



Swine Health Information Center

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*Newsletter*  
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## OUR LATEST INFORMATION ON PROTECTION OF US SWINE HERD HEALTH

- [SHIC-Funded MSHMP Monitoring Detection of PRRSV variant 1H.18](#)
- [SHIC Wean-to-Harvest Biosecurity: Comparing Efficiency and Efficacy of Automated versus Manual Power Washing Final Report](#)
- [SHIC Wean-to-Harvest Biosecurity: Assessing Factors Impacting Pig Caretaker Motivation and Compliance Final Report](#)
- [Pork Industry Representatives Serve as US Delegation Members at WOA General Session](#)
- [May Disease Monitoring Reports](#)

### SHIC-Funded MSHMP Monitoring Detection of PRRSV variant 1H.18

The Swine Health Information Center-funded Morrison Swine Health Monitoring Project (MSHMP) noted an increase in occurrence of a novel PRRSV variant in December 2023 and January 2024. In the [May 10, 2024, MSHMP report](#), a total of 61 sequences belonging to the novel PRRSV variant 1H.18 have been reported as of week 19 of 2024 in the MSHMP database. This variant has been identified in nine production systems located mostly in Iowa (n=23) and Minnesota (n=22), along with one sequence detected in Illinois. The 61 1H.18 sequences originated from 46 unique sites, including five breeding, 10 grow-finish, 11 others, and 20 unknown. Assessing MSHMP data for changing trends in PRRSV strain occurrence can serve as an early warning for the presence of new or emerging viral variants. Close monitoring of PRRSV 1H.18 by the MSHMP team is ongoing. See the [full report](#) for contributing authors and figures and visit the [MSHMP science page](#) as well.

During initial analysis, the sequences belonging to this group were classified as a somewhat rare RFLP pattern (1-12-2) and consequently assigned to sub-lineage L1C or L1H, dependent on the classification method used. When the new variant classification (see below) was applied, a novel clade comprised

of sequences positioned between sub-lineages L1H and L1C on the phylogenetic tree was identified. Per the MSHMP report, most of the 61 PRRSV 1H.18 sequences have now been classified as either RFLP 1-8-4 (n=32), 1-12-2 (n=20), or 1-12-1 (n=1). Sporadic detections of the 1H.18 variant date back to 2018 and a slight increase in cases has been noted since late 2023 and early 2024. MSHMP staff point out the surge in 1H.18 sequences in 2020 likely went undetected due to sequences at the time being classified as RFLP 1-8-4 and 1-4-4 L1C, common RFLP types that occur in many different lineages and sub-lineages, and many of the sequences originated from a single site. The production impact of this variant has not yet been formally assessed, although both mild and more severe clinical presentation have been reported by MSHMP participants.

In reporting on the new variant, MSHMP staff commented they do not currently have enough evidence to suggest this variant is of immediate concern to the swine industry, but prospective monitoring is warranted given the sudden increase in cases. The authors recommend careful consideration when interpreting isolated case reports and sequence counts, as they may lead to erroneous conclusions due to reporting biases. MSHMP staff will continue to proactively monitor this variant, and additional reports will be issued as the situation unfolds.

In their report on the PRRSV variant, MSHMP staff included relevant observations, saying RFLP may erroneously group genetically dissimilar PRRS viruses while segregating closely related ones. Phylogenetic methods organize PRRS viruses into ancestral “families,” commonly called lineages and sub-lineages that tend to form broad groups. Recognizing the need for a comprehensive fine-scale variant classification system across all sub-lineages, an American Association of Swine Veterinarians-funded working group, comprised of researchers from the University of Minnesota, Iowa State University, and USDA, is developing and testing a new variant classification method. The new variant nomenclature was used throughout the MSHMP Science Page, since lineage/sub-lineage and RFLP (either separately or combined) were not initially accurate when used as case definition to identify this novel 1H.18 clade.

These observations underscore the challenge faced by both RFLPs and sub-lineages in confidently labeling sequences belonging to this group. With a recent influx of sequences belonging to this variant, the report has compiled current available data to ensure stakeholders and industry are informed. Critical evaluation of routine herd health monitoring data provides a mechanism to detect changes in pathogen occurrence that could indicate a new or emerging disease..

