



Swine Health Information Center

Swine Health Information Center

2018 Progress Report

Executive Summary

Swine Health Information Center

Organization

The Swine Health Information Center (SHIC) began operation as a 501(c)(3) corporation on July 4, 2015. The mission of SHIC is to protect and enhance the health of the United States swine herd through coordinated global disease monitoring, targeted research investments that minimize the impact of future disease threats and analysis of swine health data.

The National Pork Board, National Pork Producers Council and the American Association of Swine Veterinarians have each appointed two representatives to the SHIC Board of Directors. Three at-large producer representatives are also members of the Board. The Board approved a 2018 operating budget, a 2018 Plan of Work and a plan for FDIC insured investments, that is modeled after that of the National Pork Board, for the money more than the yearly operating budget.

A Monitoring and Analysis Working Group and a Preparedness and Response Working Group have been formed to provide program oversight and decision-making. Each are actively meeting to fulfill their respective objectives.

Swine Health Information Center 2018 outreach

There has been personal outreach to pork producers, veterinarians, allied industry and state and federal animal health officials to foster collaboration, develop projects, increase understanding of SHIC and its mission and inform them about the research and programs. Their feedback has helped focus and refine SHIC responsibilities, research and programs. Presence and participation in meetings with international organizations has helped to monitor swine diseases and issues around the world.

Progress on the Swine Health Information Center 2018 Plan of Work

Preparedness

- 1) The publication of the Polymerase Chain Reaction (PCR) Assay Catalog provides diagnosticians at our veterinary diagnostic labs, who are working every day with swine health case submissions, pertinent information about the 17 new PCR tests funded by SHIC, including contact information of the experts for questions about availability and use.
- 2) 2018 research continued to fill in identified preparedness gaps for Viral Matrix priority pathogens:
 - a. An oral fluids PCR test for Japanese Encephalitis Virus (JEV) infection in swine has now been developed for US veterinary diagnostic labs.
 - b. Newly released research sponsored by SHIC gives the industry the ability to detect and differentiate the majority of field strains of PCV3 and PCV2.
 - c. Analysis of veterinary diagnostic laboratory data obtained over the last two years will determine how closely certain clinical signs and pathologic lesions are associated with the presence of PCV3 and the amount of the virus found in each case.

Swine Health Information Center 2018 Progress Report

- d. SHIC research led to the creation of the first influenza PCR for animals that detects and differentiates between Influenza A, B, C and D with one test. The developed assay has wide application for diagnosis, monitoring and surveillance of influenza in swine, bovine, avian, other animals, including humans upon clinical validation.
 - e. We can now discern diagnostically between classical and high path variant PRV with a single, highly sensitive and specific PCR test. The assay was validated on nasal swabs, oral swabs, whole blood, serum, and tissues
 - f. SHIC-funded research conducted at Iowa State University resulted in the development and validation of a porcine kobuvirus (PKV) real-time reverse transcriptase PCR (rRT-PCR) to detect strains of PKV circulating in US swine.
 - g. Research on Swine Acute Diarrhea Syndrome Coronavirus (SADS-CoV), a coronavirus variant emerging in China, focuses on the development of a diagnostic triplex PCR that gives diagnostic laboratories the tool for PED, PDCoV and SADS-CoV detection in one test, saving producers testing diagnostic fees.
- 3) Following multiple outbreaks of African Swine Fever (ASF) in China, continued spread of ASF in Bulgaria, Romania struggling to control the virus and the first ASF cases discovered in Belgium, SHIC revised the priority of African swine fever (ASF) on the Swine Viral Disease Matrix, moving ASF from third on the Matrix to second.
 - 4) To go along with SHIC's prioritized list of endemic and foreign swine viruses in the Swine Viral Disease Matrix, a Swine Bacterial Disease Matrix has been developed.
 - 5) The Swine Health Information Center (SHIC), National Pork Board, National Pork Producers Council, and American Association of Swine Veterinarians jointly authored and offered three important resolutions individually addressing African swine fever (ASF), classical swine fever (CSF), and pseudorabies virus (PRV) diagnostics and surveillance during the US Animal Health Association (USAHA) annual meeting.
 - 6) SHIC co-funded, with the National Pork Board and USDA, a USDA research project for analytic specificity validation of commercial PCR test kits for FMD, CSF and ASF, using oral fluids. The outcome of the project will provide 'surge capacity' testing of oral fluids to validate herd disease status and support continued movement of disease-free pigs during or after an outbreak.

Monitor and Mitigate Risks to Swine Health

- 1) International disease monitoring reports are created based on the systematic screening of multiple official data sources, such as government and international organization websites, and soft data sources like blogs, newspapers and unstructured electronic information from around the world. With high interest in the movement of African Swine Fever, the reports are currently being released bimonthly.
- 2) To investigate the opportunity for foreign swine pathogens to enter the US related to international breeding stock conveyances, a review is characterizing US breeding stock companies' international biosecurity practices.
- 3) A new Senecavirus A (SVA) outbreak was seen in Brazil during 2018 and reported via the AASV e-letter and the SHIC monthly e-newsletter.

Swine Health Information Center 2018 Progress Report

- 4) Complexities in designing a quality project and difficulties in identifying collaborators for first points of concentration and transport biosecurity studies prevented implementation of a project during 2018. Continued investigation of transport biosecurity is proposed for the 2019 SHIC plan of work.
- 5) A method to test bulk feed products and how to apply it to monitoring shipments for pathogen contamination has been funded by SHIC and is currently being researched.
- 6) Options to mitigate feed pathogen transport and transmission using Hazard Analysis and Risk-Based Preventive Controls and/or blockchain are being investigated.
- 7) SHIC and the National Pork Board have collaborated directly with USDA Ag Research Service on Plum Island, USDA-APHIS and other key researchers to support studies to determine the minimum infectious dose of foot and mouth disease (FMD) virus needed to infect pigs via feed ingredients using normal feeding behaviors.
- 8) A meeting of stakeholders, including representatives of USDA, FDA, universities, industry organizations, producers, the feed processing industry and SHIC, was held to review current government policies and regulations and to make recommendations about research to help reduce the risk for pathogen transmission via feed and feed ingredients.
- 9) Risk mitigation research is testing several commercially available feed additives that may be added to feed during milling or manufacture to neutralize or reduce the amount of these pathogens in feed and help mitigate the potential risk of transport.
- 10) At the Kansas State University high biosecurity lab, researchers are working directly with ASF, CSF and PRV to determine the potential for survival in feed and feed ingredients under a shipment transboundary model as well as assessing tools for mitigating the risk of virus transport in feed and feed ingredients.
- 11) Researchers are investigating using dust samples to monitor for swine pathogens in US feed mills. There is potential for the findings to lead to development of a diagnostic laboratory panel of assays where a single submitted swab of feed mill dust could be analyzed for multiple feed-based bacteria and viruses – a low-cost tool that could be used to help address feed safety.
- 12) Swine industry groups including SHIC, National Pork Board, National Pork Producers Council, and American Association of Swine Veterinarians developed a list of questions related to feed safety for producers to ask of their suppliers.
- 13) Current SHIC-funded research says feedstuffs coming from facilities with no or unknown biosecurity are safer to use at least 78 days after a born on date that prevents additional contamination for bagged or sealed feedstuffs and 286 days after a born on date for bulk feedstuffs that can't be sealed or shipped in a way to prevent additional contamination, and when stored just below room temperatures.
- 14) In collaboration with SHIC and the other industry organizations, the American Feed Industry Association (AFIA) has developed a tentative working definition of biosecure feed and feed component manufacturing facilities.
- 15) SHIC and AFIA are funding an additional, more comprehensive investigation into the half-life of viruses, to update the 78 days holding time information. Updated information on holding time after a born on date will be communicated in early 2019.
- 16) A 2018 published study analyzed the risk of African swine fever (ASF) and classical swine fever (CSF) being introduced into the US through prohibited swine products carried by air passengers and identified locations and time periods at higher risk so preventive and mitigation measures could be implemented. The combination of the 2018 ASF epidemic in China and the increased travel in and

Swine Health Information Center 2018 Progress Report

from China may change the estimate of risk. The SHIC and the National Pork Board are co-funding a project with the University of Minnesota to update this risk estimate.

