

COXIELLA BURNETII ANTIBODIES IN CALVES CONCENTRATED IN A LARGE-CAPACITY CALF HOUSE IN AN AREA WITH ENDEMIC INCIDENCE OF Q FEVER

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Abstract

Literák A.: *Coxiella burnetii* antibodies in calves concentrated in a large-capacity calf house in an area with endemic incidence of latent Q fever. Acta vet. Brno, 63, 1994: 65-69.

A total of 539 calves in a large-capacity calf house in the district of Strakonice (Czech Republic) were examined serologically for *Coxiella burnetii* antibodies in 1988-1990 using the complement-fixation test. The antibodies were detected in 6% (3.6 to 8.4%, 95% confidence limits) of calves up to 14 days of age, in 1.5% (0.3 to 2.7%, 95% confidence limits) of calves aged 3 months and in no animals aged 6 months. The calves showing antibodies after arrival at the large-capacity calf house within 14 days of age came from 13 different farms of the district. It is concluded that calves are not responsible for the spread of Q fever in herds even under the open-turnover system.

Coxiella burnetii, calves, antibodies, CFT

The presence of *Coxiella burnetii* antibodies in cattle in the South-Bohemian region of the Czech Republic was investigated by Lisák et al. (1989) during a two-year period. Using the complement-fixation test, they demonstrated *C. burnetii* antibodies in 16.5% of 747 animals, mostly producing cows, coming from 23 farms. Řeháček et al. (1985) using the microagglutination reaction found *C. burnetii* antibodies in 10.8% of 370 cattle coming from 17 farms of the southern part of the Šumava region. In spite of a rather large proportion of serum-positive reagents, marked clinical manifestations of Q fever in these areas were not observed.

The incidence of *C. burnetii* antibodies among calves in the South-Bohemian region was mentioned by Řeháček et al. (1985) only very briefly: 58 calves were examined upon arrival at a large-capacity calf house with negative results and in only one of them *C. burnetii* antibodies were detected before the animals were put to graze.

The present study was designed to assess the serum prevalence of *C. burnetii* antibodies in calves shifted to a large-capacity calf house from different farms in the South-Bohemian region that, considering the observations reported by Lisák et al. (1989) and Řeháček et al. (1985), can be regarded as one of endemic incidence of latent Q fever.

Observations on *C. burnetii* antibodies among calves in other parts of the world were reported a. o. by Sawyer et al. (1973), Gossler and Burtschell (1973) and Adeseyun et al. (1984).

Materials and Methods

Calves were examined for *C. burnetii* antibodies on three occasions: upon arrival at a large-capacity calf house, after 3 months of their stay in the calf house upon change from milk feeding to vegetable feeding and before leaving the calf house at 6 months of age. The large-capacity calf house under study was located in the northern part of the district of Strakonice (Map No. 1). From its catchment area 40 calves arrived each week, which represented about 60% of all calves born on the farms of this area.

The calves were examined from the 21st of January to the 11th of July 1990. The blood samples were withdrawn at 3-month intervals.

A total of 539 calves were examined; one examination only was carried out in 208 animals, 2 examinations also in 208 animals and 3 examinations in 123 animals. Upon arrival of the calves at the calf house within 14 days of age 400 examinations were carried out, 328 examinations were carried out on 3-month old animals and 265 examinations were conducted on animals aged 6 months. Thus the total number of examinations was 993.

The detection of *C. burnetii* antibodies was made with the complement-fixation test using the micromethod technique with phase 2 antigen (Bodibion, Bioveta Nitra). The starting titre was 8 or 10. The sera with antibodies were diluted in two-fold steps to find the highest positive titre.

Results

C. burnetii antibodies were found in 6% (3.6 to 8.4%, 95% confidence limits) of calves up to 14 days of age, in 1.5% (0.3% to 2.7%, 95% confidence limits) of 3-month old calves and were not detected in calves aged 6 months (Table 1).

Table 1
Incidence of *C. burnetii* antibodies in calves in a large-capacity calf house

Age	up to 14 days	3 months	6 months
No. examinations	400	328	265
No. calves with antibodies	24	5	0
% of calves with antibodies	6 %	1,5 %	0 %
(95 % confidence limits)	(3,6-8,4 %)	(0,3-2,7 %)	-

In 14 out of 29 cases *C. burnetii* antibodies were detected in the starting serum dilution; the highest titre was 128 (Table 2).

The dynamics of antibody incidence appears from the results of repeated examination of calves recorded as positive. In 13 out of 14 calves *C. burnetii* antibodies were not detectable by the complement-fixation test at 3 months of age. Serum conversion at 3 months of age was recorded in 1 out of 14 animals (Table 3).

