

TITLE

NETWORK ANALYSIS OF PIGS MOVEMENTS IN ARGENTINA: BASIC REPRODUCTION RATE IN RELATION WITH OF FARMS BIOSECURITY

Laura Valeria Alarcón^{1,2}, Pablo Ariel Cipriotti³, Mariela Monterubbianesi⁴, Carlos Perfumo⁵, Enric Mateu⁶, Alberto Allepuz⁶

¹ *Department of Swine Medicine, La Plata National University*

² *Universitat Autònoma de Barcelona*

³ *Department of Quantitative Methods and Information Systems, School of Agriculture, University of Buenos Aires*

⁴ *National Food Safety Service*

⁵ *Laboratory of Special Pathology, La Plata National University*

⁶ *Centre de Recerca en Sanitat Animal, Universitat Autònoma de Barcelona*

CONTENT

The spread of an infectious disease within the livestock population is highly determined by the network of contacts between farms. Usually, a small fraction of the population contributes disproportionately to spread the infection and therefore targeted interventions aimed at those farms are highly effective. The aim of the present study was to identify the pig farms that would potentially have the highest contribution to the dissemination of infectious diseases in Argentina by transporting breeding pigs. The network was built with the movements originated in farms authorized for the sale of breeding animals and with destination to commercial farms during 2017. The farms were the nodes of the network and the movements of animals among them, the edges. We calculated farms-level network properties (in- and out-degree, and betweenness). Those values were used to calculate the basic reproductive rate (R_0) according to Woordhouse et al. (2005). To examine the role of each farm in the potential transmission they were removed one by one, starting by those with the highest degree and/or betweenness; the R_0 was calculated for each reduced network and divided by the R_0 of the full network according to Marquetoux et al., (2016). The biosecurity score was calculated according to Alarcón et al. (2018) for all the farms. Results evidenced that just 2.7% of the nodes (i.e. 39 farms) accounted for most of the potential spread of the disease as the removal of those nodes resulted in a reduction of 80% of the R_0 ratio. The biosecurity score of those “super-spreaders” was similar to the other farms (41% vs. 37%). The results of this study show that a targeted program for increasing the biosecurity of those farms and a continuous surveillance of their health status might be a cost/effective approach to prevent dissemination of diseases at country level.