



Swine Health Information Center

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Newsletter
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OUR LATEST INFORMATION ON PROTECTION OF US SWINE HERD HEALTH

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SHIC Wean-to-Harvest Biosecurity: Platform to Automatically Classify Truck Sanitation Status (Final Report)

A pilot project funded by the Swine Health Information Center Wean-to-Harvest Biosecurity Research Program, in partnership with the Foundation for Food & Agriculture Research and Pork Checkoff, aimed to address the challenge of documenting truck washes between visits to slaughterhouses and return to swine barns, a critical aspect of market haul sanitation in the swine industry. Led by Drs. Daniel Linhares and Edison Magalhães of Iowa State University, the study updated the online inventory of truck washes in the Midwest and assessed three different methods for automatically recording truck wash events and market pig deliveries at packing plants. To enable producers to verify trailer cleanliness, automated reports were produced on the status of each trailer to identify non-compliance, such as those trailers not washed between packing plant loads.

Read the truck automated sanitation classification (TASC) study industry summary [here](#).

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 research priorities in three areas – bioexclusion (keeping disease off the farm), biocontainment (after a break, keeping disease on the farm to lessen risk to neighbors), and transportation biosecurity (live haul, culls, markets, deadstock, and feed haul along with innovative ways to stop pathogens from moving from markets and concentration points back to the farm).

For the recently completed TASC study, the overall objective was to assess three independent platforms to allow swine producers to automatically record events concerning truck-wash and market pig deliveries at packing plants. Specific objectives included 1) update the inventory of truck wash stations available in the Midwest, 2) develop the TASC platform to evaluate the field implementation of three methods to capture and manage truck movement data on slaughter plant and truck wash station visits, 3) develop the TASC dashboard to provide real-time information, and 4) enable a search function to allow producers to identify the sanitation status of trucks. The project was conducted in collaboration with one Midwest swine production system to evaluate the feasibility and effectiveness of different technologies in recording truck-related events for this company in Iowa.

In collaboration with the Iowa Pork Industry Center, the truck wash inventory and mapping, originally

developed in 2015, was updated utilizing a 52-question survey applied to truck washes across 12 different states. The goal of the mapping was to provide producers information about the publicly available truck wash location and details related to facility operations, such as services provided, time and type of wash, and other information.

The updated map of truck washes with the results from the work mentioned is available at the following link: <https://www.ipic.iastate.edu/truckwash.html>

For the development of the TASC platform, three approaches were tested: 1) GPS tracking of trucks and trailers, 2) a software application (CleanTrailer app) for automatic creation of electronic tickets for washing events, and 3) manual data collection at truck wash and packing plant sites. For the truck and trailer GPS approach, beacons were installed in all trucks and trailers to enable data recording every 30 seconds in trucks and every 30 minutes in trailers. Once the beacons were installed and running in trucks and trailers, geofences were established to differentiate between vehicles entering and exiting the packing plant or the truck wash.

For the second approach, the CleanTrailer software application was utilized to create tickets for each trailer wash during the pilot study. The goal was to utilize a technology that is feasible for implementation by the truck wash personnel while automatically storing truck wash information. The CleanTrailer app collected information regarding truck wash events including worker name, trailer plate photo, and pictures captured before and after washing the trailer. For the third approach, manual collection of data on truck movement at the truck-wash and packing plants was performed.

Data was collected in this study between the periods of July 10, 2023, and August 11, 2023, representing 799 deliveries of pigs to the packing plant and 792 trailer washing events. Data was utilized to compare and evaluate the accuracy and reliability of each method.

Further, the collected data was utilized to build the TASC platform using statistical algorithms based on output generated by the three approaches utilized

in this study, which captured data concerning GPS movements, the CleanTrailer app, and on-site manual truck and trailer check in. Algorithms were built to summarize the information from all trailers and trucks, across the three approaches into data visualization reports. Information was organized at both the trailer and truck level. Information in the reports included: number of loads per day, number of visits to washing bays, number of dirty (did not visit washing bay) truck movements, number of dirty (did not visit washing bay) trailer movements, number of pig loads between washes, time (minutes) at the truck wash, and number of movements before washing.

