



Swine Health Information Center

2016 Swine Health Information Center Progress Report

Table of Contents

Executive Summary Page 2

Background of the SHIC-NPB Contract Funding SHIC. Page 5

Swine Health Information Center 2016 Progress Report Page 8

Swine Health Information Center organization Page 8

Board of Directors Page 8

Swine Health Information Center Working Groups Page 8

Swine Health Information Center 2016 outreach Page 9

Progress on the Swine Health Information Center 2016 Plan of Work Page 11

Preparedness and Response Working Group - Preparedness Page 11

Preparedness and Response Working Group - Response Page 12

Monitoring and Analysis Working Group – Monitoring Page 13

Monitoring and Analysis Working Group – Analysis. Page 15

Communications Page 16

Website Design and Upkeep Page 16

Media Releases Page 17

Swine Disease Matrix Appendix A

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 2016 operating budget, a 2016 Plan of Work and a plan for federally insured investments of the money in excess of the operating budget that is modeled after that of the National Pork Board.

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 its objectives.

Swine Health Information Center 2016 outreach

There have been personal outreach activities to foster collaboration, develop projects, increase understanding of SHIC and its mission and inform people about the research and programs. The feedback has helped to 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 2016 Plan of Work

Preparedness and Response Working Group – Preparedness

In 2016, SHIC Matrix research focused on the ability to detect the Matrix pathogens via nucleic acid detection, using platforms that are commonly available in the U.S. major veterinary diagnostic laboratories, for example PCR testing. Twenty-one research proposals from U.S. universities, an allied industry biotechnology company and the Canadian national animal health laboratory were selected for funding.

Nine additional swine disease fact sheets were added to the 24 already available before 2016. The objective of the fact sheets is to be a resource to give information needed quickly in the face of an outbreak or emerging disease caused by one of the pathogens listed in the Swine Disease Matrix.

SHIC is funding a project that will help define disease introduction risks to the U.S. pork industry that come from importing feedstuffs and feed components. Preliminary results for Senecavirus A (surrogate for FMD), Bovine Viral Diarrhea virus (surrogate for CSF) and Bovine Herpes Virus-1 (surrogate for PRV) are completed.

Preparedness and Response Working Group – Response

SHIC continues to make progress toward supporting nationwide operational disease preparedness with the Rapid Response Corps (RRC) project. The goal of this project is to develop a rapid response program for epidemiological investigations of emerging, transboundary and endemic swine diseases. A cooperative agreement with USDA is in place to help fund rapid response investigations, if USDA participation is approved by the herd owner.

When or where the next emerging disease will appear cannot be predicted. SHIC is prepared with funds in place that can be quickly mobilized to support filling the immediate research gaps following introduction. The funds for emerging disease research have not had to be used during 2016.

SHIC funded Seneca Valley Virus research results were presented during 3 interactive webinars. One hundred twenty-five veterinarians and pork producers from 29 U.S. states, Puerto Rico and Canadian provinces attended the webinar series held on May 16, 18 and 20. The webinars are now archived on the swinehealth.org website for ongoing use.

To help more producers and their veterinarians solve outbreaks from unknown causes, SHIC developed a program to help offset diagnostic fees for further investigation after the initial diagnostics are completed. A novel Sapelovirus, causing morbidity and mortality via CSN infection, has been identified through this process. In another case, Pasivirus was detected by Next Generation Sequencing in sera samples. A caveat is that merely detecting a novel virus with molecular techniques in a sample is not definitive evidence for disease causation.

Monitoring and Analysis Working Group – Monitoring

SHIC has conducted a survey about swine diseases and related issues using the international network of the Monitoring and Analysis Working Group. Responses came from 13 foreign countries, including Japan, Korea, Philippines, China, Poland, Ukraine, Russia, United Kingdom, Spain, Brazil, Chile, Columbia and Canada.

SHIC is funding a project to help analyze the effectiveness of on-farm biosecurity practices. The evaluation will help U.S. pork producers to implement effective biosecurity and prevent outbreaks of emerging diseases.

The Swine Disease Matrix is a list of viruses that are known to be able to infect pigs (found in Appendix A). The Monitoring and Analysis Working Group has reviewed and updated the Matrix content and the prioritization of the viruses. The Swine Disease Matrix is used to help the Center focus its research and information on high priority pathogens.

