A near-real time global surveillance system for swine diseases
Project #20-174 SHIC
Final report

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I.   Industry summary

Since 2018, the continuous expansion of ASF through Asia, Europe, and the Americas has kept raising concerns in the industry, resonating with the events of 2013, when a devastating epidemic of porcine epidemic diarrhea (PED) virus caused far-reaching losses. Those events demonstrated the importance of developing systems to provide situational awareness to stakeholders in near-real time to coordinate actions between government agencies and the industry with the ultimate objective of preventing or at least mitigating the impact of disease epidemics. The swine industry is vulnerable to the introduction of pathogens, and their variants, from which the US is currently free. We have developed a private- public-academic partnership to support a system for near real-time identification of hazards that will contribute to the mission of assessing risks to the industry. Identified hazards were shared monthly with swine practitioners and the government to help increase the country's awareness and preparedness. Ultimately, the system has kept contributing to identifying and early detection or creating awareness of key stakeholders to support current prevention and mitigation strategies for the introduction of foreign pathogens into the US.

II.   Keywords

Swine diseases – global surveillance – hazards - preparedness – awareness

III.   Scientific abstract

The aim of the project was to create a public, private, and academic partnership to implement a system for near real-time global surveillance of swine diseases. The system's output was the identification of hazards that were subsequently scored using a *step-wise* procedure of screening to identify emerging infectious disease events that, potentially, may represent a risk for the US swine industry. A combination of soft and official data were actively and passively collected and organized. Following successive screening steps in which data and information were synthesized, edited, corrected, and expanded in collaboration with selected stakeholders, a report describing the outputs has been available within the SHIC report to the industry and to the public on a routine basis. From October 2020 through October 2022, 24 reports were produced. In addition to the three USDA-classified tier 1 reportable foreign animal disease (FAD) of swine (ASF, CSF, and FMD), reports for significant changes in the epidemiological situation of productive diseases such as PRRS or pseudorabies disease, have also been included.

IV.   Introduction

The epidemic of porcine epidemic diarrhea virus that affected the US swine population of the US in 2013-2014 demonstrated the importance of developing systems to provide situational awareness to stakeholders in near-real time, to coordinate actions between government agencies and the industry with the ultimate objective of preventing or mitigating the impact of diseases epidemics.

Multiple sources of information may contribute to developing a near real-time global surveillance system for foreign swine disease. Sources of information may be classified as "soft" or "unofficial/informal" (online news aggregators, eyewitness reports (e.g., rumors) or data that have not been confirmed) and "hard" or "official" (confirmed by national or international agencies).

Official data are those reported by national and international agencies, such as the World Animal Health Organization (WOAH) through its database, WAHIS, the United Nations Food-and- Agriculture-Organization (FAO) through Empres-i or the European Commission (EC) through its Animal Disease Information System (ADIS), for example. An informal report from a contact in a given country may be considered "soft data". Results of an internet search in newspapers and blogs, or other informal sources, such as ProMed, Google Alerts, or the USAHA newsletter, may, in general, be considered soft data unless they report or include a confirmation from a government or inter-government agency or organization.

The use of those sources of information for early detection of emergent health issues is analogous to using a diagnostic test to detect disease in an animal or herd. Consequently, the surveillance system may be characterized in terms of its sensitivity and specificity, and one may expect "soft data" to be more sensitive (and less specific) than "official data". Some initiatives have been launched to facilitate access to data and rumors to agencies, making use of soft and/or official data. There are advantages and disadvantages associated with each of those systems.

In the project here, we have developed and used for several years a system to collect, organize, and make available to swine practitioners and relevant government institutions on a monthly basis a report on the global status of emerging infectious threats to the US swine industry.

V.   Stated Objectives from original proposal

  A. Collect information related to hazards represented selected swine diseases.

  B. Organize and share data

  C. Critically evaluate and summarize data

VI.   Material and methods

Specifically, we have:

- Collected information related to hazards represented selected swine diseases by

    o   Searching data and reports from national and international agencies (official data)
    o   Creating a web-based platform for stakeholders and contacts worldwide to introduce rumors and data on swine health events (passive surveillance of soft data). Users will be required to log into the system to submit their reports and will be offered the option of keeping their contribution anonymous or publicly acknowledged.
    o   Conducting daily internet searches in selected languages and translate data and reports into English, if needed (active surveillance of soft data)
    o   Periodically contacting stakeholders from critical regions and at critical positions to gather information they may have collected nationally and internationally (active surveillance of soft data).

