VACCINATION AS A TOOL TO CONTROL COXIELLA BURNETII INFECTED SHEEP FLOCKS

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Introduction: In early 2008 more than 100 cases of Q-Fever in humans were observed in Lower Franconia, Bavaria. These cases were attributed to sheep. Sheep were vaccinated twice three weeks apart with an inactivated phase I vaccine (Coxevac®, CEVA, Düsseldorf) in 2008 and a single booster vaccination (vacc.) was performed in 2009.

Objective: This study summarizes the results of longitudinal serological testing over a period of 1½ years (yrs) and molecular detection of Coxella burnetii (C.b.).

Material and methods: Phase I- and II-antigens (PhI/PhII) of CHEKIT-Q-Fever (Idexx) were coated separately to ELISA plates. The test protocol was the same as for the commercial test. C.b.-genome was detected by real-time PCR. An average number of 268 sheep of 9 flocks were analysed for PhI/PhII antibodies on 5 occasions: at 1st vacc. (t₀), at 2nd vacc. (t₁), three weeks after 2nd vacc. (t₂), before 3rd vacc. (t₃= t₀+≈1 yr) and half a yr after 3rd vacc. (t₄). Pairs of placenta and vaginal swabs (n = 223) collected pp. after t₂ were investigated by PCR and pairs of blood and vaginal swabs (n= 146) sampled at and after t₄ were analysed for antibodies and C.b., respectively. Each 30 sheep from an infected flock (excluded from vacc.) and from a seronegative flock with no history of Q fever were included as controls.

Results and discussion: Although a phase I vaccine was used, after the initial vacc. seroconversion to both phases was observed. But only PhI reactivity was boosterized at t₂, while that of PhII remained unchanged or even slightly decreased. Additionally, prevalence of PhI+/PhII- pattern increased continuously from 6% (t₀) to 49% (t₃). Subsequent revaccination had almost no effect on this prevalence (46%, t₄). The elevated frequency of PhI+/PhII- in vaccinated flocks was in contrast to the otherwise rare finding of this pattern in unvaccinated flocks. Simultaneously, prevalence of PhI+/PhII+ pattern decreased from 82% (t₁) to 39% (t₃) and revaccination did not result in a significant increase (46%, t₄). A significant difference of C.b. shedding was observed in the control flocks and vaccinated sheep, respectively. Detection of C.b. was associated with PhII-antibodies.

Conclusion: We hypothesized that PhII-antibodies could be a marker of infection within a DIVA-concept. The question, if excretion of C.b. decreased due to vacc. or natural immunity, is still not answered.

Keywords: Q-Fever, Vaccination, PCR, Serology, Sheep