The U.S. pork industry is importing feed ingredients from countries with endemic swine diseases that are not present in this country. A pilot project investigating the use of Next Generation Deep Sequencing to survey imported feed components and other imported products was completed. The project determined that Next Generation Deep Sequencing was not successful in detecting some viruses spiked into some feed components.

Monitoring and Analysis Working Group – Analysis

Swine health test and related data from different Veterinary Diagnostic Labs need to be standardized to facilitate quickly compiling, sharing, accessing data for epi analysis. SHIC is the primary source of funding for the veterinary diagnostic laboratories of Iowa State University, Kansas State University, University of Minnesota and South Dakota State University to work with Clemson University to standardize the way that they report their diagnostic laboratory swine testing results. USDA is providing partial funding and their work with the National Animal Health Laboratory Network will help to ensure that, when completed, the results of the project can be offered to the other veterinary diagnostic labs that do swine work so there will be national coordination.

The Swine Health Monitoring Project currently involves approximately 40% of the sows in United States for monitoring economically important pathogens. A data management program is being developed to collect, collate, analyze and report data from various sources to create value for producers. In the short term, this project contributes to the control and prevention of important swine diseases and in the longer term, builds SHIC capacity for data collection, organization and providing capability to facilitate response to emerging pathogens.

SHIC has funded a project to determine whether oral fluids collected by hanging ropes in the holding pens of a contemporary U.S. abattoir can be effectively used for swine disease surveillance. Preliminary results are being evaluated.

Swine Health Information Center Communications*Website Design and Upkeep*

The SHIC website was reorganized to look and feel updated and to facilitate more intuitive use, increase professionalism of web presence, and facilitate organization. During 2016, there were close to 10,000 individual sessions with people from across the world. New visitors accounted for 62% and returning visitors accounted for 38% of the sessions. When benchmarking against other livestock agriculture websites, the SHIC website had more total sessions, more new users, more pages viewed per session, more time spent on the website per session and more returning users.

Media Releases

Media releases included articles posted as an e-letter by the American Association of Swine Veterinarians, newsletters published at 8 week intervals starting mid-2016 and at least monthly press releases. All e-letters and press releases were published in the news section of the website <http://www.swinehealth.org/news/>. Some organizations with national industry e-letters are starting to monitor the SHIC News page and pick up articles direct from when articles are posted at this location. The newsletter database includes more than 3,000 contacts. Contacts receiving the newsletter include veterinarians who associate themselves with the pork industry, producer and pork industry decision makers, allied industry and industry reporters and news editors for digital, print and radio outlets. Press releases went to industry trade magazines, digital media, industry newspapers, radio stations and Reuters press reporters.

Background of the SHIC-NPB Contract Funding the Swine Health Information Center

Exhibit A of the SHIC-NPB contract funding the Center's work gives the concepts leading to the Center's formation (July 4, 2015).

Exhibit A

Lessons Learned from PED

The experience of PED provides many lessons. First, the likelihood of identifying the pathway of introduction for production diseases (not classical foreign animal diseases like FMD, CSF or ASF) is extremely small given the breadth of inputs the industry gets through foreign trade. There will be more foreign production diseases that will enter the U.S.

Second, the U.S. pork industry can't expect the USDA, alone, to protect pigs from these emerging diseases. The resources necessary to do so simply are not available. The industry needs to take more responsibility for response to emerging disease. With PED, time was wasted developing effective diagnostic tests and capabilities. This can be improved. And producer willingness to share information about their disease status helped to inform producer actions and industry response. With industry-directed epi analysis of this data, the health of pigs on the farm can benefit.

Third, better state-federal-industry coordination is essential. Pork producers taking responsibility and working with state and federal animal health officials will help to avoid the debacle that we had with the first year of PED. That responsibility includes an industry functional program doing research, monitoring global diseases and enabling producers to share information in a secure manner – something that needs to urgently be done before the next production disease arrives.

Swine Health Information Center

The Swine Health Information Center will be responsible for those programs. It will be a 501(c)3 organization separate from NPPC, AASV and NPB. Its function will be to focus on emerging and endemic swine disease threats. To keep overhead low and efficiency high, it will contract with NPB and others for needed services.