- Organized, critically evaluated, summarized and shared relevant data and information

VII.   Results

The project has been successful in identifying and communicating a number of potential threats to the swine industry. In particular, the project came in time to collaborate with relevant stakeholders in collecting, organizing, critically reviewing, and communicating the expansion of ASF through Asia and Europe.

Since the inception of the project and through November 2022, 64 reports have been produced (monthly, bimonthly, and emergency). Currently, the three USDA-classified tier 1 reportable foreign animal disease (FAD) of swine (ASF, CSF, and FMD) are included in the report, and comments regarding productive diseases listed in the SHIC matrix are also included when appropriate, considering the epidemiological context of the event.

New sections have been included in the report, in which specific topics are developed in-depth to provide context and interpretation of the monthly events.

Here we summarize some of the most relevant highlights communicated through the project, along with the dates in which it was communicated:

Date	Highlights
11/1/2022	• **ASF spreads in the Philippines**: Western Visayas had previously been among the last few regions in the country that had remained ASF-free since the first outbreak in July 2019. *Surveillance at Points of Entry* • **Pork products seized in Taiwan**: Customs officials at the Taoyuan International Airport seized over 180 lbs of Vietnamese pork zongzi (dumplings). • **The Philippines protects its main backyard hog producer region**: The ASF task force seized over 1,400 lbs of pork products - *from regions with confirmed ASF cases* - in Negros Occidental. • **Thailand authorities intercept smuggling of pork in air passenger luggage**: An attempt to smuggle almost 20 lbs of pork sausages from Vietnam was foiled in Bangkok by the Customs Department at the airport. • **Rising concerns in the United Kingdom:** Over a single weekend of inspections, 2.5 tonnes of illegal pork products from ASF-affected countries were seized at the port of Dover.
10/3/2022	• **Brazil's preparedness at points of entry:** Prohibited pork products from Russia were seized at Rio de Janeiro International Airport. • **Presumable false alarm in Ecuador**: Ecuadorian authorities have ruled out CSF and ASF in samples from a suspicious case reported in Esmeraldas province. Additional testing is scheduled. • **ASF in South Korea:** New outbreaks in domestic pigs - over 15,000 pigs culled.
9/5/2022	• **FMD in Indonesia:** Authorities and the regional community are partnering to deploy an urgent vaccine campaign to prevent further spread of the disease - so far, a total of 1,589,144 head of livestock have been vaccinated. • **FMD in South Africa:** Week three of its national cattle movement ban continues as the country still battles over 120 open outbreaks of the disease. • **ASF in Russia:** First 2022 outbreaks in commercial farms - at least five premises affected so far. • **Vietnam ASF control:** Authorities have temporarily halted the ASF vaccination deployment amid reports of pig deaths pending investigations.
8/1/2022	• **The UK**: Following the new long-distance jumps of ASF across Europe, the UK has raised concern and increased ASF risk status of introducing the virus through a human-mediated route from medium to high. • **The DR**: Since January, more than 4,000 kilos of pork have been seized at Las Americas International Airport.