- 17) SHIC, National Pork Board, National Pork Producers Council, and American Association of Swine Veterinarians have asked for international travelers to report if they are not diverted for secondary screening after returning from overseas travel and declaring that they've been on farms or in contact with animals. The information will be given to DHS Customs and Border Protection to improve protection from foreign swine disease introduction.

Improve Swine Health Information

- 1) A literature review was completed for each of the 31 pathogens whose SHIC factsheets have not been recently updated. This helps ensure the information in the fact sheets is accurate and up to date.
- 2) SHIC is continuing to support the Morrison Swine Health Monitoring Project (MSHMP). MSHMP currently monitors approximately 50% of the U.S. sow herd for economically important pathogens. In the short term, this project contributes to the control and prevention of important swine diseases and in the longer term, builds capacity for data collection, organization and providing capability to facilitate response to emerging pathogens.
- 3) Analysis of MSHMP's data helps to control and prevent swine diseases. Projects during 2018 found:
 - a. When controlling disease spread, it is possible to calculate the ideal places in a system to start control strategies to more efficiently slow disease spread, and these same calculations can help target the ideal locations for disease monitoring in a system.
 - b. PRRS-related biosecurity practices can be prioritized by assessing the number of production events in facilities of all sizes and production styles that had a direct impact on outbreaks.
- 4) SHIC has funded a thorough study of the National Poultry Improvement Plan, its associated organizational structure and operations, and industry participation and execution across the various segments of the US Poultry Industry, in order to assess the potential for establishing a similar program for the US Swine Industry.
- 5) The domestic disease monitoring "Swine Disease Reporting System" uses veterinary diagnostic lab test results reported from Iowa State University, University of Minnesota, South Dakota State University and Kansas State University. The monthly reports include analysis of PEDv, PDCoV, and PRRS data and the incidence and causes of central nervous system syndromes in pigs.
- 6) SHIC coordinated a meeting of the project coordinators of independent and voluntary swine health and producer information sharing programs around the country. Hosted by The Ohio State University Veterinary School faculty, the purpose was to discuss successes and challenges of individual programs in Illinois, Ohio, Pennsylvania, and the Morrison Swine Health Monitoring Project.

Swine Health Information Center 2018 Progress Report

Surveillance and Discovery of Emerging Disease

- 1) A Senecavirus A (Seneca Valley Virus or SVA) outbreak investigation, funded by SHIC with in-kind contributions from the National Pork Board, reports about an incident where so many pigs needed to be held for SVA investigation in the abattoir it threatened plant operations.
- 2) In 2018 SHIC funded further diagnostic work into understanding a hemorrhagic tracheitis syndrome that has been moving east to west across Canada.
- 3) Current statistical methods for selecting diagnostic laboratory sample submission size, i.e., how many pigs and which pigs to sample, worked well for traditional farms, but does not work for modern farms because of industry evolution since they were developed. A project is underway, focusing on technical aspects and experimental design related to the development of more efficient and cost-effective surveillance systems, with an emphasis on preparing the swine industry for detecting and eliminating emerging and/or foreign animal diseases.

Responding to Emerging Disease

- 1) Reports of porcine epidemic diarrhea virus (PEDV) triggered a request for the SHIC Rapid Response Program to help identify pathways of PEDV introduction onto affected farms. SHIC initiated Rapid Response Team investigations to test the program as well as assist affected producers by identifying high risk events preceding the outbreaks.
- 2) Following the Rapid Response Teams' investigations of the PEDV affected farms, the National Pork Board organized an interactive review with the participating veterinarians to examine outbreak reports and identify outcomes and action items. This SHIC-NPB collaboration helped to further develop the overall goal of building and maintaining industry preparedness in the event of an emerging or foreign animal disease outbreak.

Swine Health Information Center Communications

- 1) The SHIC website
 - a. The SHIC website has been organized to facilitate intuitive use, increase professionalism of web presence and facilitate organization. Google Analytics of the website traffic was used to measure impact of media efforts. All media releases are to communicate to the end audiences of SHIC timely and relevant information, as well as the activities of the Center.
 - b. There were over 16,000 individual sessions during 2018, compared to over 11,000 in 2017. Most visits were from the US, Canada, Mexico and the UK with a total of 46,844 page views (23,455 in 2017).
- 2) The SHIC eNewsletter
 - a. A monthly SHIC eNewsletter publication schedule continued in 2018 with additional updates being sent following the outbreak of African Swine Fever in China. More than 3,000 contacts are in the newsletter database. "Percent opens" for the eNewsletter was 34.4% (Constant Contact Benchmark is 11/0%) and "percent clicks" through to articles on the SHIC website was 14.8% (Constant Contact Benchmark is 7.2%).

Swine Health Information Center 2018 Progress Report

3) Press releases

- a. There were fewer press releases in 2018 vs 2017 because key media have now subscribed to the SHIC eNewsletter for up to date, monthly information. For press release distribution, general emails were sent to 235 ag news outlets and individual emails were sent to the top five pork press editors for each press release. Nearly 100 percent of the press releases were picked up by these national editors covering the US pork industry.

Swine Health Information Center 2018 Progress Report

Swine Health Information Center organization

1) The Swine Health Information Center is a 501(c)(3) corporation governed by a Board of Directors

The producer members of the Board of Directors are active pork producers or representatives of pork producing companies or allied industry that have an interest in the mission of the Center and that serve as champions for the Center's objectives and goals. There are nine members:

- a. Two named by the National Pork Board
 - i. Gene Noem, pork producer, Minnesota
 - ii. Mark Greenwood, AgStar Financial Services, Minnesota
- b. Two named by the National Pork Producers Council
 - i. Dr. Howard Hill, pork producer and NPPC past-president, Iowa
 - ii. Bill Luckey, pork producer and past member of NPPC Board of Directors, Nebraska
- c. Two named by the American Association of Swine Veterinarians
 - i. Dr. Matt Anderson, Suidae Health and Production and AASV past-president, Iowa
 - ii. Dr. Daryl Olsen, AMVC and AASV past-president, Iowa
- d. Three at-large producer members
 - i. Mark Schwartz, pork producer, Minnesota
 - ii. Dr. Mike Terrill, Topigs Norsvin, Minnesota
 - iii. Dr. Matthew Turner, JBS USA, Colorado

2) A 2018 operating budget and investment portfolio was developed.

The SHIC Board of Directors approved an operating budget for 2018 and has reviewed and modified the budget during the year to best meet the SHIC mission. The approved operating budget addressing the 2018 Plan of Work was \$2,136,564.

Extra funds not needed for the operating budget were invested in securities with Wells Fargo Bank and modeled after the National Pork Board's investment plan. The investments are a series of FDIC insured Certificates of Deposit, laddered to provide on-going operating funds as the certificates reach maturity.

3) SHIC Working Groups have been formed to provide input and oversight as the Center fulfills its mission.

The Working Groups give the opportunity to provide program oversight and decision-making, supplemented and informed by subject matter expertise. To complete the SHIC Plan of Work two working groups have been formed.

The Monitoring and Analysis Working Group is charged with assessing foreign, transboundary production disease risk using information from a variety of sources. The outcome of this assessment is the on-going prioritization of the Swine Disease Matrix. It is also responsible for improving the health of the nation's swine herd through the development and oversight for on-going projects. These include monitoring for domestic diseases affecting swine health and analyzing health and other data to

Swine Health Information Center 2018 Progress Report

support on-farm and prospective producer decision making. The Working Group reviews and selects research and program activities that address its Plan of Work.