The Center is not a surveillance program but will be an organized system for monitoring disease trends. Analysis of the volunteered swine health data will help inform producers' swine health and management decisions.

Sharing information will help to see trends and risks much more quickly. Voluntary participants will independently decide what and how much information they want to share. This will also determine how much information they will see. A technology that enables data analysis without taking ownership or control of the data will be used.

The Center cannot prevent diseases from getting into the country and it is not a response plan. But it will be a tool to help respond more quickly and efficiently to swine diseases. It will research the biggest existing threats to swine health that are already in SE Asia and elsewhere so the U.S. will be better prepared to respond to these diseases through better diagnostics and information.

Center deliverables

The Center will monitor foreign and endemic disease risks and vulnerabilities. Gathering and coordinating this information from a variety of private, company and government resources will help to inform pork producers of emerging swine disease risks and help pork producers to be better prepared. It will also better focus research resources.

The Center will fund and manage research needed to improve diagnostic capabilities to detect and respond to emerging production diseases. That research will help to fill in the diagnostic and information gaps identified through the Swine Disease Matrix. And, as global monitoring changes disease priorities, the Center will keep the Matrix up to date to ensure focus on the highest risk diseases.

Using new technology without the need to capture producer information into a separate database, the Center will provide epidemiological analysis of disease data that will help to improve swine health on the farm. This will also give producers the information they need to help them to make decisions on their farms that will affect biosecurity and biocontainment.

As the Center progresses, it can provide the record-access infrastructure to support the Secure Pork Supply plan for producer participants. And it can give the industry a way to manage national swine health information to support international trade of U.S. pork products.

Swine Health Information Center Mission

The mission of the Center is to protect and enhance the health of the US swine herd through coordinated global disease monitoring, analysis of swine health data and targeted research investments that minimize the impact of future disease threats.

Swine Health Information Center Scope of Work**1) Swine Disease Matrix project**

Organizing and funding the research needed for diagnostic and informational preparedness for prioritized, potential production diseases will be a core activity of the Center.

2) Global swine health and issues identification

Through global disease monitoring, the Center will manage the Swine Disease Matrix and heighten awareness and actions about emerging diseases. The result will be improvement of the biosecurity and biocontainment ability to protect the U.S. swine herd.

3) Swine health data analysis and monitoring for trends

Enhancing the capabilities of the Swine Health Monitoring Project is a priority of the Center. The Center will also enable producers to get information about emerging and endemic disease trends. It will review and provide support to improve active disease introduction risk assessments, which will help producers improve their farms' biosecurity.

Funding

A onetime Checkoff investment of \$15M of supplemental money will fund the Center for its 5 year life. This money is supplemental from 2014-15 Checkoff funds and are outside of the regular NPB program budget.

Funding of the Center past its 5 year life will depend on it being able to demonstrate a sufficient return on the investment to justify keeping it running. Ongoing funding may come from Checkoff funds, U.S. pork allied industries, for example grain commodity associations, animal health products companies and additional funding to the diagnostic research from the pork industries of other countries.

Swine Health Information Center 2016 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
 - a. 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:
 - i. Two named by the national Pork Board
 1. Dr. Brett Kaysen, Zoetis, Colorado
 2. Mark Greenwood, AgStar Financial Services, Minnesota
 - ii. Two named by the National Pork Producers Council
 1. Dr. Howard Hill, pork producer and NPPC past-president, Iowa
 2. Bill Luckey, pork producer and NPPC past-president, Nebraska
 - iii. Two named by the American Association of Swine Veterinarians
 1. Dr. Matt Anderson, Suidae Health and Production and AASV past-president, Iowa
 2. Dr. Daryl Olsen, AMVC and AASV past-president, Iowa
 - iv. Three at-large producer members
 1. Mark Schwartz, pork producer, Minnesota
 2. Dr. Mike Terrill, CEO of Topigs Norsvin, Minnesota
 3. Dr. Matthew Turner, JBS USA, Colorado
2. A 2016 operating budget and investment portfolio was developed.
 - a. The SHIC Board of Directors approved an operating budget for 2016 and has reviewed and modified the budget during the year to best meet the SHIC mission.
 - b. Funds in excess of the operating budget were invested in securities with Wells Fargo Bank that were modeled after the National Pork Board's investment plan
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.
 - a. 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 support on-farm and prospective producer decision making. The Working Group reviews and selects research and program activities that address its Plan of Work
 - b. The Preparedness and Response Working Group is charged with oversight of the Swine Disease Matrix research. It is responsible for funding decisions to fulfill the Matrix research objectives. It is also responsible for advising 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 2016 Outreach

