Overview of Porcine Deltacoronavirus Occurrence in the United States Breeding Herds

Catalina Picasso-Risso, Emily Geary, Mariana Kikuti, MSHMP Participants, Cesar A. Corzo

Morrison Swine Health Monitoring Project
Veterinary Population Medicine, University of Minnesota

Key Points

- There was an increased in PDCoV cases with higher proportion on winter season.
- PDCoV cases are clustered in space and time suggesting local transmission
- *PDCoV monitoring is still important to achieve control.*

Since first reported in the US in 2014, the Porcine Deltacoronavirus (PDCoV) became a recognized enteric pathogenic cause of diarrhea in suckling pigs. Breeding herd cases of PDCoV have been increasing in the past years raising concern to the industry. Even though some epidemiological research has been done when the disease was first reported (2014-2015), there is a lack of understanding of the spatiotemporal patterns at the regional level since then, the factors associated with incidence over time, and the capacity of monitoring this non-reportable disease.

In this study, we performed a formal epidemiological assessment of PDCoV occurrence and spread dynamics between 2015 and 2021 in the Midwest and Southeast regions of the country. These regions are where the highest US swine density is located, and where the majority of the Morrison Swine Health Monitor Project (MSHMP) participating farms operate.

We utilized location and outbreak dates to describe and analyze the spatiotemporal trend of PDCoV from reports of more than 1300 farms from 38 systems. We assessed for global (Cuzick-and-Edwards, directionality test, and Knox test), and local (permutation model of spatial scan statistics) spatial and spatiotemporal clustering of MSHMP-reported PDCoV cases between January 2015 and July 2021. There was a total of 163 cases reported in 15 states, with the majority of them (70%) reported in the last couple of years (2019-2021), and over winter time (93/163), when risk was 3.43 times higher (95%CI: 2.07 – 5.67) related to the lowest incidence season (summer).

A strong (p-value <0.01) spatio-temporal clustering was detected in the study area, with an increased risk (1.5 to 2.5 times) of disease at <5 km distances of farms infected within 35 days as shown in the figure below. Three significant (P-value<0.05) clusters were observed in different regions in 2020, and one in the northwest of the Midwest area during the last semester of 2015. However, when adjusting by the system only one cluster (P-value<0.05) was observed between March and May 2020.
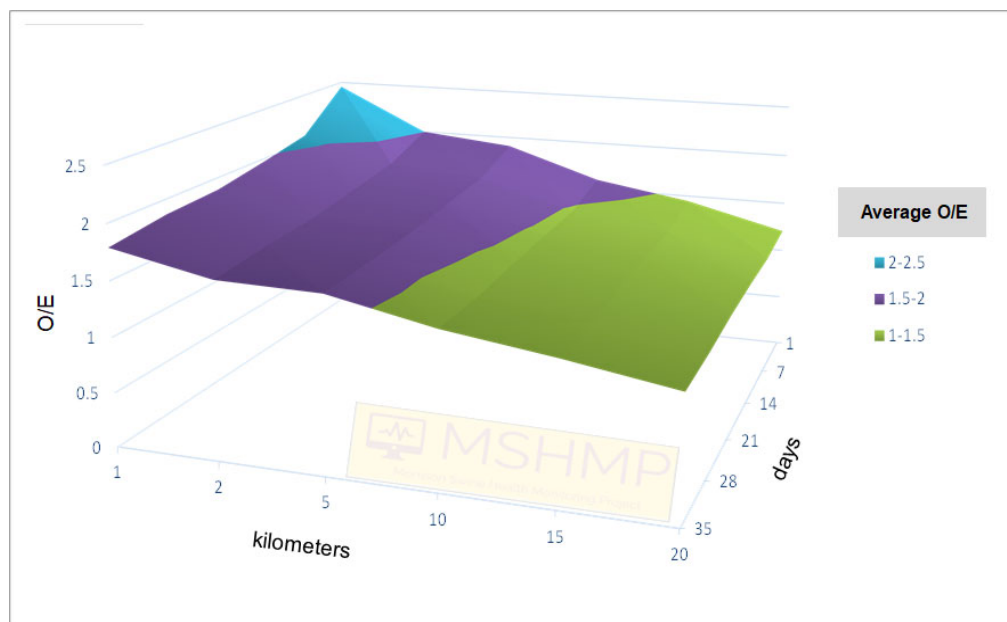

Figure 1: Spatiotemporal clustering within 2km and 7 days showed 2-2.5 more observed cases than expected (*turquoise*), and within 5km and 35 days indicated 1.5-2.5 observed expected ratio (*turquoise and purple*).

Results obtained here highlight a steady increase in cases over the years. The areas and periods of disease aggregation suggest that local transmission from infected to susceptible neighboring farms is happening and likely serving as sources of virus maintaining the disease in the area. Results here show that PDCoV whole-system monitoring is still important, and controls measures need to be strengthened to limit the spread and impact of the disease.