PRRS Update: The Future of Control and Elimination - Advances in our knowledge

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The U.S. Obstacle to greater Reproductive Efficiency, Profitability, and Global Competitiveness

PRRS..... $680 million and counting
Talk Focus

• Brief review of advancing knowledge
  – Recently developed tools
  – Elimination methods
  – Transport biosecurity
  – New monitoring tools
The U.S. PRRS Road Map?
Recent advancements

• Elimination Strategies
• Importance of transport in PRRS spread
• Direct and indirect pig contact spread
• Understanding aerosols - Filtration strategies
• More vaccines and more effective usage
• Pig Genetic Resistance genes discovered
• PADRAP Risk Assessment Tool
Recent advancements

• Better tests and testing capabilities
• Developing regional elimination and control strategies
• Virus tracking – epidemiology
• New Economic evaluation of PRRS costs
• Advances in understanding PRRS immunity
• Advances in understanding virus manipulation of the immune response
So Where Does This Lead Us?

• “Two Steps forward then one back”
  – Producer interest and engagement growing
  – Many regional elimination efforts have started
  – Bioexclusion efforts continue to improve
  – Biocontainment efforts still lacking
  – Biomanagement – vaccines/LVI strategies evolving but still lack broad cross protection
NEW TOOLS & Information

• Cotton Rope as a surveillance Method
• PADRAP – the gold standard in risk assessment
• Airborne movement is not everywhere
• Filtration of boar studs – absolutely
• In previously infected pigs the virus may move slowly
• Producers are willing to work together and share information
NEW TOOLS & Information

• Farm closure in an outbreak reduces losses
• Transport innovations – trailer designs
• Place PRRS negative pigs in negative areas?
• PRRS vaccines are helpful in negative pigs in harms way – timing dependent
• Lot of testimonials on killed vaccine use in sows
• Sequencing and mapping have finally become useful tools in tracking viruses
Development of Successful Methods of Elimination

- Depopulation – Repopulation ($200/sow place)
- Herd Closure followed by negative gilt introduction – Rollover ($50-$80/sow place)
- Mass vaccination followed by herd Closure then negative gilts – Modified Rollover ($60 - $100/sow place)
Development of Successful Methods of Elimination

• Homologous Serum inoculation (LVI) followed by herd closure- modified rollover ($50/sow place)

• Introduction of negative gilts only with batch farrowing (small herds/quarterly introductions)

• Parity segregation – Farm switching with Negative gilts ($???)

• Any method that follows a 200 day or greater closure rule + negative gilts and semen (boars)
Successful Methods of Elimination

• For all farm elimination plans – the “Devil is in the Details”

• Biosecurity is a key part of every plan
  – PADRAP Risk Assessment

• Planning timelines for essential steps and adhering to the plan is critical

• Monitoring status and progress through testing

• Rapid response to adverse situations when they arise
Pig Transport Biosecurity

• Historically, transport was often incriminated in the spread of infectious disease
  – PRRS virus
  – Porcine circovirus
  – Transmissible Gastroenteritis Virus (TGE)
  – *Salmonella* and *E. coli*
  – *Mycoplasma*
  – *Streptococcus suis* and *Haemophilus parasuis*
  – Foreign Animal Diseases – FMD, CSF, ASF, others
Pig Transport Biosecurity

• Next to the pig – transportation operations have always been the greatest risk for disease agent dissemination and new disease introduction in the pig industry!
Pig Transport Biosecurity

• Over the past decade there has been significant advances in transport biosecurity
  – Real world disinfectant studies
  – Trailer drying and superheating facilities
  – New Biosecure trailer designs
  – Strategic dispatching and routing management
  – Positive and negative haul fleets
  – Driver Protocol development and planning
  – Route monitoring with GPS technology
  – Truck wash management, inspection, monitoring
Pig Transport Biosecurity

• Any disease - apparent or not will be shed by the last pigs hauled on a trailer becoming the immediate disease risk to the next pigs hauled.

• We once thought a clean trailer was adequate but no longer!

• Transport disease exposure can nullify all the good work done to eliminate pig risks.
How do we make swine transport Biosecure?

