**SWINE HEALTH INFORMATION CENTER**
**INTERIM RESEARCH GRANT REPORT**

# Development of a web-based application for rapid response epidemiological investigations, risk assessments and biosecurity benchmarking, Project #19-149 SHIC

**Derald Holtkamp, Professor**

**Department of Veterinary Diagnostic and Production Animal Medicine, Iowa State University College of Veterinary Medicine, Ames, IA**

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## Industry Summary:

The need to quickly identify, control, and eliminate a pathogen in an endemic, emerging, or transboundary disease outbreak in the United States is crucial to protect the swine industry from suffering huge economic losses. In August of 2016, SHIC funded Iowa State University to develop the Rapid Response to Emerging Disease Program (RRP). A Rapid Response Corp (RRC) was formed for the program. The RRC is a nationwide network of veterinarians, state animal health officials or representatives, epidemiologists and, when appropriate, federal animal health officials who are trained, prepared and committed to moving within 24 hours of contact to conduct epidemiological investigations when a new transboundary or emerging disease threat occurs. The standardized approach, methodology, forms, and reports developed for the Iowa Pork Producers Association (IPPA) funded PRRS outbreak investigation pilot project, were adapted to develop the RRP. Online training modules, checklists, investigation forms, surveys, and report templates to conduct a rapid response investigation are now available for download on the SHIC website. The objective of this project was to facilitate the continuation of the RRP beyond the current five-year funding stream for SHIC by automating and streamlining the rapid response investigation process through a web application. This proposal included the planning phase to automate and streamline the process. The RRC was maintained at 35 members for the duration of this project. To support the continuation of the RRP, and to provide members of the RRC with additional training, a pre-conference seminar was conducted at the American Association of Swine Veterinarian's Annual Meeting in March of 2020. The seminar was titled "Conducting effective outbreak investigations: Learning from our mistakes, part 2." The seminar followed the successful pre-conference workshop offered as training for the RRC members at the same meeting in 2019. The possibility of integrating the RRP into the National Pork Board's swine business continuity system (AgView®) was explored. Delays in the development of AgView led to the exploration of simpler, more executable approaches. A web-based version of the investigation form used by the RRC members to conduct outbreak investigations has been developed using Qualtrix, which is a commercially available online survey platform. The web-

based version of the investigation form will be tested in Vietnam, as part of another SHIC funded study to investigate African swine fever (ASF) virus on farms in Vietnam.

**Keywords:** epidemiological outbreak investigations, rapid response corps, Rapid Response to Emerging Disease Program

**Scientific Abstract:**

The need to quickly identify, control, and eliminate a pathogen in an endemic, emerging, or transboundary disease outbreak in the United States is crucial to protect the swine industry from suffering huge economic losses. In August of 2016, SHIC funded Iowa State University to develop the Rapid Response to Emerging Disease Program (RRP). A Rapid Response Corp (RRC) was formed for the program. The RRC is a nationwide network of veterinarians, state animal health officials or representatives, epidemiologists and, when appropriate, federal animal health officials who are trained, prepared and committed to moving within 24 hours of contact to conduct epidemiological investigations when a new transboundary or emerging disease threat occurs. The standardized approach, methodology, forms, and reports developed for the Iowa Pork Producers Association (IPPA) funded PRRS outbreak investigation pilot project, were adapted to develop the RRP. Online training modules, checklists, investigation forms, surveys, and report templates to conduct a rapid response investigation are now available for download on the SHIC website. The objective of this project was to facilitate the continuation of the RRP beyond the current five-year funding stream for SHIC by automating and streamlining the rapid response investigation process through a web application. This proposal included the planning phase to automate and streamline the process. The RRC was maintained at 35 members for the duration of this project. To support the continuation of the RRP, and to provide members of the RRC with additional training, a pre-conference seminar was conducted at the American Association of Swine Veterinarian's Annual Meeting in March of 2020. The seminar was titled "Conducting effective outbreak investigations: Learning from our mistakes, part 2." The seminar followed the successful pre-conference workshop offered as training for the RRC members at the same meeting in 2019. The possibility of integrating the RRP into the National Pork Board's swine business continuity system (AgView®) was explored. Delays in the development of AgView led to the exploration of simpler, more executable approaches. A web-based version of the investigation form used by the RRC members to conduct outbreak investigations has been developed using Qualtrix, which is a commercially available online survey platform. The web-based version of the investigation form will be tested in Vietnam, as part of another SHIC funded study to investigate African swine fever (ASF) virus on farms in Vietnam.

