



Objective

Q fever is a ubiquitous disease in cattle, sheep and goat farms. In France, a study has shown that nearly 30% of cattle herds have cattle seropositive for Q fever (Gache *et al.*, 2017)¹. The diagnosis of Q fever remains a daily challenge for practitioners (Viavoice 2020 study, Perceptions of farmers and animal and human health professionals on Q fever)². While diagnostic methods during an abortive episode have progressed, combining PCR and serological analyses³, screening for Q fever without abortions remains uncommon. A first step in herds with reproductive problems may be to identify if *Coxiella burnetii* is actively circulating. The objective of this study was thus to evaluate the frequency of detection of *Coxiella burnetii* by PCR applied to tank milk, in dairy cattle herds for which reproductive performance is disappointing.



Materials and methods

Two methods of animal recruitment were implemented, each corresponding to a different entry route for triggering investigations when reproductive troubles are suspected.

Firstly, recruitment via veterinarians was implemented. Eligible dairy cattle herds had to present both a clinical suspicion of Q fever "excluding abortion" (abnormal incidence of metritis, retained placentas, premature and/or weak calves) as well as an alert on reproductive performance: rate of renewal, success rate at first artificial insemination (AI), number of cows and heifers with more than 3 AI, objectified in particular by figures compared to the first quartile of the breed concerned on the website of the French observatory for cattle reproduction (Reproscope)⁴. Knowledge of farms has allowed to refute the involvement of most of the other classic factors negatively impacting reproduction (e.g., feeding, management, building, other health problems). Thus 288 farms were recruited between June 2020 and December 2021.

At the same time, recruitment was implemented by analyzing the annual reproduction reports, resulting from performance checks in September 2021. Farms located in Pays de la Loire (France) were targeted for poor reproductive performance. To limit bias, only Holstein breed herds of more than 30 animals, with a barn average between 8500 and 9500 kg/L/year were considered. Eligible herds had to have 3 degraded reproduction criteria (success rate at first AI, rate of cows with more than 3AI and percentage of late returns in heat according to the annual reproduction report as of March 31, 2021). 136 farms among this population were targeted.

The analysis method was the same in both cases: real-time PCR on bulk tank milk.



Results

- In the first population, 46% of the 288 farms investigated by veterinarians had a positive PCR (figure 1), attesting an active circulation of the bacterium on the farm, and with a probability that Q fever was the cause of the poor reproductive performances observed. On these farms, the continuation of the investigations to confirm a suspicion of *Coxiella burnetii* involvement may be relevant (for example with individual serological surveys on cows with reproductive problems).
- Of the 136 farms with reproductive problems targeted during the performance check, 21.3% were positive.

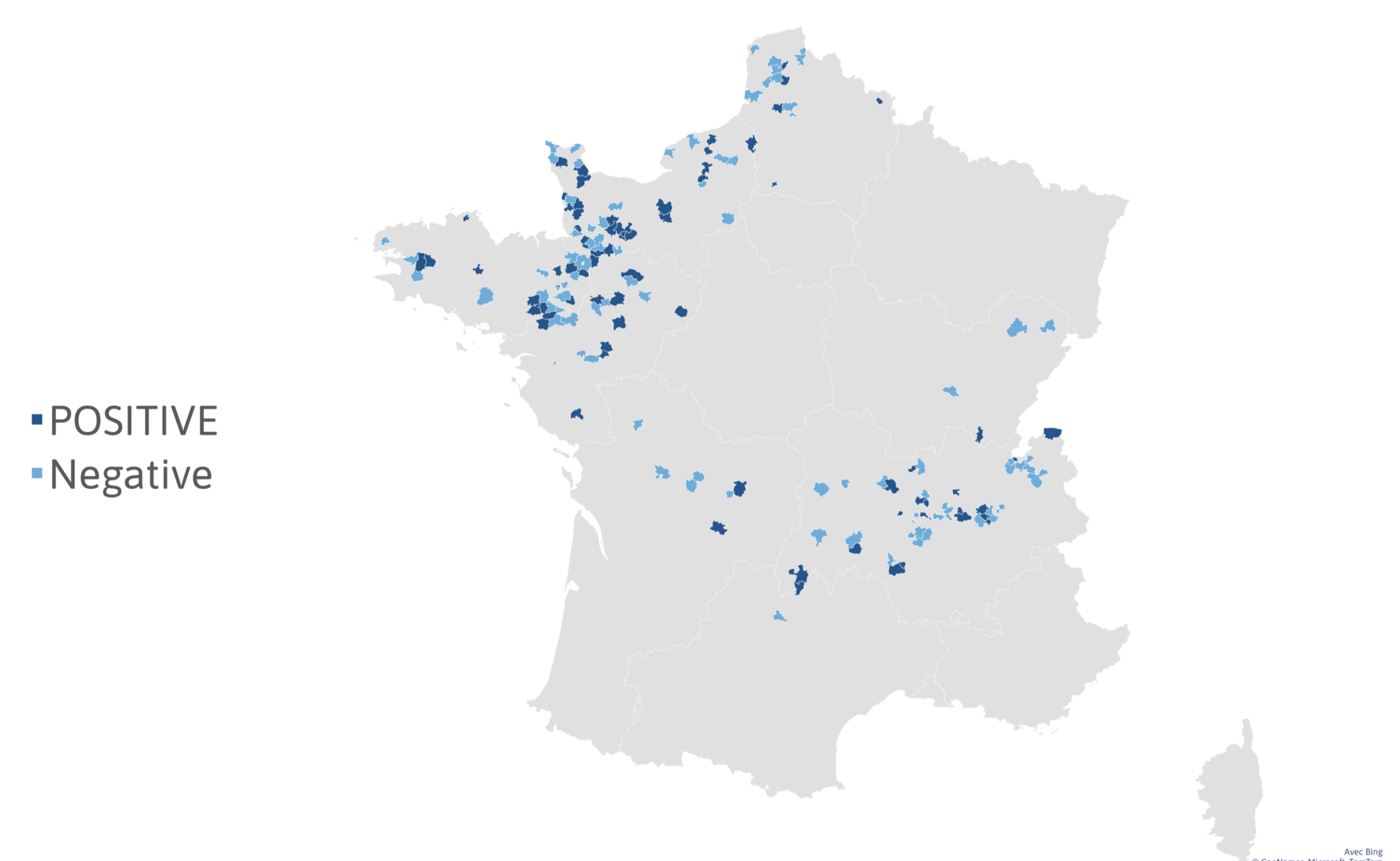


Figure 1: Distribution and status of dairy cattle herds recruited by veterinarians between June 2020 and December 2021

Conclusions

- **Whether on simple criteria (clinical, macroscopic analysis of reproductive performance), or detailed analysis of reproductive performance over a season, *Coxiella burnetii* was detected by PCR on bulk tank milk in 1 farm out of 5 to 1 farm out of 2, depending on the recruitment method of the farms.**
- **A bulk tank milk PCR can be a good first orientation analysis to judge the relevance of further investigations to confirm the involvement of *Coxiella burnetii* in reproductive disorders in dairy cattle.**