

# First serological evidence of Q fever circulation in ruminant herds in French Guiana

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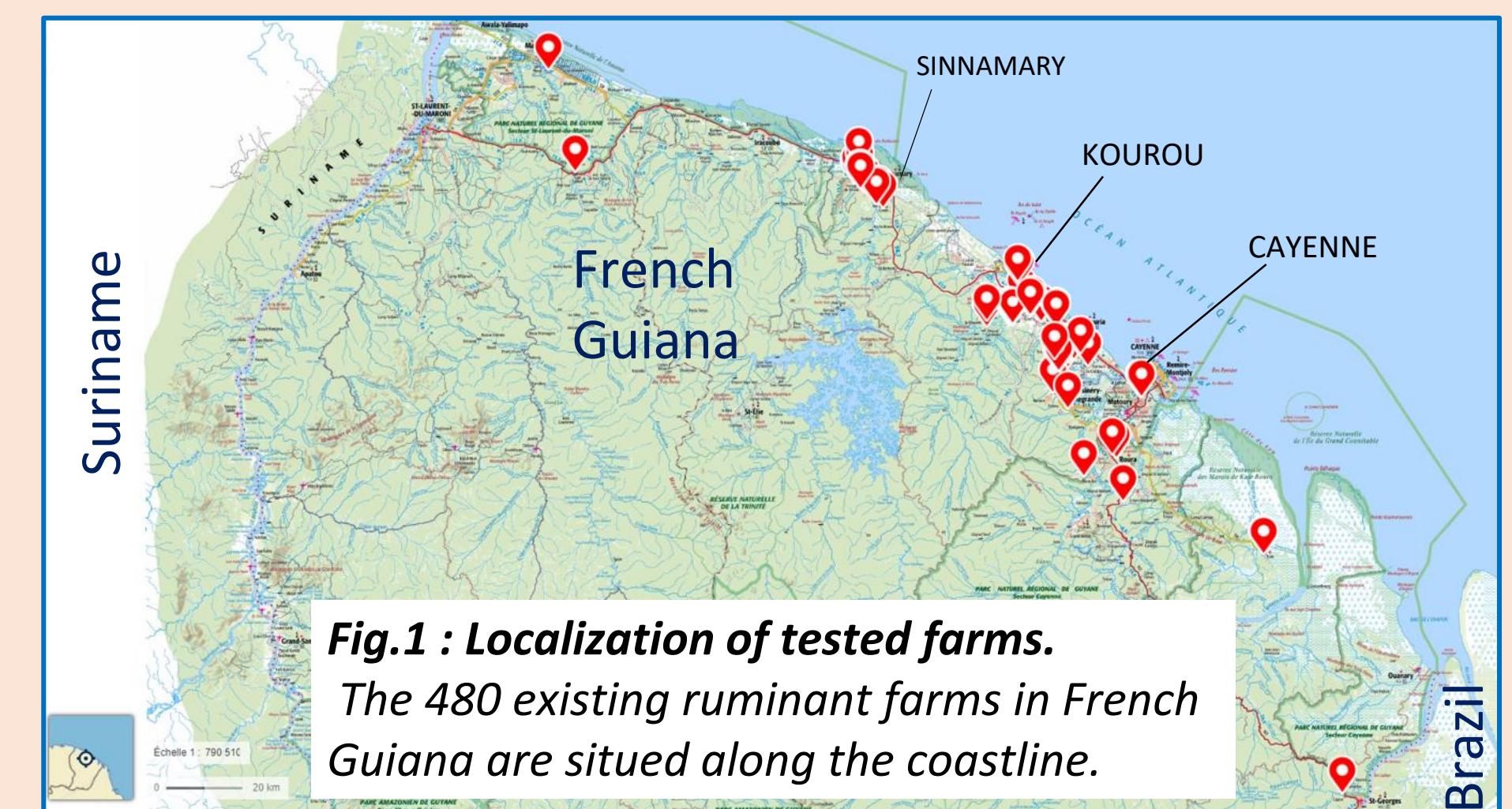
## BACKGROUND

- High incidence of human Q fever in French Guiana.
- Incomplete knowledge about animal reservoir(s) of this bacterial zoonosis in a singular hyperendemic area.
- Presence of a sheep farm within 5 km is an exposition risk factor for human seropositivity in the department\*.

