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State-wide eradication: How we did it

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Introduction

The successful eradication of pseudorabies (PR) from the North Carolina swine population was the result of good organization, planning, and implementation. Attacking this problem was no different than attacking any problem we face in our businesses today. We plan, do, check, and act (Shewhart Cycle). In the case of pseudorabies eradication most of the tools and technical skills were already proven and our challenge was to organize and implement necessary practices.

From a 'big picture' standpoint the road to success in the effort to eradicate pseudorabies in North Carolina was as follows:

- recognize and identify the problem
- develop a team
- develop a strategy/plan
- implement the plan
- develop individual herd clean-up plans with time tables

Recognizing and identifying the problem

The decade of the 1990s was one in which the swine population in North Carolina grew at an unprecedented rate. Contract production was already a popular concept in the poultry industry in North Carolina, so the adaptation of this business structure to the swine industry was relatively easy. Several companies in southeast North Carolina had the same vision: own the animal, provide the production expertise, feed, medication, transportation, etc., and join in a partnership with individual producers to provide the facilities and labor. As a result, the sow base in North Carolina grew from 362,000 in 1990 to 1,080,500 in 1998. This production was concentrated in a few counties in southeast North Carolina, with Sampson and Duplin counties forming the epicenter.

As in other areas of the country where swine have been concentrated, pseudorabies (PR) developed a stronghold in southeast North Carolina. The North Carolina Department of Agriculture and swine producers acknowledged the pseudorabies problem in the early 1990s and devel-

oped plans to eradicate the disease as was the case in all other heavily infected states. Vaccine was used widely and with implementation of a good vaccination program the pseudorabies virus was being eliminated even from the large 2,000–5,000 sow herds using the test and removal method of eradication. Vaccine also was used extensively in finishing pigs in high risk areas. By vaccinating these finishing pigs, the risk of reinfesting sow farms from finishing sites in close proximity was minimized. However, when the number of quarantined herds declined and the market crashed in the latter part of 1994, the number of finishing pigs that were vaccinated also declined. In 1995 and 1996 the eradication program in North Carolina was at a standstill.

By the mid-1990s several producers in North Carolina had developed more global production systems. These producers either owned or contracted nursery and finishing capacity in other states, particularly the upper midwest. States that had made good progress in eradicating pseudorabies were rattling their swords, increasing quarantines and suggesting that they might ban the importation of pigs from states with high incidences of infection. Of course, any disruption in pig flow to out-of-state facilities would have had a huge negative impact on the business structure of many North Carolina producers. The threat of not being able to move pigs interstate suddenly brought the problem into focus. The problem was identified!

Developing a team

There were two key events that occurred in 1997 that changed the course of the pseudorabies eradication program in North Carolina. The first of these events was the development of the PRV Advisory Committee. A small group of producers, recognizing the economic impact that a failing effort to eradicate pseudorabies would have, asked the Commissioner of Agriculture to appoint a Pseudorabies Advisory Committee. This committee in turn appointed a Pseudorabies Technical subcommittee that advised the primary committee on various technical issues of the disease, vaccination programs, vaccines, etc. The Pseudorabies Advisory Committee acted only in an advisory capacity to the North Carolina Department of

Agriculture but, because it was composed of producers, it had the power of peer pressure.

The second significant event was an LCI Pseudorabies Summit in North Carolina in July 1997. Several individuals on the National Pseudorabies Control Board, USDA APHIS Swine Diseases staff, LCI Pseudorabies Committee, and the USAHA Pseudorabies Committee were concerned about the lack of progress North Carolina was reporting. The number of quarantined herds was increasing rather than decreasing. Several individuals deserve credit for promoting this idea of a summit, including Jim Leafstedt, Chairman of LCI Pseudorabies Committee; Phil Bradshaw, Chairman of the National Pseudorabies Board; and Dr. Arnold Taft, Coordinator of the Pseudorabies Eradication Program for the USDA APHIS.

