INTERSECTIONS OF ENVIRONMENTAL MANAGEMENT AND BIOSECURITY IN ANIMAL AGRICULTURE

SCOTT MERRILL, GABRIELA BUCINI, ERIC CLARK, DEANNA SELLSNOW, TIM SELLSNOW AND JULIE SMITH

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Road map:

- Gabriela Bucini: disease spread simulation with Agent Based model (ABM)
- Scott Merrill: serious games and decision-making
- Eric Clark: data collection, human risk attitude clusters and merging into ABM

The archived presentation is available at: https://articles.extension.org/pages/21819/chronological-webcast-archive
The goal of the project is to facilitate the development and adoption of practices and policies that collectively reduce the impact of new, emerging and foreign diseases of food producing animals in the United States.

What affects disease spread?

What else?

How to account for human behavior?
Overarching question:

How does human risk attitude affect the adoption and compliance of biosecurity?

Agent Based Model (ABM)

1. Swine Production System with Transportation Networks: Hogs and Feed
2. Disease Spread: Porcine Epidemic Diarrhea virus (PEDv)
3. Biosecurity based on human risk attitudes

Purpose of the simulation model

- To visualize the dynamics of disease spread
- To understand how human decisions affects the transmission of disease

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Hog facility/producer:
- Grow and exchange hogs
- Facility type (inner circle color)

Slaughter plant:
- Receive market-weight hogs from finishing producers

Feed mill:
- Deliver feed to producers

(Bucini et al., 2017; Wiltshire et al., under review)

Farm-to-Farm networks
Feed Mill networks
Slaughter Plant networks

Disease spreads on networks
Agents connected via networks of animal movement or feed delivery.

SIS model

Recovery time

Infection probability

$p(\text{interaction, biosecurity})$
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Applications

- “What if...” scenarios testing
- Interactive tool to understand dynamics of human behavior, biosecurity and disease control.

Reflection

- We want to make the simulation model as realistic as possible by using collected human decision data.
- How can we collect human decisions?