The Preparedness and Response Working Group is responsible for oversight of the Swine Disease Matrix research. It is responsible for funding decisions to fulfill other Matrix-related research objectives. It also provides advice and oversight of SHIC's role in the emerging swine diseases response plan. That includes the appropriate SHIC response to an emerging swine disease and for the information and analysis necessary to support the proportional pork producer and pork industry response to these emerging diseases. The Working Group reviews and selects research and program activities that address its Plan of Work.

Swine Health Information Center 2018 Outreach

- 1) There has been personal outreach to pork producers, veterinarians, allied industry and state and federal animal health officials to foster collaboration, develop projects, increase understanding of SHIC and its mission and inform them about the research and programs. The feedback has helped to focus and refine SHIC responsibilities, research and programs. Following is a list of organizations and meetings where SHIC's research and programs were presented or discussed.
 - a. Pork producers
 - i. AMVC Swine Health Services; Carthage Veterinary Service; Christensen Farms; Compeer Swine Operational Peer Group; JBS; The Mashhoffs; Iowa Select Farms; Pipestone; Prestage Farms; Schwartz Farms; Seaboard Foods; Smithfield Foods, Hog Production Division; Swine Vet Center; 21st Century Strategic Forums, 21st Century Pork Club
 - ii. Canadian Pork Producers Association
 - iii. Minnesota Pork Producers Association's Research Committee
 - iv. National Pork Board's Board of Directors
 - v. National Pork Board's Swine Health Committee
 - vi. National Pork Producers Council's Animal Health and Food Security Committee
 - vii. National Pork Producers Council's Board of Directors
 - viii. National Pork Producers Council's Pork Action Group
 - ix. National Pork Producers Council's Packers Processors Industry Council
 - x. Ohio Pork Producers Council
 - xi. Swine Disease Response Council
 - xii. UMN Allen D. Lemman Swine Conference
 1. Feed Research/Safety breakout seminar
 - b. Allied industry
 - i. American Feed Industry Association
 - ii. Boehringer Ingelheim Vetmedica
 - iii. Central Life Sciences
 - iv. Genus PIC
 - v. Global VetLINK
 - vi. Institute for Infectious Animal Diseases
 - vii. National Association of Ag Broadcasters

Swine Health Information Center 2018 Progress Report

- viii. National Corn Growers Association
- ix. National Grain and Feed Association
- x. National Institute for Animal Agriculture
- xi. Tetracore, Inc.
- xii. Thermo Fisher Scientific
- xiii. United Soybean Board
- xiv. U.S. Animal Health Association, including Allied industry, USDA and State Animal Health Officials
- xv. Zoetis
- c. Veterinarians
 - i. American Association of Swine Veterinarians Board of Directors meetings
 - ii. 2018 American Association of Swine Veterinarians annual meeting
 - iii. Swine Medicine Education Center, Iowa State University
- d. Veterinary Diagnostic Laboratories, Colleges of Veterinary Medicine and Academics
 - i. Kansas State University Ag Biosecurity Coordination Network
 - ii. Iowa State University Veterinary Diagnostic and Production Animal Medicine
 - iii. North American PRRS Symposium and Emerging and Foreign Animal Diseases
 - iv. University of Minnesota Veterinary Diagnostic Laboratory
- e. USDA
 - i. Ag Research Services
 - ii. Animal and Plant Health Inspection Service, Administrator
 - iii. Animal and Plant Health Inspection Service, Deputy Administrator, Veterinary Services
 - iv. Animal and Plant Health Inspection Service, Veterinary Services Leadership Team and Veterinary Services staff
 - v. Center for Epidemiology and Animal Health
 - vi. Center for Veterinary Biologics
 - vii. National Import Export Services
 - viii. National Veterinary Services Laboratory
 - ix. USDA ASF Policy Exercise
- f. International
 - i. Agrocere PIC
 - ii. OIE, International Organization for Animal Health
 - iii. OIE, International Organization for Animal Health, Director General
 - iv. Ontario Animal Health Network
 - v. UK Pig Veterinary Society

Progress on the Swine Health Information Center 2018 Plan of Work

Preparedness

1. Swine Viral Disease Matrix

In 2016, SHIC Matrix research focused on the ability to detect the Viral Matrix pathogens via nucleic acid detection, using PCR testing – a platform that is commonly available in the U.S. major veterinary diagnostic laboratories. 2017-funded research focused on the development and validation (analytic and diagnostic) of antibody detection assays for monitoring for emerging diseases, determining freedom from disease (after an outbreak), or defining the extent of disease spread. During 2018 development of additional tests helped to fill in gaps in diagnostic preparedness.

PCR Assay Catalog

The recent publication of the Polymerase Chain Reaction (PCR) Assay Catalog for diagnostic laboratories demonstrates how far the pork industry has advanced in ability to test for emerging diseases. The catalog provides diagnosticians at our veterinary diagnostic labs, who are working every day with swine health case submissions, pertinent information about the 17 new PCR tests developed, including contact information of the experts for questions about availability and use. Additionally, the catalog summarizes the research behind the test development and covers technical background information including sample types and analytical and diagnostic sensitivity and specificity.

Continued Viral Matrix Pathogen Research

2018 research continued to fill in identified gaps in preparedness for Viral Matrix priority pathogens:

- When Japanese Encephalitis Virus (JEV) infects a naïve herd, the mortality rate of infected piglets is close to 100 percent, and 50 to 70 percent of sows experience reproductive failure. While JEV is endemic in Asia and the Pacific, many countries like the United States don't have and don't want this disease. New research has uncovered the ability of the virus to be spread between pigs by direct contact so SHIC has sponsored a novel and convenient means to monitor for and detect JEV in saliva via rope testing. An oral fluids PCR test for JEV infection in swine has now been developed for use in US veterinary diagnostic labs.
- PCV3 is on the radar of SHIC as a potential emerging disease, with recognition that more work needs to be done to understand its role in disease syndromes.
 - Newly released research sponsored by SHIC gives the industry the ability to detect and differentiate the majority of field strains of PCV3 and PCV2.
 - PCV3 can, and has been, found in multiple tissues and samples associated with variable clinical signs. SHIC has sponsored research to take a deep dive into past University of Minnesota Diagnostic Lab submissions. The goal is to mine diagnostics data obtained over the last two years and determine how closely certain clinical signs and pathologic lesions are associated with the presence of PCV3, and the amount of virus found in each case.

Swine Health Information Center 2018 Progress Report

- When the Swine Viral Disease Matrix was created to help prioritize emerging diseases of risk, Influenza C and D Viruses were added and a review of readiness completed. This has resulted in the creation of the first 5-Plex Reverse Transcriptase Influenza PCR for animals that detects and differentiates between Influenza A, B, C and D with one test. The developed assay has wide application for diagnosis, monitoring and surveillance of influenza in swine, bovine, avian, other animals, including humans upon clinical validation.
- Early detection and understanding sources of PRV are essential to contain spread and prevent economic losses, should the virus arrive in the US. The availability of a test to discern classical from the variant high path Chinese strain strengthens the US ability to respond quickly and effectively. We can now discern diagnostically between classical and high path variant PRV with a single highly sensitive and specific PCR test. The assay was validated on nasal swabs, oral swabs, whole blood, serum, and tissues at the Kansas State University Veterinary Diagnostic Laboratory and at the National Veterinary Services Laboratory in Iowa. Specificity of the assay was further confirmed by testing over 300 clinical samples (serum, tissues, and swabs) collected from Canadian and US national herds.
- SHIC is watching porcine kobuvirus (PKV) as a possible emerging swine virus that could pose a valid threat to the US pork industry. SHIC-funded research conducted at Iowa State University resulted in the development and validation of a PKV real-time reverse transcriptase PCR (rRT-PCR) to detect strains of PKV circulating in US swine. The validation process of the PCR resulted in data that suggests PKV is widespread in US swine and additional research is needed to discern if pigs with or without diarrhea are infected with PKV or if different strains of the virus are more likely to cause diarrhea in swine.
- Swine Acute Diarrhea Syndrome Coronavirus (SADS-CoV), a coronavirus variant emerging in China, has been on SHIC's radar and, because of information coming directly from China, research has been initiated. The research focuses on the development of a diagnostic triplex PCR giving diagnostic laboratories the tool for PED, PDCoV and SADS-CoV detection in one test, saving producers testing diagnostic fees.

