Technology and methodology development for improved biosecurity in livestock transport vehicles – Phase 2: Preliminary system development and data acquisition

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Project Status: Completed in 2018

This study demonstrated that:

- **Heating trailers at 75°C consistently for 15 minutes can inactivate pathogens and therefore increase biosecurity.**
- **When compared to current washing procedures, the trailer vacuuming and washing system prototype can:**
  - **Remove more material from the trailer before washing**
  - **Use less water**
  - **Contain waste**
  - **Improve worker operating conditions**

  However, in order to for the system to be commercially viable, it would need to be automated.

Why was this study done?

The health of pigs during transport is potentially compromised by the spreading of pathogens due to the difficulty of disinfecting livestock transport trailers. The main goals of this project were to 1) develop a vacuum wash system in order to rapidly clean transport trailers to a higher standard and 2) investigate if heating trailers would ensure the deactivation of all pathogens.

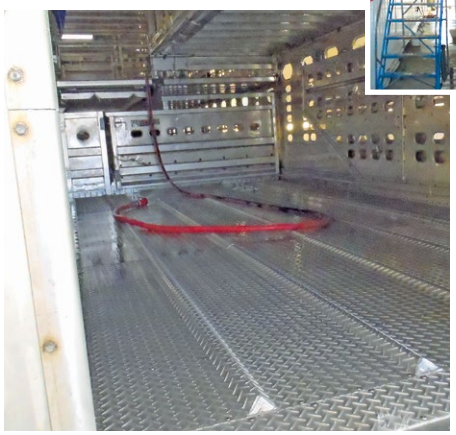
What was done and what was the outcome?

Verification that heating trailers can inactivate pathogens

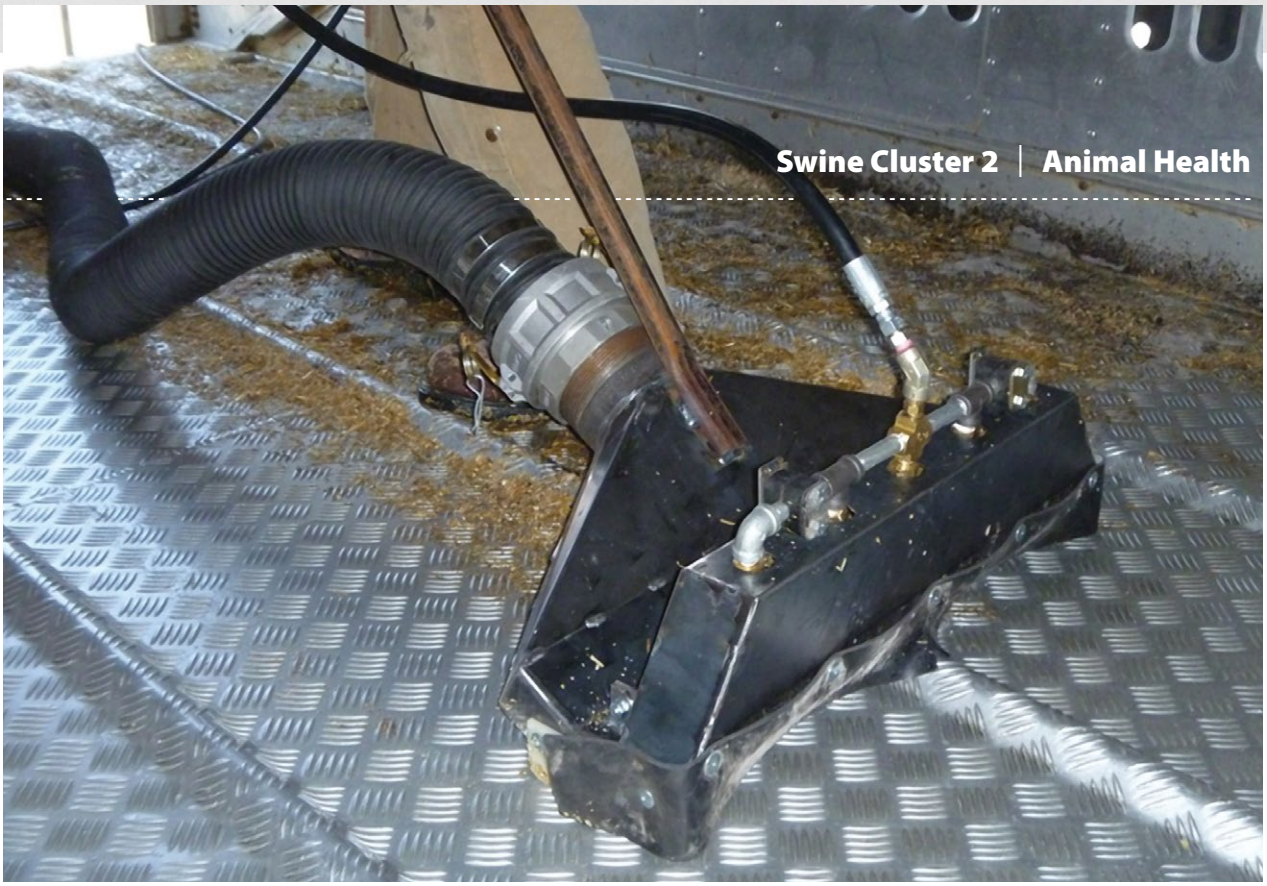
Researchers found that heating trailers to a temperature of 75°C and maintaining this for 15 minutes was necessary to deactivate the porcine epidemic diarrhea (PED) virus, which is very resistant to heat.

