and 45.5-78.6% (Belgium, Denmark, the Netherlands, Poland, Spain) [1]. The average herd size is the highest in the examined region among the European countries, with average number of animals/herds being 217 in Slovakia, 138 in the Czech Republic and 76 in Hungary thus the

potential risk for spreading the disease are also highest than other European countries [3].

Our similar study showed that the causative agent of Q fever is widespread in dairy cattle in the region, but sheep and goats also appear to pose a major risk for spreading the disease [4].

Based on our results we can conclude that the growing number of farms managing a large number of animals, where cattle density is high, correlates with the increasing prevalence of *C. burnetii* in the region. In our recent study it has also been demonstrated that high *C. burnetii* seroprevalence among dairy farm workers correlated with a high prevalence of *C. burnetii* in Central and Eastern European dairy herds [5]. Moreover 100% seropositivity were found in our research among dairy farm veterinarians which was the highest of all figures previously reported by international surveys [6].

Keywords: Dairy cattle; Central and Eastern Europe; Q fever; bulk tank milk

Table 1: Summary of *Coxiella burnetii* specific ELISA and PCR test results of bulk tank milk samples originating from Central and Eastern Europe.

Herd size ^a	Number of herds	ELISA ^b	PCR ^c	ELISA & PCR ^d	Positive results with ELISA and/or PCR tests	
					Total number	Percentage
250-499	2	0	0	2	2/2	100.00%
500-999	3	0	0	3	3/3	100.00%
Total CRO	5	0	0	5	5/5	100.00%
50-249	3	1	0	0	1/3	33.33%
250-499	10	5	0	5	10/10	100.00%
500-999	9	2	0	7	9/9	100.00%
≥1000	2	0	0	2	2/2	100.00%
Total CZ	24	8	0	14	22/24	91.60%
50-249	4	2	0	1	3/4	75.00%
250-499	34	12	0	22	34/34	100.00%
500-999	39	12	0	27	39/39	100.00%
≥1000	10	2	0	8	10/10	100.00%
Total HU	87	76	0	47	86/87	98.85%
250-499	3	1	0	2	3/3	100.00%
500-999	5	2	0	3	5/5	100.00%
≥1000	2	0	0	2	2/2	100.00%
Total SK	10	3	0	8	10/10	100.00%
Total	126	87	0	74	123/126	97.61%

^aRanges of number of animals in the examined herds are given according to country of origin. Abbreviations: CRO - Croatia, CZ - Czech Republic, HU - Hungary, SK - Slovakia

^bNumber of results positive only with ELISA tests.

^cNumber of results positive only with PCR tests.

^dNumber of results positive with both ELISA and PCR tests.

References

- Dobos A, Kreizinger Z, Kovács ÁB, Gyuranecz M. Prevalence of *Coxiella burnetii* in Central and Eastern European dairy herds. *Comp Immunol Microbiol Infect Dis.* 2020; 72: 101489.
- Dobos A, Balla E. Industrial dairy cattle farms in Hungary source of *Coxiella burnetii* infection in humans. *Vector Borne Zoonotic Dis.* 2021; 21: 498-501.
- Commission E. EU Dairy farms report. 2013.
- Dobos A, Fodor I, Kiss G, Gyuranecz M. Serological survey of *Coxiella burnetii* infections in dairy cattle, sheep, goats and zoo animals in Hungary - Short communication. *Acta Vet Hung.* 2021; 69: 105-9.
- Dobos A, Fodor I, Tekin T, Đuričić D, Samardžija M. Presence of *Coxiella burnetii* in dairy cattle and farms in the Czech Republic. *Pol J Vet Sci.* 2022; 25: 231-5.
- Dobos A, Balla E. *Coxiella burnetii* infection rate among intensive dairy farm veterinarians. *Hung Vet J.* 2021; 143: 11-6.