Swine Viral Disease Matrix Update

Following multiple outbreaks of African Swine Fever (ASF) in China, continued spread of ASF in Bulgaria, Romania struggling to control the virus and the first ASF cases discovered in Belgium, SHIC revised the priority of African swine fever (ASF) on the Swine Viral Disease Matrix from an average risk score of 7.7 to 8.3. This moved ASF from third on the Matrix to second. Appendix A shows the newly revised Swine Viral Disease Matrix with its prioritization scoring.

2. Swine Bacterial Disease Matrix

The pork industry has spent millions to better understand viruses, however it is often bacteria that kills the pig. In addition, current biosecurity practices are primarily devised to keep viruses out and potentially fail to address the endemic nature of bacteria in a herd.

To go along with the Swine Viral Disease Matrix, SHIC's prioritized list of endemic and foreign swine viruses, a Swine Bacterial Disease Matrix, has been developed. This new tool will guide a focused look at the US pork industry's highest bacterial risks to help facilitate research and information. Both are

Swine Health Information Center 2018 Progress Report

important tools and part of SHIC's mission to protect and enhance the health of the United States swine herd. Appendix B shows the new Swine Bacterial Disease Matrix.

3. Improve FMD, CSF and ASF Diagnostic Capabilities

USAHA resolutions

SHIC, National Pork Board, National Pork Producers Council, and American Association of Swine Veterinarians jointly authored and offered three important resolutions individually addressing African swine fever (ASF), classical swine fever (CSF), and pseudorabies virus (PRV) during the US Animal Health Association (USAHA) annual meeting. The pork industry resolutions request immediate ASF surveillance, ask USDA to expand and harmonize accepted tissues to test for CSF and ASF because it is possible they could be clinically similar or be confused with current diseases, and for a PRV PCR test to be validated by USDA for use in the National Animal Health Laboratory Network (NAHLN) labs. The resolutions passed review of six USAHA committees and were approved by the entire body without dissent. They were also supported by 26 state pork producer associations: Arizona, Colorado, Florida, Hawaii, Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Mississippi, Montana, Nebraska, New York, North Carolina, North Dakota, Oklahoma, Ohio, Pennsylvania, South Dakota, Texas, and Wisconsin.

FMD, CSF and ASF Oral Fluids Test Kit Validation

Historically, individual animal tissue collection, like a serum sample, has been used to monitor herd disease status to enable movement or sale during a disease eradication program. The Secure Pork Supply includes the use of surveillance to demonstrate freedom of disease to enable pig movement or sale during a disease outbreak or eradication program. Validation of oral fluids-based surveillance that will demonstrate herd health status will give animal health officials information needed for them to permit movements from an outbreak Control Zone and producers a cost-effective and scientifically sound way to collect samples for establishing herd disease status.

SHIC co-funded, with the National Pork Board and USDA, a research project for analytic specificity validation of commercial PCR test kits for FMD, CSF and ASF, using oral fluids. The research is scheduled to be complete and the tests kits analytically validated March 1 of 2019.

Monitor and Mitigate Risks to Swine Health

1. Identify and mitigate swine disease risks by international monitoring

International Swine Disease Monitoring Reports

Initially funded by SHIC in 2017, the International Swine Disease Monitoring Report is a program for systematically monitoring swine diseases around the world. It was developed at the University of Minnesota using a private-public-academic partnership including collaboration with the USDA/APHIS Center for Epidemiology and Animal Health (USDA-CEAH). The aim of these reports is to have a support system for near real-time identification of hazards that will contribute to the mission of assessing risks to the industry and ultimately, to detect, identify, or prevent occurrence of events in partnership with official agencies and with our international network of collaborators.

Swine Health Information Center 2018 Progress Report

Reports are created based on the systematic screening of multiple official data sources, such as government and international organization websites, and soft data sources like blogs, newspapers and unstructured electronic information from around the world that then are curated to build a raw repository. Afterward, a group of experts uses a multi-criteria rubric to score each event, based on novelty, potential direct and indirect financial impacts on the US market, credibility, scale and speed of the outbreak, connectedness, and local capacity to respond. The output of the rubric is a final single score for each event which is then published in the report.

With the concern about ASF circulating in China and elsewhere, SHIC is currently publishing bi-monthly reports to ensure current information is available.

International Transport Biosecurity

US swine breeding stock are routinely sold and transported overseas. To investigate the opportunity for foreign swine pathogens to enter the US related to these conveyances, the University of Minnesota is characterizing US breeding stock companies' international biosecurity practices.

International contacts survey for on-the-ground foreign disease information.

A new Seneca Valley Virus (Senecavirus A or SVA) outbreak was seen in Brazil during 2018 and reported via the AASV e-letter and the SHIC monthly eNewsletter. Most cases initially were in finishing pigs, moving to nurseries and then to farrowing. Lesions are usually very severe, such as completely detached hooves, and healing was delayed, sometimes taking more than 10 weeks. There are reports of farrowing sites with suckling piglet mortality rates approaching 30 percent. RNA samples extracted from the vesicular fluid will be sequenced to elucidate the similarities between the current SVA and the virus from the 2014-2015 outbreak. However, one open question is whether there is a new mutant SVA circulating in Brazil, with greater pathogenicity, or if this was just a fall in immunity of the Brazilian herd after these three years between the two outbreaks.

Understanding Disease Introduction Risk from International Air Travel

According to a study by Cristina Jurado, et. al, doi: 10.1111/tbed.12996, 2018, on average 8,000 pork derived products are annually confiscated by Customs and Border Protection at the United States ports of entry such as international airports, harbors or mail offices. Their study aimed at analyzing the risk of African swine fever (ASF) and classical swine fever (CSF) being introduced into the US through prohibited swine products carried by air passengers and identifying locations and time periods at higher risk where and when preventive and mitigation measures should be implemented.

The study used international travel and USDA Customs and Border Protection data from January of 2010 to March of 2016. Thus, the results were based on data prior to the August 2018 notification of the beginning of the ASF outbreak in China. In addition, World Bank data on air transport in and from China shows a 13% increase from 2016 to 2018. The combination of the 2018 ASF epidemic in China and the increased travel in and from China may change the estimate of the risk of ASF entry through US airports. SHIC and the National Pork Board are co-funding a project with the University of Minnesota to update this risk estimate.

Swine Health Information Center 2018 Progress Report

Improve screening following international travel

When returning to the United States after visiting a farm or being in contact with animals in a country (or countries) with African swine fever (ASF), or any other foreign animal disease, travelers should declare this information to US Customs and Border Patrol via written form, airport kiosk, or verbally. They should then be diverted for an ag secondary screening by an ag specialist. SHIC, National Pork Board, National Pork Producers Council, and American Association of Swine Veterinarians have asked for international travelers to report their experience if they are not diverted for secondary screening upon return to the US following overseas travel. SHIC is collecting information about the customs experience and the industry associations will be sharing it with DHS Customs and Border Protection to help assess performance and improve prevention of foreign disease introduction.