	● **FMD in Indonesia**: Regional concern due to the fast spread of the disease in the archipelago. ● **Australia on high alert**: Increased vigilance as FMD viral fragments are detected in meat products.
7/4/2022	● **ASF in Italy**: Lazio region's authorities reported the first outbreak in domestic pigs in the country. ● **ASF in Germany**: First outbreak confirmed in domestic pigs in Lower Saxony, the most important production region in the country with about 30% stock of pigs. ● **UK authorities rule out suspected case of FMD**: a temporary FMD control zone was lifted after testing confirmed the absence of the disease.
6/3/2022	● **First ASF vaccine to be available in Vietnam:** NAVET-ASFVAC authorization announced by Vietnam authorities - receives the support of USDA's Agricultural Research Service. ● **ASF in Germany**: Alarm in western Europe after the report of the first case in domestic pigs in the south of the country - less than 5 miles from the French border. ● **ASF in Italy**: four months after the first case in Piedmont, another 15 new cases confirmed in the Lazio region - 250 miles southeast of the cluster in northern Italy. ● **First ASF report in Nepal**: becoming the 17th Asian country to report the disease. ● **WAHIS 2021 report**: The WOAH's general assembly (former OIE) report highlights the current animal health situation based on the notifications and reports from member countries; the median time from disease confirmation to report submission increased by 2 days compared with the 2005-2020 period.
5/2/2022	● **JEV in Australia:** another 23 piggeries tested positive in April. Authorities' estimates predict up to 60-80% losses in affected sites. ● **Closer to the finish line:** a vaccine candidate for ASF has passed a crucial safety test required for regulatory approval. ● **PED in Canada**: Manitoba's largest outbreak to date; surveillance through Environmental Testing ongoing at high-traffic sites, over 48,000 submitted so far.
4/4/2022	● **First major outbreak of Japanese encephalitis in Australia**: Over 50 farms affected across four southeastern Australian states. ● **ASF in the Dominican Republic:** The confirmation rate among reported cases has stayed over 40% since November, with more than 1,150 confirmed outbreaks so far. ● **Increased Risk at Port of Entry**: The seizure of meat products from China at California seaports has increased by 33% compared to the same period of last year. ● **EFSA Technical Report**: Public consultation on the ability of ASFV to remain viable in different matrices.

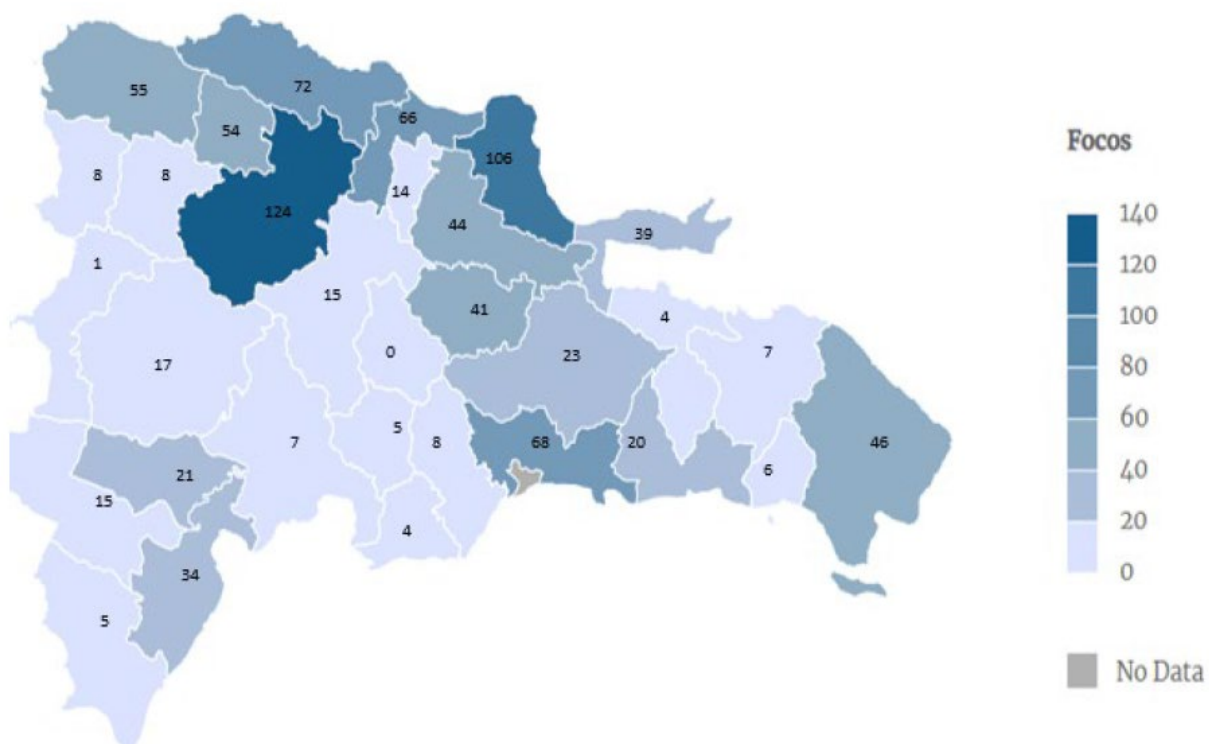Some examples of the maps produced in the reports are found below:

Map 1. Location of the first ASF outbreak reported in Lower Saxony, ~10 miles from the Dutch border (July 2022)

Map 2. Location of the first reported outbreaks of ASF in a pig farm in Germany. (June 2022)

The virus has affected around 3,000 producers because more than 74,000 pigs were affected.