The LCI Pseudorabies Summit brought focus and a sense of urgency to the problem and, most important, resulted in the 100% commitment of the North Carolina pork producers to eradicate pseudorabies from North Carolina as prescribed in the National Pseudorabies Eradication Program. This commitment transcended everyone involved in the eradication project:

- North Carolina Department of Agriculture,
- USDA APHIS,
- pork producers,
- company management and owners,
- private and corporate veterinarians and their staff,
- production and service personnel, and
- diagnostic laboratory management and staff.

Developing a strategy

The strategy for eradication was simple, implementation was expensive and laborious.

The Strategy

Stop the spread of PRV

Identify all positive farms

Remove positive animals as quickly and as cost efficiently as possible

Rigorous surveillance to find any new infections and create confidence of the success

Implementation

Stop the spread of PRV—eliminate the susceptible population!

Vaccination

(all at producers expense)

- sow herds
 - negative: 2 times per year
 - positive: 4 time per year
 - gilts: 2–4 doses before entering breeding herd
- finishing
 - pigs from positive sow farms vaccinated
 - all pigs in three high prevalence counties—Lenior, Sampson, and Duplin—vaccinated (vaccination started in April 1997 and continues in Duplin and Sampson counties until the last sow farm quarantine is released)
 - double vaccinated finishers in areas of active infection
- employee and grower training
 - vaccine storage and handling
 - vaccine mixing
 - vaccination equipment—needle size (gauge and length), syringe calibration, and equipment cleaning
 - vaccination timing
 - vaccination site

Biosecurity

- pig flows—keep positive and negative separate
- inspection of trucks by North Carolina Department of Agriculture and corporate veterinarians
- truck washing and disinfecting
- people—cleaning between sites, no visitors
- rodent and bird control
- site selection of multiplier farms and boar studs

Identifying positive farms

- sow farms
 - high risks areas two times per year
 - all farms one time per year
- finishers
 - all facilities once per year
- circle testing
 - all sow farms and finishers within a 1–1/2 mile radius

Diagnostic support is critical to this aspect of the eradication program. The diagnostic serology tests available to our industry are some of the most sensitive and specific

tests in veterinary diagnostic medicine. The Rollins Veterinary Diagnostic Laboratory gave tremendous support by providing not only accurate but timely results. When a positive herd was identified, all farms within a two mile radius were notified by fax so that herds could be booster vaccinated if needed and circle testing could commence immediately.

Herd clean-up plans

Each herd veterinarian working with the North Carolina Department of Agriculture team developed a herd clean-up plan with a timetable for each pseudorabies-positive sow herd. The progress of each plan and its adherence to the timeline was reviewed at each monthly Pseudorabies Advisory Committee meeting.

What are the essential components of an effective pseudorabies herd clean-up plan? In our experience:

- commitment
- accurate data
- testing plan
- aggressive immunization
- removal of positive animals
- monitoring success (surveillance)

Commitment

Commitment on the part of all team members is essential. Often the commitment of producers is questioned, but I have found little reluctance on the part of producers to participate actively when a good plan is developed and the other team members are enthusiastic and positive about the program. In North Carolina, rules and regulations to levy civil penalties and require producers to come to Raleigh to obtain permits to move all type of swine from their farms were available to regulatory officials but rarely was there a need to exercise such power. Obviously some producers are more proactive than others, but in the end swine producers are law-abiding citizens and realize the advantages of eliminating a costly disease from the industry.

Accurate data

The need for accurate herd data is self-evident. Individual animal identification of each breeding animal is essential. The need for this accurate data is accentuated in large herds. We quickly realized in North Carolina that the first component of herd clean-up plan needs to be a herd census. In addition, it is essential to identify positive animals so that they could be culled at the appropriate time in their production cycle. To verify the accuracy of the culling process, we often bled animals at the time of culling to be sure the right (positive) animals were culled.

