

Evaluation of the trade patterns and social network structure of pig movements in the US and their association with PRRSV transmission.

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**Purpose:** The porcine reproductive and respiratory syndrome virus (PRRSV) is responsible of large economic losses in the US swine industry. Ongoing surveillance efforts to control and eradicate PRRSV in the US have provided large number of PRRSV sequences which, coupled with the high PRRSV genetic variability, allows to identify sites related epidemiologically (i.e. PRRSV small genetic distance, same restriction fragment and length polymorphism -RFLP-). However, fundamental questions remains unaddressed: which are the transmission routes that are mostly contributing to PRRSV transmission?, what is the specific role of pig movements in the introduction and spread of specific PRRSV RFLPs? In this study we aim to address the role of pig shipments in the transmission of different PRRSV RFLPs within and between systems using social network analysis (SNA).

**Methods:** We used more than 200 PRRSV sequences (> 30 RFLP) of open reading frame (ORF) 5 region from PCR-positive field samples and more than 150,000 pig movement records collected over 3 years in different US pig production systems. For each system, yearly directed and weighted networks were built with nodes being pig sites and links being the pig shipments. Each network was assessed for scale-free fitting a power-law distribution and small world properties. Centrality measures were computed for each site and trade communities (i.e. “groups of sites”) were identified using the “Walktrap” algorithm with links weighted on the number of pig moved per shipment.

**Results:** As a result, we identified groups of sites sharing similar PRRSV RFLPs (where a shared PRRS control program will be highly beneficial) and pig sites where pig movements play a key role for new PRRSV introduction and/or spread.

**Conclusions and Relevance:** Outcomes of this study will support risk-mitigation strategies to better prevent and control PRRSV transmission through pig shipments in the US.