1. There have been personal outreach activities to foster collaboration, develop projects, increase understanding of SHIC and its mission and inform people 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. South Dakota Pork Producers Association annual meeting
 - ii. Minnesota Pork Producers Association annual meeting
 - iii. Iowa Pork Producers Association annual meeting
 - iv. UMN Allen D. Lemman Swine Conference
 1. SHIC update breakout seminar
 - v. National Pork Board Swine Health Committee meetings
 - vi. 21st Century Strategic Forums, 21st Century Pork Club
 - vii. National Association of Farm Broadcasters
 - viii. National Pork Producers Council Pork Action Group
 - ix. National Pork Producers Council Board of Directors
 - x. Maxwell Foods
 - xi. Smithfield Foods, Hog Production Division
 - b. Allied industry
 - i. U.S. Animal Health Association
 1. Allied industry, USDA and State Animal Health Officials
 - ii. Zoetis
 - iii. Genus PIC
 - iv. Boehringer Ingelheim Vetmedica
 - v. Animal Health Institute
 - vi. GlobalVetLINK
 - vii. MetaFarms
 - viii. National Institute for Animal Agriculture
 - ix. Institute for Infectious Animal Diseases
 - x. APC, Functional Proteins
 - xi. Iowa Biotechnology Association
 - c. Veterinarians
 - i. 2016 American Association of Swine Veterinarians annual meeting
 - ii. 2016 ISU James D. McKean Swine Disease Conference
 - iii. Swine Medicine Education Center, Iowa State University
 - iv. North Carolina State University, North Carolina veterinarians
 - d. Veterinary Diagnostic Laboratories, Colleges of Veterinary Medicine and Academics

- i. Kansas State University Veterinary Diagnostic Laboratory
- ii. Iowa State University Veterinary Diagnostic and Production Animal Medicine
- iii. University of Minnesota Veterinary Diagnostic Laboratory
- iv. National Agricultural Biosecurity Center, Kansas State University
- v. U.S. Pork Center of Excellence
- vi. North American PRRS Symposium and Emerging and Foreign Animal Diseases
- e. USDA
 - i. USDA Animal and Plant Health Inspection Service, Administrator
 - ii. USDA Animal and Plant Health Inspection Service, Deputy Administrator, Veterinary Services
 - iii. USDA Animal and Plant Health Inspection Service, Veterinary Services Leadership Team and Veterinary Services staff
 - iv. USDA Center for Epidemiology and Animal Health
 - v. USDA National Veterinary Services Laboratory
 - vi. USDA Ag Research Services
- f. International
 - i. Ontario Animal Health Network
 - ii. OIE, International Organization for Animal Health
 - iii. International Pig Veterinary Society

Progress on the Swine Health Information Center 2016 Plan of Work

Preparedness and Response Working Group

Preparedness

- 1) Develop the call for proposals and select the projects for funding to start work on satisfying the Swine Disease Matrix Project
 - a) In 2016, SHIC Matrix research focused on the ability to detect the Matrix pathogens via nucleic acid detection, using platforms that are commonly available in the U.S. major veterinary diagnostic laboratories, for example PCR testing. Given that some of these assays may already be produced and available in other countries, the research effort included an assessment of the fitness for purpose of these tests. And, since some of the pathogens in the Swine Disease Matrix are not currently in the U.S., some of the research will be conducted in collaboration with a foreign laboratory or in another manner to ensure that the pathogen will not be introduced to the U.S. Twenty-one research proposals from U.S. universities, an allied industry biotechnology company and the Canadian national animal health laboratory were selected for funding.
 - b) Based on input from USDA and the subject matter experts likely to do the research, the objective for the 2016 Matrix research was to focus solely on pathogen detection, which is a change in the plan and budget of the contract Exhibit A. Subsequent research will continue with serology capabilities and fulfill the Exhibit A plan.
- 2) Additional Matrix fact sheets
 - a) Nine additional swine disease fact sheets were added to the 24 already available before 2016. The objective of the fact sheets is to give information needed quickly in the face of an outbreak or emerging disease caused by one of the pathogens listed in the Swine Disease Matrix.
 - b) Created by the Center for Food Security and Public Health, College of Veterinary Medicine, at Iowa State University, the fact sheets focus on:
 - 1) Etiology
 - 2) Cleaning/Disinfecting
 - 3) Epidemiology
 - 4) Transmission
 - 5) Infection/Pathogenesis
 - 6) Diagnostics
 - 7) Immunity
 - 8) Prevention and Control
 - 9) Knowledge Gaps
- 3) Virus rate of inactivation using a shipping model for feed ingredient imports
 - a) SHIC is funding a project that will help define disease introduction risks to the U.S. pork industry that come from importing feedstuffs and feed components. After PEDV was introduced into the United States in 2013, a USDA pathways analysis concluded that the most likely route of introduction was from 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.

