Air Sampling as a tool for detection and surveillance of respiratory pathogens in pig herds

Preliminary results using commercial air samplers in nine units across three farms

Anne Feijen [1,2], Frank Vandenbussche [1], Dominiek Maes [2] and Marylène Tignon [1]

[1] Sciensano, Belgium [2] Ghent University, Belgium

Introduction

The Porcine Respiratory Disease Complex (PRDC) is a multifactorial disease in pigs and leads to significant economical losses worldwide. Current diagnostics are invasive, fragmented and performed on individual animals.

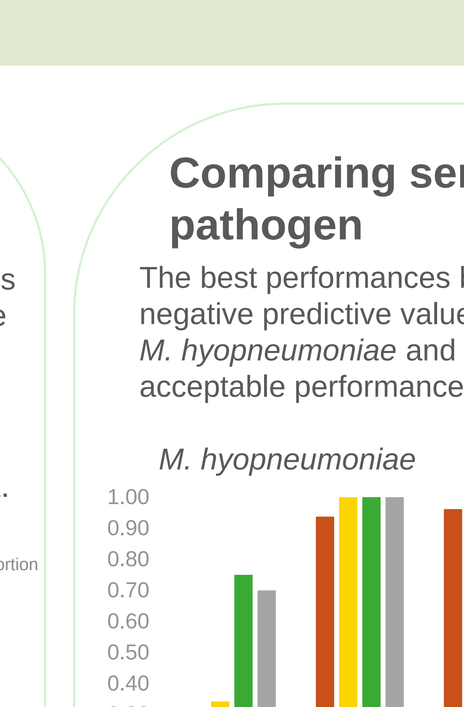
There is a need for a global, non invasive monitoring system for PRDC in which air sampling could play a crucial role.

Coriolis µ
Bertin Technologies

MD8 Airport
Sartorius

AeroCollect
AeroCollect A/S

Methodology



Samples taken in 3 units per farm
- Diverse air samples: Coriolis µ, MD8 Airport and AeroCollect
- Conventional methods: serum (PRRSV EU/NA), nasal- (swIAV) and tracheobronchial swabs (*M.hyopneumoniae*)

Sample processing via
- Concentration (Coriolis µ)
- Filter dissolution (MD8 Airport)
- Washout with PCR-grade water (AeroCollect)

Extraction performed on all samples (except AeroCollect)

