Application of filter standards to evaluate used filters against PRRSV

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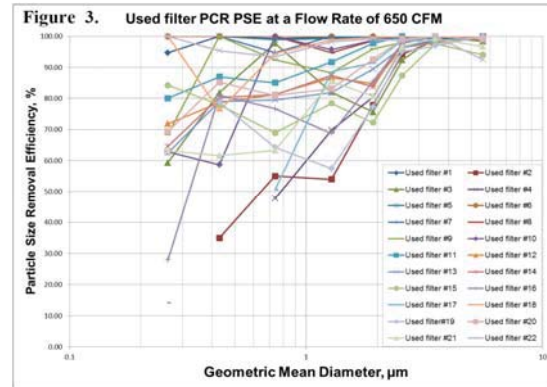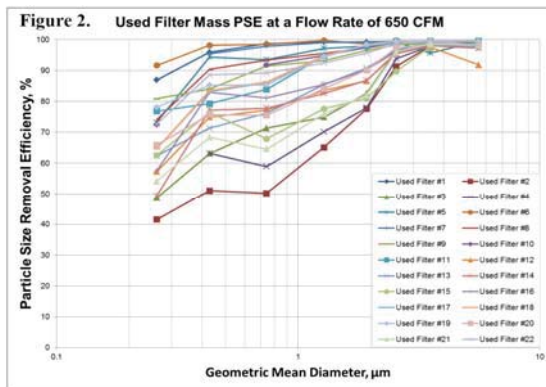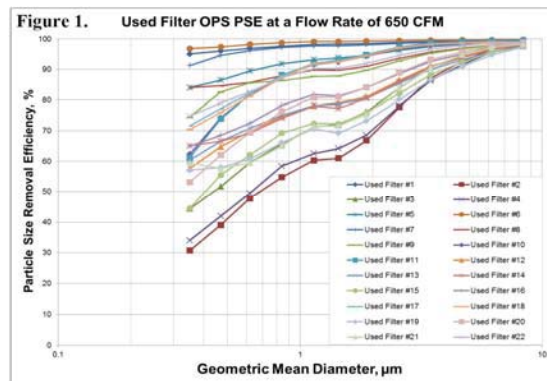
Background
- Air filtration systems have been widely adopted as a method of mitigating aerosol transmission of PRRSV in swine facilities.
- Filters are designed to entrap particles of specific sizes with specific efficiencies for each particle size range.
- Recently, we showed that testing filter efficiency for PRRSV can follow the standards established by the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE 52.2 standard).

Objective
Apply filter ASHRAE 52.2 standards to test used filters and compare particle size removal efficiencies (PSE) for PRRSV among methods employed that measure total particles, mass and PRRSV.

Figures 1, 2, 3
Compare the particle size removal efficiencies (PSE) in 12 to 36 month old filters (*) using an optical particle counter (OPC) that measures total particles (Fig 1), fluorometer that measures fluorescein as a measure of mass (Fig 2), and a quantitative RT-PCR that measures amount of PRRSV (Fig 3).

Figure 1. Used Filter OPS PSE at a Flow Rate of 650 CFM

Figure 2. Used Filter Mass PSE at a Flow Rate of 650 CFM

Figure 3. Used filter PCR PSE at a Flow Rate of 650 CFM

Conclusions
- Filter efficiency measured as total particles, mass, or as PRRSV particles in general was similar; however the reported efficiency was more variable with PRRSV than with total particles or mass.
- Significant variation and discrepancy was observed at lower particle sizes <2 μm (reported filter efficiency was affected by sensitivity of the PCR).
- Some filters showed a change in filter efficiency as filters aged.
- Filter efficiency to evaluate used filters for PRRSV can follow ASHRAE 52.2 standards.

Implications
- Producers and veterinarians can use ASHRAE 52.2 filter testing standards to evaluate changes in their filters efficiency.
- Although standardized testing methods can be applied to used filters, guidelines are still needed to assess when filters should be changed.
- There is a need to have open public domain tests that are reproducible between laboratories.