Findings of the TASC study revealed that while all three approaches had strengths and limitations, GPS-based tracking showed higher accuracy in documenting truck wash events and deliveries at packing plants compared to other approaches. However, GPS-based methods were susceptible to errors such as false or duplicate events and geofence limits, highlighting the importance of optimizing technology parameters to minimize discrepancies. In comparison, despite the CleanTrailer app having slightly inferior performance for recording truck wash events, it provided an electronic ticket with pictures of before and after the wash, providing additional information beyond the electronic wash ticket. Despite some missed washes, the agreement between GPS data and the CleanTrailer app was generally high, indicating the potential of automated systems in ensuring compliance with sanitation standards.

Overall, this study demonstrates the capability of utilizing currently available methods used in the swine industry for recording truck wash events and deliveries at the packing plant, thereby establishing a framework for ensuring compliance with sanitation standards and verifying the status-quo of trailers. Examination of the data reveals that trailer-related information was more accurate than truck information. Through automating the processes of integrating data from multiple technologies and reporting wash compliance, the developed TASC platform is a valuable tool for decision-makers within swine production systems, enabling them to identify potential avenues for enhancing market haul sanitation practices.

The results of this study have significant implications for the swine industry, as providing producers with automated reports to monitor truck wash compliance will change behaviors. The scalability of the methods tested suggests broader applicability across production systems, offering a standardized approach to monitoring market haul sanitation practices. Ultimately, these findings empower producers to make informed decisions regarding truck sanitation, thereby safeguarding animal health and improving overall industry practices.

SHIC Expands Ongoing Monitoring and Communication Efforts for Influenza with Project to Identify Research Priorities for H5N1 Risk to Swine

In response to the ongoing outbreak of HPAI H5N1 in the dairy industry, SHIC has highlighted IAV monitoring in swine through the domestic disease monitoring reports, coordinated a HPAI H5N1 in livestock webinar along with AASV, and published newsletter articles to inform stakeholders of current IAV knowledge. To build on these efforts, SHIC has recently funded a literature review to identify research priorities and knowledge gaps for HPAI H5N1 risk to swine. Led by Dr. Montse Torremorell, University of Minnesota, the project will outline currently available information on clinical presentation, detection, mitigation strategies on swine flu, and research priorities for HPAI H5N1 in swine.

The mission of the Swine Health Information Center is to protect and enhance the health of the US swine herd by minimizing the impact of emerging disease threats. Disease threats are evaluated for risk when there is a change in the species affected, the clinical presentation, the severity of disease, or the geographic range impacted. SHIC identified HPAI H5N1 as a potential emerging disease threat to US swine due to the recent outbreak in dairy cattle, which represents a change in species affected and clinical presentation through mastitis. No cases of H5N1 have been detected in US swine and industry efforts are focused on preventing infection.

Due to be completed by late summer 2024, the HPAI H5N1 literature review will outline current knowledge on the virus and identify the greatest research needs to mitigate risk to swine. More specifically, the review will cover the current knowledge for H1 and H3 influenza strains currently circulating in swine as well as the H5N1 influenza strains circulating in wild birds and dairy cattle. Current understanding of clinical presentation, diagnostic samples, surveillance and management strategies will be reviewed. Research priorities for prevention, preparedness, mitigation and response for H5N1 risk to swine will be identified.

In other ongoing influenza activities, SHIC supports routine monitoring of IAV in swine through the Swine Disease Reporting System which aggregates data from participating veterinary diagnostic laboratories in the US and reports the major findings to the swine industry through monthly reports. A newly implemented monitoring capability provides the industry with information regarding IAV detection in each state, including an expected rate of prevalence based on historical detection. Further, there is an added feature for mapping IAV diagnostic data across states for visualization of changes from state-specific baselines. Monthly reports can be accessed here: <https://www.swinehealth.org/domestic-disease-surveillance-reports/>

SHIC, in collaboration with AASV, hosted a webinar on HPAI H5N1 in livestock and risk to swine on Friday, April 19, 2024 that garnered high interest. A total of 1341 individuals registered with 921 joining the webinar live across 30 countries. Goals of the webinar were to have subject matter experts provide the latest information on influenza A virus, including an overview of the pathogen, global and domestic distribution, research outcomes for HPAI experimental infection in swine, experiences and perspectives of the dairy industry from the current outbreak, and an outbreak investigational tool for identifying and mitigating biosecurity risks. Additionally, information for producers on actions that can be taken to reduce the risk of avian influenza introduction on-farm was provided. The webinar can be viewed on demand here: <https://www.swinehealth.org/podcasts/>

