Modeling the spread of African swine fever in the Belgian pig livestock industry

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Context
New cases of African swine fever (ASF) are regularly reported in Eastern Europe since its spread from Georgia in 2007. Consequently the risk of ASF introduction to Western Europe is not null.

Question:
What would be the consequences of an introduction of ASF virus in Belgium?

Data & Methods

DTU-DADS-ASF model (Halasa et al., 2016)
A stochastic model that simulates ASF spread

1°) Within-herd spread (SLIR)
2°) Control Methods (detection, movement restrictions, surveillance zones, culling …)
3°) Between-herd spread (Direct contacts, indirect, local)
4°) Economic module

Outputs
• Per infected herd:
  • Diagnosis time
  • Infection time
  • Infection mode
  • IDs
  • …
• Per iteration (epidemic):
  • First detection time
  • Number of infected herds
  • Epidemic duration
  • Economic losses
  • …

Results
Various scenarios were simulated based on the herd(s) selected to start the disease spread (index herd). Each scenario is simulated with 2000 iterations.

Conclusions
The model predicts that, in most of the cases, the disease will be detected and controlled before any spread, if the index herd is chosen randomly. Nevertheless if ASF virus is introduced in a "super-spreader" herd (worst case scenario), the number of infected herds is predicted to be 6 (median). The predictions estimate the time of first detection before 20 days after introduction of the virus (median).

Results on potential epidemic sizes and resources needed during such epidemics can be useful to build contingency plans. Further studies should include economic data to compute costs related to the epidemic.