## **SHIC Wean-to-Harvest Biosecurity: Comparing Efficiency and Efficacy of Automated versus Manual Power Washing Final Report**

A study funded through the Swine Health Information Center [Wean-to-Harvest Biosecurity Research Program](#), in partnership with the [Foundation for Food & Agriculture Research](#) (FFAR) and Pork Checkoff, recently completed an evaluation of pressure washing tools and methods to enhance biosecurity and overcome labor shortages. Power washing is a critical step for pathogen reduction and is part of a comprehensive farm biosecurity plan, but it is time, labor and resource intensive. Led by Dr. Francisco Cabazon, vice president of Pipestone Research, the study compared the efficacy and efficiency of

an automated power washer to a manned power-washing crew, with evaluation of cleaning time, manpower time, water usage, and cleanliness rate. Read the full report [here](#).

Overall study results showed water usage was greater for the robotic power washer compared to manual washing across two seasonal wash events. Further, the overall time required to wash barn rooms was greater with the robotic power washer compared to manual washing. The robotic power washer rooms required additional manual wash time to meet sanitation goals for a clean room. The evaluation showed power washing needs at facilities are time and resource intensive and the robotic power-washer prototype did not provide adequate savings in manpower or water usage. Although manual labor hours were reduced by robotic power washing, further refinements are needed due to washing time and water requirements.

SHIC, along with FFAR, a non-profit organization established in the 2014 Farm Bill, and Pork Checkoff, partnered to develop the Wean-to-Harvest Biosecurity Program to investigate biocontainment or bioexclusion engineering controls (modifying equipment, physical barriers, site design, ventilation, robotics, or other technologies) that will help overcome labor shortages and the need to share personnel, such as with loading, vaccination, or cleaning and disinfection crews, across sites in a production or contracting service network.

The [pressure washer study](#) was conducted in a 2,400 head wean-to-finish barn with two rooms of 1,200 head capacity (196 feet x 50 feet) with 44 pens each. A group of nursery pigs were placed in the barn and raised until harvest. The barn was then cleaned, with one room washed using traditional manual power washing methods from a contract service, and the other room cleaned using a railed robotic power washer prototype, followed by a manual power wash to remove any additional manure (touch-up post robot). The trial consisted of two washing events (August 2023 and February 2024) for comparison and seasonal variation.

In the room washed with the rail robotic power washer prototype, four rails were installed (two on each side of the room divided by the central

hallway) to cover the pen floor and side walls at a maximum height of 10 inches from the slat level. The rail robotic power washer prototype consisted of a trailer head carrying a rotary nozzle connected to a gas power washer. The trailer head was battery powered, and the speed of the trailer on the rail and the speed of rotation of the nozzle could be adjusted. Two different rotary nozzles were tested. The robot power washer with a single rotary nozzle was set to move through the rails at an average speed of 11.0 inches per minute, with a nozzle rotation time cycle of 22 seconds (August 2023 data). In the case of the double rotary nozzle, the robotic power washer was set to move at an average speed of 14.8 inches per minute, with a nozzle rotation time cycle of 30 seconds (February 2024 data). In both cases, the speed of the trailer head and rotation of the nozzle were adjusted to achieve two hits per slat.

Multiple methods were used to evaluate cleanliness (pre-wash, post-wash, and post touch-up), including 1) visual assessment, 2) adenosine triphosphate measurements to assess organic material, 3) bacterial culture with dip slides, and 4) a reverse-transcriptase real-time PCR (RT-qPCR) for rotavirus detection. There were 12 pens assessed in each room, which were equally spaced throughout the room. Five sites in each pen were assessed: fencing, floor, wall, waterer, and feeder.

In August 2023 (single rotary nozzle test), total water usage in the robotic power washing room was 8,396 gallons in comparison to 6,211 gallons in the manual power washing room. Total washing time in the robotic power washer room was 22.1 hours (13.0 hours of robotic washing and 9.1 hours of manual touch up washing) in comparison to 10.5 hours of manual power washing in the control room. The manual washing labor time in the robotically washed room was reduced 13% (1.4 hours), but total washing time was longer by 11.6 hours.

In February 2024 (double rotary nozzle data), total water usage in the robotic power washing room was 10,897 gallons in comparison to 7,526 gallons in the manual power washing room. Total washing time in the robotic power washer room was 19.3 hours (10.1 hours of robotic washing and 9.2 hours of manual touch up washing) in comparison to 13.3 hours of manual power washing in the control

room. In this case, manual washing labor time in the robotically washed room was reduced by 31% (4.1 hours) with the robot, but overall washing time was longer by six hours.

Cleaning score differences before and after washing were significant for each power washer method, at all sites in a pen, and in each testing method. The visual cleanliness trend was from very dirty to clean or very clean. For the robotic power washed room, the post-wash touch-up by the manual power washing team was necessary for the median value to reach the "Very Clean" score.

