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PROCEEDINGS

Prevalence of influenza viruses infection in swine herds in Brazil in 2011

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Introduction

Influenza A virus (IAV) infections are endemic diseases in swine herds (1). In Brazil, initial studies analyzed swine sera collected from 1996-1999. Antibodies against subtype H1N1/ Texas1/77 (2.2%) and H3N2/New Jersey/76 (16.7%) were detected by hemagglutination inhibition (HI) assay (2). Recent work described the first outbreak of the pandemic 2009 human H1N1 IAV (pH1N1) infection in a Brazilian swine herd (3). Furthermore, retrospective serology studies indicated an increase in frequency and antibody titers from 2006 – 2010 (4). However, it also demonstrated a lack of specific antibodies to pH1N1, which suggests Brazilian pigs were not fully protected against the pH1N1 from previous exposure. The objective of this work was to determine the presence of antibodies and IAV subtype circulation in pig populations of seven Brazilian States.

Materials and Methods

From July to December 2011 a survey using nasal swabs and sera from pig herds was carried out at Embrapa Swine and Poultry Research Center in Concordia, Brazil. Samples consisted of 49 commercial farms with or without respiratory signs of seven Brazilian states (Minas Gerais, Mato Grosso do Sul, Mato Grosso, Paraná, Rio Grande do Sul, Santa Catarina and São Paulo). Sampling (into the herd) considered 95% confidence and 95% sensibility of the test and a minimal prevalence of 10% in the herd. Thus, 30 pigs (60-85 days old) were sampled per farm, a total of 1464 serum samples or nasal swabs each. Serologic assays included the HI and the Avian Influenza MultiS-Screen Idexx ELISA (5). HI assays were used to evaluate serum samples against classic H1N1-A/sw/IA/31 (AAF6/19/92) or H1N1, H3N2-A/sw/IA/8548-2 or H3N2, both purchased from NVSL-ARS-USDA; and H1N2/31/11 or H1N2 (δ) and pH1N1/107b/10-3A(H1N1) or pH1N1 (3) both isolated from field cases of IAV. Nasal swabs were screened for IAV matrix gene by real-time PCR (IAV qPCR) and further tested for pH1N1 using a real-time PCR (pH1N1 qPCR) as described previously (6).

Results

The serology screening test used was a commercial ELISA developed for the detection of IAV nucleoprotein antibodies in avian species (5). All 49 studied farms presented antibodies for IAV, which percentage of positive ranged from 3.33 to 100% of tested sera. The majority of the tested farms (63%) presented ≥ 75% of pigs positive for IAV antibodies by the ELISA test (Figure 1). Moreover, the HI analyses of positive ELISA sera revealed specific antibodies for pH1N1, H1N2, H1N1 and H3N2 (Figure 2).

Figure 1 - ELISA

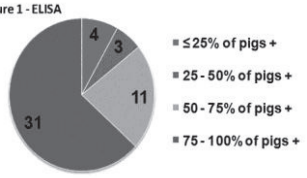
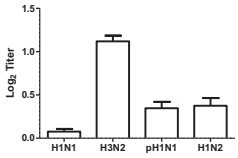
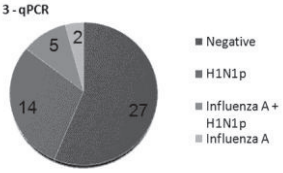


Figure 2: HI analyses



Viral RNA was identified in nasal swab samples of pigs by qPCR (Figure 3). The pH1N1 was more frequently detected, where 14 herds were positive for pH1N1 (29%), 5 for both pH1N1 and IAV (11%), 2 farms (4%) were only positive for IAV (not pH1N1) and 27 farms were negative (56%). IAV qPCR can detect all IAV subtypes, including pH1N1. Although less sensitive, the pH1N1 qPCR (6) is specific for this virus. Thus, the combination of these two tests can differentiate as positive for pH1N1 or another subtype as H1N1, H1N2 or H3N2, among others.

Figure 3 - qPCR



Conclusions and Discussion

This study demonstrates that IAV, including pH1N1 circulate in Brazilian swine herds. Besides sensitivity differences among qPCR tests, the difference on percentage of positive and negative farms by ELISA and qPCR are due to duration of viral shedding versus antibody detection by serology.

References

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