- b) Because of the importation from China of high volumes of feed ingredients a model was developed to study whether PEDV harbored in imported ingredients could remain viable over the time and under the environmental conditions encountered during a “trans-Pacific” shipment from Asia to the USA. That model is being used to evaluate the survival of Swine Disease Matrix viruses in feed ingredients using the virus of interest or viral surrogates to represent the actual pathogens.
 - c) Preliminary results for Senecavirus A (surrogate for FMD), Bovine Viral Diarrhea virus (surrogate for CSF) and Bovine Herpes Virus-1 (surrogate for PRV) are completed.
 - d) The next phase of testing, that includes Feline Calicivirus (surrogate for Vesicular Exanthema), Canine Distemper virus (surrogate for Nipah virus) and Vesicular Stomatitis Virus, is underway.
- 4) Entry risk assessment
- a) Formal risk assessment will help to inform how likely a virus is to enter the U.S. and potential mitigation steps that could be used to reduce the risk. The SHIC Monitoring and Analysis Working Group considered the focus of the risk assessment (Virus specific? Orally transmitted viruses?) and the availability of data that could inform the risk assessments.
 - b) The Working Group discussed the possibility of contracting for a formal risk assessment but because of the paucity of data and the cost of a formal risk assessment the decision was made to postpone a project. It may be revised and offered as part of the 2017 Plan of Work.

Response

- 1) Rapid response infrastructure plan
- a) SHIC continues to make progress toward supporting nationwide operational disease preparedness with the Rapid Response Corps (RRC) project. The goal of this project is to develop a rapid response program for epidemiological investigations of emerging, transboundary and endemic swine diseases. Swine health experts, who can be deployed on farms within 72 hours after a request, will investigate possible introduction pathways and potential movements of the cause of the outbreak. An advisory group of swine veterinarians has been formed to help guide development and implementation of the program.
 - b) A cooperative agreement with USDA is in place to help fund rapid response investigations, if USDA participation is approved by the herd owner.
- 2) Emerging disease research
- 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. When or where the next emerging disease will appear cannot be predicted. SHIC is 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.
 - i) The funds for emerging disease research have not had to be used during 2016.
 - b) SHIC funded Seneca Valley Virus research results were presented during 3 interactive webinars. One hundred twenty-five veterinarians and pork producers from 29 U.S. states, Puerto Rico and Canadian provinces attended the webinar series held on May 16, 18 and 20. The webinars are now archived on the swinehealth.org website for future use.