**Introduction:**

The need to quickly identify, control, and eliminate a pathogen in an endemic, emerging or transboundary disease outbreak in the United States is crucial to protect the swine industry

from suffering huge economic losses. In 2013, a pilot program, funded by the Iowa Pork Producers Association, was initiated to develop a standard approach to conducting epidemiological investigations of porcine reproductive and respiratory syndrome (PRRS) outbreaks in breeding herds. The objective of the PRRS outbreak investigation project was to identify, when possible, the likely cause of outbreaks, identify gaps in biosecurity and reduce the frequency of outbreaks in sow herds over time. The project aimed to create a standard approach for veterinarians and producers, as well as researchers, to systematically observe and gather information about PRRS outbreaks and more rapidly "learn from our mistakes."

In response to events following the introduction of porcine epidemic diarrhea virus (PEDV) into the United States in 2013, the Swine Health Information Center (SHIC) funded Iowa State University to develop the Rapid Response to Emerging Disease Program (RRP). A Rapid Response Corp (RRC) was formed for the program. The RRC is a nationwide network of veterinarians, state animal health officials or representatives, epidemiologists and, when appropriate, federal animal health officials who are trained, prepared, and committed to moving within 24 hours of contact to conduct epidemiological investigations when a new transboundary or emerging disease threat occurs. The standardized approach, methodology, forms, and reports developed for the IPPA funded PRRS outbreak investigation pilot project, were adapted to develop the RRP. Online training modules, checklists, investigation forms, surveys, and report templates to conduct a rapid response investigation are now available for download on the SHIC website.

**Objectives:**

The objective of this project was to support the maintenance of the RRP and facilitate the continuation of the RRP beyond the current five-year funding stream for SHIC by automating and streamlining the rapid response investigation process through a web application. This proposal included the planning phase to automate and streamline the process.

**Materials, Methods and Outcomes:**

An RRP Project coordinator, who was appointed when the RRP was initiated, continued to be supported by this project. Their responsibilities included support of RRC members and ongoing coordination and promotion of an RRC training program. The RRP project coordinator was responsible for maintaining the list of trained and certified individuals.

The RRC is a ready source of qualified, trained, and practiced individuals who have agreed to be activated to conduct epidemiological investigations in the event of a new emerging or transboundary disease outbreak of known etiology in the United States. There are currently 35 RRC members that are enrolled and trained in the RRP, and they are dispersed over the 6 regions in the United States (Table 1). The RRC members were recruited within regions within the United States. By using a regional approach, the RRC members can travel within 24 hours within that region and conduct the investigations in a timely manner. The RRP divides the United States into 6 regions as shown in Figure 1.

**Table 1. Displays the current number enrolled in the RRC.**

| Region | Members currently enrolled in RRC |
|---|---|
| 1 | 2 |
| 2 | 3 |
| 3 | 14 |
| 4 | 6 |
| 5 | 6 |
| 6 | 4 |
| **Total** | 35 |

