Advanced disease transmission modeling to enhance U.S. swine industry preparedness for emerging diseases

NCSU-CGA Pests Pathogens Research Showcase

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NC STATE UNIVERSITY

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Acknowledgement/Funding

United States Department of Agriculture
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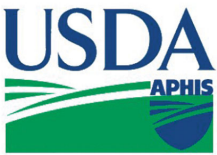

$3.2M

Acknowledgement

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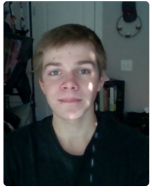

Will Gardner

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What we do!

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1. Studying routes of between-farm disease transmission *main goal* in targeting of control strategies to minimise the spread of disease.
2. Emphasis on the *role of farm-level biosecurity profile on disease transmission.*
3. Mathematical methods and machine learning tools that allow the swine industry to design and adopt effective interventions for important infectious diseases.
4. Developed the Rapid Access Biosecurity (RAB) app™.

Our solutions to the problem(s)

What makes a biosecurity plan?

Within RABapp™, a completed Secure Pork Supply plan for a single site display all 169 biosecurity features as both a written description (left) and a visual map of the premises (right).

Written plan

Pirate Pork Farm Enhanced Biosecurity Plan for FAD Prevention in North Carolina

Date Created: 3/5/2021

This Biosecurity Plan is based off of the Secure Pork Supply (SPS) Self-Assessment Checklist for Enhanced Pork Production Biosecurity: Animals Raised Indoors, [August 2017] and was developed using guidance from the SPS Information Manual for Enhanced Biosecurity: Animals Raised Indoors. All documents are available at www.securepork.org. In the Plan below, all items have been implemented except those indicated which will be implemented prior to requesting an animal movement permit.

Scope of Biosecurity Plan

- National Premises Identification Number (PIN): 00XYZ12 Nursery
- Premises Address: 2468 Go Bulls Rd Durham, NC 28341
- Premises GPS Coordinates: 32.127481, -64.951797
- Animals* on primary premises: Swine and 2800
- Other business operations on premises? Yes
- If yes, what? Hay
- Secondary premises** locations:
  - Will be provided to Responsible Regulatory Officials if this premises is located in an FAD Control Area
  - *Work with your State Animal Health Official to determine if separate PINs are needed for all of your associated premises.

*Animals that are susceptible to FMD include cattle, pigs, sheep, goats, and elk. For biosecurity guidance for dairy cattle and beef cattle, see www.securemilksupply.org and www.securebeef.org.
**Work with your State Animal Health Official to determine if separate PINs are needed for all of your associated premises. When a premises becomes infected, all premises with the same PIN number will be considered to be infected.

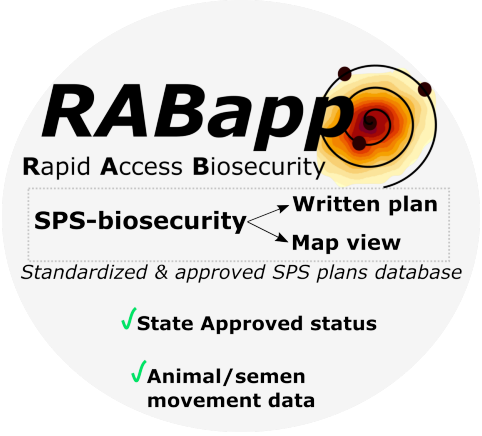
+

Map view of the site

Standardized map view

RABapp™

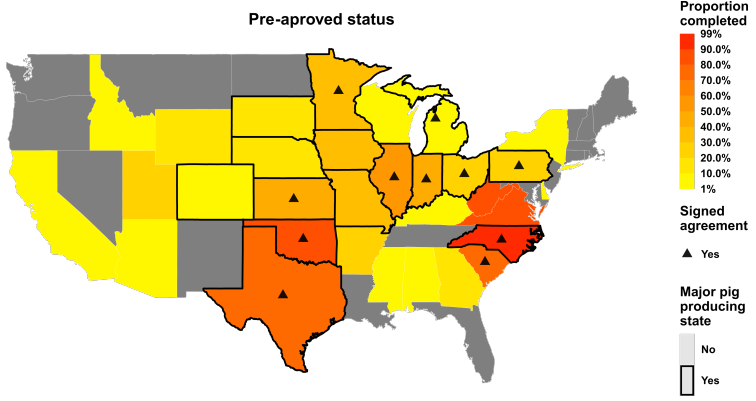
The Rapid Access Biosecurity app (RABapp™) is a web-based tool for enhancing on-farm biosecurity preparedness and contact tracing across the U.S. swine industry, available 24/7.



Our solutions to the problem(s)

RABapp™ in numbers

1. Total number of participating companies (large), mid-size and clinics= 52.
2. Departments of Agriculture (SAHOs) = 15.



RABapp™ SPS plan SAHO approval

- SAHO can approve SPS plans directly in RABapp™.
- Comments are required for sections not approved.
- The farm map views are available alongside the written part of the plan.

RABapp™ Transmission models

Transmission model for ASF and Porcine reproductive and respiratory syndrome virus (PRRSV)

- ASF
  - View transmission risk for farms within a given outbreak duration.
  - Download tables showing risk proportions over time in simulated outbreak.
- PRRSV
  - View detailed reports of outbreaks.
  - Forecast risk of farm re-infection.

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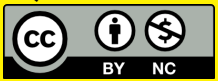
1. RABapp™ hub, host, validate and audit on-farm biosecurity (swine, cattle, and poultry).
2. Swine ear tag may be used to monitor the transmission of endemic and foreign diseases remotely.
3. Mathematical model at farm, barn, pen, and animal level be used to make decisions daily at the desired level.

Thanks for listening

Questions?