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SDEC Partners Research Update

Project Update: Effect of PRRSV aerosols particle size on air filtration efficiency

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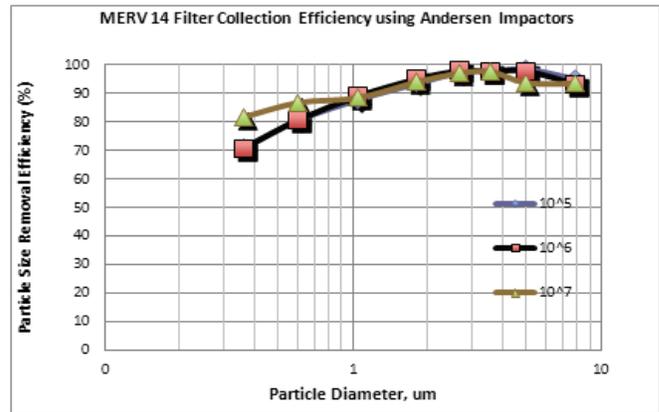
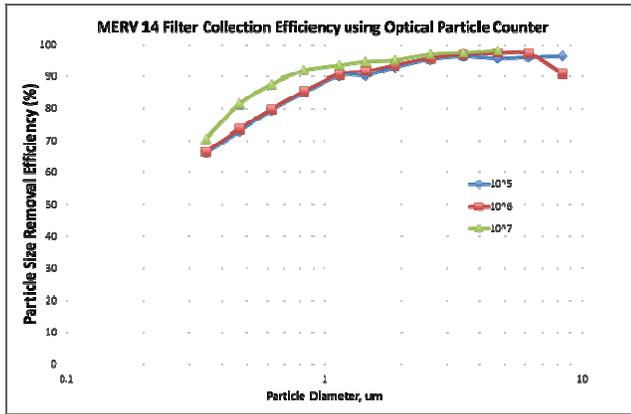
Background

- PRRSV infectious aerosols represent a continuous risk for new PRRSV infections in breeding herds. Air filtration in breeding herds is effective at reducing incidence of PRRSV breaks.
- Filters have a different efficiency in capturing particles of different sizes. Smaller sizes of particles tend to remain suspended in the air and represent a higher risk for aerosol transmission. Filtered breeding herds may be at risk of PRRSV aerosol transmission if they get saturated with the range of particles of the right size to pass through the filters.
- Understanding the aerosol's particle size distribution that PRRSV is associated with is important to determine the risk of aerosol transmission and the risk for potential failure of air filtration systems.
- Filters are designed to entrap particles of specific sizes with specific efficiencies for each particle size range
- MERV 14:
 - 0.3-1 μ m >75% efficiency à \leq 25% penetration
 - >1 μ m >90% efficiency à \leq 10% penetration
- MERV 16:
 - 0.3-1 μ m >95% efficiency à \leq 5% penetration
 - >1 μ m >95% efficiency à \leq 5% penetration

Objective

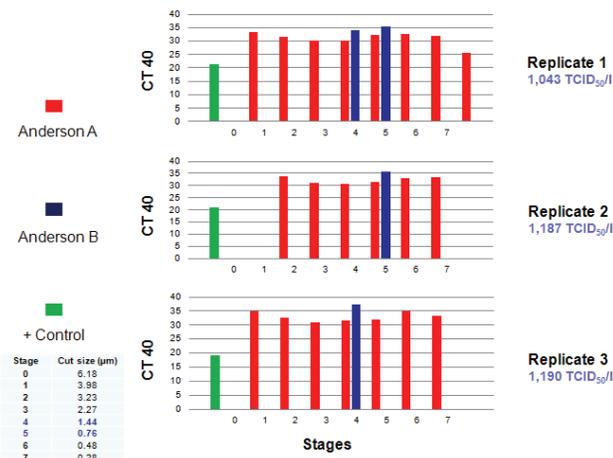
To assess the efficiency of commercially available filters at removing PRRSV from aerosols of selected particle sizes

Results

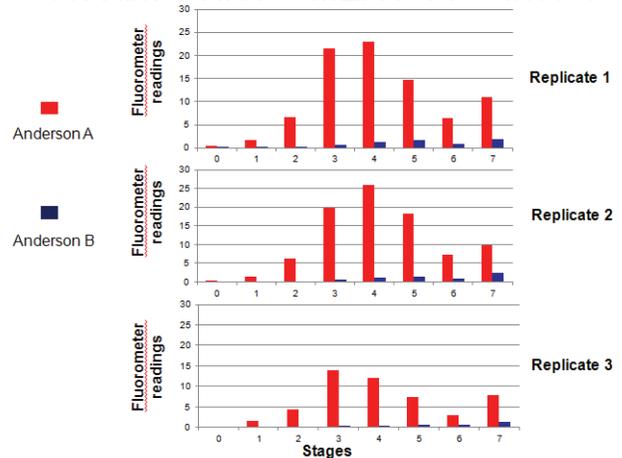


In the MERV 14 filter, PRRSV was detected in particle size aerosols below stage 4 which included particles <1.44 microns and of the respirable range

Results PRRS – MERV 14 – 1×10^4



Results PRRS – MERV 14 – 1×10^7



Conclusions

- Overall study showed that PRRSV associated with small particle size aerosols can penetrate filters
- Filter efficiency was affected by particle size but efficiency was not affected by the virus log concentration in the initial solution
- OPC and the fluorometry readings demonstrated good agreement and repeatability for filter efficiency and particle penetration .

Implications

- A main question remains to know what aerosol particle size is PRRSV associated with under field conditions.
- Future work also includes development of ASHRAE standards to determine filter longevity under field conditions