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.
  - 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.
  - 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.
  - 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.
  - 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.

45   •   Update the SHIC Swine Disease Fact Sheets.

46   ○ The 34 Swine Disease Fact Sheets that are currently available are the second most

47   accessed information on the SHIC website. The content will continue to be

48   monitored to ensure that the latest information remains available.

49   •   Enhance communications

50   ○ Information comes in many different ways from a wide variety of places, both

51   domestically and internationally. Many times it is difficult to interpret because the

52   offered analysis or interpretation of the results conflict. Consolidating, validating

53   and summarizing research and other publicly available information will help to

54   ensure that producers get up-to-date and accurate information to inform and make

55   decisions.

56   ○ Ensuring different audiences receive the information that they will pay attention to

57   may require specialized messaging and the utilization of various messaging

58   platforms. State animal health officials and state pork producer associations are

59   specific audiences for which that may apply.

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61   **Monitor and Mitigate Risks to Swine Health**

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63   •   In coordination with other industry organizations, help to fill in the gaps of research and

64   information needed to prevent, prepare, and respond to foreign animal or emerging

65   diseases.

66   ○ African Swine Fever will continue to be a monitoring priority in 2023 with the

67   objective of using the information to protect the US industry from its introduction.

68   During 2020, SHIC partnered with the other industry organizations for a

69   comprehensive review of the diverse but interdependent components of national

70   biosecurity. The National Pork Board's Foreign Animal Disease Task Force is

71   discussing and researching effective foreign animal disease prevention, response,

72   and recovery. Continued communication with CBP will help inform risk of ASFV

73   introduction at borders and mitigation strategies for ASFV introduction through

74   imported products or travelers. With coordination with the other pork industry

75   organizations, SHIC will continue to participate with research to inform effective

76   national prevention, response, and recovery programs.

77   •   Identify swine disease risks by international monitoring.

78   ○ Enhance the Global Disease Monitoring Report to improve understanding of disease

79   status in countries around the world.

80   ▪ Currently, the Global Disease Monitoring Report relies primarily on official

81   sources of information about country-specific disease status. A pilot project

82   will explore an expanded international veterinary diagnostic lab network that

83   will provide standardized disease reporting from other countries.

84   ▪ There are multiple organizations and companies monitoring diseases around

85   the world and their information will be compiled into one, informative

86   format.

87   ▪ Individuals with international disease experience will be asked for their input

88   and analysis of unofficial perspectives about disease reports from other

89			countries. There will be a focus on Asia/SE Asia for disease status and
90			movement information as that region seeks to rebuild their herd.
91		o	Foster information sharing with government and allied industry international
92			contacts through international animal health organizations and meetings.
93			▪ Understanding the origin and progression of emerging, re-emerging, and
94			novel infectious diseases is critically important to preventing epidemic and
95			pandemic outbreaks. The World Organization for Animal Health (WOHA) and
96			Food and Agricultural Organization of the United Nations (FAO) facilitate
97			international health information sharing and build and maintain databases of
98			emerging diseases of member countries. Interacting with these entities and
99			other swine disease centered programs could provide lessons for the U.S.
100			pork industry about monitoring, analysis, preparedness, and response for
101			emerging diseases.
102	•	Investigate the ability of common inputs to production to act as biologic or mechanical
103		vectors for disease introduction onto farms.
104		o	Decrease the potential for pathogen transmission via feed.
105			▪ USDA and FDA consider pathogen transport via imported feed products to be
106			an unlikely risk because of limited objective information. Data and
107			information will be gathered to support an objective risk assessment and
108			evaluate cost-effective mitigation techniques and strategies.
109			▪ If contaminated feed component products are imported, those pathogens
110			are likely to be spread within the country during feed processing. A project
111			investigating potential ways to decontaminate feed mills is coming to a close.
112			Next step research may be needed to better understand how those
113			decontamination protocols could be implemented.
114		o	Investigate common inputs other than feed for potential roles of pathogen
115			introduction.
116			▪ Common inputs such as vaccines, breeding supplies and others, including
117			imported commodities, could be a source of pathogen introduction to farms.
118			Selected inputs will be investigated to identify if they could be biosecurity
119			risks.
120	•	Improve farm biosecurity.
121		o	Investigate innovative and cost-effective ideas to improve transport biosecurity
122			according to the Wean-to-Harvest Biosecurity Program transport priorities.
123			▪ The Morrison Swine Health Monitoring Project could be an opportunity to
124			leverage the willingness to share swine health information to be able to
125			evaluate transportation biosecurity opportunities.
126		o	Bioexclusion and biocontainment
127			▪ The swine viral and bacterial disease matrices include zoonotic pathogens.
128			They need to be analyzed for swine susceptibility and probability of infection.
129			Then analyzing the ability to contain these pathogens to the site will help to
130			mitigate the potential for them to become a wide-spread public health issue
131			originating on pig farms.
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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

177   information that they will need to effectively respond to the disease
178   outbreak.

