

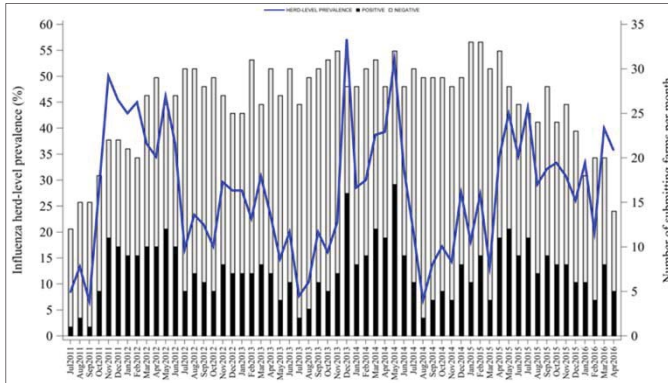
Influenza herd-level prevalence and seasonality in Midwestern sow farms

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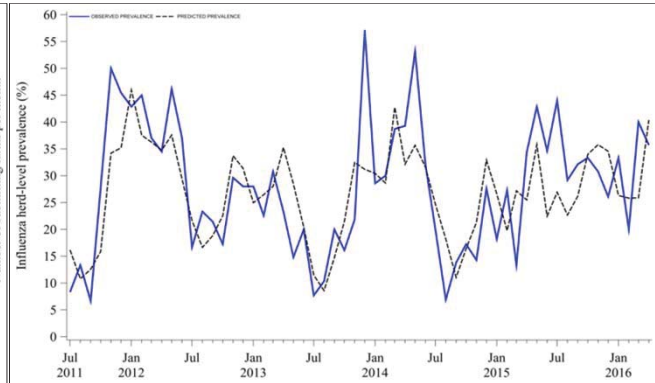
Key points:

- Influenza is endemic and seasonal in piglets from sow farms in the Midwest with higher infections in winter and spring.
- Influenza seasonality was partially explained by outdoor air absolute humidity and temperature trends.
- Influenza genetic diversity was high and co-circulation of more than one genetically distinct virus was common.

Influenza A virus is a major cause of respiratory disease in pigs. It increases mortality and feed conversion ratio, and decreases average daily weight gain in finishing pigs. Sow farms play a critical role on influenza transmission, epidemiology and control since piglets prior to weaning can covertly maintain, diversify and transmit influenza to other farms. To study influenza levels over time and its seasonality, we analyzed monthly testing data of piglets at weaning (n= 1,523 oral-fluid submissions) from 34 sow farms during ~5 years (July 2011 to April 2016).

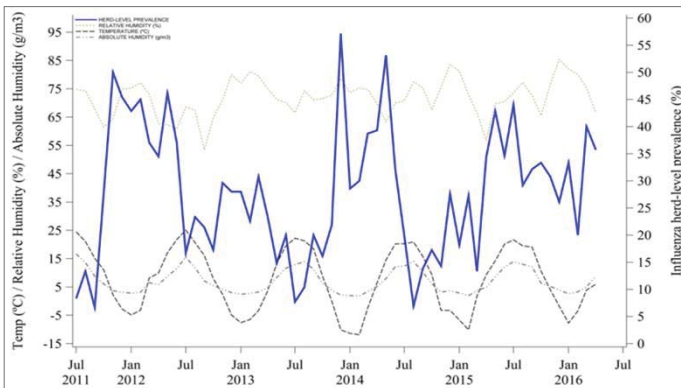


Legend: Blue line - Herd level Prevalence, Black columns - Positive, White columns - Negative

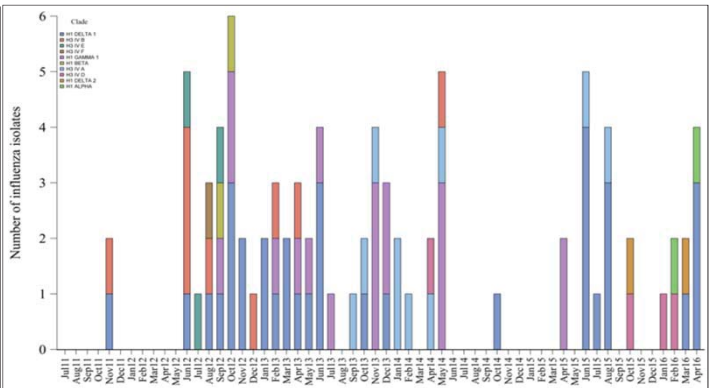


Legend: Blue line - Observed prevalence, Dashed line - Predicted prevalence

There were 28% of positive submissions with a median influenza herd-level prevalence of 28%. Influenza herd-level prevalence and seasonality is shown above (blue lines). Mean outdoor air absolute humidity and temperature observed at 0, 1 or 2 months before a given month were partially correlated with influenza herd-level prevalence but relative humidity was not. Genetic diversity was significant with 10 genetically distinct clades of contemporary US swine influenza viruses as shown below. Furthermore, 21% of farms had 3 genetically distinct viruses circulating over time; 18% had 2, 41% had 1 and 20% had no isolates available.



Legend: Blue line - Herd-level prevalence, Green dashed line - Relative humidity (%), Long-dashed line - Temperature (C), Long/short dashed line - Absolute humidity



Legend: Dark Blue- H1 DELTA 1, Dark Peach- H3 IV B, Teal- H3 IV E, Brown- H3 IV F, Purple- H1 GAMMA 1, Yellow-Green- H1 BETA, Light Blue- H3 IV A, Pink- H3 IV D, Orange- H1 DELTA 2, Bright Green- H1 ALPHA

In summary, influenza herd-level prevalence in Midwestern sow farms had a seasonal pattern with higher levels in winter and spring. This is important to better allocate influenza control strategies such as vaccination in sow farms. Influenza seasonality was partially explained by outdoor air absolute humidity and temperature although other factors such as immunity and new introductions may play a role in the observed seasonality. More work is needed to evaluate the effect of absolute humidity and ventilation rates on influenza infections in pig farms. Genetically distinct viruses co-circulated over time within the same farms, which highlights the importance to mitigate influenza introductions into farms and decrease persistent and endemic infections using control strategies that consider the wide genetic diversity and co-circulation.

Read the full story at <https://www.frontiersin.org/articles/10.3389/fvets.2017.00167/full>.

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