Swine Biosecurity Practices

3rd International Biosafety & Biocontainment Symposium: Bio-risk Management in a One Health World

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Outline of presentation

• Introduction

• Understanding how pathogens enter swine farms

• Tools available to assess risk and improve biosecurity
  – Production Animal Disease Risk Assessment Program (PADRAP)
  – PRRS Outbreak Investigation Program
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For swine focus is on bio-exclusion

• Biggest concern is with keeping pathogens out of a herd
• Pathogens that
  – Difficult to control
  – Can be eliminated from a herd
  – For which there is poor heterologous protection when new isolates are introduced

• Porcine reproductive and respiratory syndrome virus (PRRSV)
• Porcine epidemic diarrhea virus (PEDV)
• Transmissible gastroenteritis (TGE)
• Swine influenza virus (SIV)
• Mycoplasma hyopnuemoniae
Prior to introduction of PEDV in the U.S. in 2013, nearly all bio-exclusion practices were done for the sake of PRRSV

- PRRS is most costly disease ($664 million/year in U.S.)
  - Causes productivity losses in all ages of pigs
- Virus has incredible survival strategies
  - Many isolates with relatively little and unpredictable heterologous protection between isolates
  - Long period of infection and shedding
- Can be eliminated from individual herds
- Control is possible but challenging and requires bio-exclusion of new isolates
Biocontainment

- Generally an afterthought – unwilling to spend resources to benefit neighbors
- Gets some attention in large production systems
- Regional PRRSV / PEDV projects
  - Producers in a geographic area agree to share information on status and outbreaks
  - Producers in some projects are agreeing to adopt practices to reduce spread of virus
    - Vaccination of growing pigs
    - Coordinated weaned pig placement
    - Biosecurity
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Basis for thinking about bio-exclusion: Understanding how pathogens enter swine farms

- Swine pathogens are not capable of locomotion
- Must be carried by something else
- That something else may be described as a “carrying agent”

Examples of carrying agents:
- Replacement gilts
- Semen
- Trucks
- People
- Feed
- Air
Introduction of pathogens into a herd is the result of a series of “events” and “failures”

Carrying agent enters farm?

- No
  - No Risk
- Yes

Carrying agent is contaminated w/infectious pathogen?

- No
  - No Risk
- Yes

Pathogen gets from carrying agent to pigs in herd?

- No
  - No Risk
- Yes

Herd is infected
Effective biosecurity must do one or more of the following:

1. Reduce frequency of exposures
   - ie. reduce how often a carrying agent come into close proximity to the herd

2. Reduce probability that carrying agent is infected or contaminated

3. Reduce probability that pathogen is transmitted from infected or contaminated carrying agent to pigs in herd
Examples of bio-exclusion practices on swine farms to reduce frequency of exposures:

- Capital investments to reduce frequency with which carrying agents enter farm - On-farm disposal of dead animals (e.g. composting, incineration)
- Impose restrictions – Only essential personnel allowed to enter farm
Examples of bio-exclusion practices on swine farms to reduce probability that carrying agent is infected or contaminated

- Reduce exposure - Trailers that haul replacement gilts is dedicated to the farm or prohibited from hauling positive animals
- Decontaminate – Wash, disinfect and dry livestock trailers between every load
- Test – Test semen or boars at boar stud for presence of pathogens
Examples of bio-exclusion practices on swine farms to reduce probability that pathogen is transmitted to pigs in herd

- Create zones and clean-dirty lines / barriers – Install perimeter fence
- Manage flow of people and vehicles – Dead disposal is located away from buildings with separate drive for rendering truck
- Scheduling – Last activity of the day is move dead pigs to disposal area and check feed bins
BUT... risk assessment on swine farms can quickly get overwhelming for producers. “Page-after-page” of protocols doesn’t work!

Need tools to assess risks and implement biosecurity that is tailored for farms or production systems.
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Production Animal Disease Risk Assessment Program (PADRAP) is a program through which a set of disease risk assessment surveys are delivered.