Next, using a temperature data collection system installed within the trailers, the procedure was applied during typical 'thermal assisted drying and decontamination' (or 'trailer baking') cycles of commercial livestock transport trailers. Results showed that 87% to 99% of interior surfaces of trailers did in fact reach 75°C for 15 minutes. Consequently, up to 13% of the trailer surface areas did not meet the required conditions for deactivating PED virus. Improving the configuration of side panels to facilitate airflow and refining the heating air distribution both showed potential in ensuring that 100% of the trailer met the required conditions. Researchers also discovered that fecal matter served as an excellent insulator. Therefore, using efficient washing methods prior to heating is essential in order to remove all clumps of organic material that may contain pathogens.

Trailer wash facility. Source: PAMI



Condition of floor after flood wash. Source: PAMI



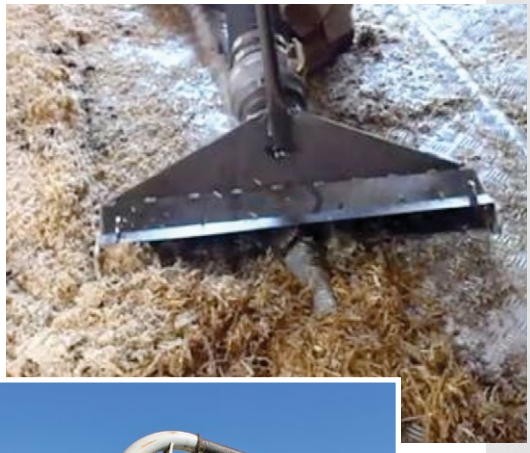
Second pass with the wet attachment to perform a pressure wash combined with vacuuming. Source: PAMI

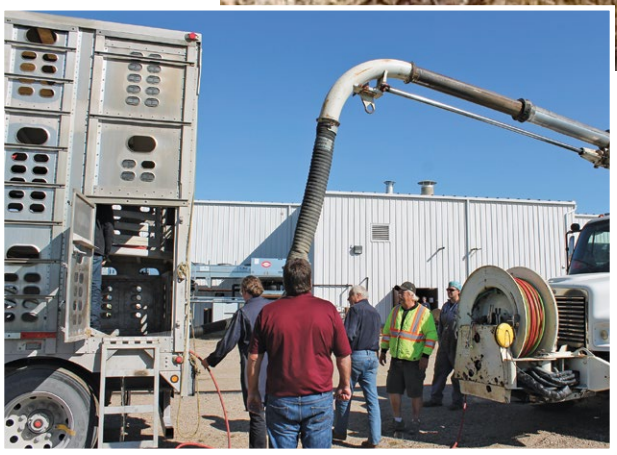
Vacuum wash system development

The trailer vacuum wash system prototype was tested by a swine transport company in Saskatchewan. After each trial, improvements were implemented and the system was tested again. A second operator was of great help to maneuver the hose while the first operator vacuumed bedding and waste from the trailer. The system would definitively need an automated carrier for the hose to be efficiently operated by only one person.

Operators from the swine transport company reported that vacuuming and washing with the tested system removed significantly more material from the trailer and required significantly less water than the current method in use.

