



2018 Plan of Work

Swine Disease Matrix

- Review and, when necessary, revise the Swine Disease Matrix.
 - The Monitoring and Analysis Working Group recommends including bacterial pathogens in the Swine Disease Matrix. Communications during 2017 indicate *Actinobacillus pleuropneumonia*, *Klebsiella* sp. causing pneumonia and *Strep suis* are candidates to model for bacterial disease emergence.
- Use Swine Disease Matrix research to enhance swine disease diagnostic capabilities.
 - Continue PCR and ELISA development for selected viruses in the Swine Disease Matrix.
 - Thirty-Three Swine Disease Matrix pathogens have new or updated PCRs from SHIC-funded 2016 or USDA support. Thirteen pathogens have oral fluid ELISAs being developed using 2017 SHIC support. As new information or emerging pathogens are discovered, through SHIC's surveillance and discovery plans or other means, there may be a need to continue to support for improving diagnostic capabilities.
 - Consider diagnostic sensitivity and specificity validation for prioritized viruses in the Swine 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. The Preparedness and Analysis Working Group discussed this diagnostic validation as a priority for 2017 and decided it wasn't needed, at that time. Diagnostic sensitivity and specificity validation will again be considered and may need to be funded in 2018.
 - Ensure effective SHIC-funded Matrix diagnostic tools are available to the veterinary diagnostic laboratories.
 - Prioritized SHIC-funded diagnostic tools and resources enabling their implementation need to be available to veterinary diagnostic laboratories. Staging these tools for access by the veterinary diagnostic laboratories will provide surge capacity, in the event of a generalized outbreak, and enhanced detection capability for emerging diseases.

Monitor and Mitigate Risks to Swine Health

- Identify swine disease risks by international monitoring.
 - Continue and enhance foreign disease monitoring and reporting.
 - A formal program for monitoring disease status and circulation around the world began in 2017. Further refinement and improvement during 2018 will expand the coverage and

enhance the utility of the reports being generated. When possible, USDA collaboration will be included and improved.

- Use international contacts to survey for on-the-ground foreign disease information.
 - Expertise and experience with foreign, transboundary diseases already lies with veterinarian and other professionals that work or consult internationally. Also, members of the Monitoring and Analysis Working Group have international contacts. Surveying these groups for emerging diseases or health challenges can help to inform the prioritization of the Swine Disease Matrix and enhance the foreign disease monitoring reporting.
- 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 International Organization for Animal Health (OIE) 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.
- Improve transport biosecurity from points of concentration.
 - Define and better understand transmission pathways as the first step to making transport biosecurity recommendations and preventing disease transmission through transportation.
 - Surveys of first points of concentration, focusing on the truck/trucker and facility interface, will help to identify possible specific interactions most likely to transmit pathogens. These on-site surveys will identify high risk events and measure their occurrence in these facilities to help prioritize them and enable rapid biocontainment progress.
 - U.S. swine genetic companies are shipping pigs internationally and the conveyances are returning to this country. Identifying and assessing biocontainment procedures used by these companies will potentially uncover ways to improve prevention of transboundary disease transmission.
 - Improve trailer disinfection to help prevent transmission of emerging and foreign animal diseases.
 - There is no industry benchmark of transport biosecurity practices after trucks leave market sites. Establishing this industry benchmark will identify the most effective biosecurity practices to emphasize, inform benchmarking and enable measuring progress.
 - There are not enough commercial truck washing facilities to effectively clean and disinfect all transport trailers. Alternative trailer disinfection techniques need to be identified and investigated.
 - Ineffective truck washing facilities may facilitate pathogen transmission while giving producers a false sense of security. Identification and communication of effective standard operating procedures for washing facilities and monitoring those procedures' effectiveness will help implementation of consistent transport risk mitigation.
- 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.
 - Completed proof-of-concept research has identified higher risk virus by feed component combinations. Research to test feed additives for their ability to reduce virus load in feeds is underway. The results of this research need to be brought to the farm to test under farm feeding conditions.
 - FDA considers pathogen transport via imported feed products to be an unlikely risk because there is little objective information about it. To be able to confidently sample feed

components for virus contamination, validated feed component sampling procedures focused on biologics need to be developed.

- If contaminated feed component products are imported, those pathogens are likely to be spread within the country during feed processing. The next step to research initiated in 2017 that identified, in the laboratory, an effective way to monitor feed processing facilities for swine viral pathogens will be a pilot project for monitoring feed mills in the field using these techniques.
- Effective feed mill clean out or disinfection procedures to mitigate risks identified during monitoring need to be developed and validated.
- Blockchain technology to record, audit and verify feed biosecurity from imported sources may be considered as a cost-effective, feed process control tool to mitigate risks from pathogen transport in feed ingredients.
- Work with collaborators to provide objective information about sources and quantities of imported feed components and about alternative ways to prevent pathogen introduction into the U.S. through these products.
 - Information about the sources and quantity of imported feed components used during production needs to be compiled to inform producers about their alternatives. The next step will be to understand the economic comparisons of mitigations by using feed additive products while processing feed, buying from process controlled suppliers or sourcing based on health status of the source country. Producers need to have this objective information about these imported goods to consider economic and risk-based sourcing decisions.