PADRAP is owned by The American Association of Swine Veterinarians (AASV) and is used by veterinarians who are members.

www.padrap.org
Enables benchmarking of disease risks

- Example of reports

“Individual Risk Factor” report
Enables benchmarking of disease risks

*Example of reports*

“Risk Quadrant” report
Collaborative effort

- American Association of Swine Veterinarians (AASV)
- Iowa State University (ISU) providing program coordination and web hosting
  - Director: Derald Holtkamp
  - Associate Director: Chris Mowrer

- Financial support
  - National Pork Board (NPB)
  - Boehringer Ingelheim Vetmedica Inc. (BIVI)
  - Harrisvaccines
  - National Pork Producers Council (NPPC)
  - Newport Laboratories
Training sessions conducted

- **355:** Veterinarians trained
  - 61 training sessions (31 online; 30 face-to-face) conducted in the U.S., Canada, Mexico, Serbia and online
  - Used primarily by veterinarians in the U.S, Mexico and Canada
  - Veterinarians from Australia, Bermuda, Columbia, Chile, Germany, Italy, Japan, Netherlands, Philippines, Serbia, South Korea and UK have also been trained
  - Train-the-trainer program
    - Has worked well for delivering training sessions in non-English speaking countries
There are currently two assessments available through PADRAP

1. PRRS Risk Assessment for the Breeding Herd
2. PRRS Risk Assessment for the Growing Pig Herd

The program was built to accommodate the inclusion of risk assessments for other diseases in the future.
Examples of how veterinarians use PADRAP to help producers systematically assess disease risk factors and biosecurity gaps

- **Create awareness** about biosecurity gaps and motivate producers to improve
  - Risk **benchmarking** reports can be a powerful motivators
  - Identify opportunities to plug gaps in biosecurity

- **What-if analysis** can be done by completing actual and hypothetical assessments of the same site
  - To assess or demonstrate the impact of changes in biosecurity practices or other risk factors
PRRS Risk Assessment for the Breeding Herd

- Database of PRRS Risk Assessment for the Breeding Herd (version 2) continues to grow
  - 3,509: Breeding Herd assessments completed and submitted to the database (as of February 2014)
  - 1,734: Sites assessed (as of February 2014)
PRRS Risk Assessment for the Growing Pig Herd

- Currently have
  - **1,018**: Grow-Finish assessments completed and submitted to the database (as of February 2013)
  - **881**: Sites assessed (as of February 2014)
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Start thinking about every outbreak as an opportunity to observe, learn and improve

- **Outbreak investigations** are a way to exploit the opportunity
  - Identify gaps and opportunity to improve biosecurity
  - Attempt to identify the source of the virus and how it may have infected the herd

“Never let a good crisis go to waste”

— Winston Churchill
The most meaningful learning often occurs by those in the field

- Producers and veterinarians who are prepared to observe and record information

More rapidly “learn from our mistakes”
Objective

- Develop **PRRS Outbreak Investigations Program** for breeding herds to reduce the frequency of outbreaks in breeding herds
  - Help veterinarians perform outbreak investigations
    - Most veterinarians recognize the value of investigations
    - Often don’t get done due to lack of time
    - An “Outbreak Investigations Coordinator” will do the time-consuming data collection and summary tasks for the veterinarian

_Funded by Iowa Pork Producers Association (IPPA) with Checkoff_$
Procedures

• Gather historical “pre-outbreak” data
  – Production records
  – Diagnostics and PRRSV status history for the breeding herd
  – History of PRRS outbreaks and virus elimination projects
  – Historical use of bio-management practices e.g. use of vaccine or live virus inoculation
  – PRRS Risk Assessment surveys (PADRAP)

• Great summer intern project for students!
PRRS Outbreak Investigation Form

• What we already have
  – Historical pre-outbreak data collected in the summer
• “Scramble data”
  – Description of current outbreak
  – PRRSV status and sequences of PRRSV isolates from other herds in the region
  – Weather data
PRRS Outbreak Investigations Summary

• Summary of findings

Outbreak Investigations Summary is designed to be a report on the investigation that the herd veterinarian can provide to the producer.
Outbreak investigations database

- Populated with information collected on the Outbreak Investigations Form and Outbreak Investigations Summary
- Maintained by coordinator and housed at ISU CVM
Pilot project

• Sites enrolled for the pilot
  – 10 sites in Buchanan County project
  – 2 other sites just outside Buchanan County project
  – 6 in the SE IA project
  – ~10 sites in sites in SW IA project

• Outbreak investigation coordinator position
  – Performed by a research associate at ISU CVM
    (Chris Mowrer)
Summary of PRRS Outbreak Investigations Program

• Best approach we have to answer the question: Which carrying agents are most frequently causing outbreaks?

• Start thinking about every outbreak as an opportunity to **observe, learn and improve biosecurity**

• Recognize that producers and your veterinarians are best positioned to make observations

• Learn from our mistakes faster
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Questions

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