

Researchers Get Testy with Airborne Pathogens

By Geoff Geddes, for Swine Innovation Porc

AIRBORNE PATHOGENS in pig barns are like unwelcome house guests: intrusive and apt to do harm if they stick around. Not only can they be an economic burden for producers, but such pathogens sometimes elude biosecurity measures.

While there's little dispute that filter systems are the key to combatting these intruders, researchers saw a void when it came to testing filter performance. As a means of addressing that, the project "Bio-exclusion and bio-containment strategies to control epidemics resulting from airborne viral and bacterial transmission" was born.

Putting filtration to the test

"The idea was to take various filtration devices and test them to determine their effectiveness against viruses and bacteria," said Dr. Caroline Duchaine, Full Professor - Department of Biochemistry, Microbiology and Bioinformatics at Laval University.

Currently, filters are sold based only on their ability to capture dust. Following an extensive literature review, Dr. Duchaine and her collaborators - Laura Batista, Stéphane Godbout, Marie-Aude Ricard and Jean-Gabriel Turgeon - designed and built a new testing platform in 2016. The platform would evaluate the capture efficiency of different pre-filter and

filter combinations for influenza, PRRSv and virulent *Streptococcus suis* serotype 2 models.

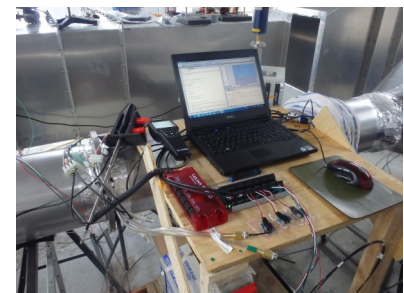
Progress is a team sport

"I was surprised to learn that there was no such testing system available prior to our project," said Dr. Duchaine. "We are probably the only lab in the world doing this sort of development. It's a great opportunity to bring together engineers, microbiologists and veterinary scientists to help pig producers keep their animals safe from disease."

Of course, when you are going where no researcher has gone before, getting there is bound to be a challenge.

"For the testing, we had to create aerosols loaded with virus and bacteria, but it's tough to mimic the particle sizes that carry microbes in a swine barn. The challenge was to make the artificial model as close to the natural environment as possible."

With that accomplished, Dr. Duchaine and her colleagues are focused on the many benefits for industry.



Left: Testing platform. Above: Set-up used to collect data. Source: Centre de développement du porc du Québec

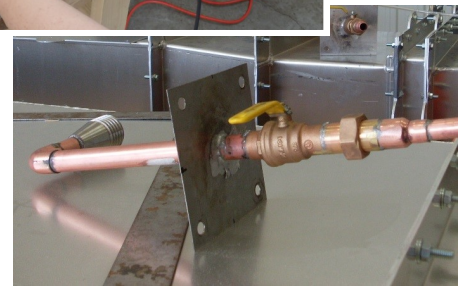


Benefits package

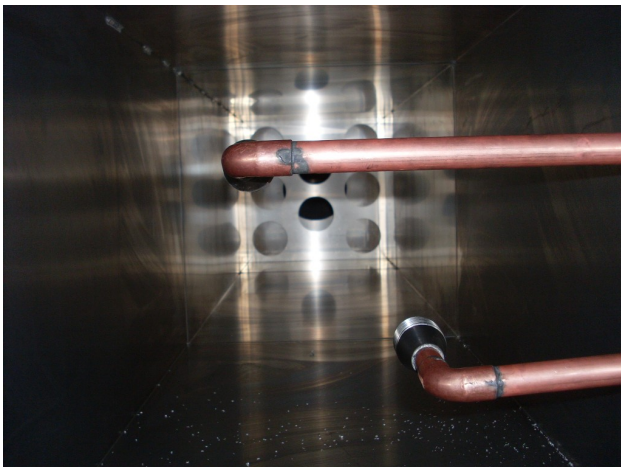
“If we can demonstrate that the filtration requirements for capturing infectious disease agents are less than what producers are currently buying, it could save them a lot of time and money,” said Dr. Valerie Letourneau, project coordinator.

As well, this newly developed platform is a tool that can be used to design affordable filtration systems. In the future, the platform could help determine if used filters are still as efficient as new ones in capturing airborne viruses. It may also test the hypothesis that old filters can be a source of airborne viruses and bacteria through the re-emission of collected dust into the environment.

“Filtration companies tell producers to change filters when they have a pressure drop in their ventilation system, but that’s an expensive process,” said Dr. Letourneau. “We hope we can accurately describe the life span of filters and give producers good advice for the capture of dust and infectious agents.”



Above: Verification of data. Below: Sampling probes.
Source: Centre de développement du porc du Québec



Sampling probes used inside testing platform.
Source: Centre de développement du porc du Québec

Like any good research, this project aims to fill some critical gaps in our knowledge base. Though people often think that science has a handle on how far a disease like PED travels and how to capture it, little is actually known about bio aerosols, so this collaboration among professionals is a big step towards changing that.

“The overall objective of our lab is to better understand infectious agents in the swine barn, how they behave and the best ways of controlling air quality in that environment,” said Letourneau.

Given the financial implications of disease in the hog industry, that understanding could have a big impact on the producer’s bottom line. Whether it’s unwelcome pathogens or uninvited guests, the goal is the same: Get them out before the damage is done.