Through the SHIC newsletter and SHIC website,

several articles have been provided to inform stakeholders about IAV risk and monitoring in swine including a two-part article series overview of the HPAI H5N1 in livestock and risk to swine webinar and an article detailing current IAV monitoring in swine through USDA surveillance and SDRS. Additional SHIC activities include development of a SHIC Talk podcast on H5N1 IAV, participation in a producer roundtable for disease monitoring and control at World Pork Expo, and multiple interviews with agriculture media outlets to inform producers on steps to reduce the risk of IAV introduction into their farms.

Information about influenza and research priorities for prevention and preparedness of HPAI H5N1 in swine can be found at www.swinehealth.org.

SHIC Wean-to-Harvest Biosecurity: Effects of Manure Pumping on Disease Spread in Growing Pigs (Final Report)

A study funded by the Swine Health Information Center Wean-to-Harvest Biosecurity Research Program, in partnership with the Foundation for Food & Agriculture Research and Pork Checkoff, investigated the risks of manure pumping to introduction and spread of pathogens across wean-to-finish sites. Led by Drs. Ana Paula Poeta Silva and Daniel Moraes, working with the principal investigators Drs. Daniel Linhares and Gustavo de Sousa e Silva of Iowa State University, the study provided evidence that the processes associated with manure pumping and land application pose a risk for the introduction of PRRSV into pig sites.

Also, there was plenty of PEDV RNA detected in pit samples from most herds visited despite the absence of clinical disease or PEDV in oral fluids. Further, the study characterized the level of risk for specific manure pumping practices or site characteristics, such as nursery compared to grow-finish, storage in deep pits or lagoons, timeline of pumping and spread relative to pig placement, and distance of crops for manure application.

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

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 research priorities in three areas – bioexclusion (keeping disease off the farm), biocontainment (after a break, keeping disease on the farm to lessen risk to neighbors), and transportation biosecurity (live haul, culls, markets, deadstock, and feed haul along with innovative ways to stop pathogens from moving from markets and concentration points back to the farm). The goal of the program is to leverage funds to develop new tools and technologies that can enhance biosecurity in the wean-to-harvest phases of swine production.

Manure removal is a common practice typically performed twice yearly at nursery and grow-finish pig sites. Manure is then spread on fields surrounding those sites for its nutritional and fertilizing value to grain and forage crops. Disease introduction can occur through manure agitation and pathogen spread during the pit pump out process or during the application of contaminated manure on nearby fields. To define the risk of manure pumping on disease introduction to pigs, the objectives of this study included 1) identifying the risk factors for disease onset in wean-to-finish sites following manure pumping and spread in nearby fields, 2) determining the frequency of PRRSV and PEDV detection in pit samples from wean-to-finish sites and the likelihood of increasing PCR-positivity of oral fluids after manure pumping.

For objective one, a retrospective study investigated pig lot- and site-level risk factors related to manure pumping and spread for PRRSV or PEDV onset in wean-to-finish sites. Specifically, the study estimated the odds of a PRRSV or PEDV outbreak occurring within four weeks after manure pumping out from the site (exposure 1) or being near a field receiving manure at 1-, 3-, and 5-miles from the site (exposure 2). Sites included in the study conducted at least one manure pumping event or received manure spread on neighboring crop fields between July 2020 and December 2022. A satellite remote-sensing system was used to locate and characterize manure pumping activities and procedures, such as sites of manure origin and crop fields of manure spread destination.

PRRSV or PEDV outbreaks (cases) were defined based on veterinarian assessment, pathogen

detection in tissues, and increased mortality rate after the pumping event or receiving manure. The odds of a PRRSV or PEDV outbreak within four weeks after manure pumping out from the site was calculated across all data collected. For the analyses, controls were selected to match spatially (within 6.2 miles of cases) and temporally (placement dates within a 4-week interval from outbreak dates) cases.

