Swine Health Information Center
2023 Plan of Work

Improve Swine Health Information

• Make industry swine health information available to help identify, communicate, and mitigate regional and national risks to herd health.
  o The Swine Disease Reporting System (SDRS) takes advantage of the willingness of the major veterinary diagnostic laboratories to share information and the SHIC-supported infrastructure to enable it. The SDRS will explore ways to become more helpful and informative.
    ▪ Advisory member feedback regarding possible improvements or enhancements to SDRS will be gathered through periodic meetings and/or conference calls. The objective will be to make the SDRS a source of more timely and actionable information for the industry.
    ▪ Mine SDRS data for emerging disease signals. Some examples could include reporting of emerging syndromic conditions, investigating co-infection diagnostic results as an indicator of future PRRS outbreak, regional reporting of pathogens to better understand epidemiologic spread, compiling and analyzing VDL negative test results and using diagnostic and production data analysis to measure the economic impact of controlling emerging or endemic disease.
  o Veterinarians are challenged with new technologies identifying agents either causing or associated with disease for which information about management or control might be limited. Sharing experiences and management options will foster communication and inform discussion about management. Four to six current topic webinars, using the model of the 2022 management webinars, will be offered. The objective is to “keep pace with industry chatter” about health challenges with the topics selected.
  o One challenge of broadly disseminating data and information from scientific manuscripts is that many require a subscription or fees to access. SHIC will explore how to increase the ease of accessibility for swine veterinarians and producers of scientific manuscripts through a pilot open-access journal fee support program.
• Develop the industry capacity for detection of emerging disease, rapid response, and continuity of business.
  o The Morrison Swine Health Monitoring Project (MSHMP) will help to identify industry needs through the input from the project’s participants and other sources. Continued efforts will be made to make the shared information more actionable by increasing enrolled participants across all production phases and gathering input from participants to help them quickly meet health challenges. Specific analysis projects using MSHMP data and modeling endemic diseases in preparation for response to emerging diseases will be supported to return value to the participants and encourage more producers to cooperate with the project. That value to participants will also translate to value for all pork producers.
• Update the SHIC Swine Disease Fact Sheets.
  o The 34 Swine Disease Fact Sheets that are currently available are the second most accessed information on the SHIC website. The content will continue to be monitored to ensure that the latest information remains available.

• Enhance communications
  o Information comes in many different ways from a wide variety of places, both domestically and internationally. Many times it is difficult to interpret because the offered analysis or interpretation of the results conflict. Consolidating, validating and summarizing research and other publicly available information will help to ensure that producers get up-to-date and accurate information to inform and make decisions.
  o Ensuring different audiences receive the information that they will pay attention to may require specialized messaging and the utilization of various messaging platforms. State animal health officials and state pork producer associations are specific audiences for which that may apply.

Monitor and Mitigate Risks to Swine Health

• In coordination with other industry organizations, help to fill in the gaps of research and information needed to prevent, prepare, and respond to foreign animal or emerging diseases.
  o African Swine Fever will continue to be a monitoring priority in 2023 with the objective of using the information to protect the US industry from its introduction. During 2020, SHIC partnered with the other industry organizations for a comprehensive review of the diverse but interdependent components of national biosecurity. The National Pork Board’s Foreign Animal Disease Task Force is discussing and researching effective foreign animal disease prevention, response, and recovery. Continued communication with CBP will help inform risk of ASFV introduction at borders and mitigation strategies for ASFV introduction through imported products or travelers. With coordination with the other pork industry organizations, SHIC will continue to participate with research to inform effective national prevention, response, and recovery programs.

• Identify swine disease risks by international monitoring.
  o Enhance the Global Disease Monitoring Report to improve understanding of disease status in countries around the world.
    ▪ Currently, the Global Disease Monitoring Report relies primarily on official sources of information about country-specific disease status. A pilot project will explore an expanded international veterinary diagnostic lab network that will provide standardized disease reporting from other countries.
    ▪ There are multiple organizations and companies monitoring diseases around the world and their information will be compiled into one, informative format.
    ▪ Individuals with international disease experience will be asked for their input and analysis of unofficial perspectives about disease reports from other
countries. There will be a focus on Asia/SE Asia for disease status and movement information as that region seeks to rebuild their herd.

- Foster information sharing with government and allied industry international contacts through international animal health organizations and meetings.
  
  - Understanding the origin and progression of emerging, re-emerging, and novel infectious diseases is critically important to preventing epidemic and pandemic outbreaks. The World Organization for Animal Health (WOHA) and Food and Agricultural Organization of the United Nations (FAO) facilitate international health information sharing and build and maintain databases of emerging diseases of member countries. Interacting with these entities and other swine disease centered programs could provide lessons for the U.S. pork industry about monitoring, analysis, preparedness, and response for emerging diseases.

- Investigate the ability of common inputs to production to act as biologic or mechanical vectors for disease introduction onto farms.
  
