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Swine influenza in the North American industry

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Swine influenza continues to be an economically significant disease in the North American swine industry. During the last few years this disease has increased in importance. Not only have new viral subtypes been reported but also the disease appears to be harder to control. Vaccine efficacy is under review owing to the limited cross-protection reported among subtypes. Also, the dynamics of population immunity may have changed with increased herd size and regional density. Still, numerous questions remain unanswered and little is known about transmission and how herds become infected. An evident seasonal effect is described for swine influenza, with a higher incidence in the fall and winter months. Veterinarians and producers grow frustrated seeing that most intervention strategies work only occasionally at best.

Issues to consider

Does SIV have clinical relevance?

Does SIV have clinical relevance? What is the impact of SIV on production parameters? How much do we have to invest to get SIV under control? SIV is usually associated with the porcine respiratory disease complex (PRDC) and it is seen as another respiratory virus that is difficult to control. Is this association real? Or, is the virus by itself causing the losses rather than an association with other pathogens?

How do herds get infected?

How do herds get infected? Traditionally we have assumed that swine influenza virus gets transmitted through air. This assumption leaves the producer with few tools to protect its unit. However, as we learn more about the role that other sources may have in transmission—such as infected people, transport, etc.—producers should be able to design more comprehensive biosecurity programs.

Persistence of SIV in pig populations

The traditional belief that SIV moves readily through the whole population soon after being introduced into a herd may no longer apply as pig farms have increased in size and we have added segmentation and compartmentalization in the pig flow. Also, vaccine is commonly used in breeding herds and a mixed population immunity may exist in nursery and growing age pigs. Could it be pos-

sible that the virus is transmitted differently in these conditions? Could it be that SIV exists as an endemic infection in certain herds? Or, are the infections all new, lateral, infections?

Diagnostics

As new subtypes of SIV have become more prevalent, have diagnostics become more limited? We know that certain subtypes will not react with commonly used reagents at the diagnostic laboratories and genotyping illustrates the complexity of SIV strain diversity in US swine systems.

Genetic diversity

Recent studies have shown that multiple lineages of antigenically and genetically diverse influenza type A virus co-circulate in the US swine population. Before the isolation of H3N2 viruses in 1998, swine influenza in the US was an endemic disease caused exclusively by classical-swine H1N1 viruses. After 1998, the swine population in the US has become a dynamic viral reservoir containing multiple viral lineages. Therefore, the influenza reservoir in the US swine population has gone from a stable single viral lineage to one where genetically and antigenically heterogeneous viruses co-circulate. The growing complexity of influenza at this animal-human interface and the presence of viruses with a seemingly high affinity for reassortment makes the US swine population an increasingly important reservoir of viruses with human pandemic potential.

Vaccines

Traditional SIV vaccines have been considered to be quite effective. As the number of serotypes and subtypes has increased, the efficacy of the vaccines is being questioned. Vaccine companies are making major efforts to market products targeting these new subtypes. The question remains whether swine SIV vaccines will need updated isolates in a similar way to what is done in the case of humans, where vaccines with the new prevalent isolate are available on a yearly basis.

Zoonotic potential

It is well known that influenza is a zoonotic disease. There are reported cases in the literature that show that SIV can

be transmitted from pigs to humans and vice versa. Whether transmission will be limited to few cases, only affecting people in direct contact with pigs at the farms or slaughter plants, or spread to become a human pandemic remains to be seen, but the potential is there. Depending on what happens in the future, SIV control methods for swine may be dictated by governmental public health institutions.

Conclusion

A lot of questions concerning SIV still remain unanswered. I plan to discuss some of these issues and the implications for the swine industry. Lessons on epidemiology, transmission and control can be learned from other industries, such as the poultry industry.