Dry vacuuming the bulk material on the trailer floor. Source: PAMI





Truck wash equipment. Source: PAMI

Collaborators

Jennifer Brown	Prairie Swine Centre
Hubert Landry	Prairie Agricultural Machinery Institute
Volker Gerdts	VIDO-InterVac

Additional project information

Click on the links below for further information on this project

Links were last updated in 2022

R&D Featured Articles—by Geoff Geddes for Swine Innovation Porc

Articles may be found at: http://www.swineinnovationporc.ca/resources-e-newsletters.php

- On The Road Again
  - December 2019 (Vol. 4, No. 18.)
- The Heat is On: Truck Wash System Dissolves Disease. -
  November 2017 (Vol. 2, No. 1.)

Farmscape Interviews:

- Automated Washing of Swine Transport Vehicles Moves Closer to Reality
  - February 12, 2018
- Thorough Washing Needed to Ensure Thermal Drying Kills All Pathogens
  - January 29, 2018
- High Pressure Hot Water and Vacuum Followed by Baking Shown Effective for Cleaning Swine Trailers
  - January 22, 2018
- Improved Trailer Design Offers Improved Animal Welfare, Faster Loading and Easier Cleanability
  - July 21, 2017
- Interest in Hydraulic Swine Transport Trailer Designs Builds in Canada
  - July 7, 2017
- Trailer Design Changes Needed to Improve Cleanability
  - June 29, 2017
- VIDO-InterVac Research Sets Parameters for Heat to Destroy Disease Causing Pathogens
  - June 2, 2017
- Achieving Target Temperatures Key Challenge When Using Thermal Assisted Drying and Decontamination
  - May 25, 2017
- Research Demonstrates Value of Baking Swine Transport Trailers
  - May 18, 2017
- Thermal Assisted Drying and Decontamination Effective in Deactivating Pathogens in Swine Transport Vehicles
  - May 16, 2017
- Hydrovac Technology Reduces Volumes of Water Required to Clean Swine Transport Vehicle
  - May 2, 2017
- Application of Heat to Swine Transportation Equipment Inactivates Disease Causing Pathogens
  - May 1, 2017
- Effort to Automate Swine Transport Vehicle Washing Moves to Next Phase
  - April 28, 2017

Farmscape Interviews:

- Use of Heat Speeding Up Turn Around Cutting Costs of Cleaning Swine Transport Trailers
  - December 12, 2016
- Demonstration of New Technology for Washing Swine Transport Trailers Expected By March
  - November 21, 2016
- Swine Transport Trailer Redesign Needed to Improve Biosecurity
  - November 10, 2016
- Addition of Heat Improves Cleaning and Disinfection of Swine Transport Vehicles
  - September 9, 2016
- Heat Proves Effective in Inactivating Swine Pathogens in Transport Equipment
  - August 14, 2016
- Hydrovac Based Swine Transport Cleaning Equipment Expected by Year's End
  - August 12, 2016
- Scientists Prepare for Next Phase in Automating Cleaning of Swine Transport Trailers
  - June 2, 2016
- Cleaning Tool Trailer Surface Interface Next Step In Perfecting Hydrovac Trailer Cleaning Technology
  - May 13, 2016
- Research Demonstrates Effectiveness of Hydrovac in Cleaning Swine Transport Trailers
  - May 6, 2016
- Research Shows Hydrovac Technology Offers Potential to Reduce Time and Cost of Cleaning Swine Transport Vehicles
  - December 9, 2015
- Automated Swine Transport Wash Project Moves into Phase 2
  - December 1, 2015
- Saskatchewan Pork Industry Symposium 2015—Audio Special
  - November 19, 2015
- Phase 1 of Truck Wash Automation Project Now Complete
  - November 4, 2015
- New Biosecurity Strategies Improve Cost Effectiveness of Containing PEDv
  - July 17, 2015
- Research Demonstrates Feasibility of Automating Washing of Swine Transport Vehicles
  - May 25, 2015
- Automation Expected to Speed Up Disinfection of Livestock Trailers and Cut Costs
  - March 24, 2015
- Automation Offers Potential to Improve Truck Washing
  - March 4, 2015
- Researchers Explore Potential of Automated Truck Washing to Improve Biosecurity
  - February 19, 2015
- Researchers Target Faster Truck Washing and Reduced Costs
  - February 6, 2015

Additional reading:

- Ethier, S. (2016) Improving biosecurity in swine transport. Article. *Western Hog Journal, Summer 2016, pp. 37-39.*
  Retrieved from: https://www.albertapork.com/alberta-pork-home/canadian-hog-journal
- Fonstad, T. (2015) Transportation Biosecurity Project Update. Presentation. *Saskatchewan Pork Industry Symposium. Saskatoon, SK, November 17-18, 2015.*
  Retrieved from: https://www.saskpork.com/pork-symposium/

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