Improve Swine Health Information

- Update the SHIC Swine Disease Fact Sheets.
 - The 34 Swine Disease Fact Sheets that are currently available are the second most commonly accessed information on the SHIC website. They were authored in 2015 and need to be updated to ensure that they include the latest research and information available. SHIC Working Groups will review the fact sheets and recommend a revision schedule.
- Develop the industry capacity for detection of emerging disease, rapid response and continuity of business.
 - The Morrison Swine Health Monitoring Project will help to identify industry needs through the input from the project's participants. Specific data analysis projects will be supported within the Project. They will serve 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. Projects that are related but tangential to the Swine Health Monitoring Project may be identified. Support for these projects will return value to the Project's participants and other producers.
- Make industry swine health information available to help uncover, communicate and mitigate regional and national risks to herd health.
 - Survey for pathogens at first points of concentration.
 - Packing plants and market buying stations receive a wide variety of animals from wide geographic sources. Identifying pathogens brought into these first points of concentration or leaving via fomites or aerosols may help to identify emerging diseases. This also provides a cost-efficient opportunity to help uncover regional differences that might be able to be used in predicting disease risk and outbreaks models currently being studied.
 - Continue to evolve and refine domestic swine disease monitoring and reporting.
 - Communicating the results of the data analysis will inform the industry about emerging diseases or syndromes that might look like an isolated incident without this coordination. This information could also be used by producers to evaluate regional health risks from

movement of swine and be better informed and therefore prepared. For example, Rotavirus, PRRS and Strep suis have or are demonstrating the ability to evolve different serotypes or pathogenicity. In addition, the information will support the development of an effective disease risk and outbreak model currently being studied.

- Additional program funds

Surveillance and Discovery of Emerging Disease

- Investigate newly identified agents associated with disease.
 - Understand the clinical relevance and epidemiology of novel viruses in the Swine Disease Matrix.
 - The veterinary diagnostic labs continue to find novel viruses in the Swine Disease Matrix being associated with clinical disease syndromes. More needs to be done to understand and validate their potential role in these syndromes. Porcine sapelovirus, PCV3, porcine astrovirus and parainfluenza virus are examples of specific pathogens that are being questioned. Even bastrovirus, a virus not in the Swine Disease Matrix, has been implicated in a clinical disease syndrome. Better understanding these agents' epidemiology and pathogenicity are important to identifying if they have a role in clinical disease.
- 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 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.
 - 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.
 - A 2017 state, federal and industry stakeholders national workshop identified gaps, tools and research needs for robust national swine health surveillance system to support coordinated early detection, rapid response and efficient control of FADs and emerging diseases. State, federal and industry partners need to continue to be engaged to implement the recommendations and make progress toward a more effective, coordinated swine health surveillance system.
 - Evaluate novel surveillance programs to see if they can be best used to manage emerging disease. Sampling blood collection vessels at processing plants, oral fluid collection in lairage or spatially balanced surveillance programs are examples of surveillance tools to consider.

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
 - A Rapid Response Program for investigating incidents of emerging disease was completed in 2017. To make it as responsive and efficient as possible, it needs to be tested and refined by investigating epidemiologically distinct incidents of endemic disease outbreaks. Then enhancements to the program by automating and streamlining the rapid response

investigation process need to be implemented. An advisory group will provide input that will facilitate producer acceptance of the Rapid Response Program beyond the 5-year funding stream for SHIC. Consider future funding in 2020.

- Help producers and veterinarians respond to and manage newly emerging diseases.
 - Improve communications so people know actionables in the event of an emerging disease.
 - People need to be clear about the communications pathway that will facilitate rapid response to an emerging disease and need to be reminded of resources available to them to help detect, prepare and respond to emerging diseases on the farm. Within the communications programs budget, there will be a focused effort in 2018 to communicate an effective response communications pathway.
 - Quickly research pathogens causing emerging disease outbreaks.
 - An industry-accepted definition of “emerging disease” needs to be developed and communicated to justify spending finite funds on an outbreak.
 - Senecavirus A (Seneca Valley Virus) was the first opportunity for SHIC to rapidly respond to an emerging disease with research according to high priority industry needs. 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 introduction. This research will provide producers and their veterinarians with critical information that they will need to effectively respond to the disease outbreak.
 - Support a rapid, unified industry response to emerging disease outbreaks.
 - Working with the National Pork Board, National Pork Producers Council and American Association of Swine Veterinarians, the state-federal-industry Swine Disease Response Council will be beta-tested to help understand and overcome barriers to a coordinated, industry-wide emerging disease response.