Assessment of four sampling methods to detect *Mycoplasma hyopneumoniae* in live pigs using a Bayesian approach

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Aim

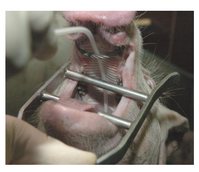
To assess the abilities of **four sampling methods** to detect ***Mycoplasma hyopneumoniae*** (Mhp) by nested-PCR on **live pigs in a field context**.

Material and methods

One herd chronically affected by respiratory disorders
A sample of **60 pigs** was constituted by a **random selection** from a batch of **finishing** pigs.

Each pig was submitted to **4 SAMPLINGS**

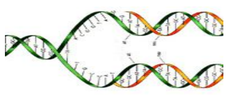
- **Oral-pharyngeal brushing**
  with a brush protected by a catheter
  (Ori Endometrial BrushTM, Orifice Medical AB, Ystad, Sweden)



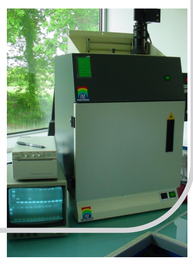
- **Tracheo-bronchial swabbing**
  with a sterile catheter used for tracheal intubations
  (Euromedis, Neuilly-sous-Clermont, France)
- **Tracheo-bronchial washing**
  by transtracheal aspiration of 10 mL of PBS with a sterile catheter

- **Nasal swabbing**
  with "CytoBrushs" (VWR International, Fontenay-sous-Bois, France)

LABORATORY ANALYSES



Mhp DNA was identified by modified **nested-PCR** [1]



STATISTICAL ANALYSIS

WinBUGS [3]

·The **sensitivity** and **specificity** of each sampling method were estimated using a **Bayesian analysis framework** [2].

·**Parameters prior distributions** were based on previous **external data**.

·Since samples taken from SPF pigs gave negative results, a **deterministic constraint** was used for the **specificities** of all sampling methods which was taken as equal **to one**.

·The **sensitivity of the parameter estimation** to the choice of priors was assessed by comparing **3 models** incorporating different **sets of prior distributions** ranging from **vague priors** (M1) to **more informative ones** (M3).

·**Model convergence** was assessed using the Raftery and Lewis test and the Gelman-Rubin diagnosis.

·The **models were compared** on the basis of the **d**eviance **i**nformation **c**riterion, the **number of parameters estimated in the model** and of the **Bayesian p-value**.

Results and Discusion

✓Mhp was detected in:

- **13.3 %** of the pigs by nasal swabbing
- **40.0 %** of the pigs by oro-pharyngeal brushing
- **53.3 %** of the pigs by tracheo-bronchiolar washing
- **60%** of the pigs by tracheo-bronchiolar **swabbing**

✓Whatever the model, nasal swabbing had the **lowest** sensitivity and tracheo-bronchial swabbing the **highest** with mean sensitivities of 19 % and 74 %, respectively (Figure 1).

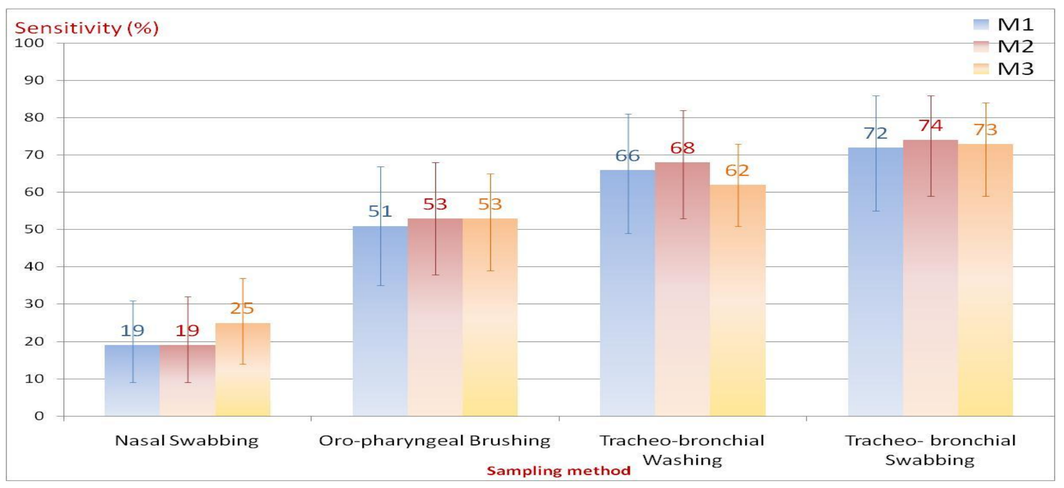


Figure 1: Mean and 95 % Credibility Interval of posterior distributions of the sensitivity of the four sampling methods of Mhp detection by nested-PCR, according to the 3 models with different prior distributions (60 pigs sampled, specificity=1 for all models and sampling methods)

✓Since the **infection status** of the pigs tested under these conditions **was unknown**, and **no gold standard** is available, the sensitivities of the sampling methods were analyzed using a Bayesian approach. To the best of our knowledge, **this is the first field study** to use such an approach to evaluate four sampling methods for assessing Mhp infection in live pigs.

As far as practical aspects are concerned, swabbing the tracheo-bronchial area with a sterile catheter is almost as convenient as obtaining nasal swabs under field conditions and only requires adding a gag to the sampling equipment. Tracheo-bronchial swabbing ensures a gain in diagnostic accuracy, being 3.5 times more sensitive than the nasal swabs commonly used in pig farms.

References

[1] Calsamiglia et al. (1999). *J. Vet. Diagn. Invest*. 11, 246-251.

[2] Berkvens et al. (2006). *Epidemiology* 17, 145-153..

[3] Spiegelhalter et al. (1996). Medical Research Council Biostatistics Unit, Cambridge, UK.