\*Flamand C, in press

## OBJECTIVES

- Seroprevalence assessment of Q fever in ruminant herds in French Guiana
- Determine whether domestic ruminants may play a role as animal reservoir in the department



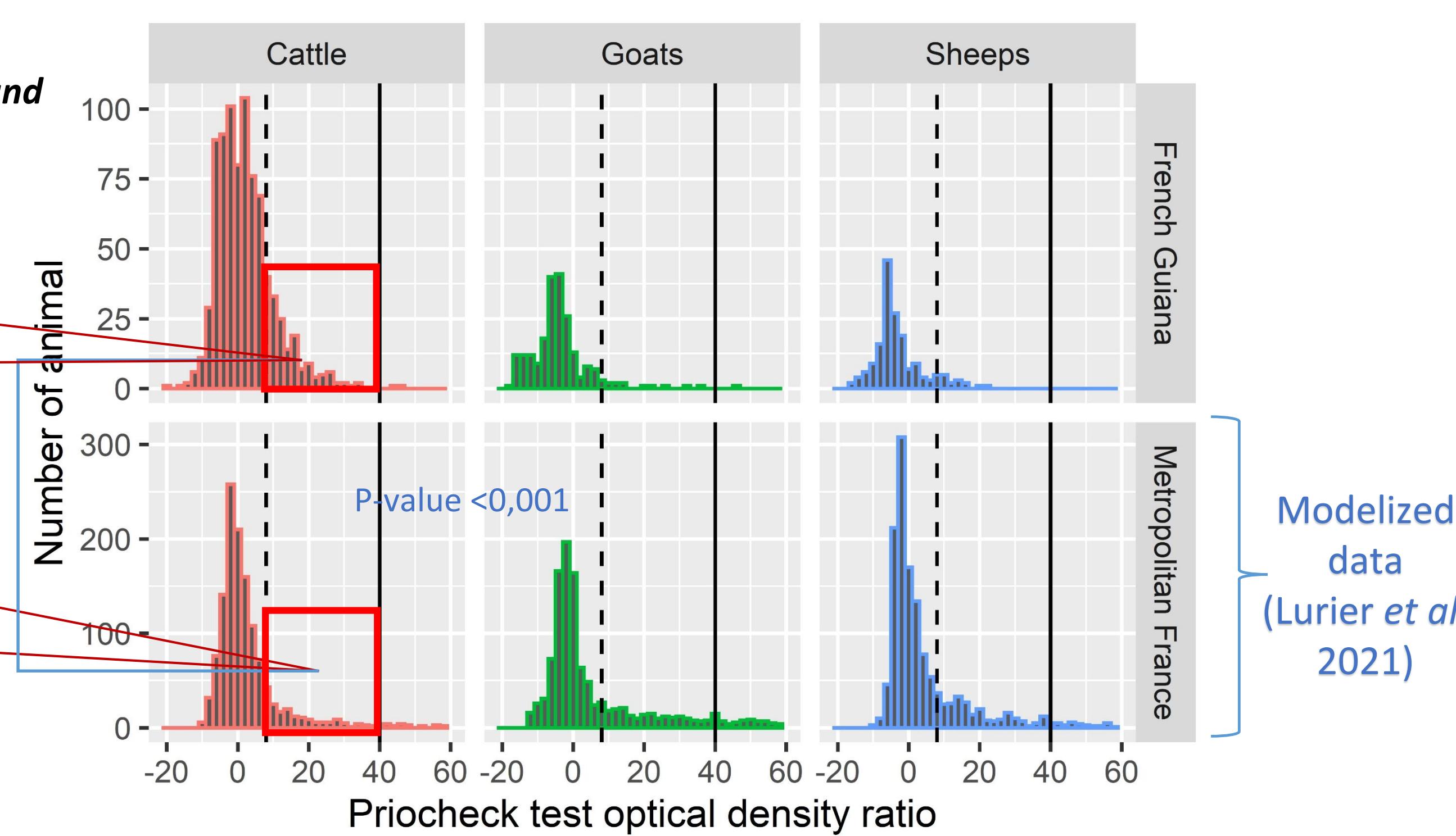
## MATERIAL & METHODS

- Sampling :** Blood from 834 cattle, 219 goats and 175 sheeps in 86 farms from 2015 to 2017 (over 480) conjointly with brucellosis prophylaxy (DGTM-DEAAF).
- Analysis method :** Applied Biosystems PrioCHECK Ruminant Q fever Ab Plate Kit (Thermo Scientific™) was used, an indirect ELISA based on Phase I+II whole antigen prepared from an ovine strain isolated in metropolitan France. Analysis setting up and performances were verified in collaboration with Q fever NRL.
- Statistical analysis :** Prevalence calculation and ajustment with test sensitivity and sensibility values were obtained from modelised metropolitan data\*\*.