Commercial qPCR for detection of
- *M. hyopneumoniae*
- PRRSV EU/NA
- swIAV

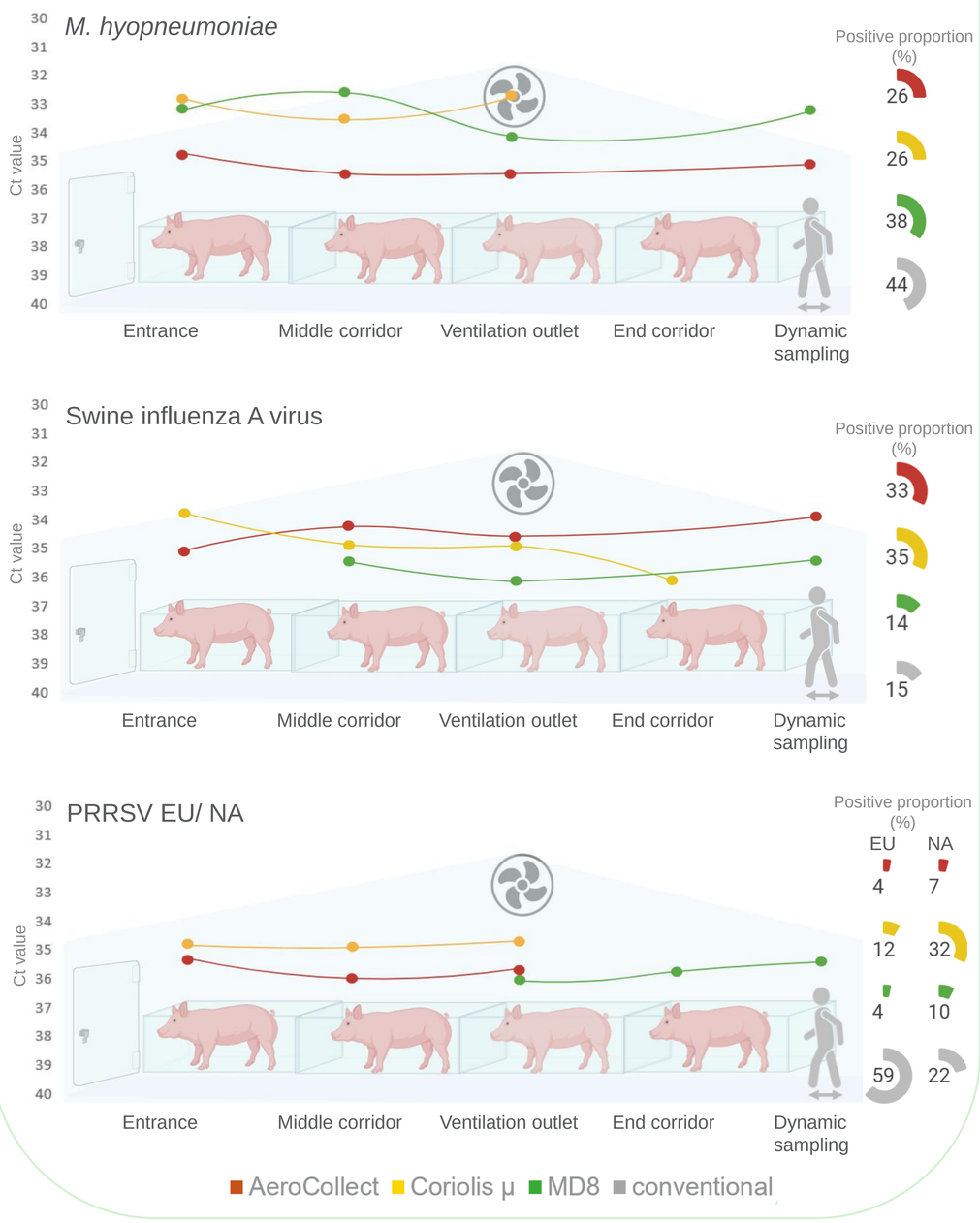
Compartments are considered positive if pathogen detection in:
- At least one conventional sample type
- Or two air samples with a Ct value < 36.5

Objective: Comparing the performance of air sampling devices (Coriolis µ ®, MD8 Airport ®, and AeroCollect®) with conventional sampling methods for detecting *Mycoplasma hyopneumoniae*, PRRSV EU/NA, and swine influenza A virus (swIAV).