- i) The first webinar, “Here’s what we know about the virus and how to manage it”, included epidemiological investigations, virus transmission, sow and grow-finish shedding and a case example of a herd closure to eliminate the virus from the farm.
 - ii) The second webinar, “An update on current diagnostic tools – capabilities and work still to be done”, focused on SHIC’s and universities’ funded research on Senecavirus A diagnostics. Topics presented included: the genetic diversity of the virus in the U.S. and an update about the virus in South America, interpreting PCR values as they correlate to virus isolation and the latest information about current and future serology tests.
 - iii) The final webinar, “Reporting vesicles and lesions – what to expect”, presented by a USDA and a state animal health official, focused on what practitioners and producers need to know about the state and federal governments’ roles and responsibilities in investigating cases of vesicular disease. The National Animal Health Laboratory Network and the Plum Island Animal Disease Center described the samples, testing and timeline needed to rule out Foot-and-Mouth Disease during an investigation.
- 3) Pilot project for emerging disease discovery support
- a) There continue 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.
 - b) To help more producers and their veterinarians solve outbreaks from unknown causes, SHIC developed a system to help offset diagnostic fees for further investigation after the initial diagnostics are completed. To request support of diagnostic fees the diagnostician of the case must contact SHIC. In cases of unresolved high or ongoing morbidity or mortality a panel of diagnosticians will review the case and must concur that the most likely differential diagnoses have been addressed. To ensure that a foreign animal disease is not being missed, the SAHO of the premises’ state must be aware of the case and the lack of a satisfactory diagnosis and has considered if a foreign animal disease investigation should be initiated.
 - c) A novel Sapelovirus, causing morbidity and mortality via CSN infection, has been identified through this process.
 - d) In another case, Pasivirus was detected by Next Generation Sequencing in sera samples. This isn’t a common finding and should be emphasized that many viruses are endemic in swine populations. Merely detecting a novel virus with molecular techniques in a sample is not definitive evidence for disease causation.

Monitoring and Analysis Working Group

Monitoring

- 1) DVM post doc position
 - a) Developing the network to monitor disease risks and analysis of swine health data is a core Swine Health Information Center responsibility. To support this activity a focused, academic effort is needed to ensure broad coordination of international and domestic swine health data and epidemiological analysis.
 - b) Rather than funding a position at one university, in 2016 these funds were used to support epidemiologic research and investigations at multiple universities.

- 2) International swine disease monitoring
 - a) SHIC has conducted a survey of swine diseases and related issues using the international contacts network of the Monitoring and Analysis Working Group. The survey asked the respondents to list the top five pathogens circulating and causing production losses in their country or region. It included a description of the morbidity, mortality and/or production losses from each pathogen and asked about the control measures that are currently being used. Next was a query about pathogens that might not be among the top five but are appearing to be emerging and are deserving of further monitoring. The final question asked for an opinion about the possible consequences to the U.S. pork industry should these pathogens gain entry here. Responses came from 13 foreign countries, including Japan, Korea, Philippines, China, Poland, Ukraine, Russia, United Kingdom, Spain, Brazil, Chile, Columbia and Canada.
- 3) Disease/biosecurity risk assessment
 - a) SHIC is funding an investigation with Iowa State University to help analyze the effectiveness of on-farm biosecurity practices. PRRS incidence is being used as the biosecurity indicator, comparing key differences in the biosecurity aspects of farms with relatively low PRRS incidence, compared to those with high PRRS incidence. The investigation is being conducted on cooperating farms enrolled in the Swine Health Monitoring Project.
 - b) The project is an Iowa State/University of Minnesota collaboration that helps to foster inter-university cooperation and could result in better understanding the effectiveness of biosecurity protocols. The evaluation will help U.S. pork producers to implement effective biosecurity and prevent outbreaks of emerging diseases.
- 4) Matrix review/revision
 - a) The Swine Disease Matrix is a list of viruses that are known to be able to infect pigs (Appendix A). Prioritization was done by assigning a 1 to 10 score to each of three criteria. The likelihood of introduction into the United States was included in the prioritization to account for introduction from foreign sources. Likewise, the likelihood of an endemic pathogen changing and causing a newly emerging disease or syndrome was also considered. The likely effect on production economics of disease from the pathogens was included as was the probable effect on domestic and/or international markets from an outbreak due to the pathogen. It is a living spreadsheet as the criteria information will change with time. The Monitoring and Analysis Working Group has reviewed and updated the Matrix content and prioritization. Regular updates are planned.
- 5) Feed ingredient monitoring research project
 - a) The U.S. pork industry is importing feed ingredients from countries with endemic swine diseases that are not present in this country. Ongoing monitoring of feed ingredients to check for the presence of these pathogens will help to inform the U.S. industry and add to the data needed for pathogen-specific risk assessments.
 - b) A pilot project investigating the use of Next Generation Deep Sequencing to survey imported feed components and other imported products was completed.

- c) Next Generation Deep Sequencing was not successful in detecting viruses spiked into some feed components.
- d) More work will be done to investigate methods of antigen detection that might be useful for this survey work.