\*\*Lurier T, Rousset E, Gasqui P, Sala C, Claustre C, Abrial D, Dufour P, de Crémoux R, Gache K, Delignette-Muller ML, Ayral F, Jourdain E. Evaluation using latent class models of the diagnostic performances of three ELISA tests commercialized for the serological diagnosis of *Coxiella burnetii* infection in domestic ruminants. Vet Res. 2021 Apr;52(1):56. See Poster # 231.

## RESULTS

**Fig.2 : ODR distribution in ruminants in French Guiana and metropolitan France**



**Table 1 : Apparent seroprevalence (manufacturer's threshold) and real seroprevalence (according to modelisation)**

| Year    | Species | Number | Number of positives (OD>40%) | Apparent prevalence [CI 95%] | Number of positives (OD>8%) | Real prevalence [CI 95%] |
|---------|---------|--------|------------------------------|------------------------------|-----------------------------|--------------------------|
| 2015    | Cattle  | 275    | 1                            | 0.4 [0 ; 2.3]                | 48                          | 13.2 [7 ; 20.3]          |
|         | Goat    | 86     | 0                            | 0 [0 ; 5.3]                  | 4                           | 0.9 [0 ; 6.7]            |
|         | Sheep   | 46     | 4                            | 8.7 [2.8 ; 21.7]             | 6                           | 4.8 [0 ; 19.1]           |
| 2016    | Cattle  | 296    | 2                            | 0.7 [0.1 ; 2.7]              | 85                          | 28 [20.6 ; 37.5]         |
|         | Goat    | 31     | 0                            | 0 [0 ; 13.7]                 | 6                           | 16.2 [2.9 ; 35]          |
|         | Sheep   | 62     | 0                            | 0 [0 ; 7.3]                  | 8                           | 4.4 [0 ; 16.8]           |
| 2017    | Cattle  | 263    | 2                            | 0.8 [0.1 ; 3]                | 19                          | 0.7 [0 ; 4.9]            |
|         | Goat    | 102    | 2                            | 2 [0.3 ; 7.6]                | 5                           | 0.9 [0 ; 6.2]            |
|         | Sheep   | 67     | 0                            | 0 [0 ; 6.8]                  | 7                           | 2.5 [0 ; 12.7]           |
| 2015-17 | Cattle  | 834    | 5                            | 0.6 [0.2 ; 1.5]              | 152                         | 14.2 [10 ; 19.4]         |
|         | Goat    | 219    | 2                            | 0.9 [0.2 ; 3.6]              | 15                          | 1.8 [0 ; 6.6]            |
|         | Sheep   | 175    | 6                            | 2.3 [0.7 ; 6.1]              | 21                          | 3.7 [0 ; 10.8]           |

Accounting for the Se and Sp at the 8% threshold

| Species | Sensibility        | Specificity        |
|---------|--------------------|--------------------|
| Cattle  | 0.86 [0.71 ; 0.93] | 0.92 [0.9 ; 0.94]  |
| Goat    | 0.92 [0.87 ; 0.96] | 0.95 [0.93 ; 0.96] |
| Sheep   | 0.91 [0.83 ; 0.96] | 0.92 [0.9 ; 0.94]  |

