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Outbreak investigation in a breeding stock company

Jerome O. Geiger, DVM, MS; Mark J. Engle, DVM, MS; Robert W. Thompson, DVM, MS; Tom Riek, DVM

PIC Health/Transportation Team, Hendersonville, Tennessee

Introduction

Traditionally, the response of a breeding stock company in the face of a disease outbreak was different from that of a commercial production system. This was (and in some cases may still be) appropriate inasmuch as success and failure were measured differently between the two business entities. Historically, a breeding stock company would influence larger populations across multiple ownerships, thus the risks associated with disease and the spread of disease were magnified across genetic pyramids. With consolidation, internal multiplication and regional disease elimination projects, that distinction has blurred in many cases. Hence, the primary role for many veterinarians in modern swine production is to prevent the introduction of new pathogens to a swine population. With these points in mind, it becomes increasingly important that aggressive, focused protocols for health-related investigations (traditionally associated with breeding stock companies) be applied across the industry.

Investigation triggers

A wide variety of factors may initiate a health-related investigation, independently or in concert with others. Circumstances must always be considered, thus a thorough knowledge of the production system in question and its history is necessary. Changes in management, nutrition, flow or environment are definitely considerations. In the case of serologic or molecular testing evidence, false positives do exist and must be considered. In short, knowledge of all confounding factors and understanding of the evidence at hand are essential. Experience has taught it is best to be conservative – "when in doubt, shut down the movement."

A health-related investigation is initiated any time a legitimate concern exists there has been a change in health status in a site, system or flow. Evidence of the status change may be subjective (e.g. observation of coughing pigs) or objective (e.g. increased morbidity/mortality). The following is a list of factors (not necessarily all-inclusive) that could initiate a health-related investigation within a breeding stock company.

- Clinical observation by farm staff, production supervisors, veterinarians or transport personnel.
- Laboratory evidence (serologic, molecular, culture, histopath or others).
- Necropsy information with or without laboratory confirmation.
- Real-time production performance (SPC charts, syndromic evidence).
- Slaughter check information.
- Feedback from customers.
- Evidence of a biosecurity breach.

Initial response to the evidence

Once sufficient evidence has been assembled and verified to suspect a change in health status, the breeding stock veterinarian has two immediate and concurrent responsibilities:

- To prevent the spread of the pathogen within in the breeding stock company or downstream to customers.
- To substantiate or refute the pathogen's introduction.

The population in question should be segregated from the remainder of the flow or other flows to the greatest extent possible. Biosecurity practices to prevent the spread of the pathogen should be initiated. When possible, pig and people flows should be altered. Transportation of pigs, feed and materials (e.g. semen) should change. In some cases, transportation routes might be altered. Transportation equipment might be segregated or re-allocated. Communication to all aspects of production is very important – keep the feed mill, truck wash and maintenance personnel appraised of changes in biosecurity rules, even if temporary.

As early as possible, an accurate and reliable diagnosis is needed. Additional samples may be necessary and prompt turn-around is vital. Coordination with a reputable accredited diagnostic lab will expedite the process.

Laboratory personnel can provide valuable guidance to sample selection and preparation.

Outbreak investigation

If a change of health status is confirmed, changes in production flows and biosecurity may need to become permanent, at least as long as risk of pathogen spread exists. It will also be necessary to investigate/determine the source and route of pathogen entry to prevent further exposure. Below is an investigation guide. While the items have been prioritized, it is important to realize several aspects should likely be running concurrently.

1. Isolate, identify and "fingerprint" the pathogen. Using tissue submissions, swabs or other appropriate samples, isolate the specific pathogen and determine its exact identity as closely as possible. Determine the pathogen's genetic sequence whenever possible. Start this process early because it requires time and the data will be needed as additional information is available.
2. Identify the geographic point of entry to the best of your ability.
   a. Attempt to identify the location of the very first clinical cases based on individuals, rooms, or buildings and their proximities to doors, fans, feedlines, water sources, etc.
   b. PCR results from various locations within a room or building will be helpful, in support of clinical observations. Oral fluid PCRs may afford easy and rapid data collection.
3. In conjunction with 2., construct a timeline to estimate the date of entry/exposure.
4. Reconcile inventory numbers. As soon as possible, determine if current inventory has too many or too few animals based on transfer sheets, transport records and dead counts.
5. Gather historic meteorologic data focused on the timeline in 3.
6. Consider swabs/cultures of transport vehicles and truck wash facilities to determine possible involvement. Early collection of these samples will be critical.
7. Closely examine the production flow both upstream and downstream as well as related herds or sites. Consider the relevance of any farm, site or situation showing similar signs in a similar timeframe. Gather and review pertinent diagnostic work.
8. As early as possible, update information on the locations of all swine populations within 10km for additions or introductions. Gather as much detail as possible about these populations, regarding size, health status, sources, flows, current clinical signs, transport, etc.
9. Interview farm staff to identify biosecurity risks.
   a. Review downtime practices.
   b. Consider living arrangements, exposure to pigs or livestock outside of the farm.
   c. Is the staff aware of biosecurity problems, flaws or mistakes? Example: unlocked doors or failure to follow shower-in protocols.
10. Gather and review all documentation regarding biosecurity, feed or animal deliveries or removals.
    a. Visitor logs
    b. Transport driver logs, trailer wash records (location, personnel, timing, etc.)
    c. Repair work and associated personnel (previous work, location, timing).
    d. Animal transfers
       i. Market loads
       ii. Cull loads
       iii. Replacements
       iv. Dead removal
    e. Feed deliveries. Do feed drivers enter the buildings or make human or swine contact with the farm in any way?
    f. Material entry. Semen, office supplies, medications, repair parts.
11. Gather and review all related production and veterinary reports within two months of suspected date of exposure (3.). Are there details or new evidence that influence the timeline?
12. Review all biosecurity protocols, looking for flaws or opportunities for pathogen entry. Consider:
    a. Downtimes
    b. Personnel's outside exposure to livestock
    c. Shower-in/shower-out procedures
    d. Dead removal
    e. Material entry procedures
    f. Transport
       i. Washing locations and protocols
       ii. Load-out procedures