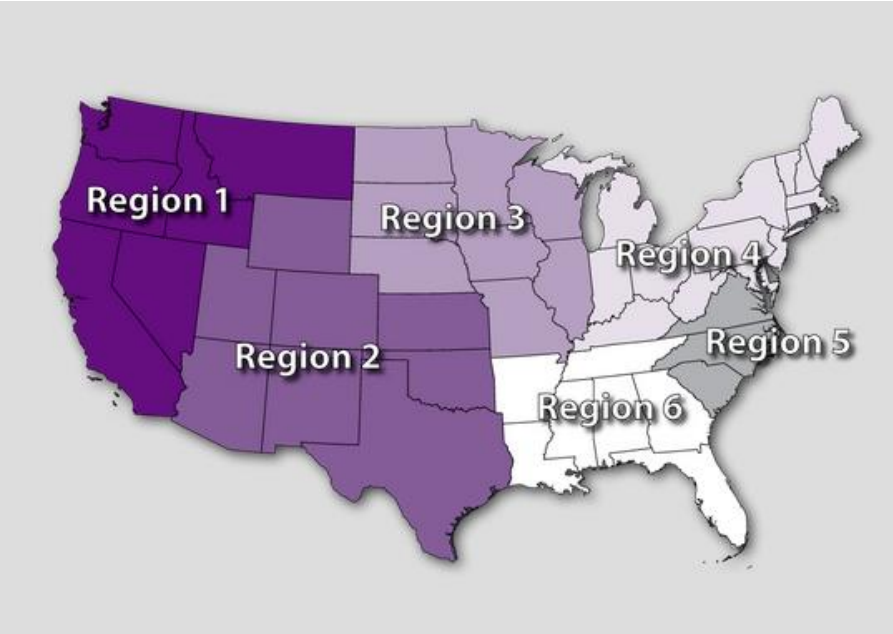


**Figure 1: RRP regions. Each region will have several RRC members that will quickly be able to respond in the event of an emerging or transboundary disease outbreak.**

To support the continuation of the RRP, and to provide members of the RRC with additional training, a pre-conference workshop was conducted at the American Association of Swine Veterinarian's Annual Meeting in March of 2020. The seminar was titled "Conducting effective outbreak investigations: Learning from our mistakes, part 2." The seminar followed the successful pre-conference seminar offered as training for the RRC members at the same meeting in 2019. The seminar introduced participants to the concepts and resources available to efficiently and comprehensively conduct epidemiological investigations of outbreaks in swine herds. Participants were introduced to the resources (forms, examples, training videos, etc.) available online through the RRP for conducting epidemiological investigations of outbreaks. The seminar provided members of the RRC with additional training to prepare them to conduct an investigation in response to a new transboundary or emerging swine disease in the U.S. All participants learned how to use the program materials in their practice or production system to conduct more effective

epidemiological investigations of endemic disease (e.g. PRRS or PED) outbreaks. RRC members were encouraged to practice using the resources available.

In order to collect consistent information, a standardized methodology to conduct epidemiological investigations, as well as consistent investigation forms that can be easily duplicated and followed, was developed. The standardized approach for conducting epidemiological investigations was developed in a 2013 IPPA funded PRRS outbreak investigation pilot project. The standard approach focuses on carrying agents and risk events. Carrying agents are defined as an animal, person, or inanimate object that has the potential to carry a pathogen into a herd.[1] A risk event is defined as the event when one or more carrying agents cross a number of barriers around a swine premise.[1]

The possibility of integrating the investigation forms into the National Pork Board's swine business continuity system (AgView®) was explored. Delays in the development of AgView led to the exploration of simpler, but more executable approaches. A web-based version of the investigation form used by the RRC members to conduct outbreak investigations was developed using Qualtrics (SAP, Provo, Utah), which is a commercially available online survey platform. Screenshots of the investigation form in Qualtrics are shown in Figures 2 and 3. The web-based version of the investigation form will be tested in Vietnam, as part of another SHIC funded study to investigate African swine fever (ASF) virus on farms in Vietnam. That project is being conducted in conjunction with Kansas State University. Investigators at that institution will provide input on the content, design, and delivery of the survey. The experience in Vietnam will help improve the web-based version of the investigation form and provide an opportunity to refine how the data is managed to facilitate analysis of the data and communication of results with all relevant parties. The intent is to use the experience in Vietnam to further develop and test the web-based version of the investigation form before it goes live in the United States.

The investigation form may be completed online or offline. Offline forms may be completed by installing the Offline Surveys app on a device. When completed offline, the data is later uploaded when a connection to the internet is made. Data from completed investigation forms may be downloaded into an Excel spreadsheet (Microsoft, Redmond, WA) for analysis.

