Vaccinating against Q-fever with an inactivated phase-I vaccine (COXEVAC®) improves reproductive performance in *Coxiella burnetti*-infected dairy herds

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Introduction

Coxiella burnetii is an obligate intracellular Gram negative bacterium that causes Q-fever, an endemic worldwide zoonosis. The described clinical signs in cattle have been inconsistent due to frequently subclinical infection. The most commonly reported clinical signs in dairy cattle are reproductive disorders including placental damage, abortion, stillbirth, weak offspring, placenta retention, postpartum metritis and ultimately infertility.

Objectives

The present study was designed to assess the effect of vaccination against Q-fever on subsequent postpartum reproductive performance of dairy cows. The study was performed in two commercial high producing Holstein-Friesian dairy herds in north eastern Spain with a regular weekly calving .

Materials and methods

Individual blood tests were performed in heifers (> 12 m) and cows to determine the *C. burnetii* antibody status. A commercial indirect ELISA Q-FEVER kit (CoxLS kit, Lissieu, France) was used to determine antibodies against *C. burnetii* in serum samples. Animals were then blocked by serology status and randomly assigned to an untreated-Control (n = 301) or vaccine (n = 310) group. Cows in the vaccine group received 2 injections 3 weeks apart of 4 mL of inactivated phase I *C. burnetii* vaccine (Coxevac®, Ceva Animal Health) on Days 171–177 and 192–198 of gestation. Each 4mL vaccine-dose contained purified phase I *C. burnetii* corpuscular antigens (100 mg/mL) inactivated by formaldehyde.

Results

Overall, 24.9% of cows were seropositive for *C. burnetii* (herd-A 24.7% and herd-B 25.6%. Conception to 1st postpartum AI (CR1AI) in cows receiving Coxevac® was significantly greater than non-vaccinated cohorts (41.9% vs 30.1%; *P*=0.04). In addition, cows receiving Coxevac® had shortened calving-to-conception intervals (CCI) than Controls (92 vs 106 days; *P*<0.01). There were no interactions (*P*>0.10) between treatment and serology status and parity on CCI or number of AI per pregnancy.

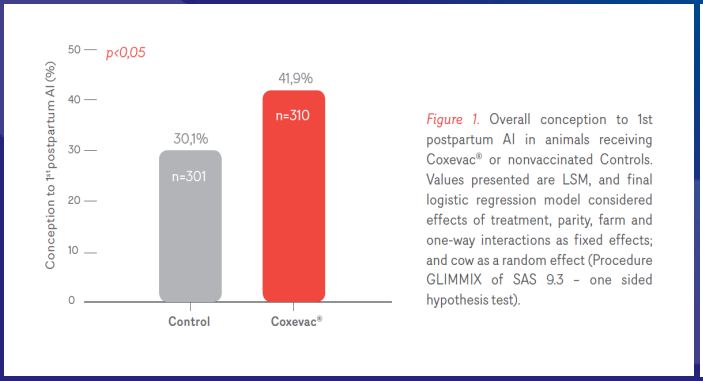

Figure 1. Overall conception to 1st postpartum AI in animals receiving Coxevac® or nonvaccinated Controls. Values presented are LSM, and final logistic regression model considered effects of treatment, parity, farm and one-way interactions as fixed effects; and cow as a random effect (Procedure GLIMMIX of SAS 9.3 – one sided hypothesis test).

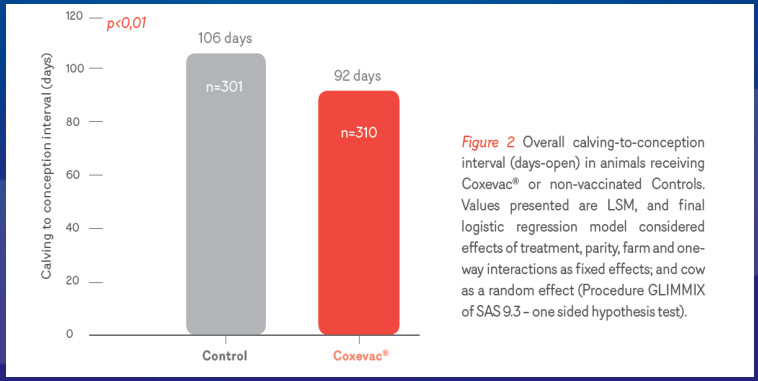

Figure 2 Overall calving-to-conception interval (days-open) in animals receiving Coxevac® or non-vaccinated Controls. Values presented are LSM, and final logistic regression model considered effects of treatment, parity, farm and one-way interactions as fixed effects; and cow as a random effect (Procedure GLIMMIX of SAS 9.3 – one sided hypothesis test).

Conclusions

Vaccination against *C. burnetii* with Coxevac® during the dry-period significantly improved conception results to 1st postpartum AI and shortened CCI. Assuming costs of each day open as 5€, reducing CCI in 14 days would represent a financial gain for the producer of 70€/cow/lactation period.