As part of the data set, a total of 2,903 pig lots were placed across 612 wean-to-finish sites. Of those, 1,444 pig lots had at least one manure pumping event with 517 reporting at least one PRRSV onset and 114 reporting at least one PEDV onset. The odds of PRRSV onset within a four-week period following pumping and spreading manure increased 1.7 times as compared to lots that were not pumped. Nurseries had higher odds of reporting PRRSV onset following manure pumping compared to grow-finish. Other characteristics associated with higher PRRSV risk included greater volume of pumped manure, and manure application <16 weeks post-placement. No association between PEDV outbreaks and manure pumping was detected in this dataset.

For objective two, a total of 77 growing pig barns with no evidence of PRRSV or PEDV before the pumping process were investigated. These barns pumped manure within 10 months of the study onset and were monitored over time to investigate the frequency of PRRSV and PEDV detection before and after manure pumping. Manure pumping occurred between April 2023 and December 2023. Oral fluid samples from pigs and environmental samples from the outside the manure pit were collected. Disease onset was based on at least one positive PCR result for PRRSV or PEDV.

Results of this prospective study demonstrated an increased likelihood of testing PRRSV-positive in oral fluids after pumping out manure. The PEDV positivity in manure was significantly higher than that of PRRSV in manure; however, there was no increase in oral fluids PEDV positivity after pumping out manure.

Overall, both study objectives provided evidence that manure pumping is associated with risk of PRRSV outbreaks. Understanding the risk factors

that are associated with manure removal from wean-to-finish pig sites will enable producers and veterinarians to develop biosecurity steps and timing considerations for the pumping processes to improve bio-exclusion and bio-containment for PRRSV.

SHIC Wean-to-Harvest Biosecurity: New Projects Funded to Investigate Transportation Biosecurity and Cost of Disease in Grow-Finish Production

The Swine Health Information Center's Wean-to-Harvest Biosecurity Research Program, funded in collaboration with the [Foundation for Food & Agriculture Research](#) and the [Pork Checkoff](#), has recently funded two new projects to advance biosecurity of US swine farms. The newly funded projects include: 1) an investigation of alternative methods for transport sanitation led by Dr. Erin Kettelkamp at the Swine Vet Center and 2) an assessment of the cost of disease in grow-finish production sites led by Dr. Karyn Havas at Pipestone Research. These awards bring the total number of projects to 18 that have been funded by the program for a comprehensive approach to enhancing biosecurity across the wean-to-harvest phases of swine production.

Priorities of the [Wean-to-Harvest Biosecurity Research Program](#) focus on site and transportation biosecurity in five targeted areas: 1) personnel biocontainment and bioexclusion, 2) mortality management, 3) truck wash efficiency, 4) alternatives to fixed truck wash, and 5) packing plant biocontainment. The research program reflects SHIC's responsiveness to an identified swine health vulnerability and collaborative efforts to leverage producer Checkoff funds to safeguard the health of the US swine herd. Proactively enhancing wean-to-harvest biosecurity will help control the next emerging disease in the US pork industry. All proposals submitted undergo a competitive review process by a task force of industry stakeholders with funding recommendations approved by the SHIC Board of Directors, FFAR, and Pork Checkoff. Projects are reviewed for their value to pork producers and their ability to provide cost-effective biosecurity

solutions on the farm.

Novel tools, technologies and approaches are needed to augment current biosecurity practices in the US swine industry. Each of the two newly funded projects investigate new ways of thinking about wean-to-harvest biosecurity. First, a project led by Dr. Erin Kettelkamp at the Swine Vet Center was awarded entitled “Investigating waterless decontamination and application potential in transportation biosecurity.” This project seeks to investigate the efficacy of a new waterless technology for the mobile application of heat and hydrogen peroxide to decontaminate PEDV in trailers and provide an alternative method for achieving necessary transport sanitation.

Second, a project led by Dr. Karyn Havas at Pipestone Research was awarded entitled “What is the cost of disease for grow-finish producers?” This project seeks to understand the cost of common diseases detected in grow-finish hogs through quantification of disease outcome indicators, such as mortality and weight gain. Costs of disease will be compared to costs required for implementation of different biosecurity practices to provide producers an objective understanding of the potential opportunity cost forfeited through poor biosecurity.

