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Dynamics of flu infection in sow farms

Andres Diaz; Montserrat Torremorell

Swine Disease Eradication Center, College of Veterinary Medicine, University of Minnesota, St. Paul, Minnesota

Introduction

Breeding herds are the source of neonatal pigs. Neonatal pigs play an important role in maintaining swine influenza A virus (IAV) infections in breeding herds, and transmit the virus to other sites.[1,2] Diversity of IAV in breeding herds may be related to animal flow since there is continuous introduction of new animals (newborns and replacement animals). Understanding the dynamics of virus infection and diversity within these populations, and how viruses are introduced and maintained in breeding herds is crucial. The objective of this study is to describe the dynamics of virus infection in breeding herds overtime and to evaluate the role of replacement animals and piglets on the introduction and maintenance of IAV in sow herds.

Materials and methods

Five conveniently selected herds were enrolled for this study and are currently being followed for a period of 12 months that started on November 2011. Only sow farms with the GDU onsite and without commercial growing to finishing were selected. In each farm three populations are being sampled each month: 3 week-old lactating piglets, gilts that have been on-site for more than 4 weeks and gilts that have been on site less than 4 weeks. From each subpopulation, 30 nasal swabs (BBL Culture Swab Liquid Stuart swabs; BD Diagnostic Systems, Sparks, MD) are collected from individual pigs to detect at least one positive sample when the prevalence is above 10%. A maximum of ten oral fluid samples are collected from each subpopulation in order to increase our chance to detect the virus at each time point. One 2-feet cotton rope is placed in each selected pen for a period of 30 minutes. Oral fluids are collected from the rope into a sterile plastic tube at the same time when nasal swabs are collected. All samples are cooled after collection, transported to the laboratory, processed, and stored at -80°C until tested by RT-PCR. Phylogenetic analysis will be developed to assess the genetic association within and between viruses found in the same herd.

Preliminary results

All farms have tested positive at least once to swine IAV by RT-PCR during the sampled months. At least one piglet has been detected positive during the follow up period with a period prevalence of 6.3% for all farms, ranging from 0.5 to 7.8% between farms (Table 1). In gilts that have been one site for more than a month SIV has been detected only in two farms and has only been detected once in each positive farm with a period prevalence of 3.5% (Table 2) for all farms ranging from 0 to 7.3% between farms. In gilts that have been less than a month on farm SIV has been detected in two farms (once and three times respectively) with a period prevalence of 9.9% for all farms ranging from 0 to 20.6% (Table 3).

Discussion and conclusions

Swine IAV transmission in endemic infected herds appears to be very dynamic within and between subpopulations found in breeding herds (pigs, gilts, and young gilts). Replacement animals can be a source of new viruses and can become reservoirs for endemic viruses in the breeding herd. Newborn piglets are naïve at birth to any IAV and they can become a source of IAV for other pigs at weaning. All of these populations could potentially be mixing vessels for different viruses if a mixed infection takes place. Phylogenetic analysis is required to better understand the direction of transmission over time and will be part of this project in the future.

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2. Toremorell et. al 2012. Transmission of influenza A virus in pigs. TRANSBOUNDARY AND EMERGING DISEASES; 59(Sl):68–84

Table 1: SIV period prevalence in 3 week-old lactating pigs

Farm	First month sampled	Last month sampled	Total swabs	Total positives	Period prevalence
1	Nov 2011	July	270	21	7.8
2	Nov 2011	July	270	19	7.0
3	January 2012	June	178	1	0.6
4	January 2012	June	179	13	7.3
5	January 2012	June	180	14	7.7
Total			**1077**	**68**	**6.3**

Table 2: SIV period prevalence in gilts that have been on site more than 4 weeks

Farm	First month sampled	Last month sampled	Total swabs	Total positives	Period prevalence
1	Nov 2011	July	259	19	7.3
2	Nov 2011	July	269	18	6.7
3	January 2012	June	180	0	0
4	January 2012	June	179	0	0
5	January 2012	June	170	0	0
Total			**1057**	**37**	**3.5**

Table 3: SIV period prevalence in gilts that have been on site less than 4 weeks

Farm	First month sampled	Last month sampled	Total swabs	Total positives	Period prevalence
1	Nov 2011	July	30	0	0
2	Nov 2011	July	209	43	20.5
3	January 2012	June	89	0	0
4	January 2012	June	118	1	0.85
5	January 2012	June	30	0	0
Total			**476**	**44**	**9.24**