Map 3. Distribution of confirmed cases of ASF in the Dominican Republic since the first case in July (March 2022)

Map Legend
In blue: provinces from Piemonte and Liguria region;
in red the most affected provinces;
in yellow: neighboring provinces from Emilia-Romagna region in high alert.

Map 4. Provinces affected by the ongoing ASF outbreak in Northern Italy (January 2022)

VIII.   Discussion

With the purpose of monitoring this project and implementing continuous improvement management, information regarding the access to the newsletter by subscribers has been captured, and summarized each semester. The open rate (OR), is the percentage of recipients who opened the report compared to how many contacts were sent the report. The average OR varies significantly between industries, with average values between 18-28% (MailChimp reports that the average open rate for companies in hobby industries is 28.49%, whereas the average open rate in the marketing/advertising industry is 17.85%). So far, the Global Swine Disease Monitoring Report is consistently one of the top clicked items in the monthly SHIC newsletter (an average of 52 unique clicks) with an average OR 28.5 across 30 months.

In this regard, it is remarkable the 35.4% OR average that reports showed between August 2018 to January 2019 (Figure 1). This was driven mainly, by the start of the ASF epidemic in China that spread quickly across South East Asia.

Regarding the access to the report through the SHIC website, the page has an average of 780 page views per month.

Not only the metrics regarding the online distribution of the reports showed a sustained interest in the receivers, but also many local and international stakeholders have shared personally and by email their support to the project.
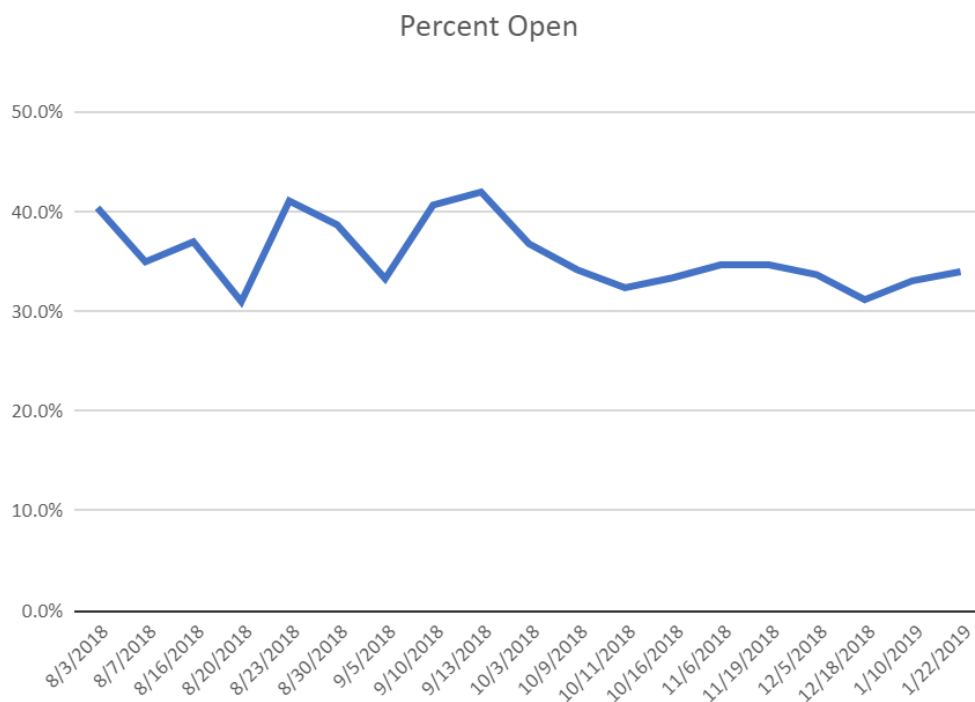

Figure 1. The figure above shows the *open rate (OR)*, which is the percentage of recipients who opened the report compared to how many contacts were sent the report.