  - Decrease the potential for pathogen transmission via feed.
    
    - USDA and FDA consider pathogen transport via imported feed products to be an unlikely risk because of limited objective information. Data and information will be gathered to support an objective risk assessment and evaluate cost-effective mitigation techniques and strategies.
    
    - If contaminated feed component products are imported, those pathogens are likely to be spread within the country during feed processing. A project investigating potential ways to decontaminate feed mills is coming to a close. Next step research may be needed to better understand how those decontamination protocols could be implemented.
  
  - Investigate common inputs other than feed for potential roles of pathogen introduction.
    
    - Common inputs such as vaccines, breeding supplies and others, including imported commodities, could be a source of pathogen introduction to farms. Selected inputs will be investigated to identify if they could be biosecurity risks.

- Improve farm biosecurity.
  
  - Investigate innovative and cost-effective ideas to improve transport biosecurity according to the Wean-to-Harvest Biosecurity Program transport priorities.
    
    - The Morrison Swine Health Monitoring Project could be an opportunity to leverage the willingness to share swine health information to be able to evaluate transportation biosecurity opportunities.
  
  - Bioexclusion and biocontainment
    
    - The swine viral and bacterial disease matrices include zoonotic pathogens. They need to be analyzed for swine susceptibility and probability of infection. Then analyzing the ability to contain these pathogens to the site will help to mitigate the potential for them to become a wide-spread public health issue originating on pig farms.
Responding to Emerging Disease

- Identify high risk events likely to be responsible for introducing emerging diseases onto farms.
  - Refine and enhance the Rapid Response Program
    - Program management will continue. To ensure that the members of the Rapid Response Teams are available to respond to nonprogram emerging disease outbreaks quickly and effectively, the volunteer participants will need to be expanded. Rapid Response Team investigations will continue to be supported, if requested by producers.
    - A standardized outbreak investigation instrument has been drafted and a web-based data and information entry platform has been developed. Also, the National Pork Board’s AgView program is offered as a tool for tracing pig movements and demonstrating inter-site relationships. The next step is to revise the training programs and conduct exercises to ensure that the Rapid Response Team members can effectively use these new tools.
    - To enhance effective and rapid response and investigation into Rapid Response Team investigations, as well as increase biosecurity of investigations, the use of “telehealth” technologies will be investigated.

- Help producers and veterinarians respond to and manage newly emerging diseases.
  - Learning lessons from the High Path Avian Influenza (HPAI) outbreak may provide tools to better respond to emerging diseases.
    - Collaboration with producers, veterinarians and state and federal animal health officials will help identify the strengths of effective HPAI response and control and the barriers to more enhanced control.
      - Research may be necessary to validate the transfer of HPAI information and experience to pork production.
        - For example, effective characterization of PRRS strains will add to the epidemiological information necessary to be able to respond and contain new outbreaks. Sequencing data may enable identification and tracking of the most prevalent strains and help better inform biosecurity.
  - Early warning of disease event likelihood offers the opportunity for early response leading to more effective containment and recovery.
    - Investigations into analyzing farm and regional data from the Morrison Swine Health Monitoring Project for early warning have been previously supported and published. Next step enhancements of these early warning technologies and analyses could improve their sensitivity and disease outbreak prediction capabilities.
  - Quickly research pathogens causing emerging disease outbreaks.
    - There is no predicting when or where the next emerging disease will appear. SHIC needs to be prepared with funds in place that can be quickly mobilized to support filling the immediate research gaps following an outbreak. This research will provide producers and their veterinarians with critical...
information that they will need to effectively respond to the disease outbreak.

- Assess the effectiveness of sanitation and decontamination protocols.
  - Sanitation and decontamination protocols are designed to prevent pathogen transmission through contact with contaminated surfaces. Assessing the effectiveness of the protocols will validate results. This could be important for containing an emerging production disease and it will be an important question to answer in preparation for effective response to a foreign animal disease.
    - Diagnostic assays which have the capability to differentiate infectious from non-infectious pathogen genetic material would help validate decontamination protocols and determine risk to pigs. Development and validation of pen-side and laboratory-based diagnostic assays with this capability will be pursued for clinical and environmental samples.
    - A project to develop this technology for use in the pork industry is ending. The next steps are for field validation and potential modification of the technology for easier, cheaper field use.
  - Also, new cost-effective models for environmental sampling, such as spatially balanced surveillance, have the potential for validating decontamination and may help enable the opportunity for safe, timely return to production.

- Improve the ability to investigate disease outbreaks to enhance emerging disease discovery.
  - Investigation of outbreaks requires more than the biosecurity hazards analysis offered by the Rapid Response Program. The National Pork Board’s AgView program may help to uncover site relationships that could add information to emerging disease discovery and investigation.
  - Forensic tools such as whole genome sequencing are also needed to characterize pathogens that are causing outbreaks and the epidemiology of regional, and site-to-site spread. Capabilities, strengths, weaknesses, and costs of whole genome sequencing will be examined to determine its use as an effective forensic tool.