2. Improve transport biosecurity from points of concentration.

Multiple meetings and calls trying to devise a way to monitor first points of concentration for pathogens and to improve biosecurity at these facilities were held. Complexities in designing a quality project and difficulties in identifying collaborators for first point of concentration and on-farm transport biosecurity studies prevented implementation of a project during 2018. Continued investigation of transport biosecurity is proposed for the 2019 SHIC plan of work.

3. Investigate the ability of common inputs to production to act as biologic or mechanical vectors for disease introduction onto farms

Feed risk research and information

After PEDV was introduced into the United States in 2013, a USDA pathways analysis concluded that the most likely route of introduction was using contaminated containers moving between countries and being used to import feed or feed ingredients. However, the pattern of the U.S. outbreak was such that a more direct involvement of imported feed needed to be investigated.

SHIC-funded 2016 – 17 research about the potential for feed and feed ingredients to harbor and transmit viral pathogens has been completed. The SHIC Swine Viral Disease Matrix was used to identify target viral pathogens for evaluation in the study. Researchers used “surrogate viruses” in some instances, which allowed study of closely related and structurally similar viruses. Results of the study (summarized in Appendix C) conducted by Pipestone Applied Research, South Dakota State University and Kansas State University shows the potential for PRRSV and other viruses to contaminate and survive in feed ingredients, including soybean meal and distillers dried grains and solubles (DDGs). ASF, Seneca Virus A (surrogate for FMDV and of interest itself) and Bovine Herpesvirus-1 (surrogate for PRV) have also been found to be able to survive in feed ingredients under the shipping time and environmental conditions from China or Eastern Europe.

USDA and FDA believe there are currently many unknowns and data gaps that should be identified to help define or validate feed risk. In the absence of information regarding the predictive ability of unvalidated test results to accurately determine the potential risk associated with feed, they believe the design and implementation of a testing strategy is not feasible. At this time, it is up to the pork

Swine Health Information Center 2018 Progress Report

industry to address potential risk of foreign animal disease introduction into the US from imported feed ingredients.

One of the major concerns is that commercial feed in the US may become ASF-contaminated from imported feed ingredients. In a statement on November 12 to the Shenzhen Stock Exchange, the Chinese Tangrenshen Group reported that ASF was detected in feed samples in one of their units. The feed was manufactured by their 51 percent owned subsidiary, Bili Meiyingwei Nutrition Feedstuff. Following this statement, on November 13, Tangrenshen Group followed up stating that test made by one of the units has actually ruled out the presence of ASF in feed. Subsequently, the operation resumed work as normal.

A method to test bulk feed products and show how to apply it to monitoring shipments for pathogen contamination has been funded by SHIC and is currently being researched. Also, currently being researched, with results expected soon, are feed pathogen mitigation options using Hazard Analysis and Risk-Based Preventive Controls and blockchain.

SHIC and the National Pork Board have collaborated directly with USDA Ag Research Service on Plum Island, USDA-APHIS and other key researchers to support studies to determine the minimum infectious dose of foot and mouth disease (FMD) virus needed to infect pigs via feed ingredients using normal feeding behaviors. Simultaneously, this project will look at the effectiveness of possible mitigants being added to the feed to help neutralize the virus. To date, no study has looked at the FMD dose needed to infect a pig via feed, using normal feeding behaviors. Successful completion of the project will provide critical knowledge pertaining to the risk of introduction of FMD into the US pig production system by imported feed components as well as potential mitigation of that risk.

A meeting of stakeholders, including representatives of USDA, FDA, universities, industry organizations, producers, the feed processing industry, and SHIC, was held in June 2018. The objective of the meeting, hosted by SHIC and the National Pork Board, was to review current government policies and regulations and to make recommendations about research to help reduce the risk for pathogen transmission via feed and feed ingredients. A report from the meeting can be found on the Swine Health Information Center's website, www.swinehealth.org.

Risk mitigation research is testing several commercially available feed additives that may be added to feed during milling or other processes to neutralize or reduce the load of these pathogens in feed and help mitigate the potential risk of transport. The initial phase of the project consists of screening a panel of 10 mitigants against identified higher-risk combination of viruses and feed ingredients. The panel of viruses, which were selected based on their ability to survive in feed ingredients, include SVA (FMDV surrogate), BHV-1 (surrogate for PRV), PRRSV, PEDV, and ASFV.

At the KSU high biosecurity lab, researchers are working directly with ASF, CSF and PRV. They are determining the potential for survival in feed and feed ingredients under the transboundary model as well as assessing tools for mitigating the risk of virus transport in feed and feed ingredients.

Swine Health Information Center 2018 Progress Report

KSU researchers are investigating the use of dust samples to monitor for swine pathogens in US feed mills. The research validates standardized dust swabbing techniques for detection of Senecavirus A (SVA) at feed mills, albeit with less precision than directly analyzing feed samples. Of particular interest, the research also simultaneously determined the prevalence and distribution of SVA in United States swine feed mills, as an indicator of risk of domestic and foreign animal disease transmission through feed. Prevalence for SVA is low in US feed mills. But, in a mill where SVA was found on feed mill worker shoes, a farm that that mill fed went positive for SVA after detection in the mill. There is potential for the findings to lead to development of a diagnostic laboratory panel of assays where a single submitted swab of feed mill dust could be analyzed for multiple feed-based bacteria and viruses – a low-cost tool that could be used to help address feed safety.

Pork producers and feed suppliers are asking about feed safety due to the discovery and spread of African swine fever (ASF) in China where some feed ingredients, including soy bean meal, dried distillers grains and solubles (DDGS), amino acids, and vitamins, are manufactured and exported to the US. In response to this concern, SHIC, National Pork Board, National Pork Producers Council, and American Association of Swine Veterinarians developed a list of questions related to feed safety for producers to ask of their suppliers and reviewed existing research for information about appropriate feed holding time to enhance feed safety.

The research on holding time is based on a calculated half-life of viruses in these feed ingredients. The half-life of a virus is the time that it takes 50 percent of the amount of virus to naturally degrade. The the current research says feedstuffs coming from facilities with no or unknown biosecurity are safer to use 78 days after a born on date when additional contamination for bagged or sealed feedstuffs can be prevented and 286 days after a born on date for bulk feedstuffs that can't be sealed or shipped in a way to prevent additional contamination, and when stored just below room temperature. This holding time is sufficient to allow natural degradation of 99.99% of potential viral contamination.

Because the current research calculates half-life on limited data, SHIC and the American Feed Industry Association (AFIA) are funding a comprehensive investigation into the half-life of viruses in different feed ingredients, to help give more science-based information to calculate holding time. Updated information on holding time will be communicated early in 2019.

In response to industry-developed questions for feed suppliers, AFIA has developed a tentative working definition for “biosecure” feed and feed component manufacturing facilities after consultation with AFIA members and pork industry representatives. This tentative working definition is provided for the animal feed industry’s consideration as firms work with their suppliers on biosecurity, verification activities and to communicate such practices to customers.

Improve Swine Health Information

1. Update the SHIC Swine Disease Fact Sheets

A literature review was completed for each of the 31 pathogens whose SHIC factsheets have not been recently updated. The analysis of the literature review showed that the recently published information

Swine Health Information Center 2018 Progress Report

would not substantially change information in the factsheets. Follow-up reviews will be done to ensure the factsheets remain accurate and up to date.

2. Develop the industry capacity for detection of emerging disease, rapid response and continuity of business

Morrison Swine Health Monitoring Project (MSHMP)

The MSHMP currently monitors approximately 50% of the U.S. sow herd for economically important pathogens. Veterinarians for these producers share site identities, locations, diagnostic information and, when requested, management interventions and production data.

In the short term, this project contributes to the control and prevention of important swine diseases. Longer term, the project builds industry capacity for data collection, organization and providing capability to facilitate response to emerging pathogens.