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

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

205 • Japanese Encephalitis virus has caused pork production and public health disease in
206   Australia. Research priorities have been drafted that focus on what producers will be asking
207   and what they need to know for effective prevention, detection, response, and recovery
208   should the virus enter North America.
209   o Investigate trade implications of a JEV incursion into the US, including countries
210   where JEV is endemic and countries negative for JEV. Estimate the potential
211   economic losses to the US pork industry due to production losses on sow farms,
212   disrupted domestic and international markets, and trade restrictions if JEV is
213   introduced.
214   o Investigate the mechanism of JEV spread throughout a single production site,
215   defining the risks or epidemiological factors playing a role in the extent of
216   transmission and variation of clinical signs within a litter and across litters. Goals
217   include identifying mitigation strategies to minimize JEV impact on farm production.
218   ▪ Define the role of vector-free or direct pig-to-pig transmission in the
219   epidemiology of JEV.

220   o   Design novel or confirm current US diagnostic assays for JEV (PCR and antibody at
221   NVSL, FADDL and NAHLN laboratories) can distinguish between other flaviviruses in
222   the US (WNV, SLEV) and will detect all five genotypes (I-V) of JEV.
223   o   Model spatiotemporal spread of JEV post-incursion to identify mitigation strategies
224   for biocontainment and rapid eradication from the US.
225   o   Investigate vaccine candidates for use in US commercial swine to minimize
226   production losses if JEV is introduced, focusing on subunit, vectored, mRNA, or killed
227   vaccines, that could be deployed post-outbreak and would allow differentiation of
228   vaccinated from infected animals (DIVA).
229   o   Investigate effective mosquito control measures for swine farms in the US, including
230   recommendations based on site design, ventilation type, and manure storage.
231   Chemical insecticide residues and withdrawal periods should be indicated.
232   o   Determine the most effective consumer and producer messaging on JEV being a
233   "mosquito disease," with the goal of minimizing negative effects on pork production
234   and consumption while maximizing safety and protection of swine personnel in the
235   event of JEV incursion.
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Surveillance and Discovery of Emerging Disease

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239 •   Enhance detection of emerging disease to facilitate rapid response.
240   o   Offer diagnostic fee support to help detect emerging diseases.
241   ▪   There continues to be incidents of high morbidity/high mortality where an
242   etiology is either not identified or there is a strong supposition that the
243   identified pathogen is not the likely cause of the outbreak. In these cases,
244   there is a need for further diagnostic workup. Support for these follow up
245   diagnostic workups will come after producers have funded the initial
246   diagnostics. This work will help ensure that an emerging disease is quickly
247   and accurately identified for action by the industry's emerging disease
248   response plan.
249   ▪   Diagnosticians will be asked for their views of barriers to broader use of the
250   diagnostic fee support program and if there are ways that it can be enhanced
251   for ease of use and increased adoption for compatible cases.
252   o   Investigate innovative sampling protocols to compare them with current practices
253   and see if sampling sensitivity or specificity or ease of collection can be improved.
254   Examples include oral fluids for FAD surveillance and an objective comparison of
255   tonsil scrapings and tongue tips with other sample types.
256 •   Find improvements that can be made toward a nationally coordinated swine health
257   surveillance system to prepare, detect, and rapidly respond to emerging and regulatory
258   foreign animal diseases.
259   o   Veterinary diagnostic laboratories submissions need to be characterized to
260   understand the messaging and incentive needed for accurate information to
261   accompany tissues. For example, identifying the reason for inaccurate premises
262   identification numbers will facilitate quick and effective response to an emerging or
263   transboundary, foreign animal disease outbreak.

- Investigate newly identified agents associated with disease.
    - 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.
    - The Monitoring and Analysis Working Group will review and revise the viral and bacterial matrices as needed.
    - 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.
    - 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.
    - 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.