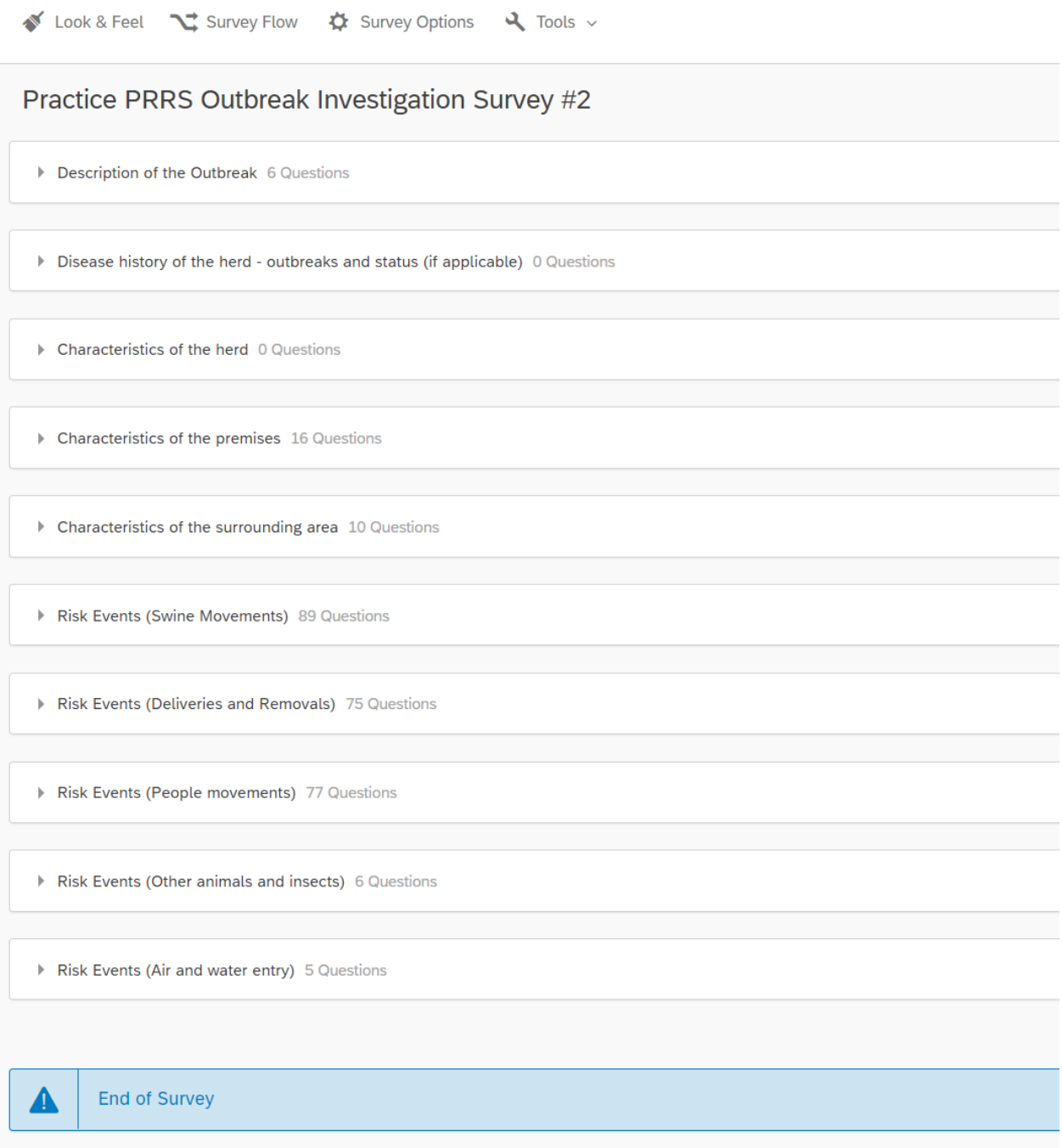


**Figure 2**. Screenshot of the rapid response investigation form in Quatrix. The questions in each section are accessed by clicking on the section name.