Greater bacterial count, higher rotavirus detection, and increased ATP levels were found after the washing process for both wash methods. Power washing does not clean the barn, it is solely a means to remove debris and must be followed by a disinfection process. Power washing should be completed to the necessary level to ensure that disinfection can be performed effectively.

Cleaning expectations of this barn were extremely high and could explain, to some degree, the long touch-up process. The robotic power washer cannot easily access the feeders and as such, the washing crew spent considerable time washing the feeders. The number of feeders in the barn will be a limiting factor to the efficiency of the robotic power washer. The barn used for this research has a low pigs:feeder ratio (27 pigs per feeder, doubled one-hole wet dry feeder). Another limiting factor for the automated power washer was the number of rails and their positioning. In the current study, four rails were installed in the room. This allowed walls to be washed at a maximum height of 10 inches from the slat level; however, the robotic washer did not cover the central hallway.

Additional rails could increase the covered area by the rail power washer, but it would represent additional costs for producers and time of operation.

Further investigation of robotic power washing systems is warranted to be able to identify methods for effective and efficient use of this technology on-farm to help address challenges during labor shortages.

## SHIC Wean-to-Harvest Biosecurity: Assessing Factors Impacting Pig Caretaker Motivation and Compliance Final Report

A study funded through the Swine Health Information Center Wean-to-Harvest Biosecurity Research Program, in partnership with the Foundation for Food & Agriculture Research (FFAR) and Pork Checkoff, recently evaluated caretaker motivation related to compliance with biosecurity behaviors. Led by Dr. Michael Chetta of Talent Metrics Consulting, an exploratory study was conducted to establish a baseline for worker motivation and identify the primary factors within the industry that could be impacting biosecurity compliance.

While significant resources are devoted to training personnel on the proper execution of biosecurity control measures, this study aimed to fill the gap surrounding the motivations and barriers that determine whether personnel will consistently perform the measures. This research and measurement related to motivation is the first of its kind in the industry and sets the groundwork for better understanding the social science of swine industry biosecurity.

Read the study's industry summary [here](#).

To conduct this study, an online survey was developed and a total of 139 animal caretakers from five pork production companies participated in the survey and formed the study's sample population. Questions measured quantitative responses to different factors which may impact compliance such as attitude, social norm, perceived behavioral control, behavioral intent, job demands, job resources, level of exhaustion, and disengagement from work. Results suggest the swine industry's challenge with biosecurity compliance is not wholly driven by issues with motivation. Results for attitude and job resources suggest further investigation into the rewards, supervisor support, and performance feedback categories of job resources could be promising avenues for continuing to explore what drives biosecurity non-compliance. Specifically, personnel being rewarded for following biosecurity procedures was highlighted as an opportunity.

SHIC, along with [FFAR](#), a non-profit organization established in the 2014 Farm Bill, and Pork Checkoff, partnered to develop the [Wean-to-Harvest Biosecurity Program](#) to investigate the impact of personnel on pathogen biocontainment and bioexclusion. Research priorities emphasized comparing implementation and compliance incentives and/or rewards and their successes, shortcomings, or adoption barriers across sites or systems to help understand worker motivation to consistently execute biocontainment and/or bioexclusion protocols.

This study highlights a novel application of Industrial and Organizational (I/O) Psychology principles to the U.S. swine industry to assess caretaker motivation to engage in biosecurity-compliant behaviors. Swine caretakers participated in the online survey, provided in both Spanish and English languages, that was developed using items, adapted or in original form, from previous research and established measures.

Initial findings of the caretaker motivation and resources study suggest the swine industry's problem with biosecurity compliance is not a motivationally driven issue, and not wholly influenced in the way initially conceptualized and measured. There is strong support that biosecurity compliance is influenced by job resources (specifically supervisor support), availability of performance feedback and rewards. Additionally, the analyses suggest workers are heavily impacted in doing their work and adhering to biosecurity protocols by physical workload and demanding contact with animals.

There is reason to believe that motivation can be assessed differently and that the impact of training and measuring the implementation/effectiveness of biosecurity procedures could yield valuable insights. Continuing this research across the US swine industry will help to better understand the interactions and motivations behind worker attitudes and perceptions towards biosecurity adherence and to enhance positive outcomes for employees, farms, and consumers..