Mean Ct value by location and positive proportion by device

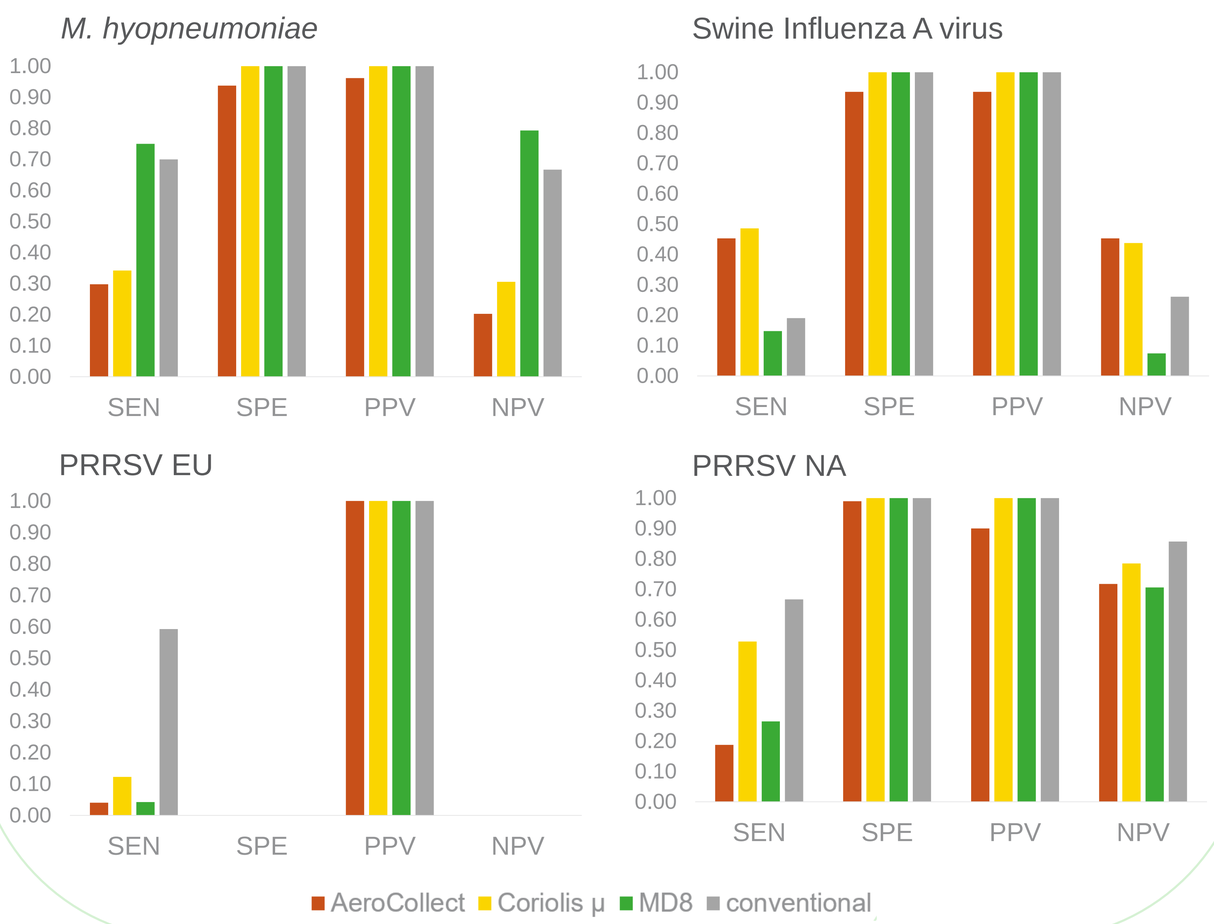
The graph presents the mean Ct values per sampling by device across various locations. To the right, the proportional percentages of positive samples are shown for each device.

Dynamic sampling was most effective for *M. hyopneumoniae* (MD8 Airport) and swIAV (AeroCollect). For PRRSV EU and NA, the best results were obtained by sampling the ventilation outlet with Coriolis µ.



Comparing sensitivity and specificity of devices by pathogen

The best performances based on sensitivity (SEN), specificity (SPE), positive and negative predictive value (PPV and NPV respectively), are the MD8 Airport for *M. hyopneumoniae* and the Coriolis µ for swine influenza A virus. AeroCollect showed acceptable performance for swine influenza A only.



Conclusion and future work:

All samplers detected the pathogens. MD8 Airport was most suitable for bacteria, Coriolis µ for both viruses. Highest detection was achieved through dynamic sampling (MD8 Airport) and targeting the ventilation outlet (Coriolis µ). Further research with a larger sample size is needed to confirm these findings.

Health
Food Chain Safety
Environment

The research that yielded these results, was funded by the Belgian Federal Public Service Health, Food Chain Safety and Environment through the contract RF23/21- AIRPIG. It also benefits from European PRRS Research Awards from Boehringer Ingelheim (2023)

Interested?
Contact: Anne Feijen
T. +32 479 90 54 07
anne.feijen@sciensano.be