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Testing the Biosecurity of a Prototype Swine Transport Trailer

With increased demands for improved biosecurity in the swine industry to prevent the spread of infectious diseases including Porcine Reproductive and Respiratory Syndrome virus (PRRSv), a project developed by Prairie Swine Centre and the Canadian AgriSafety Applied Science Program is focused on the design and testing of a prototype trailer that offers enhanced biosecurity during transport. The prototype trailer was designed as a completely enclosed trailer with air filtration and climate control sensors that provides a stable transportation environment for swine that serves to improve both biosecurity and animal welfare.

Testing for Biosecurity



As part of the *Improving Biosecurity and Welfare of Animals During Transport* project, a series of tests are planned to be conducted with the goal of assessing the performance of the innovative features of the prototype trailer in preventing airborne pathogen contamination to the pigs during transport in addition to providing an acceptable climate for pigs. Prior to the tests, modifications to the prototype trailer have been implemented based on the results and observations from the completed AgriSafety-funded project, as well as inputs and feedback from various pig production stakeholders. As shown in the figure below some of the modifications included (a) the installation of drinking and misting systems, as well as (b) upgrading of the temperature relative humidity (RH), (c) air velocity, and (d) carbon dioxide sensors for close monitoring of the environmental conditions inside the animal compartment.

Road tests will be conducted to evaluate the operation of the modified prototype trailer under actual transport conditions in relation to animal welfare and maintaining optimal thermal conditions within the animal compartment. Weaned pigs will be loaded inside the trailer and will be monitored in real-time through the 5-hour trip by utilizing video cameras mounted on each deck. Following the road tests, disease-challenge tests will be carried out to assess the effectiveness of the air filtration system in maintaining biosecure conditions for the pigs during transport.

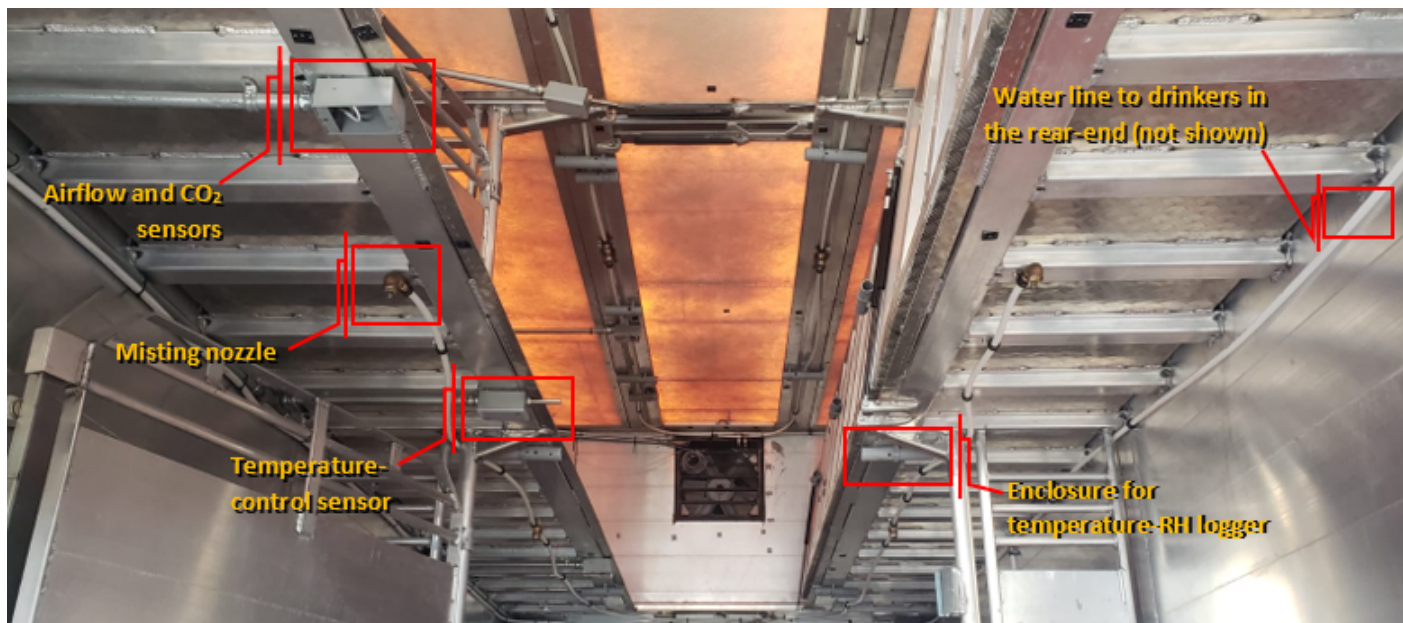


Figure 1. Lower deck of the modified prototype trailer showing the drinking and misting systems as well as the sensors for temperature, relative humidity, airflow and carbon dioxide monitoring.

The air filtration system is composed of MERV-8 pre-filters and MERV-16 main filters. With the ventilation and air filtration systems in operation, the loaded trailer will be exposed to ventilation exhaust air from a barn known to be positive for Porcine Reproductive and Respiratory Syndrome virus (PRRSv).

Experimental parameters for the disease-challenge tests include:

- 6 replicates in total, 3 in summer and 3 in winter
- 1 treatment and 1 positive control in each replicate. Treatment groups will involve exposure of loaded trailer with the ventilation and air filtration systems in operation, while the positive controls groups will have pigs in the trailer but without the air filtration system installed.
- During each test, airborne viral load will be assessed by collecting air sampled at the upstream (before the filter) and downstream side of the trailer (animal compartment) during the exposure period

After the exposure, pigs will be quarantined for 14 days and observed for symptoms of disease. During the observation period, rectal temperature and daily weight gain will be measured, and blood samples will be collected for serologic response and viremia. In addition, pigs will be examined daily for clinical signs such as coughing, sneezing, respiratory problems, among others. Overall trailer performance in protecting against airborne disease infection will be assessed based on the number of pigs in the control and treatment groups that exhibit signs of disease during the observation period.