## **Pork Industry Representatives Serve as US Delegation Members at WOAHO General Session**

The 91st General Session of the World Assembly of Delegates for the World Organisation for Animal Health recently convened from May 26 – May 30, 2024, in Paris, France. As part of the Session, WOAHO marked a 100-year milestone anniversary since being founded in 1924. Representatives of the US pork industry served as members of the US delegation, including Swine Health Information Center Executive Director Dr. Megan Niederwerder, National Pork Board Chief Veterinarian Dr. Dusty Oedekoven, and consultant to the National Pork Producers Council Dr. Liz Wagstrom. As WOAHO serves as the global authority on animal health, the standards discussed and implemented can affect all US producers.

The General Session of the World Assembly of 183 member countries serves as the highest authority of the WOAHO. The World Assembly includes delegates of all member countries and meets at least once a year. The General Session lasts five days every May in Paris, France. During the General Session, delegates adopt international standards in the field of animal health with a focus on international trade, elect governing bodies of WOAHO, adopt resolutions on the control of major animal diseases, examine and approve annual reports, and appoint the Director General of WOAHO. Delegates also explore ways WOAHO can collaboratively shape a sustainable future for global animal health and welfare.

Special Sessions, in addition to the WOAHO Plenary Sessions, included a Global Coordination Committee for African Swine Fever meeting to identify ASFV priorities and goals for different regions around the world and a Special Session on Compartmentalization to discuss how regionalization, zoning and compartmentalization can support international trade.

The World Organization for Animal Health (WOAHO) [Terrestrial and Aquatic Animal Health Codes](#) provide standards for the improvement of animal health and welfare and veterinary public health worldwide, including through standards for safe international trade in terrestrial and aquatic

animals and their products. The manuals provide a standardized approach to the diagnosis of the diseases listed in the Terrestrial and Aquatic Codes. Diseases of concern to swine producers listed within the Terrestrial Animal Health Code include African swine fever virus, classical swine fever virus, porcine reproductive and respiratory syndrome virus, foot and mouth disease virus, pseudorabies virus, and include diseases of public health concern such as Japanese encephalitis virus.

Learn more about the General Session [here](#).

# SWINE DISEASE MONITORING REPORTS

The Swine Health Information Center, launched in 2015 with Pork Checkoff funding, protects and enhances the health of the US swine herd by minimizing the impact of emerging disease threats through preparedness, coordinated communications, global disease monitoring, analysis of swine health data, and targeted research investments. For more information, visit <http://www.swinehealth.org> or contact Dr. Sundberg at [psundberg@swinehealth.org](mailto:psundberg@swinehealth.org).

## DOMESTIC

This month's Domestic Swine Disease Monitoring Report brings information about the PRRSV positivity remaining at high levels in the wean-to-market category, with 41% of submissions being positive. Also, at a state-level monitoring, the overall PRRSV positivity was above the expected in Iowa, South Dakota, and Indiana. For enteric coronaviruses, PEDV and PDCoV positivity continued to decrease as expected for the beginning of the summer, with PEDV having 10% and PDCoV having 3% positive submissions. However, in the state-level monitoring, the overall positivity continues above the expected for PEDV in Kansas and for PDCoV in Minnesota. *Mycoplasma hyopneumoniae* was above the expected in the weekly monitoring, with the weeks of May 6 and May 13 increasing positivity, driven mainly by sow farm submissions. The advisory group highlighted the presence of more co-infections in the field with PRRS, mainly bacteria such as *Pasteurella multocida*, *Glaesserella parasuis*, and *Streptococcus suis*. At the ISU-VDL, PRRSV, *Streptococcus suis*, Influenza A virus, *Pasteurella multocida*, and *Glaesserella parasuis* are the top five pathogens diagnosed in submitted tissue cases and also show this pattern of co-diagnosis. The podcast hosts talked with Dr. Luc Dufresene (Demeter Quebec and Swine Veterinary Partners) about regional biosecurity for control & prevention of pathogen spread; tips and tricks for PEDV elimination initiatives; success stories of regional elimination of PEDV and PRRSV L1C.5; and implications of PRRSV diversity.

[VIEW REPORT](#)

## GLOBAL

In the June Global Swine Disease Monitoring Report, read about government action in Brazil self-declaring the country Foot-and-Mouth Disease-Free Status Without Vaccination. More than 244 million cattle and buffaloes on around 3.2 million properties will no longer be vaccinated against the disease. A new outbreak of classical swine fever in domestic pigs in Japan affected a commercial farm with over 17,500 pigs. Learn about a study initiated in 2022 that investigated survival of ASFV in 14 plant derived feed and bedding materials. And learn about an incident in Taiwan where an Indonesian passenger was deported after bringing a meal containing pork into the country. A quarantine dog detected the pork, leading to a NT\$200,000 (\$6,205) fine. Unable to pay, the traveler was deported.

[VIEW REPORT](#)