The calves having antibodies upon arrival at the large-capacity calf house within 14 days of age came from 13 farms of the catchment area. The origin of calves with antibodies within 14 days of age is shown in Map No. 1. (The origin of the remaining 2 calves was not established.)

Table 2
Distribution of *C. burnetii* antibody titres in calf sera

Titre	No. findings
8-10	14
16-20	7
32-40	5
64-80	2
128	1

Table 3
Dynamics of the incidence of *C. burnetii* antibodies in repeatedly examined positive reagents

Case No.	Age		
	up to 14 days titre	3 months titre	6 months titre
1	8	N	0
2	10	0	N
3	10	0	0
4	10	0	0
5	20	0	0
6	20	0	0
7	20	0	N
8	20	0	N
9	40	0	0
10	128	N	0
11	N	10	0
12	N	10	0
13	N	40	0
14	0	40	N

N = not examined

Discussion

The incidence of *C. burnetii* antibodies in calves varied with age. Whereas the proportion of calves having antibodies upon arrival at the large-capacity calf house was 3.6 to 8.4% (95% confidence limits), no antibodies could be detected in animals leaving the calf house at 6 months of age. The decline in the proportion of calves with antibodies was gradual; 0.3 to 2.7% of the calves had antibodies at 3 months of age. Although this outcome cannot be evaluated statistically because the number of animals examined at 3 months of age was smaller than that examined within 14 days of age, the progressive disappearance of antibodies from the blood stream became in addition evident from the results of repeated examination of calves with antibodies. The *C. burnetii* antibodies found within 14 days of age were presumably of colostrum origin and then disappeared similarly to other colostrum-derived antibodies (Halliwell and Gorman 1989). Possible further persistence of specific antibodies would be due to subsequent antibody production induced by contact of the calf with the infectious agent. From our results it appears that no such contact in the large-capacity calf house took place. A kind of exception might be the only case of serum conversion in a calf aged 3 months.

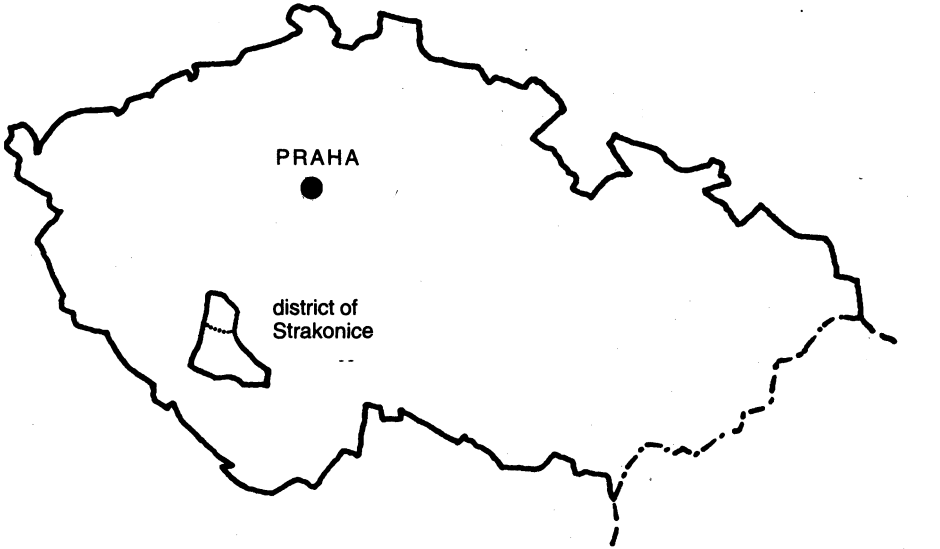
The fact that calves having *C. burnetii* antibodies within 14 days of age came from 13 farms of the catchment area confirms the areal distribution of *C. burnetii* infection in the district of Strakonice as was reported by Lisák et al. (1989). The main cause of the spread of *C. burnetii* infection in bovine herds in our country has been seen in the abolishment of the closed turn-over system (Řeháček et al. 1987, Vošta et al. 1989) and in the adoption of practices under which animals are moved from one place to another without checks for possible transmission of causative agents of some latent infections.

Nevertheless, from our results it appears that, as regards the concentration in a large-capacity calf house of calves coming from various farms, the open turn-over system does not involve the risk of further spread of *C. burnetii* infection even in those areas where the proportions of latently infected cows in the herds are considerable. Heifers and bullocks leaving the large-capacity calf house after 6 months showed no antibodies against *C. burnetii*. Similarly, in Germany, Schaal and Schaffer (1984) did not detect *C. burnetii* antibodies in any of 173 animals, 6 months to 2 years of age, from 70 herds with the incidence of Q fever.