Analysis

- 1) VDL data standardization
 - a) Swine health test and related data from different Veterinary Diagnostic Labs need to be standardized to facilitate quickly compiling, sharing, accessing data for epi analysis. Establishing and adopting the use of universally recognized data standards and message schema are the foundational elements necessary to enable the development of the sustainable and scalable systems of connectivity and web-based analytical tools necessary to support the needs and demands of the 21st century pork industry in North America.
 - b) SHIC is the primary source of funding for the veterinary diagnostic laboratories of Iowa State University, Kansas State University, University of Minnesota and South Dakota State University to work with Clemson University to standardize the way that they report their swine testing results.
 - c) USDA is also an important partner in the effort. They are providing partial funding and their work with the National Animal Health Laboratory Network will help to ensure that, when completed, the results of the project can be offered to the other veterinary diagnostic labs that do swine work so there will be national coordination.
- 2) Swine Health Monitoring Project
 - a) The SHMP currently includes approximately 40% of the sows in United States for monitoring economically important pathogens. Veterinarians for these producers share site identities, locations, diagnostic information, and when requested management interventions and production data. A data management program is being developed to collect, collate, analyze and report data from various sources to create value for producers. In addition, short term research projects directed at helping producers prevent and control pathogens such as PRRSv and PEDv are being supported. This will create value, encourage participation and build confidence and support for the long term objectives of the project.
 - b) In the short term, this project contributes to the control and prevention of important swine diseases and in the longer term, builds SHIC capacity for data collection, organization and providing capability to facilitate response to emerging pathogens.
 - c) AgConnect technology was proposed to be the IT tool to help reach SHMP goals. However, a different, project specific and timely approach was discovered. This enabled significant savings that have been used for other SHIC research and programs.
- 3) Swine health data epi analysis projects
 - a) SHIC has funded a project to determine whether oral fluids collected by hanging ropes in the holding pens of a contemporary U.S. abattoir can be effectively used for swine disease surveillance. Oral fluid specimens offer specific advantages for surveillance of livestock populations: (1) they are easily collected by a single person; (2) they can be collected without stress or risk to pigs or people; (3) at the population level they provide a higher probability of

disease detection than serum and (4) they can be used to screen for antigen, nucleic acid, or antibodies for a growing number of pathogens.

b) Preliminary results are being evaluated.

Communications

Website Design and Upkeep

The SHIC website was reorganized to look and feel updated and to facilitate more intuitive use, increase professionalism of web presence, and facilitate organization. Google Analytics of the website traffic was used to measure impact of media efforts.

Plan and Outputs

- Re-org of site from being home page heavy and older look and feel to be organized by category and more modern and professional look and feel.
- Main tabs and categories established
- Ability to link into the site created so impact of effort could be monitored.
- Google analytics integrated and monitored monthly.
 - Annotations of all media events recorded
 - Impact post media event noted and reported monthly to Dr. Sundberg with any recommended actions
- Banners on home page designed to represent mission and immediately answer the questions
 - What do we do?
 - What's in it for you?
- Effort made to link back to the site in the first paragraph of all press releases and at pertinent times at other points in news releases.
- Other pages organized and established when needed.

Results and Impact

- Summary of 2016:
 - Close to 10,000 individual sessions for the year.
 - 37.7% returning visitors
 - Spent 3:48 minutes per visit back
 - 62.3% new visitors
 - Spent 1:48 minutes per visit
 - Close to 6000 separate users
 - Close to 30,000 total page views
 - Average of 3 pages per session
 - Average session duration of 2:30
 - 72% of users were from the USA
 - 7.75% were from Canada
 - 2.21% from United Kingdom
 - 18.04% Other countries (with <2% each) --90 additional countries reached

- Besides the home page, users were most interested in emerging disease information (Sapelovirus, SVV, Fact sheets)
- Compared to Ag livestock benchmarks:
 - 49.27% more sessions
 - 28.04% more new users
 - 8.84% more pages per session
 - 23.54% more time spent per session
 - 14.22% less new sessions (we had more returning users)

Media Releases

The objective of the media releases is to communicate to the end audiences of SHIC timely and relevant information, as well as activities of the center.

