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IPVS ABRAVES

A high mortality of H1N1pdm vaccinated sows related with H1N2 subtype

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Introduction

Influenza A virus (IAV) causes an acute respiratory disease in swine which imposes substantial economic losses in pig production, especially when paired with additional respiratory pathogens (1). In Brazil, since the emergence of 2009 H1N1 pandemic virus (pdm09) several outbreaks associated with H1N1, H1N2 and H3N2 viruses have been described in pig herds (2). To minimize the impacts of IAV in pig farms, the use of vaccines has been applied preventively (3). However, the great antigenic and genetic diversity of IAVs has limited the vaccine efficacy or cross-protective immunity against heterologous homosubtypic or heterosubtypic IAVs (4). Also, a vaccine-associated enhanced respiratory disease (VAERD) in pigs that received a whole inactivated virus (WIV) vaccine and were challenged with a heterologous H1 virus has been reported (5,6). The aim of this study was to report an influenza outbreak with a high mortality rate in vaccinated sows.

Materials and Methods

This case report refers to a breeding herd of 1,800 sows, located in Paraná state, routinely vaccinated with H1N1pdm inactivated virus, presented a mortality surge of 40 deaths in 8 days (28 gilts and 12 sows). A morbidity rate of 90% and a mortality rate of 2.2% were associated with clinical signs of fever, lethargy, nasal discharge, cough, and respiratory distress.

Necropsy was performed in 3 sows and tissue samples were collected for laboratory analysis. Analyzes were conducted for bacterial isolation on blood Agar plates and incubated at 37°C for 24-48 hours in microaerobic atmosphere, qPCR for *Actinobacillus pleuropneumoniae* using NewGene APPAmp kit (Simbios Biotecnologia), RT-q-PCR for IAV (7) and multiplex RT-PCR assays for IAV subtyping (8). For histopathologic examination, formalin-fixed lung tissue samples were routinely processed and stained with hematoxylin and eosin and immunohistochemistry for IAV using Universal LSAB™+/HRP Kit (Dako).

Results

Gross lesions were characterized by interlobular edema, dark red firm multilobular to coalescing lung lesions and congestion of the lung and trachea. Histological lesions consisted of moderate diffuse neutrophilic bronchopneumonia with necrotizing bronchiolitis, congestion and moderate edema. There was moderate diffuse lymphoplasmacytic tracheitis. No other significant lesions were observed in other tissues. On immunohistochemistry, all lungs were positive for IAV staining. Lung samples showed no bacterial growth, and they were negative for *A. pleuropneumoniae*. All lung samples were positive for IAV, and the virus subtype was characterized as H1N2 by multiplex RT-PCR.

Discussion and Conclusion

This study describes an influenza outbreak with a high mortality rate of sows previously vaccinated with an H1N1pdm virus and infected with an H1N2 virus. Influenza vaccines licensed in Brazil are a commercial monovalent H1N1pdm09 WIV and an autogenous WIV. Currently, IAV is endemic in Brazilian pig herds and genetically diverse virus subtypes circulate in the herds (9). A higher occurrence of H1N1pdm from 2012 to 2015, H3N2 in 2017, and H1hu in 2017 to 2019 has been shown (10), demonstrating a variability of IAV subtypes over time. Similar to this case, several studies described VAERD in pigs vaccinated with a WIV that is antigenically mismatched with the infecting virus (6). In these studies, severe inflammation and pneumonia were observed (5).

Although the HI test or phylogenetic analysis were not performed in our study, we can suggest the occurrence of VAERD based on the clinical signs, gross/histopathologic lesions, and mortality intensity. Regardless, the increasing genetic and antigenic diversity of H1 IAVs circulating in swine added to the use of WIV vaccines creates optimal conditions for vaccine-virus mismatch and potential VAERD in the swine population. In conclusion, it is recommended to determine the IAV that is circulating in a specific herd before the utilization of commercial inactivated IAV vaccines.

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