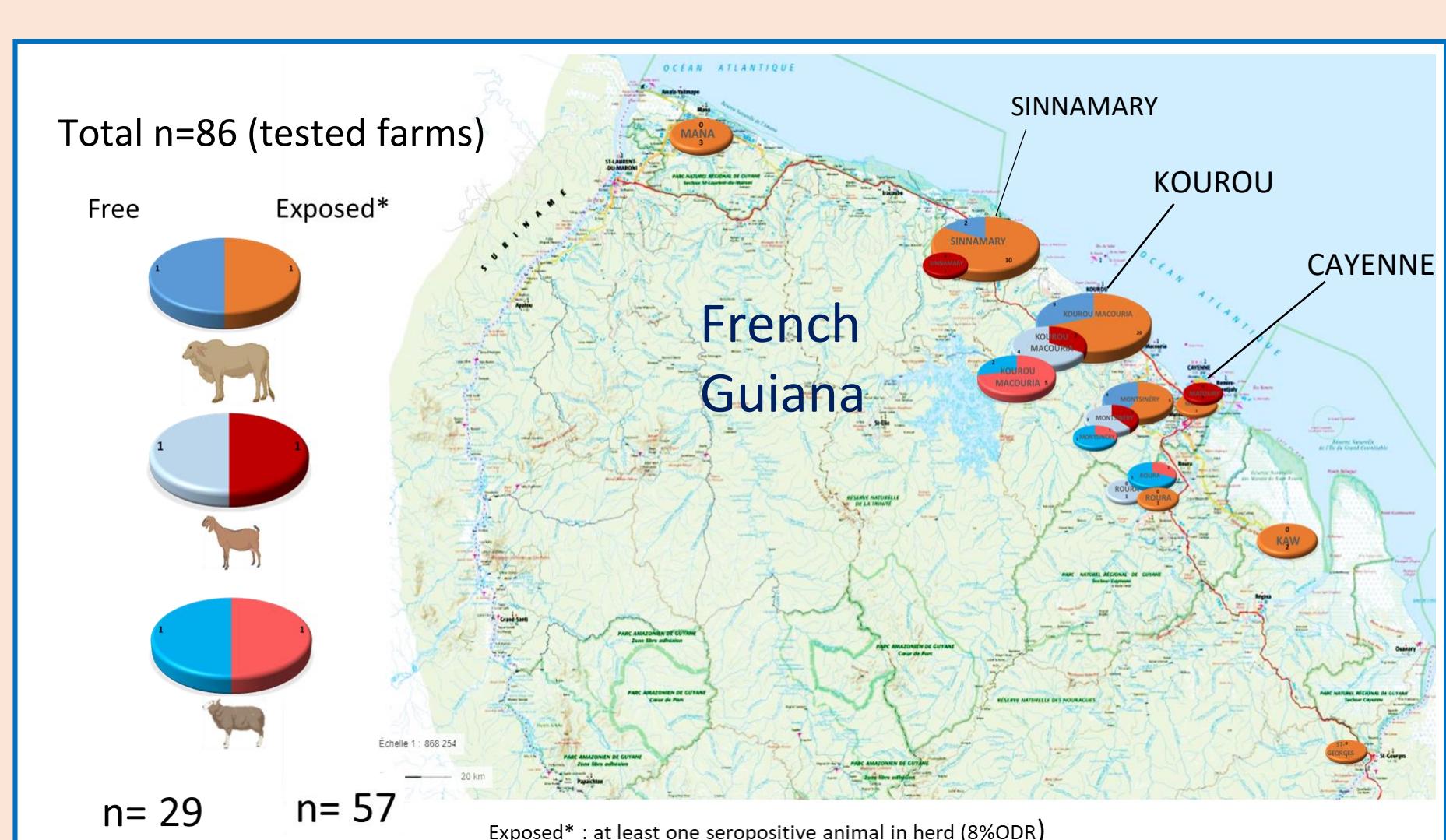
Sensitivity and specificity estimation setting the threshold at 8% ODR

Reliable Se & Sp values  
 for Metropolitan France

## CONCLUSION

- First large-scale study of ruminant livestock in French Guiana for Q fever seroprevalence.
- Evidence of a potential important *Coxiella burnetii* exposition, which had not been shown until now:
  - Highest real prevalence in 2016 in cattle and goats. (dotted box in Table 1)
  - 66,3 % of sampled herds have been exposed to *Coxiella burnetii*.
  - Real prevalence estimated at 14,2 % in cattle with confidence interval [10 ; 19,4].
- Differences observed between guyanese data and metropolitan data with higher prevalence in cattle than in goats and sheep in French Guiana

Phenomenon in cattle to explore



## PERSPECTIVES

- Consolidate the evaluation of Q fever serological tests (on Guianese sera).
- Deepen studies on the epidemiological situation in ruminants: serology and PCR detection, diagnosis of abortion, spatio-temporal studies, search for risk factors.
- Improve and/or develop diagnostic tools suitable for epidemiological investigations in various animal reservoirs and environmental sources in French Guiana.
- Study the diversity of strains circulating in Guiana, harbouring probably antigens different to the antigen used in the Applied Biosystem Priocheck commercial kit.