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- At the end of the first semester of 2022, a survey was distributed through the SHIC report with the intended of gathering feedback on our Disease Monitoring Reports and helping to identify opportunities to improve our work, which were considered in the development of this renewal proposal. This is a summary of the main outputs obtained with the survey:

Does the GLOBAL Swine Disease Monitoring Report provide valuable information to you?
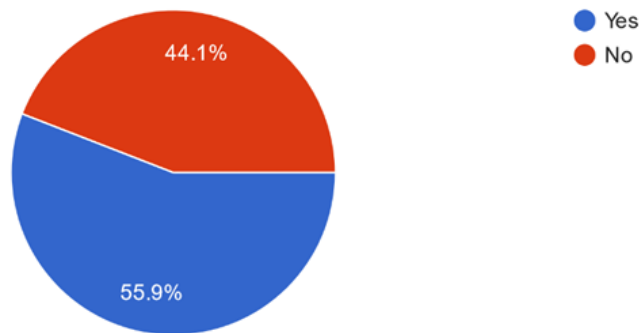35 responses

- Yes
- No

8.6%

91.4%
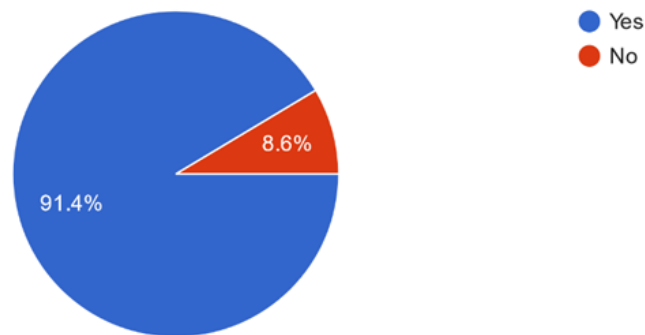
32 = yes, 3 = no

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If you answered yes to the previous question, what do you find most valuable in the report? - some examples extracted from the 32 responses:

- Trends with pathogens, and awareness of diseases around the globe.
- Its nice to see what's going on in other areas
- It is helpful to get the global disease updates. It is important to understand the movement and changes in global health issues. It is useful as a teaching tool in U.S.
- Keeps me informed of what is happening around the globe.
- Helps one appreciate the risk of diseases circulating in the industry.
- Leading trends to watch for
- Up to date information and knowledge about what people are being told by SHIC.
- Where thigns are happening and how they are moving from report to report
- Staying updated on the swine disease and having a place to go back and looking information as it's more impactful to my area.
- Trusted source for info
- Validation of some global data
- Reliable information on time
- Real-time, aggregated data
- Knowing what is the most prevalent strains out there.
- One souce of information on (re-) emerging disease and global trends
- The information is summarized in relevant bullet points easy to understand and grasp

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Does the GLOBAL Swine Disease Monitoring Report provide actionable content affecting decision-making?

34 responses

19 = yes, 15 = no

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If you answered yes to the previous question, what kind of decision-making does this report affect? -- - some examples extracted from the 18 responses:

- I can share with my clients in order for them to help make decisions
- It provides the impetus to continue to push for improved biosecurity and FAD preparedness. We utilize examples from this report to communicate the biosecurity message to producers and decision makers.
- Comparing what best practices are.
- Some times I rub my eyes and gape in astonishment at what I am reading. More seriously I consider ways I can better assist the industry.
- Is our research focused in right direction for emerging risks
- Improving bio security
- We consider the information on the product development based on producers needs
- Awareness of where ASF is from a travel standpoint
- Enables assessment of risk of entry into US
- I think it increases regional awareness and can help producers identify their local/regional level of disease risk. Thus, it helps producer make overall management decisions about their biosecurity needs.
- Travel abroad and having visitors from other countries

IIX. Publications:

- Reports (n=64) have been issued since November 2017. The reports are available at the SHIC webpage: https://www.swinehealth.org/global-disease-surveillance-reports/
- The project reports and their outputs have also been disseminated through the SHIC, ASSV, and MSHMP newsletters.

- Presentation at 2022 conferences:

    o Leman Conference 2022 - Session: Actionable monitoring of ASF, PRRS, and other diseases - How to stay up-to-date on what's happening at-home and abroad - Monday, September 20, 2022

    o USAHA AAVLD - Global Animal Health and Trade (GAHT) Committee Agenda Tuesday, October 11, 2022

    o 2022 NAPRRS/NC229: International Conference of Swine Viral Diseases - Session 7: Emerging Diseases and Field Detection - Friday, December 2, 2022.

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