

Network analysis of main service providers for swine herds participating in regional PRRS control programs in Ontario, Canada

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**Purpose:**

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 (PED) and the exposure to contaminated feed (Pasick et al., 2014); and swine truck networks have been linked to the occurrence of specific porcine reproductive and respiratory syndrome (PRRS) virus genotypes (Arruda et al., 2015). The current North American swine industry is characterized by a high degree of connectedness of swine sites within production systems, and a limited number of specialized service providers such as animal transporters and feed suppliers.

The objective of the current study was to describe static relationships between swine sites and their service providers, including transportation, feed, semen and boar companies.

**Methods:**

The source of data was a SQL Server 2008 database containing data from PRRS area control and elimination projects. Network information was collected using a standardized questionnaire. Network analysis was conducted in Gephi 0.8.2 and included measures of degree, betweenness centrality and closeness centrality. Relationships were considered undirected, both service providers and sites were considered nodes, and an edge was defined as a connection between a site and a service provider.

**Results:**

A total of 613 sites were enrolled in the study. These sites were connected to a total of 49 feed companies and 80 truck companies. The 202 breeding herds included in the study reported to receive semen from 14 companies and boars from 34 genetic companies.

**Conclusions:**

The average number of degrees and centrality parameters showed that for all networks, a few nodes had the greatest importance in the network, connecting multiple network components.

**Relevance:**

All parameter distributions were highly right skewed, suggesting that when the goal is to decrease disease transmission, focusing on a few nodes should yield a greater beneficial impact.

Pasick et al. 2014. *Transb Emerg Dis* 61(5):397-410

Arruda et al. 2015. *Transb Emerg Dis* doi: 10.1111/tbed.12343