Two 2018 MSHMP data analysis projects that help to inform producers and veterinarians about disease management:

- The frequency of swine movement in North America makes the industry vulnerable to disease spread. To explore how modifying movement patterns can reduce disease spread, SHIC sponsored research at the University of Minnesota Department of Veterinary Population Medicine to look at the question: Can we reduce the vulnerability of the US swine industry to disease spread by prioritizing surveillance and control on specific farms? Key take home messages were when controlling disease spread, it is possible to calculate the ideal places in a system to start control strategies to more efficiently slow disease spread, and these same calculations can help target the ideal locations for disease monitoring in a system.
- PRRS-related biosecurity practices can be prioritized by assessing the number of production events in facilities of all sizes and production styles that had a direct impact on outbreaks. The objective of the SHIC-funded analysis was to describe key differences in the biosecurity aspects of breeding herds with relatively low PRRS incidence, compared to those with relatively high PRRS incidence, so ongoing biosecurity assessments can be more efficient and take less time. High PRRS incident farms had a higher monthly frequency of people entering and exiting the farm, in addition to higher frequency of pig movements. On-farm rendering was the production practice having the largest difference in frequency between low versus high PRRS incidence farms. The study summary gives additional information about area density, downtime and other differences between the two groups.

Consideration of future pork industry organizational needs

The US Pork Industry - an export-centric industry that spans much of the lower 48 states - must manage animal health-related market risks. That an "event" will occur at some point in the future seems increasingly probable, and the economic consequences of an introduction of a trade-impacting disease has continued to increase due to the growth in US Pork exports. SHIC has funded a thorough study of the National Poultry Improvement Plan, its associated organizational structure and operations,

Swine Health Information Center 2018 Progress Report

and industry participation and execution across the various segments of the US Poultry Industry, in order to assess the potential for establishing a similar program for the US Swine Industry. The report is due early in 2019.

3. Make industry swine health information available to help uncover, communicate and mitigate regional and national risks to herd health

Continue to evolve and refine domestic swine disease monitoring and reporting

The domestic monitoring “Swine Disease Reporting System” is a SHIC-funded, veterinary diagnostic laboratory collaborative project resulting from the veterinary diagnostic lab (VDL) data standardization project SHIC supported in 2016 and 2017. The monthly report analyzes data from Iowa State University, University of Minnesota, South Dakota State University and Kansas State University VDL cases with molecular tests (PCR-based assays and virus genotyping) for PEDv, PDCoV, and PRRS. It also reports on the incidence and causes of central nervous system syndromes in pigs. An advisory group has been formed to help give context to the data and interpret it. The goal is to aggregate swine diagnostic data from participating reporting VDLs and present it in an intuitive format via shared reports and web dashboards.

Because the potential for new, emerging, and foreign animal diseases to affect the US swine herd is an industry-wide concern, SHIC coordinated a meeting of the project coordinators of independent and voluntary swine health and producer information sharing programs around the country. Hosted by The Ohio State University Veterinary School faculty, the purpose was to discuss successes and challenges of individual programs in Illinois, Ohio, Pennsylvania, and the Morrison Swine Health Monitoring Project. Participants shared ways each program could be improved, IT issues, premises ID verification, and a new proposal for giving state animal health officials real-time information that could help in getting movement permits in the face of a high consequence disease outbreaks.

Surveillance and Discovery of Emerging Disease

1. Investigate newly identified agents associated with disease

Senecavirus A (SVA or Seneca Valley Virus) infection is indistinguishable from foot-and-mouth disease (FMD) and other swine vesicular disease, so every outbreak, including at harvesting plants, must be investigated. An outbreak investigation, funded by SHIC with in-kind contributions from the National Pork Board, reports on an incident where so many pigs needed to be held for SVA investigation in the abattoir it threatened plant operations. The findings indicate weather conditions in the preoutbreak period were favorable for multiplication of mosquitoes, and potentially flies and other insects, which may have contributed to the spread of SVA between sites. Whether mosquitoes can serve as a vector for SVA has not been explored but the results of this investigation suggest it should. Single site suppliers with the presence of outdoor facilities had lower odds to be positive for SVA, suggesting multiple sites suppliers with contact with large production systems (e.g., shared equipment, trucks, etc.) may facilitate the transmission and spread of the disease. In addition, the presence of the packing plant inside the cluster suggests it may serve as a contact between the sites and act as a source of the virus.

Swine Health Information Center 2018 Progress Report

2. Ensure detection of emerging disease to facilitate rapid response.

Offer diagnostic fee support to help detect emerging diseases.

There continues to be incidents of high morbidity/high mortality where an etiology is either not identified or there is a strong supposition that the identified pathogen is not the likely cause of the outbreak. In 2018 SHIC funded further diagnostic work into understanding a hemorrhagic tracheitis syndrome that has been moving east to west across Canada. Results are expected in early 2019.

Find improvements that can be made toward a nationally coordinated swine health surveillance system to prepare, detect and rapidly respond to emerging and regulatory foreign animal diseases.

An effective surveillance system should provide data for production and/or business planning, document freedom from specific pathogens and provide for a rapid and effective response to emerging and/or foreign animal diseases. Current statistical methods for selecting sample size, i.e., how many pigs and which pigs to sample, worked well for traditional farms, but does not work for modern farms because of industry evolution since they were developed.

Research about technical aspects and experimental design related to the development of more efficient and cost-effective surveillance systems, with an emphasis on preparing the swine industry for detecting and eliminating emerging and/or foreign animal diseases is underway. The project provides technical and analytical expertise on diagnostic assay assessment and technical and analytical expertise on spatially balanced sampling (generalized random tessellation stratified design - GRTS). For regional surveillance, the potential advantage of the GRTS approach is that it requires fewer samples and, therefore, lower producer cost.

Responding to Emerging Disease

1. Identify high risk events likely to be responsible for introducing emerging diseases onto farms.

Rapid Response Corps

This project, now operational, developed a rapid response program for epidemiological investigations of emerging, transboundary and endemic swine disease outbreaks. The program has set up six regions across the country, small enough for Rapid Response Corps (RRC) members to be able to drive to a farm in their region and begin the investigation within 72 hours after invitation from the producer.

RRC members are veterinarian consultants, state animal health officials or their representatives, epidemiologists and, when appropriate, federal animal health officials. RRC members are trained through videos on the SHIC website that are also available for viewing by anyone that's interested.

Reports of porcine epidemic diarrhea virus (PEDV) triggered a request for SHIC Rapid Response Program to help identify pathways of PEDV introduction onto affected farms. SHIC initiated Rapid Response Team investigations to test the program as well as assist affected producers, identifying high risk events preceding the outbreaks. Following the Rapid Response Team's investigation into the PEDV affected farms, the National Pork Board (NPB) organized an interactive review of the investigations

Swine Health Information Center 2018 Progress Report

with the participating veterinarians to examine outbreak reports and identify outcomes and action items.

SHIC's goal for testing the program includes exercising the system for future emerging or foreign animal disease response needs, learning what went well, identifying what can be done better, and discovering what work needs to be done to continue to support the process. During the NPB review, participants shared their observations about results of the farms' investigations and the Rapid Response Team process. This SHIC-NPB collaboration helped to further develop the overall goal of building and maintaining industry preparedness in the event of an emerging or foreign animal disease outbreak.

