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Swine influenza virus elimination from pig herds

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Advanced Knowledge

Introduction

Swine influenza virus (SIV) continues to be an important infection in pigs. For many years in North America, SIV was mainly caused by classic H1N1 strains, but since the late 90's new subtypes have emerged. SIV infections have implications for both, public health and cost of production so there is a need to develop programs to prevent, control and eliminate the virus. This need has been emphasized by the appearance of a novel H1N1 virus of pandemic characteristics attributed to swine. Although the source of origin of the novel strain in pigs has not been found, the swine industry has significantly felt its effects. Economic losses have been significant and the reputation of the swine industry as a whole has been tainted. In addition, outbreaks and endemic infections of SIV caused by different subtypes are frequent in North America which is leaving the swine industry in a very vulnerable position.

Therefore the need to re-think our approach to SIV control in pigs is immediate and it needs to take into consideration not just the control of clinical signs and the overall production economics but also the effects that the control measures may represent for the virus itself, changes to it and the emergence of new strains.

Sporadic SIV elimination in swine herds has been reported before. In fact, classical flu epidemiology in pig herds is described as a transient infection where pigs get infected within a short period of time resulting in an immune population where pigs recover shortly after infection and where virus infection dies-out. Therefore SIV elimination may happen for certain herds as part of the natural course of the infection with the virus dying-out in all-in/all-out (AIAO), discrete closed populations or populations without previous levels of immunity. However, in large herds, continuous flow populations and herds with imperfect immunity this may not be the case. Therefore novel approaches to SIV control and improved biosecurity to prevent new viral introduction as well as methods for virus elimination are needed.

This report describes the procedures to eliminate SIV from a large three-site production pig farm using herd closure and nursery partial depopulation.

Material and methods

A three-site 1,200 sow herd became infected with SIV serotype H3N2 (Figure 1). The herd was negative for porcine reproductive and respiratory virus (PRRSV), *Mycoplasma hyopneumoniae*, and most significant respiratory pathogens. SIV infection started in the breeding herd (site 1) in September 2005. Upon infection the herd experienced clinical signs of cough, nasal secretions and sows off-feed. Infection was confirmed with serology. Infection was transmitted to the off-site nursery location with the introduction of infected weaned piglets. Nursery site was managed AIAO by room. Pigs were moved to the finishing site (site 3) after a 7 week stay in the nursery, where they remained for 16 weeks.

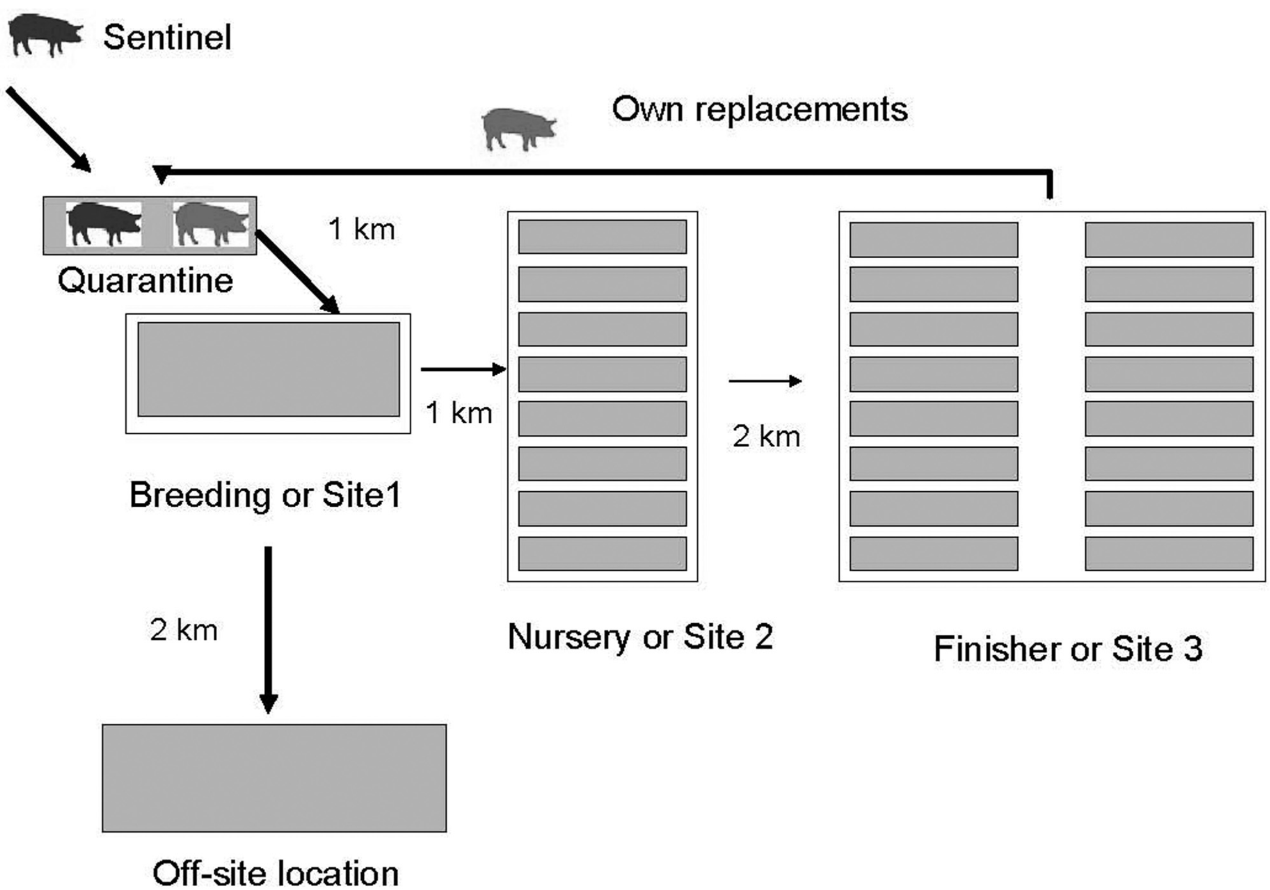
Acute clinical signs in the breeding herd lasted for about 3 weeks and after that, SIV infection remained in site 2 causing respiratory distress in pigs at about 2 weeks postweaning and lasted for 4-5 weeks approximately. As a result of the infection, nursery mortality was slightly increased, and more importantly secondary infections and medication usage increased significantly. Average daily gain was also temporally affected (Table 1).

