Influenza A virus infection in nursery pigs in Santa Catarina state, Brazil

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Introduction

In Brazil since 2009, frequent outbreaks of acute respiratory disease in pigs caused by influenza A virus (IAV) are reported. H1N1pdm09, human seasonal-origin H1N2 and H3N2 viruses are widespread in pig herds, where they continue to evolve (1). Most of the studies conducted so far were in growing to finishing pigs. However, porcine respiratory disease complex, such as influenza, are responsible for most of the losses and the use of medications in nurseries. The objectives of this study were to detect the circulation of IAV subtypes and to evaluate the IAV prevalence in swine nurseries located Santa Catarina (SC), the largest pork producer (27.9%) and exporter (51.12%) state in Brazil (2).

Materials and Methods

The study was conducted between June and September of 2018 in nurseries (with a total of 60 thousand piglets) located in the west region of SC State. Nasal swabs and blood samples were collected from 35 to 54 days-old piglets presenting respiratory clinical signs. For sampling, a confidence level of 95%, accuracy level of 5% and a prevalence of 40% were considered (3), totalizing 423 samples.
Nasal swabs were analyzed by RT-qPCR (IAV/M gene) (4) and three IAV positive samples per nursery were subtyped by using an additional RT-qPCR (5). Sera were evaluated for IAV antibodies using an ELISA (InfA Multispecies - CK401- Biocheck) and hemagglutination inhibition (HI) test (6), using as reference viruses the IAVs isolated in pigs in Brazil (H1N1pdm09/ 107-10, H1N2/ 31-11-1, and H3N2/ 28-15-8).

Results

IAV circulation was identified either by detection of viral RNA by RT-qPCR in nasal swabs (67.4%), as well as for the presence of antibodies produced against IAV by ELISA (66.9%), confirmed by the HI results (Table 1). The HI test revealed antibodies in piglets against the H3N2 virus (59/155; 38.0%), H1N1pdm09 (37/155; 23.8%) and H1N2 (5/155; 3.2%). In eight out of 11 nurseries, antibodies for at least two virus antigens were detected. IAV subtyping by RT-qPCR has detected H3N2 virus in six nurseries and H1N1pdm09 in two nurseries. The IAV subtype was not determined in samples from three nurseries (Table 1).

Table 1. IAV virus and antigen detection by ELISA, RT-qPCR and HI test

Herd	Number of samples	ELISA Positive	RT-qPCR Positive	CT range	Subtyping	Hemagglutination Inhibition		
						H3N2	H1N1	H1N2
1	40	31 (75.5%)	18 (45%)	25.63-38.87	H3N2	40-320	40	40-80
2	50	23 (46%)	5 (10%)	35.01-37.96	Not detected	<10	40	<10
3	40	24 (60%)	38 (95%)	21.84-37.46	H3N2	40-320	<10	<10
4	32	27 (84.4%)	29 (90.6%)	26.48-36.52	Not detected	80-640	40	<10
5	40	39 (97.5%)	34 (85%)	20.55-37.72	H3N2	40-80	40-80	<10
6	26	15 (57.7%)	24 (92.3%)	17.92-36.60	H1N1pdm	160	40	<10
7	33	22 (66.7%)	25 (75.8%)	17.75-38.45	H3N2	<10	80	<10
8	50	47 (94%)	29 (58%)	28.65-37.77	Not detected	40-640	40-80	40
9	40	30 (75%)	40 (100%)	13.69-31.35	H3N2	40-80	40-80	<10
10	40	11 (27.5%)	31 (77.5%)	15.64-33.90	H3N2	40-160	40	40
11	32	14 (43.8%)	12 (37.5%)	20.19-37.99	H1N1pdm	40	80	<10

Conclusions and Discussion

Our results show a high prevalence of IAV in pig nurseries in SC state and H3N2 virus was the most detected subtype. Influenza outbreaks are commonly observed in pig herds in Brazil since the introduction of H1N1pdm in 2009 (7). Previous studies have revealed H1N1pdm09 as the predominant viral subtype circulating in Brazilian pigs in the last years (8,9). However, recently, the detection of H3N2 virus has increasing in farms in Brazil. Our data further reveal that 9.6% (15/155) of the piglets reacted to at least two antigens. Thus, different viral IAVs are circulating in the swine population causing mixed infections and contributing to viral genetic rearrangements.
Our results corroborate the need to understand the evolution of IAV viruses in nurseries to better control the infection and future virus reassortments that may generate new outbreaks.

Acknowledgments

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