Communications

1. The SHIC website has been organized to facilitate intuitive use, increase professionalism of web presence and facilitate organization. Google Analytics of the website traffic was used to measure impact of media efforts. All media releases are to communicate to the end audiences of SHIC timely and relevant information, as well as the activities of the center.
2. Activity on www.swinehealth.org
 - Top pages on SHIC website (January 1-December 19, 2018) with (number of visits):
 - Seneca Valley Virus Summary (3,392)
 - Global Disease Surveillance Reports (3,321)
 - Special Announcement – ASF Belgium (3,016)
 - Domestic Disease Surveillance Reports (1,241)
 - Fact Sheets (1,197)
 - Swine Disease Matrix (1,193)
 - News (1,075)
 - ASF in China (902)
 - Disease Monitoring Reports (892)
 - Continuous WordPress and plugin updates
 - Kept website content updated with relevant pdfs and content
 - Updated Reports
 - Updated Fact Sheets
 - Posted press releases and articles
 - Posted monthly newsletters
 - Posted Special Updates
3. Website impact
 - Over 16,000 individual sessions for the year (over 11,000 in 2017).
 - 16.3% returning visitors
 - 83.7% new visitors
 - 16,177 separate users (7,379 in 2017)
 - 46,844 total page views (23,455 in 2017)
 - Average of 1.92 pages per session (2.12 in 2017)
 - Average session duration of 1:35 (2:06 in 2017)

Swine Health Information Center 2018 Progress Report

- 14,000 of users were from the USA
- 1,400 were from Canada
- 951 from Mexico
- 652 from the UK
- 6,400 from a combination of other countries

4. Press releases

There were fewer releases in 2018 vs 2017 because key media has now subscribed to the SHIC eNewsletter. Five press releases were issued in 2018:

- 2017 Accomplishments – National Pork Board Report Approved
- 2018 Plan of Work
- Transboundary Feed Study – Joint with SDSU
- Board Actions
- Feed Risk Consortium

5. Press release impact

General emails were sent to 235 ag news outlets for each press release. Farm broadcasters continued as a very important media outreach for SHIC with follow-up interviews after each press release. New delivery method of podcasts and online interviews were also utilized more this year.

- Farmscape online and radio broadcasts
- FeedNavigator.com
- Pig Progress (blog)
- Brownfield Radio Network
 - Established relationship with the Minnesota bureau for follow-up interviews and new subjects as they arise. Also established relationship with two additional Brownfield reporters for interviews and follow ups. All Brownfield interviews are shared with all Brownfield outlets.
- National ag TV (RFD-TV)
- Podcast interview with Ag News Daily

Individual emails were sent to the top five pork press editors with each press release. Nearly 100 percent of the press releases were picked up by these national editors covering the U.S. pork industry. Publications included:

- Pork Magazine and associated daily eNewsletter
- National Hog Farmer and associated daily eNewsletter (two editors)
- Feedstuffs and associated daily eNewsletter and weekly Food Animal Report
- Successful Farming and associated daily eNewsletter

6. Event Interview Opportunities

This year interviews were scheduled before these two major events, resulting in more coverage in a shorter period of time. It also expanded our reach with ag media, especially new broadcasters or editors.

- World Pork Expo – completed seven interviews in one day of Expo

Swine Health Information Center 2018 Progress Report

- National Association of Farm Broadcasters – completed 14 interviews and 2 additional the following week

7. SHIC in the AASV Weekly e-Letter

Content was provided for 45 articles for the AASV weekly e-Letter, including:

- Sow plant (cull) project
- Japanese encephalitis virus activity
- SHIC accomplishments
- 2018 Plan of Work requests
- Saliva and nasal swab testing for PPIVI
- Influenza test to differentiate types
- Domestic disease monitoring reports (multiple times)
- National Pork Board advisement on continued funding for SHIC
- Feed related research
- Gene Noem joins SHIC board
- Global disease monitoring reports (multiple times)
- SADS-CoV in China
- Rapid Response Team PEDv exercise in Oklahoma
- PRRS biosecurity study (Linhares)
- On-farm disease prevention procedures (Vander Waal)
- PCR assay for PKV
- SHIC board meeting report
- SHIC PCR catalog published
- Plum Island study on minimum infectious dose of FMD in feed/mitigation
- JEV in North America and PCR test
- SVA outbreak (2017) report
- Feed risk consortium meeting
- Differentiating between classical and high path PRV
- Chinese PRV preparedness
- Swine health monitoring coordinator meeting
- Spontaneous foreign animal disease reporting tool
- Bacterial disease matrix published
- Feed biosecurity
- US Animal Health Association resolutions
- SHIC at National Association of Farm Broadcasters Table Talk
- Customs and Border Patrol screening caution
- 2019 Plan of Work requests
- PRRS biosecurity vulnerabilities
- PCV3 data analysis project
- SVA in Brazil

Swine Health Information Center 2018 Progress Report

8. SHIC eNewsletters

A monthly SHIC eNewsletter publication schedule continued, in 2018 with additional updates sent following the outbreak of African swine fever in China and Europe. A total of 24 eNewsletters were distributed. The distribution list is consistently updated. There are more than 3,000 total contacts in the eNewsletter database.

The following chart details SHIC eNewsletter acceptance and impact.

Edition	Date Sent	#Sent	Opens	% Opens	Unsubs	Clicks¹	% Click
January 2018	1/9/2018	2995	986	32.7%	3	214	23.9%
February 2018	2/8/2018	3002	847	30.9%	1	154	18.2%
March 2018	3/13/2018	3016	820	30.1%	3	171	20.9%
April 2018	4/6/2018	2759	830	30.5%	1	217	26.1%
May 2018	5/3/2018	2762	903	33.2%	4	236	26.1%
June 2018	5/13/2018	2768	800	29.5%	3	123	15.4%
July 2018	7/3/2018	2769	771	28.4%	4	134	17.4%
August 2018 - China ASF	8/3/2018	2770	1094	40.4%	1	138	12.6%
August 2018	8/7/2018	2778	941	35.0%	3	245	26.0%
August 2018 - China ASF 2	8/16/2018	2782	1003	37.0%	1	79	8.0%
August 2018 - China ASF 3	8/20/2018	2782	846	31.0%	1	59	7.0%
August 2018 - China ASF 4	8/23/2018	2803	1127	41.1%	2	98	8.7%
August 2018 - China ASF 5	8/30/2018	2802	1063	38.7%	1	82	7.7%
September 2018	9/5/2018	2827	923	33.3%	0	231	25.0%
September 2018 - CSF in Japan	9/10/2018	2828	1127	40.7%	3	54	4.8%
September 2018 - ASF in Belgium	9/13/2018	2847	1187	42.0%	1	75	6.0%
October 2018	10/3/2018	2887	1037	36.8%	0	228	22.0%
October 2018 - update	10/9/2018	2889	962	34.2%	3	129	13.4%
October 2018 - update 2	10/11/2018	2885	907	32.4%	1	79	8.7%
October 2018 - update	10/16/2018	2901	936	33.4%	3	18	1.9%

Swine Health Information Center 2018 Progress Report

Edition	Date Sent	#Sent	Opens	% Opens	Unsubs	Clicks¹	% Click
November 2018 regular	11/6/2018	2917	979	34.7%	2	248	25.3%
November 2018 update	11/19/2018	2933	981	34.7%	1	54	5.5%
December 2018 regular	12/5/2018	2966	966	33.7%	0	215	22.3%
December 2018 update	12/18/2018	2967	898	31.2%	1	22	2.4%