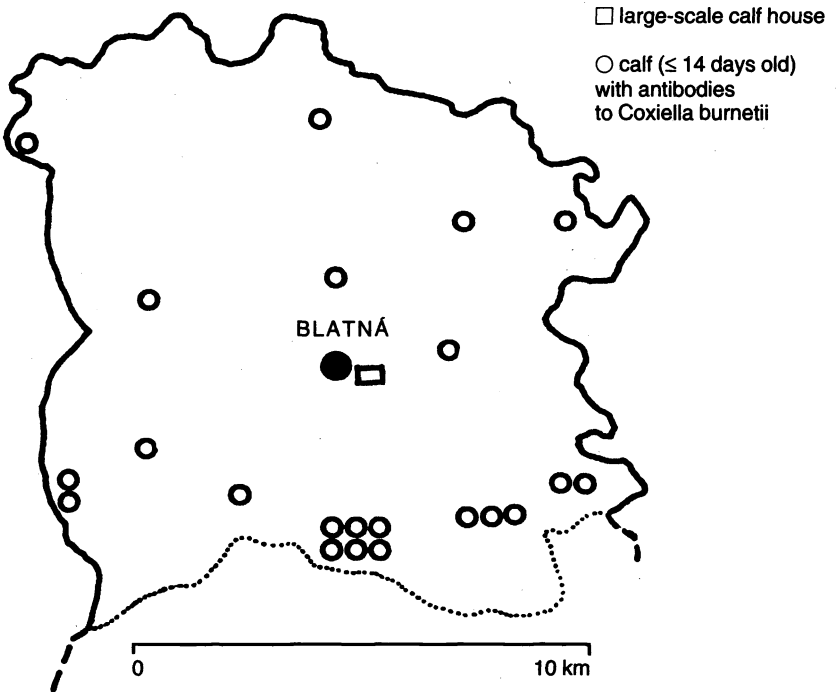
Gossler and Burtschell (1973) in their long-term serological study on 32 calves on a calf-fattening farm in Germany where, similarly to Czechoslovakia, the spread of *C. burnetii* infection in bovine herds was considerable (Kraus et al. 1987, Řeháček 1987) detected no antibodies against *C. burnetii*. The results reported by Řeháček et al. (1985) who examined 58 and 54 calves in a large-capacity calf house are essentially in keeping with those obtained in the present study but do not allow one to draw any conclusions as to the role of calves in the spread of Q fever. A lower incidence of *C. burnetii* antibodies in calves than in cows in various herds in Nigeria was reported by Adesiyun et al. (1984).

A possible relation of *C. burnetii* in cattle to a high incidence of abortion and neonatal calf death in one area of South Bohemia was suggested by Vošta et al. (1989) but their evidence was not conclusive.

Map No. 1. District of Strakonice with delineation of the catchment area supplying calves for the large-capacity calf house



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Protílátky proti *Coxiella burnetii* u telat soustředěných do velkokapacitních teletníků v oblasti s endemickým výskytem latentní Q horečky skotu

V letech 1988–1990 bylo serologicky (komplementfixační reakce) vyšetřováno 539 telat ve velkokapacitním teletníku v okr. Strakonice (Česká republika) na výskyt protilátek proti *Coxiella burnetii*. U telat ve stáří 14 dnů byly protílátky zjištěny v 6 % (3,6–8,4 %, 95 % confidence limits), u telat ve stáří 3 měsíce v 1,5 % (0,3–2,7 %, 95 % c. l.). U telat ve stáří 6 měsíců nebyly protílátky prokázány. Čtrnáctidenní telata s protilátkami pocházela ze 13 různých farem okr. Strakonice. Z hlediska šíření Q horečky skotu nepředstavují telata nebezpečí ani při provozech s otevřeným obratem stáda.

Антитела против *Coxiella burnetii* телят, содержащихся в объектах промышленного скотоводства, в области с эндемическим распространением скрытой горячки Q крупного рогатого скота

В 1988–1990 гг. серологически (комplementфиксационная реакция) исследовали 539 телят в крупном телятнике района Страконице (Чешская Республика), определяя наличие антител против *Coxiella burnetii*. У телят в возрасте 14 суток антитела были установлены в 6 % (3,6–8,4%, 95% confidence limits), у телят в возрасте 3 месяца - в 1,5 % (0,3–2,7%, 95% c. l.). У телят в возрасте 6 месяцев антитела не были установлены. Двухнедельные телята с антителами содержали на 13 разных фермах района Страконице. С точки зрения распространения горячки Q крупного рогатого скота телята не представляют собой опасности даже при открытом обороте стада.

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