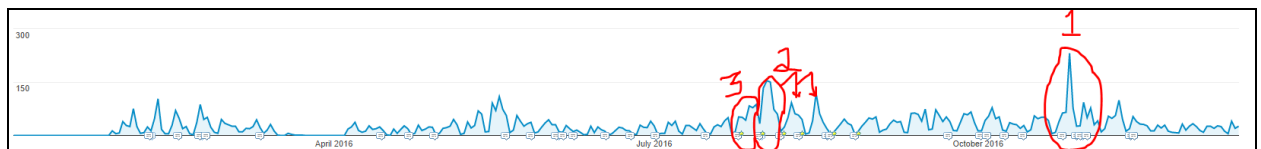
Plan and Outputs

- Weekly e-letters to AASV
- Regular newsletters (started mid-year, 8-week interval established)
- Once a month press releases.
- All efforts annotated on Google Analytics to measure impact

Results and Impact

Press releases

- 1-2 national press releases per month for the year were offered. Releases went to Industry trade magazines, digital media, industry newspapers, Radio stations, and Reuters press reporters.
- All pick up results were annotated and results observed on Google Analytics.
- National press releases generated the highest amount of interest on the site (see below)
 - #1 Article: SHIC Funded Research Identifies Feed Biosecurity as Critical to Global Animal Health
 - #2 Article: Novel Porcine Sapelovirus Found During SHIC-funded Diagnostic Investigation
 - #3 Article: It’s Not Over: Cases of Seneca Valley Virus Increase Over Summer . . . And You Can Help!



Website News

- All e-letters and press releases were published in the news section of the website <http://www.swinehealth.org/news/>
- Some national e-letters are starting to monitor the SHIC News page and pick up articles direct from when we post at this location.

Newsletters

- A newsletter was developed and a schedule of a release every 8 weeks established. As of December/Early January publish, SHIC will be on Newsletter #4.
 - >3000 total contacts in newsletter database
 - 1400 are veterinarians who associate themselves with the pork industry
 - 800 are decision makers in the pork industry with a Phase 1 focus on medium and large farms
 - 800 are allied industry
 - 15-20 are industry reporters and news editors for industry digital and print and radio outlets

Appendix A

| PRIORITIZED SWINE DISEASE MATRIX | |
|--|---------------------------|
| Representative virus affecting swine | Prioritizing score |
| foot and mouth disease | 8.4 |
| classical swine fever | 8.3 |
| African swine fever | 7.8 |
| influenza A | 6.2 |
| pseudorabies -- Chinese strain | 6.1 |
| porcine reproductive and respiratory syndrome (PRRS) | 6.0 |
| Nipah | 5.9 |
| PRRS (Chinese high path) | 5.5 |
| porcine epidemic diarrhea | 5.3 |
| swine vesicular disease | 5.1 |
| Japanese encephalitis | 4.8 |
| vesicular stomatitis | 4.5 |
| porcine teschovirus (Teschén/PTV1) | 4.3 |
| Ebola-Reston | 4.2 |
| porcine circovirus | 4.1 |
| vesicular exanthema of swine | 4.0 |
| circovirus 3 | 3.9 |
| porcine rubulavirus | 3.9 |
| transmissible gastroenteritis | 3.9 |
| Senecavirus A | 3.9 |
| Menangle virus | 3.9 |
| porcine deltacoronavirus | 3.8 |
| porcine rotavirus | 3.6 |
| influenza C | 3.5 |
| porcine parainfluenza 1 | 3.3 |
| atypical swine pestivirus | 3.2 |
| hepatitis E virus | 3.2 |
| Getah virus | 2.8 |
| porcine parvovirus | 2.7 |
| orthoreovirus | 2.2 |
| porcine respiratory coronavirus | 2.1 |
| hemagglutinating encephalomyelitis | 2.0 |
| encephalomyocarditis virus | 2.0 |
| Chikungunya virus | 2.0 |
| rabies | 1.7 |

| | |
|-------------------------|-----|
| porcine bocavirus | 1.7 |
| porcine astrovirus | 1.7 |
| porcine adenovirus | 1.6 |
| porcine kobuvirus | 1.5 |
| porcine sapovirus | 1.5 |
| Sendai virus | 1.5 |
| porcine cytomegalovirus | 1.4 |
| swine pox | 1.3 |
| porcine sapelovirus | 1.3 |
| porcine torovirus | 1.3 |
| swine papillomavirus | 1.1 |