• Some thoughts to consider:
  – Transport is the most controllable risk after semen and genetic replacement health is assured
  – Is your truck wash eliminating risk or disseminating disease?
  – Is dispatching a biosecurity nightmare?
PIC TADD trailer dryer
Transport – Heat Treatment
“Trailer Baker”

4.5 million BTU heater heats two bays at the same time
This is the readout on the Trailer Baker which reads temp at 8 locations on the trailer. All reach 165 then the 10 minute count begins.
Flexible duct used with the trailer baker. This is inside the bay.
The AP Bio-Dry
Truck and trailer are heated to 135 to 150 for 10 minutes or 120 for 20 minutes

Heating unit
AP Bio-Dry Readout – this relies on a single in trailer thermocouple to read temps.
AP movable heat ducts
Making Transport Biosecure

• Drivers should be trained to recognize biosecurity risks and have clear, concise standard protocols to follow
• Protocols must be adhered without deviation
• Procedures must be science based from “in the field” applications
• All potential cross or recontamination events must be identified and continuously avoided and accounted for
• System transportation routes should be “least risk” and monitored
Making Transport Biosecure

• What must be done:
  – Must keep accurate records
  – GPS verification of transport routes
  – Monitoring and verification of transport operations and dispatching
  – Monitoring and verification of truck wash facilities and procedures
  – Truck wash certification program needed
Biosecurity is effective against PRRS!
Making Transport Biosecure

- Scrape out and flush – a biosecurity danger zone
  - No recycle water unless it has gone through a purification process
  - Unidirectional movement of trucks, trailers, and personnel
  - Drivers must follow procedures which prevent recontamination of the trailer or tractor including the cab
  - Clean and dirty areas designated for drivers and truck wash personnel – they must remain separated
Making Transport Biosecure

• Truck and trailer sanitization facility
  – Ideally the wash and disinfection area will be separate from the scrap and flush area
  – The wash area should be cleaned between each tractor and trailer
  – All organic matter must be removed before disinfection or it will not be effective
  – Hot water is essential for proper cleaning
  – The tractor and trailer must be washed both inside and outside and inspected before disinfection.
Making Transport Biosecure

• Truck and trailer sanitization facility
  – Considerable thought and planning should go into the wash facility.
    • Clean and dirty zones
    • Driver and wash personnel should be completely separated
    • Drainage issues and slope are critical
    • Tractor and trailer drying before entering the clean zone
Making Transport Biosecure

• Truck wash facility
  – Many disinfectants are broadly effective against most swine pathogens if the temperature, contact time, and concentration is adequate
  – Antifreeze may be used with some disinfectants during sub-freezing weather
  – Acid washes aid in bio-film removal
  – Heat and drying are significant final steps in the sanitizing process
  – Recontamination risk is always present around the truck wash and must be addressed
Transport sanitization summary

1. Truck wash personnel, and drivers must be held accountable for deviations in standard operation procedures
2. Remove all bedding and visible organic matter during the scrape and flush step
3. Wash with hot water and detergent
4. Disinfect with a field proven disinfectant
5. Inspect
6. Repeat the wash and disinfection process if necessary
7. Dry or superheat
8. Monitor the process
Biosecurity and the transport driver

- The driver can be a significant cross or re-contamination risk
  - Tractor cabs should always be cleaned, disinfected, and dried before the next haul
  - Drivers should carry clean clothing and boots for each stop including the truck wash.
Biosecurity and the transport driver

– Drivers should not drive the tractor through the steps of the wash.

– Ideally the driver will not re-enter the cab until he or she has showered and changed clothing (over night) and after the rig has been moved to the wash clean zone.

– When delivering pigs the driver should put on clean outer ware and boots as he exits the cab.

– Once loaded or unloaded the outer ware and boots should not be placed in the truck cab.
Biosecurity and the transport driver

• Drivers should receive biosecurity training and regular refresher training
  – Drivers must be responsible and held accountable for biosecurity processes
  – Farm personnel should be empowered to reject and turn a driver and rig away if protocols are not followed or the trailer is not spotless.
  – Drivers must be empowered to demand a re-wash if the tractor or trailer is not satisfactorily cleaned and sanitized.
Oral Fluids – New PRRS Diagnostic Tool
Iowa State University Vet Dx Lab

- 11,000 OF samples tested in 2010
- 32,517 in 2011
- >52,000 in 2012

Jeff Zimmerman
Iowa State University

Oral Fluid Diagnostics
Caution: The PRRS X3 oral fluid antibody assay may detect antibodies against PRRSV in samples collected from pigs consuming diets containing spray-dried plasma of porcine origin.

Dr. JK Johnson
Iowa State University
Mucin

1. Present in oral fluid (all species)
2. Aggregation is time-dependent.
   - Explains why PCR/sequence success by time?
3. Mucin binds and/or inactivates pathogens
   - HIV, rotavirus, influenza virus, norovirus, coronavirus, mycoplasma, bacteria
4. Antibody is associated with mucin aggregates, but easily passes through.

5. Treatments to reverse mucin aggregation?
What will it take to Eliminate PRRS?

• We are nearing the time where eradication is feasible – *We need more science/solutions for area and long distance spread*

• A technological “silver bullet” may be in the future but unlikely within the next 10 years

• A “genetic fix” will be available over the next 5 years which should reduce Area Spread and significantly assist in elimination

• It will take unprecedented coorporation by producers of all shapes and sizes to put PRRS behind us
Thank You For the Invitation