Do we correctly estimate the efficacy of a vaccine to prevent *Coxiella burnetii* shedding using milk as the unique sample type to detect the bacterium?

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INTRODUCTION

- **Q fever**: a worldwide **zoonosis** caused by an obligate intracellular bacterium: ***Coxiella burnetii***
- **Ruminants** (Cattle, Sheep and Goats) recognised as the most important **source of human infection**
- **Shedding routes:** milk, faeces, parturition products and vaginal mucus with non concomitancy of shedding [1]
- **Prevention of *Coxiella* shedding**: key-point to limit the **transmission** of *C. burnetii* between animals and from animals to humans

- Recent evidence for the **efficacy of a phase I** C. burnetii inactivated **vaccine to prevent shedding** in susceptible animals within infected dairy herds [2]
- Due to ***C. burnetii*** shedding pattern [1], shedding was determined [2] on the basis on PCR on concomitant samplings of **milk, vaginal mucus and faeces**
- **Milk** being (i) easy and cheap to collect and (ii) the most frequent shedding route [1]: **informative value** of **Milk as the unique sample** type to detect *C. burnetii*?

Aims: to assess the efficacy of the phase I *C. burnetti* inactivated vaccine to prevent *C. burnetii* shedding, when considering milk as the unique sample type to detect the bacterium; to compare this efficacy to that obtained in [2] (taken as reference study)

MATERIAL AND METHODS

Comparison of Material and Methods between Reference study [2] and Present study

- Field trial in 6 **naturally infected herds** included after abortion(s) due to *C. burnetii* (confirmed by positive PCR on placenta)
- Within-herd, **half** of the animals **received a phase I inactivated vaccine** (Coxevac®) and the **other half placebo** (PBS)
- Determination of the **infection status** of animals (susceptible vs infected) before treatment using **ELISA** on sera and **PCR** applied:

Reference study [2]: Concomitant samplings of Milk, Faeces and Vaginal Mucus / ***Present Study: Only on Milk***

- **Study population**:

Reference study [2]: Cows and Heifers with expecting calving during the study / ***Present Study: Only Cows***

- **Follow-up period** (FUP) of **16 months** with systematic samplings to detect possible shedding using PCR applied :

Reference study [2]: Concomitant sampling of Milk, Faeces and Vaginal Mucus / ***Present Study: Only on Milk***

- **Efficacy of the vaccine** to prevent *C. burnetii* shedding in initially susceptible animals **quantified using survival analysis** (Cox model).

RESULTS AND DISCUSSION

Determination of the initial infectious status

- **99 dairy cows found susceptible** (PCR-tested negative and seronegative) before treatment **(92 cows in [2])**

  As milk is the most frequent shedding route, only a few falsely susceptible cows (7%)

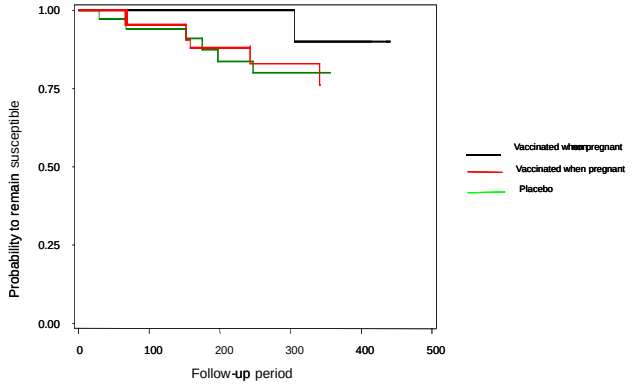
Determination of the efficacy of the vaccine

- **When vaccinated while not pregnant**, only 1 cow out of 17 detected as shedder: **3 times lower (*P*=0.3) probability of becoming a shedder** than an animal receiving placebo **(5 times lower in [2], p<0.05)**

  Protective effect of vaccination when given to non-pregnant cows **similar** in direction and almost in magnitude **to the one in [2]**

  Non significant effect, in relation to lack of statistical power **(exclusion of heifers from analysis)**

- **As in [2]**, **when vaccinated while pregnant**, similar probability of becoming shedder as an animal receiving placebo.



CONCLUSION

The use of individual milk as the unique target sample type to detect *C. burnetii* shedding of dairy cows **appears to be convenient to assess the efficacy of the vaccine** under study

References:

[1] Guatteo et al., 2007. *Veterinary Research*, 38, 849-860

[2] Guatteo et al., 2008. *Vaccine*, 26, 4320-4328