Protocol for SIV elimination in site 1 consisted on containing the infection in site 1 by avoiding continuous gilt introduction. Gilt replacement introduction in the gilt development unit was switched from monthly or bimonthly to quarterly in order to facilitate the viral infection to die-out. After that, gilts from an SIV negative source were introduced to serve as sentinels (>30 gilts).

In order to eliminate the virus from site 2, the whole site had to be depopulated at once since attempts to control virus spread by just using strict AIAO procedures had failed. In turn, site 3 was also totally depopulated. A separated off-site facility was used to accommodate the flow from site 1 while the depopulation of site 2 and site 3 was taking place. Facilities were completely emptied, cleaned, disinfected and rested for at least 4 weeks. Vaccines were not used in the breeding herd or the pig flow.

After depopulation, pig flow was restored and the pigs were monitored for the presence of clinical signs and

Figure 1: Herd lay-out, pig flow and SIV infection timeline.



September 05	SIV infection suspected
December 05	SIV infection confirmed
January 06	First group of sentinel animals introduced
April 07	Depopulation of site 2 and site 3 starts (pig flow diverted to off-site location)
August 07	Depopulation of site 2 and 3 completed
November 07	Repopulation of site 2 and site 3 completed

seroconversion using an IHA test. Performance parameters were recorded and an economic analysis was performed.

Results

Sentinel gilts introduced as SIV negative remained both clinically and serologically negative for 12 months. Therefore infection in site 1 was considered extinguished.

Serology in pigs in site 2 and site 3 had also remained negative after repopulation of the sites. No clinical signs suggestive of SIV infection were observed after completion of the study. There was an improvement in average daily gain, mortality and feed medication cost being the later the most positively affected (Table 1).

Discussion

SIV infection can be costly and under certain conditions difficult to control. This study describes the protocols to eliminate SIV in a large modern three-site production system by a short herd closure strategy in the breeding herd and depopulation of the nursery and finishing facilities. In addition, this work highlighted the economic advantages of being swine flu virus free following a partial depopulation strategy.

*This work has been fully published in Veterinary Record (2009) 165:74–77

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Table 1: Summary of production parameters for site 2 before and after depopulation

	Before depopulation	After depopulation	Difference
Number of weekly groups	26	21	
Age at weaning (days)	20.3	23.6	
Average weaning weight (kg)	5.7	6.5	
Number of animals entered into site 1	12,019	7,757	
Number of dead pigs	364	83	
Mortality (%)	3.2	1	
Average weight at exit from site 2 (kg)	30.3	36.1	
Adjusted weight at 70 days (kg)	31.2	33.0	1.8
Average daily gain (kg)	0.405	0.528	0.123
Feed efficiency	1.6	1.34	0.26