- Japanese Encephalitis virus has caused pork production and public health disease in Australia. Research priorities have been drafted that focus on what producers will be asking and what they need to know for effective prevention, detection, response, and recovery should the virus enter North America.
  - Investigate trade implications of a JEV incursion into the US, including countries where JEV is endemic and countries negative for JEV. Estimate the potential economic losses to the US pork industry due to production losses on sow farms, disrupted domestic and international markets, and trade restrictions if JEV is introduced.
  - Investigate the mechanism of JEV spread throughout a single production site, defining the risks or epidemiological factors playing a role in the extent of transmission and variation of clinical signs within a litter and across litters. Goals include identifying mitigation strategies to minimize JEV impact on farm production.
    - Define the role of vector-free or direct pig-to-pig transmission in the epidemiology of JEV.
Design novel or confirm current US diagnostic assays for JEV (PCR and antibody at NVSL, FADDL and NAHLN laboratories) can distinguish between other flaviviruses in the US (WNV, SLEV) and will detect all five genotypes (I-V) of JEV.

Model spatiotemporal spread of JEV post-incursion to identify mitigation strategies for biocontainment and rapid eradication from the US.

Investigate vaccine candidates for use in US commercial swine to minimize production losses if JEV is introduced, focusing on subunit, vectored, mRNA, or killed vaccines, that could be deployed post-outbreak and would allow differentiation of vaccinated from infected animals (DIVA).

Investigate effective mosquito control measures for swine farms in the US, including recommendations based on site design, ventilation type, and manure storage.

Chemical insecticide residues and withdrawal periods should be indicated.

Investigate vaccine candidates for use in US commercial swine to minimize production losses if JEV is introduced, focusing on subunit, vectored, mRNA, or killed vaccines, that could be deployed post-outbreak and would allow differentiation of vaccinated from infected animals (DIVA).

Surveillance and Discovery of Emerging Disease

- Enhance 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 these cases, there is a need for further diagnostic workup. Support for these follow up diagnostic workups will come after producers have funded the initial diagnostics. This work will help ensure that an emerging disease is quickly and accurately identified for action by the industry’s emerging disease response plan.
    - Diagnosticians will be asked for their views of barriers to broader use of the diagnostic fee support program and if there are ways that it can be enhanced for ease of use and increased adoption for compatible cases.
  - Investigate innovative sampling protocols to compare them with current practices and see if sampling sensitivity or specificity or ease of collection can be improved. Examples include oral fluids for FAD surveillance and an objective comparison of tonsil scrapings and tongue tips with other sample types.

- 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.
  - Veterinary diagnostic laboratories submissions need to be characterized to understand the messaging and incentive needed for accurate information to accompany tissues. For example, identifying the reason for inaccurate premises identification numbers will facilitate quick and effective response to an emerging or transboundary, foreign animal disease outbreak.
• Investigate newly identified agents associated with disease.
  o Understand the clinical relevance and epidemiology of novel bacteria and viruses found in the swine bacterial and viral disease matrices.
  ▪ The veterinary diagnostic labs find novel bacteria and viruses in the swine bacterial and viral disease matrices being associated with clinical disease syndromes. Better understanding these agents’ epidemiology and pathogenicity are important to identifying if they have a role in clinical disease. And analysis of the potential production and cost impact to producers will help with prioritize potential actions.
  ▪ Porcine circovirus (PCV) strains continue to present a challenge. A standardized case definition for PCV3 needs to be agreed upon, pathogenicity needs to be further analyzed and processing fluids or other ways to monitor associations with clinical disease need to be studied. In addition, identification of a novel PCV4 may call for adequate diagnostics to ensure the ability to detect and evaluate the potential introduction into the US.

Swine Disease Matrices

• Review and, when necessary, revise the swine viral disease matrix and the swine bacterial disease matrix.
  o The Monitoring and Analysis Working Group will review and revise the viral and bacterial matrices as needed.
  o The swine bacterial disease matrix will be assessed to try to identify risks to animal and human health, pork industry vulnerabilities to these pathogens, and diagnostic capabilities.
• Use the swine bacterial and viral disease matrices as guidelines for research to enhance swine disease diagnostic capabilities.
  o As new information or emerging bacterial or viral pathogens are discovered, through SHIC’s surveillance and discovery plans or other means, there may be a need to continue to support improving diagnostic capabilities.
  o Consider diagnostic sensitivity and specificity validation for prioritized viruses in the swine viral disease matrix.
  ▪ Matrix research thus far has been with a goal of validation to “fit for purpose”, which ensured performance under laboratory conditions. For these tests to be operational in the face of an outbreak, they may also need to be validated for sensitivity and specificity using clinical samples and tissues. Diagnostic sensitivity and specificity validation could be considered and may need to be funded for specific tests in 2023.