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# The application of biosecurity protocols in large production systems: Experiences from the field

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Disease

## Industry perspective

Our production systems have evolved to include large populations and have subsequently benefited from specialization and economies of scale; however, there has been a concurrent general loss of realizable health. Porcine reproductive and respiratory syndrome virus (PRRSV) is often considered largely responsible, but the dynamic ecological relationship between large populations of susceptible animals and numerous potential pathogens make the situation more complicated than this single virus-host relationship. The need for effective disease control strategies has never been greater. Functional biosecurity along with health pyramid development are the essential components needed to restore healthy and stable production systems. As North American pig production evolves into a global meat supplier, maintaining a competitive advantage will require strategies that eliminate and prevent disease and fulfill the marketing advantage offered by antimicrobial-free production.

## Development and potential of biosecurity

In the past biosecurity rules were developed by industry icons like Al Leman, Tom Alexander, Hank Harris, and many others. Although their ideas were steeped in common sense, these leaders had little scientific data to support or repudiate their principles. Over the years this situation has changed dramatically. PRRS, with its $500 million to one billion dollar annual price tag, has been the driver of biosecurity research more than other health threats. The University of Minnesota and Purdue University have taken a leadership role in this endeavor. Continued research is needed. But research alone will not suffice; our industry must find effective ways to implement the biosecurity principles and standards developed in university research programs.

## Functional principles

No biosecurity plan will be successful unless there is company-wide acceptance and a long term commitment to the process. It is easy to "talk the talk," but "walking the walk" is the more difficult—but essential—task. The starting point for all functional biosecurity plans is to train personnel in the basic principles needed to develop a sustainable system.

When developing functional biosecurity measures, there are several important issues that must be considered and addressed. First, an understanding of the hierarchy of controllable risks is needed before establishing biosecurity priorities. Not all risks are equivalent, and not all can be (nor should be) given equal attention. This fact is often ignored, and biosecurity measures are too often based on dubious observational conclusions or fears of the unknown. This leads to the second important consideration: It is essential that managers rely on scientifically and historically valid information when developing control strategies. Ignoring this principle will not only compromise biosecurity, but it will also needlessly elevate the cost of the biosecurity program. Third, and probably most importantly, managers must develop a sound understanding of the present level of biosecurity and the level of acceptance these current measures have among all actors in the system. By knowing this, managers can thoughtfully design ways to persuade and educate others to implement necessary improvements in the system. All individuals involved in the production system must be convinced they play a vital role in maintaining system heath; only then will they be receptive to learning and implementing biosecurity protocols. Last but not least, managers must consider the costs to implement new protocols, the odds of realizing sustained success with the protocols, and the long-term value that the measures may create.

## Biosecurity priorities

The hierarchy of potential risk is often debated, but there are five nonnegotiable areas that must be addressed:

The first system or farm consideration is still location. Good location in low pig density areas is still the best deterrent against lateral introduction of disease agents. Many farms with minimal or sloppy biosecurity efforts have remained high-health even in single-site production situations. In this ideal situation, health status is totally determined by the health of genetic introductions.

Unfortunately we are generally unable to alter today's US swine industry infrastructure. However, one thing that can be done is to move to dedicated, remote-site multiplication, thus safeguarding the health status of replacement stock. Modern biosecurity requires introduction of healthy replacement stock. Understanding the ongoing health status of the genetic supply is essential. This has technically evolved making the old vet-to-vet source switch consultation obsolete. Introductions must be through true health pyramids, preferably through a dedicated, single-site sow source. All health improvements and stability depend on the health and robustness of genetic introductions. With PRRS it is just as essential that the gilt be virus free (i.e., naïve) as the stud boar. Boar studs must maintain freedom. The use of a functional quarantine period and isolation monitoring programs is essential. PCR and other modern testing technologies offer the opportunity to shorten the traditional 30-35 day quarantine period.

The single exception to breeding stock introduction biosecurity is in parity-segregated systems. Due to weekly movement of P-2s into multiple sow farms, the biosecurity success of the entire system is highly dependent on the health status of the gilt farms. Monitoring and quarantine are impractical beyond the initial genetic introduction phase. This situation will remain a challenge until real-time PCR reaches the farm; even then, the cost in missed breeding targets may prevent action unless a reserve gilt supply is maintained. Acclimatization of gilts in a parity-segregated system is both unnecessary and detrimental to the overall health status of that system, but the entire gilt structure must be protected from lateral disease introductions sparing no biosecurity cost or consideration. The gilt farms should become the top of the commercial health pyramid.

In my opinion, pig transportation vehicles and trailers are responsible for nearly all biosecurity breaches, providing the health status of the genetic source remains constant. With PRRS, once the semen and gilt supply are PRRSV-free, at least 90% of the remaining controllable risk is associated with the internal movement of pigs. Significant areas that must be addressed are the truck wash and transportation scheduling. Trailers remain contaminated with viral and bacterial agents regardless of the efforts made to clean, wash, disinfect, and inspect. Overnight dry-down and heated systems above 160° F hold some promise to solve this problem.

Farm staff and support personnel are the last major consideration. There is little doubt that salmonella, *E. coli*, PRRS, TGE, and swine influenza are potentially moved about by individuals who breach biosecurity protocols. Showers typically protect against most disease introductions, if only to force a change of clothing. Influenza is deserving of special consideration because humans play an active carrier role. Down-time rules are useless when attempting to prevent its introduction. Influenza vaccination of all direct farm and support staff may be a necessary biosecurity effort to prevent influenza introduction. This step is likely impractical in most large production systems where fear, superstition, and management-level complacency prevent high compliance.

The remaining controllable risk factors are a small percentage of the total risk picture, but they must be addressed. Feed trucks, feed ingredients, supplies, maintenance systems, waste management personnel and equipment, water, and contract vendors make up the bulk of the remaining risk factors. Each of these must be addressed, but water and the contract vendor are critical. A vendor training and inspection program along with strict shower protocols will solve most of this latter security concern.

Within systems that don't have rural or municipal water supply, major biosecurity risks may exist. Chlorine injection and other on-farm purification systems are typically nonfunctional, Any surface water usage will allow significant introduction of pathogens. Avian tuberculosis, EMC virus, PRRS, influenza, leptospira, parvovirus, and many other bacterial, viral, and parasitic agents can and frequently do enter through the water supply.



## Conclusion

Functional biosecurity systems remain in a neonatal stage but are rapidly evolving in most large US production enterprises. Pre-harvest food safety concerns, although thus far not mentioned, have played a significant role in total biosecurity interest. These concerns may eventually drive investment in more sophisticated biosecurity interventions. Even without the food safety consideration, the cost of health instability and potential value creation of high-health systems should be enough of an incentive for industry progress. One serious roadblock is the cost to implement an effective system. This will have to be overcome if sustainable commercial health pyramids are to be developed. The recent return to industry profitability creates opportunity—unless it also causes amnesia with regard to the real costs of bad health.

## Acknowledgements

I would like to thank Doctors Lisa Becton, Wrenn Matthis, Christina Venner, and Macarena Sanz for their tireless efforts in developing and maintaining functional biosecurity within Premium Standard Farms, Inc.