



Estimating time to animal welfare concerns under movement restriction during classical swine fever (CSF) outbreaks

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Interpretative summary

Stochastic risk models were developed to estimate the time to overcrowding and feed shortage in swine premises with different production phases (nursery, grow-finish, and wean-finish) in different CSF outbreak scenarios generated using the Indiana premise identification data. Overcrowding emerged before feed shortage in more than 75% of the simulated iterations. The estimated median (5th and 95th percentiles) numbers of days when either overcrowding or feed shortage would emerge ranged from 18 (4, 40) in nursery to 72 (5, 150) in wean-finish pigs.



Source: Canadians for Ethical Treatment of Food Animals

Introduction

Millions of pigs were euthanized due to animal welfare concerns resulting from movement restrictions during historical CSF outbreaks (Elbers, et. al., 1999). Despite being recognized as one of the major welfare concerns under movement restrictions, only limited studies have quantitatively assessed overcrowding in swine herds (Bargen & Whiting, 2002). The objective of this study was to quantify the time elapsed before an animal welfare problem emerges due to movement restrictions in the swine herds in Indiana, USA during CSF outbreaks. Animal welfare concerns investigated were overcrowding and feed shortage.

Material and methods

Data sources: Indiana premise identification data, published studies, and a roundtable discussion among experts in epidemiology and swine production.

Risk models: Stochastic risk models were developed to estimate time to overcrowding (TOC) and time to feed shortage (TFS) in the swine premises under movement restrictions during CSF outbreaks.

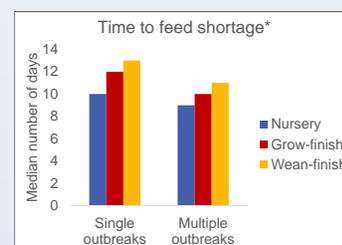
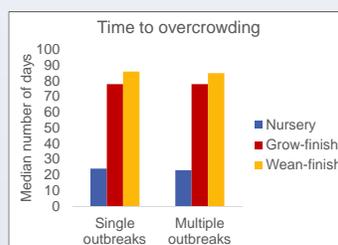
Procedure: The most likely CSF outbreak scenarios (6 single and 5 multiple outbreaks) were identified and simulated to estimate the epidemic duration at the beginning of the outbreak, which was assumed to affect premise owner's decision on whether to continue purchasing feeds or not. **Feed shortage was modelled as dependent on initially estimated epidemic duration, initial and harvest/transition age of pigs, and number of days of the outbreak in progress.** We assumed that a facility would reach its maximal capacity when the pigs reach the harvest/transition age. **Overcrowding was defined as when total weight of pigs on a premise exceeded 100-115% of the maximal capacity of the premise (measured as total weight at harvest/transition age).** 10,000 iterations were simulated to estimate TFS and TOC during a time period of 365 days. The median, 5th and 95th percentiles of TFS and TOC were reported.

References

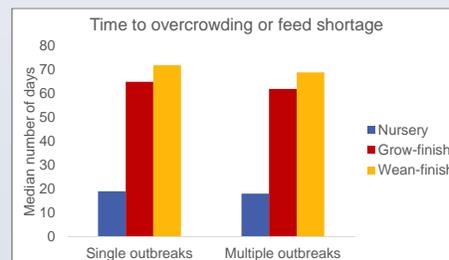
Elbers, A.R., et al., 1999. The classical swine fever epidemic 1997-1998 in the Netherlands: descriptive epidemiology. *Preventive Veterinary Medicine*, 42(3-4), 157-184.
Bargen, L.L., Whiting, T.L., 2002. Time to critical overcrowding of Manitoba swine barns in the event of restriction on animal movement. *Canadian Veterinary Journal* 43, 855-862.

Results

- Overcrowding occurred in all the simulated iterations (10,000/each) during the 365 day simulation period.
- Feed shortage occurred in approximately 30% of the iterations.
- Overcrowding emerged before feed shortage in more than 75% of the simulated iterations.
- However, if feed shortage occurred, it often occurred very early during the outbreak.
- Animal welfare concerns emerged fastest in nursery pigs with the estimated median (5th and 95th percentiles) number of days to be 18 (4,40).



*Medians were derived from the iterations (approximately 30%) when feed shortage emerged



Discussion

In this study, we developed different stochastic risk models to estimate the time to overcrowding and/or feed shortage in swine herds under movement restrictions during CSF outbreaks. These two outcome measures were identified as the two main animal welfare concerns during a CSF outbreak by the experts participating in a roundtable discussion. Both overcrowding and feed shortage could occur faster in nursery swine premises than in premises with other production phases. These findings may assist in planning for mitigation strategies during a foreign animal disease outbreak.

Conclusion

Overcrowding and feed shortage can emerge in swine herds under movement restrictions during a CSF outbreak. These animal welfare concerns can emerge more quickly in nursery premises than in premises with other production phases.

Acknowledgements

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