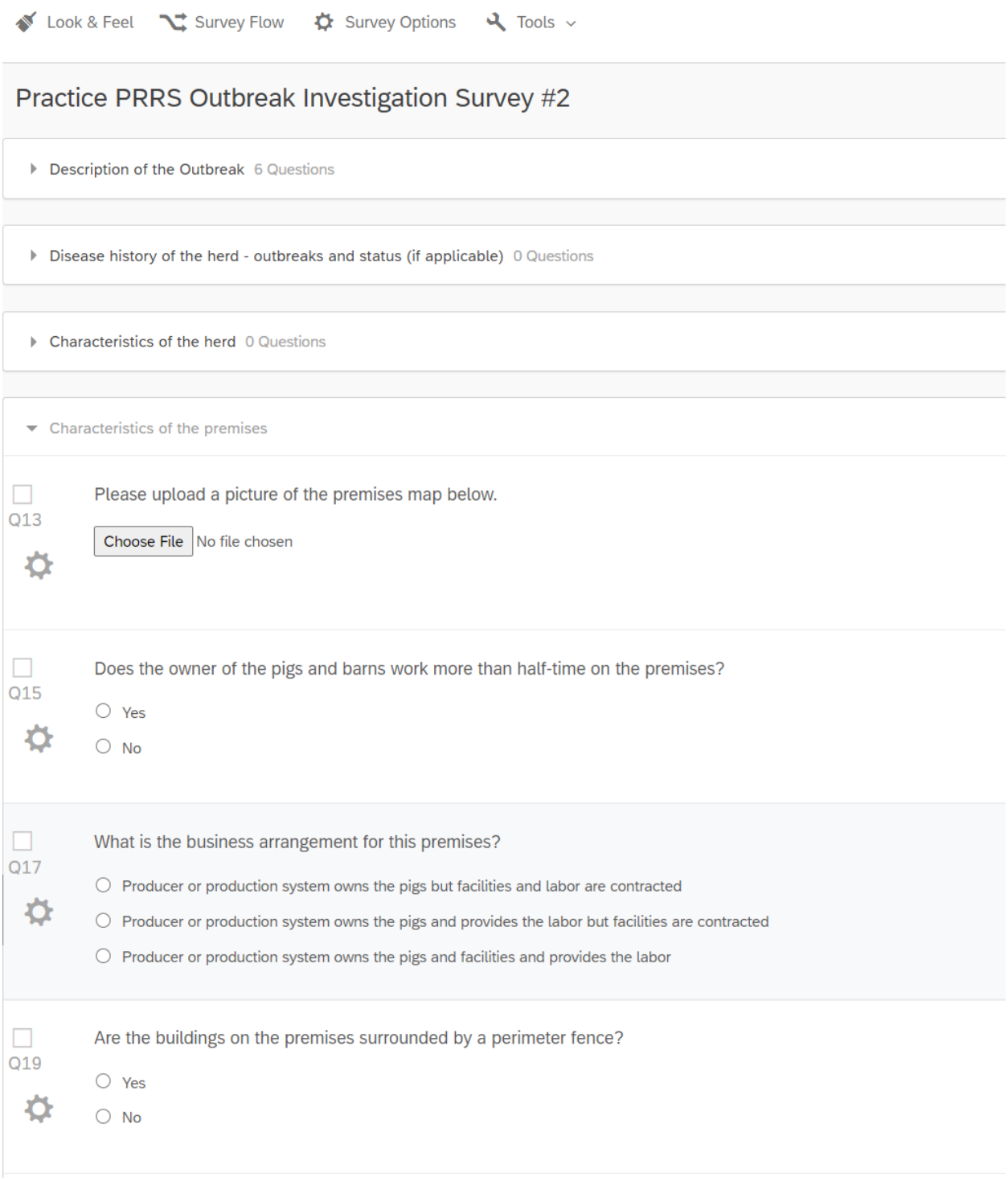


**Figure 3**. Screenshot of the rapid response investigation form in Quatrix. Questions in the Characteristics of the premises section.

**Results and Conclusion:**

The development of the RRP has led to the formation of a committed, trained, and prepared pool of veterinarians, epidemiologists and state and federal animal health officials within the six regions of the United States that are ready to conduct epidemiological outbreak investigations when a new transboundary or emerging disease threat occurs. A web-based version of the investigation form used by the RRC members to conduct outbreak investigations has been developed using Qualtrix, which is a commercially available online survey platform to facilitate the continuation of the RRP beyond the current five-year funding stream for SHIC by automating and streamlining the rapid response investigation process through a web application.

The adaptation of the standardized approach to conducting epidemiological outbreak investigations will allow the RRC members to collect a consistent set of information and create a baseline database when using it for endemic diseases, and as a database to be able to efficiently respond in the case of an emerging or transboundary disease outbreak. With the development of the online training material and the web-based version of the investigation form, the goal is to attract more veterinarians, epidemiologists, and state and/or federal animal health officials to use the standardized approach. This will benefit the swine industry by expanding the pool of individuals that are prepared to conduct epidemiological outbreaks in the face of an emerging or transboundary disease outbreak. The RRP serves as a plan and program that will help leave the industry better prepared to minimize the impact of the next emerging or transboundary disease.

**References:**

1. Baker, K et al. 2019. Conducting efficient and comprehensive epidemiological investigations of outbreaks. AASV Annual Meeting Proc. Orlando, FL.