The Wean-to-Harvest Biosecurity Program continues to accept research proposal submissions which address the five targeted priority areas until funds have been expended. Total project funds available for the Program since its inception are \$2.3 million. Real-time results of all projects will be shared as quickly as they become available for producers to implement knowledge gained on the farm.

SHIC Outreach at World Pork Expo 2024

The annual World Pork Expo, held June 5 – June 6, 2024, in Des Moines, Iowa, presented a unique opportunity for swine industry stakeholders to gather and learn about current events, new technologies and discuss production challenges. The Swine Health Information Center team attended the event to participate in swine health meetings, serve as a panelist on endemic

diseases, interact with attendees to understand current health challenges, gain insight on producer priorities for swine health research, and share updates on SHIC activities. Executive Director Dr. Megan Niederwerder and Associate Director Dr. Lisa Becton met with pork producers, swine veterinarians, production company staff, media, and other industry organizations over two full days of World Pork Expo.

Dr. Becton served as a panelist in the Pork Academy Session entitled, “Endemic Diseases, Biosecurity and Other Hot Topics in Swine Health,” during World Pork Expo. A Farm Journal’s PORK magazine article, “Producers Have Resources on Swine Health,” highlighted the session. Dr. Becton is quoted as saying, “Monitoring allows you to see trends. It’s important for producers to continue to monitor diseases, knowing there’s a cost for diagnostics, but swine health metrics are needed to manage diseases effectively on the farm.” Multiple resources to assist producers with swine health management are available on the SHIC website, including the monthly domestic and global disease monitoring reports, the latest information on research project outcomes, and disease fact sheets.

Drs. Niederwerder and Becton took part in almost a dozen interviews with swine-industry media outlets, including Feedstuffs/National Hog Farmer podcast, Brownfield Network, Linder Farm Network, WHO Radio (Des Moines), Farm Journal’s PORK magazine, and many others. Media interviews are an opportunity for SHIC staff to discuss key programs and activities that help SHIC fulfill its mission to protect and enhance the health of the US swine herd by minimizing the impact of emerging disease threats. Topics highlighted to media partners included biosecurity for wean-to-finish production and transport, influenza challenges in livestock, and updates on the current global ASFV status.

SHIC’s focus on targeted research investments is supported by a robust outreach effort to share its work and the benefits for US pork producers. Research programs for 2024 include programs focusing on its [Wean-to-Harvest Biosecurity Program](#), [Japanese encephalitis virus research efforts](#), and [projects addressing its 2024 Plan of Work](#).

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.

DOMESTIC

This month's Domestic Swine Disease Monitoring Report brings PEDV PCR genotyping information onboard, providing stakeholders with knowledge on how many samples have been tested, detection of the non-Indel variant (historically more pathogenic), the Indel (considered a milder strain), and samples that had the detection of both. Also, the report brings information about the decrease in PRRSV positivity in June, reaching less than 40% positivity in the wean-to-market submissions. At a regional level, PRRSV's overall positivity is still above the expected in South Dakota and Indiana. For enteric coronaviruses, PEDV and PDCoV positivity decreased during June, and PDCoV positivity was as low as 1.3% of overall submissions. At the regional level, the PEDV overall positivity is above the expected in Kansas and Ohio. PCV3 and PCV2 had increased positivity in the sow farm category, whereas 65% of submissions were positive for PCV3 and 34% were positive for PCV2. The podcast hosted a talk with Dr. Deb Murray (New Fashion Pork) about farm management and animal health tips for the summer period and strategies for E.coli control upper and downstream.

[VIEW REPORT](#)

GLOBAL

Information on a new African swine fever outbreak in Germany is included in the July Global Swine Disease Monitoring Report. The outbreak was reported in domestic pigs at a farm in Mecklenburg-Western Pomerania, affecting 3,000 fattening pigs. In South Korea, about 25,000 domestic swine were culled due to ASF. And in Latvia, the first ASF outbreak in domestic pigs was reported this year with about 500 pigs culled in response. Porcine reproductive and respiratory syndrome virus was confirmed for the first time in Trinidad and Tobago on a swine farm in south Trinidad. In the United Kingdom, approximately 882 pounds of illegal meat products, including 172 sheep heads, smokies cutlets, a sheep leg joint, and offal, were seized from two businesses in Reading as part of surveillance at ports of entry.

[VIEW REPORT](#)