In a multiple herd system with thousands of sows—as in the case of my employer, Murphy Family Farms—were needed to also have a system to manage the voluminous amounts of data that were created in a disease eradication program. A database was developed in 1995 that was expanded as the need for different types of information grew. The database contained the following basic information:

- state QBSP number
- farm name
- PRV status (+ or -)
- quarantine status
- quarantine date
- vaccine permission
- vaccine type
- capacity (sow, nursery, finisher)

This database became the instrument for managing our pseudorabies eradication program. The QBSP number is a global positioning-derived number identifying the exact location of a farm. Each swine farm, regardless of size, in North Carolina is given a QBSP number by the North Carolina Department of Agriculture. This number was the primary identifier in the database.

The Murphy Family Farms database provided the following:

- notification of next test date
- identification of premises in positive blocks or counties requiring vaccination
- circle testing—identify herds in a 1–1/2 mile radius and notify for bleeding
- vaccination notification—computer-generated list of sow farms and finishers that needed vaccinated each month
- vaccine usage and reporting
- diagnostic test results
- cull lists of pseudorabies positive sows and boars
- whole company finishing floor bleeds—location, age, + or -, etc.

The North Carolina Department of Agriculture has a state-of-the-art mapping package based on the QBSP numbering system. Large maps of the pseudorabies high prevalence areas were produced and provided for those working with the eradication program. Each farm was identified on the map. Using symbols, farms were identified by type of farm (sow, nursery, or finisher), ownership, and pseudorabies status. These maps and the database used to generate them were extremely valuable. If a herd was

identified as positive we could immediately identify farms in close proximity so that herds could be bled and booster vaccinated quickly. This real-time data capability allowed the sense of urgency to become reality by immediate action.

Testing and removal

Owing to the cost of the method, very few herds were depopulated and repopulated to clean-up pseudorabies. Instead, test and removal following an aggressive vaccination program prevailed. Prevalence rates within herds ranged from 10% to greater than 70%. In many positive herds breed groups were tested 2–3 weeks prior to farrowing. Positive sows were identified and culled post-weaning. One disadvantage of this program is that it caused producers to increase the flow of gilts into their farm often without adequate time for acclimatization. This precipitated flare-ups of PRRS in some herds. Herds that were cleaned up in 1998—and thus had a short window to complete the clean-up process—had to employ off-site gilt breeding projects so that bred gilts could be plugged into bred groups in which large numbers of pseudorabies-positive sows had to be culled. Some producers also chose to identify a sow farm as a “pseudorabies-positive farrowing facility” and move all their positive sows off other farms to this one site. This procedure was quite effective in speeding up the clean-up time of several farms. The removal of all the positive sows on these farms usually stopped all viral shedding.

Vaccination

The value of vaccination has been discussed elsewhere in this paper. However, the importance of mass vaccination of pigs in an endemic area cannot be stressed enough. The purpose of this vaccination program is to remove or reduce the susceptible population of finishing pigs so that a cloud of virus is not created, the result of which would be the infection of sow farms in the area. The cost of vaccinating finishing pigs for a defined period of time is

insignificant when compared to the cost of depopulating and repopulating a sow farm.

In my opinion, all producers with sow farms who by law are allowed to vaccinate for pseudorabies should do so. As the time clock on eradication winds down, the options for a positive sow herd—regardless of when it became infected—will narrow. Likely, such sow farms will be forced to depopulate with or without government financial assistance.

Vaccination does not absolutely prevent infection but a well vaccinated pig is not as likely to become infected. If a vaccinated pig or sow does become infected the length of viral shedding and the amount of virus shed is drastically reduced, thus preventing a widespread herd infection. Vaccinate! Vaccinate!! Vaccinate!!!

Surveillance

Once pseudorabies is eliminated from a population the job is half done. The amount of serology necessary for effective surveillance during the first couple of years after eradication will likely exceed the amount done during the eradication phase. Surveillance plans must identify infections rapidly to prevent spread. As states move to Stage IV the use of vaccine is prohibited, so populations of swine will be very susceptible. Therefore, surveillance testing will need to be completed at shorter intervals. We will likely have a challenge to keep adequate federal and state funding for pseudorabies once the disease is eradicated. I would predict that much of the on-farm surveillance testing will be at the producer's expense. Therefore surveillance testing will be done at concentration points or slaughter.

