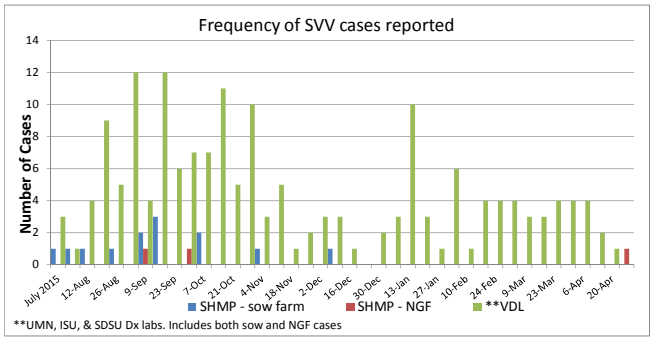
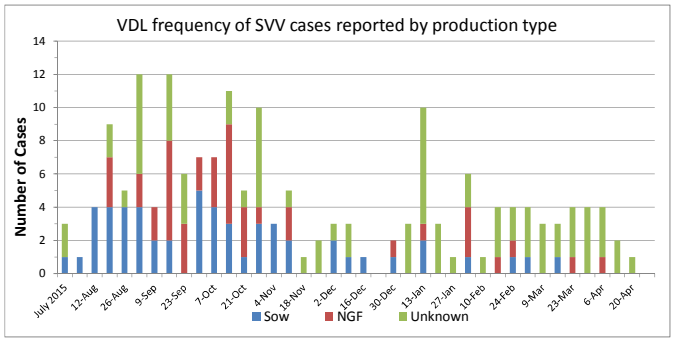
Seneca Valley Virus Update

We requested SHMP participants and UMN, ISU, and SDSU diagnostic labs to report frequency of Seneca Valley virus cases each week.

- 1 new SVV VDL case reported for week of 4/20/16 and 1 new case reported in a SHMP finishing site
- Note that the reported cases between data sources may overlap





NETWORK ANALYSIS OF MAIN SERVICE PROVIDERS FOR SWINE HERDS PARTICIPATING IN REGIONAL PRRS CONTROL PROGRAMS

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Key Point

- Indirect connections between swine sites are important for control of infectious disease spread in a timely matter.

Introduction:

The importance of networks in infectious disease epidemiology has been recognized in the last decade for several animal diseases. In Ontario, a link was established between the introduction of porcine epidemic diarrhea and the exposure to contaminated feed (Pasick et al., 2014); and truck networks have been linked to the occurrence of specific porcine reproductive and respiratory syndrome (PRRS) virus genotypes in a defined area of the province (Arruda et al., 2015). The current North American swine industry is characterized by a high degree of connectedness of swine sites clustered within production systems, and a limited number of specialized service providers focusing on specific parts of the system, such as animal transporters and feed suppliers. This requires the use of new approaches to evaluate and account for important relationships that would otherwise go unnoticed. The objective of the current study was to describe static relationships between swine sites and their service providers (including transportation, feed, semen, gilt and boar companies) and extract parameters to be used in risk factor analysis for PRRS virus positivity.

Materials and Methods

The source of data was a SQL Server 2008 database containing data from PRRS area control and elimination projects in Ontario, Canada. Demographics, biosecurity and network information was collected using a standardized questionnaire. Network analysis was conducted in Gephi 0.8.2 and UCINET 6. Edges were undirected, and defined as a connection between a site and a service provider. The five above-mentioned networks were combined and transformed to a one-mode network for analysis, from which the number of degrees (indirect connections) was extracted for each swine site. Risk factor analysis was conducted using a generalized mixed model in SAS 9.3, and included number of neighbors within three km and number of degrees as main predictors. Clustering of sites within production system was taken into account using a random effect.

Results

A total of eight hundred and sixteen sites were enrolled in the study. These sites were connected to a total of 56 feed companies and 93 truck companies. The two hundred and fifty-four breeding herds included in the study reported to receive semen from 23, gilts from 54 and boars from 37 genetic companies. A representation of the two-mode network is showed on Figure 1.

A preliminary statistical model showed a significant positive association between being PRRS positive and number of indirect connections with other swine sites. However, the statistical significance of such association disappeared when production system was included. Detailed description and analysis of networks separately is pending.

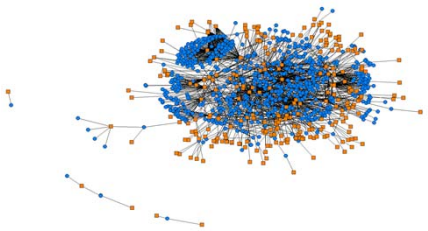

Figure1. Visualization of the two-mode network. Blue represents swine sites and orange represents service providers.

Conclusions

Indirect relationships between swine sites are important for control of infectious disease spread in a timely matter, and network analysis is a promising approach to accomplish this.

Acknowledgements

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References

Pasick et al. 2014. Transb Emerg Dis. 61(5): 397-410
Arruda et al. 2015. Transb Emerg Dis. doi: 10.1111/tbed.12343

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