SHIC Average **34.4%**
Constant Contact Benchmarks **11.0%**
14.8%
7.2%

¹Clicks = following a link from the newsletter to the SHIC website

Swine Health Information Center 2018 Progress Report

Appendix A

SWINE VIRAL DISEASE MATRIX		September 2018		
Representative virus affecting swine	Production impact	Domestic/Foreign market impacts	Likelihood of introduction into the U.S. or emergence of a domestic disease	Numerical Average
Foot and mouth disease virus	9	9	9	9.0
African swine fever virus	9	9	7	8.3
Classical swine fever virus	9	9	5	7.7
Pseudorabies virus*	8	8	5	7.0
Influenza A virus	4	8	8	6.7
Nipah virus*	8	9	2	6.3
Ebola-Reston*	8	9	2	6.3
Porcine epidemic diarrhea virus	6	4	7	5.7
PRRS virus (Chinese high path)*	6	5	5	5.3
PRRS virus	6	3	6	5.0
Porcine teschovirus (Teschen/PTV1)*	5	5	5	5.0
Japanese encephalitis virus*	5	5	4	4.7
Getah virus*	5	5	4	4.7
Transmissible gastroenteritis virus	5	4	4	4.3
Menangle virus*	4	4	4	4.0
Porcine sapelovirus*	5	1	6	4.0
Porcine circovirus	4	2	5	3.7
Circovirus 3*	4	2	5	3.7
Porcine rotavirus	4	1	5	3.3
Swine vesicular disease virus	4	3	2	3.0
Vesicular exanthema of swine virus*	3	4	2	3.0
Porcine rubulavirus*	5	2	2	3.0
Seneca Valley virus*	3	3	3	3.0
Porcine parvovirus	3	1	5	3.0
Porcine deltacoronavirus	3	2	3	2.7
Porcine parainfluenza 1 virus*	3	2	3	2.7
Atypical swine pestivirus*	3	2	3	2.7
Influenza C virus*	2	2	2	2.0
Porcine respiratory coronavirus*	2	2	2	2.0
Hemagglutinating encephalomyelitis virus*	2	2	2	2.0
Encephalomyocarditis virus*	3	1	2	2.0
Hepatitis E virus*	1	3	1	1.7
Porcine adenovirus*	2	1	2	1.7
Porcine kobuvirus*	2	1	2	1.7
Orthoreovirus*	2	1	1	1.3
Sendai virus*	1	1	2	1.3
Porcine cytomegalovirus*	2	1	1	1.3
Porcine sapovirus*	1	1	1	1.0
Vesicular stomatitis virus*	1	1	1	1.0
Chikungunya virus*	1	1	1	1.0
Rabies virus	1	1	1	1.0
Porcine bocavirus*	1	1	1	1.0
Porcine astrovirus*	1	1	1	1.0
Swine pox virus*	1	1	1	1.0
Porcine torovirus*	1	1	1	1.0
Swine papillomavirus*	1	1	1	1.0

* **Fact Sheet found on www.swinehealth.org**

Swine Health Information Center 2018 Progress Report

Appendix B

SWINE BACTERIAL DISEASE MATRIX			August 2018
Total score = Potential Public Health Impact + Need for more efficacious intervention tools + Diagnostic Tools + Impact on pig health, welfare, production sustainability + Market impact			
	Average Total Score		Average Total Score
<i>Streptococcus suis</i>	28.3	<i>Clostridium perfringens</i>	12.6
<i>Salmonella enterica</i>	22.2	<i>Mycoplasma suis</i>	12.2
<i>Mycoplasma hyopneumoniae</i>	21.8	<i>Bacillus anthracis</i>	12.2
<i>Escherichia coli</i>	21.7	<i>Listeria monocytogenes</i>	10.8
<i>Haemophilus parasuis</i>	21.1	<i>Trueperella abortus suis</i>	10.5
<i>Mycoplasma hyorhinis</i>	19.1	<i>Yersinia enterocolitica</i>	10.2
<i>Brachyspira hyodysenteriae</i>	17.4	<i>Staphylococcus hyicus</i>	10.0
<i>Actinobacillus pleuropneumoniae</i>	16.1	<i>Mycobacterium spp.</i>	9.6
<i>Actinobacillus suis</i>	15.9	<i>Burkholderia pseudomallei</i>	9.4
<i>Brucella suis</i>	15.7	<i>Yersinia pseudotuberculosis</i>	8.8
<i>Mycoplasma hyosynoviae</i>	15.2	<i>Coxiella burnetii</i>	8.0
<i>Brachyspira hamptonii</i>	15.0	<i>Actinobaculum suis</i>	7.8
<i>Staphylococcus aureus</i> including LA-MRSA	14.8	<i>Chlamydophila psittaci</i>	7.6
<i>Pasteurella multocida</i>	14.5	<i>Chlamydophila pecorum</i>	7.2
<i>Campylobacter coli</i>	14.1	<i>Clostridium botulinum</i>	7.0
<i>Leptospira spp.</i>	13.8	<i>Streptococcus porcinus</i>	7.0
<i>Campylobacter jejuni</i>	13.6	<i>Clostridium chauvoei</i>	6.0
<i>Erysipelothrix rhusiopathiae</i>	13.6	<i>Clostridium novyi</i>	6.0
<i>Clostridium difficile</i>	13.5	<i>Treponema pedis</i>	6.0
<i>Enterococcus spp.</i> including VRE	13.5	<i>Clostridium septicum</i>	5.6
<i>Bordetella bronchiseptica</i>	13.1	<i>Staphylococcus dysgalactiae</i> subsp.	5.5
<i>Brachyspira pilosicoli</i>	13.0	<i>Rhodococcus equi</i>	5.3
<i>Lawsonia intracellularis</i>	13.0		

Swine Health Information Center 2018 Progress Report

Appendix C

Virus Survival in Feed Research Summary

SVA = Seneca Valley Virus A, surrogate for FMDV; ASFV = African Swine Fever Virus; PSV = Porcine Sapelovirus, surrogate for SVDV = Swine Vesicular Disease Virus; PEDV = Porcine Epidemic Diarrhea Virus; FCV = Feline Calicivirus, surrogate for VESV = Vesicular Exanthema of Swine Virus; PCV2 = Porcine Circovirus 2; PRRSV 174 = Porcine Respiratory and Reproductive Virus type 174; BHV-1 = Bovine Herpes Virus 1, surrogate for PRV = Pseudorabies Virus; IAV-S = Influenza A Virus in Swine; BVDV = Bovine Viral Diarrhea Virus, surrogate for CSFV = Classical Swine Fever Virus; CDV = Canine Distemper Virus, surrogate for NiV = Nipah Virus; VSV = Vesicular Stomatitis Virus

Results: Summary of virus survival from batch 4 samples (37 DPI or 30 DPI) across both models.

INGREDIENT	SVA (FMDV)	ASFV	PSV (SVDV)	PEDV	FCV (VESV)	PCV2	PRRSV 174	BHV-1 (PRV)	IAV-S	BVDV (CSFV)	CDV (NiV)	VSV
Soybean meal-Conventional	Red	Red	Red	Red	Red	Green	Red	Red	Green	Green	Green	Green
Soybean meal-Organic	Green	Red	Red	Red	Green	Green	Green	Green	Green	Green	Green	Green
Soy oil cake	Red	Red	Red	Blue	Green	Green	Green	Red	Green	Green	Green	Green
DDGS	Red	Green	Green	Blue	Green	Green	Red	Green	Green	Green	Green	Green
Lysine	Red	Green	Red	Red	Green	Red	Green	Green	Green	Green	Green	Green
Choline	Red	Red	Green	Red	Green	Red	Green	Green	Green	Green	Green	Green
Vitamin D	Red	Green	Red	Red	Green	Red	Green	Green	Green	Green	Green	Green
Moist cat food	Red	Red	Red	Blue	Green	Green	Green	Green	Green	Green	Green	Green
Moist dog food	Red	Red	Red	Blue	Green	Green	Green	Green	Green	Green	Green	Green
Dry dog food	Red	Red	Red	Blue	Green	Green	Green	Green	Green	Green	Green	Green
Pork sausage casings	Red	Red	Red	Blue	Red	Green	Green	Green	Green	Green	Green	Green
Complete feed (+ control)	Red	Red	Red	Blue	Red	Red	Green	Green	Green	Green	Green	Green
Complete feed (- control)	Red	Red	Red	Blue	Red	Red	Green	Green	Green	Green	Green	Green
Stock virus (+ control)	Green	Red	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green

Red = viable virus recovered, Green = no evidence of viable virus, Blue = Not Tested