

African swine fever modelling: defusing a ticking time-bomb



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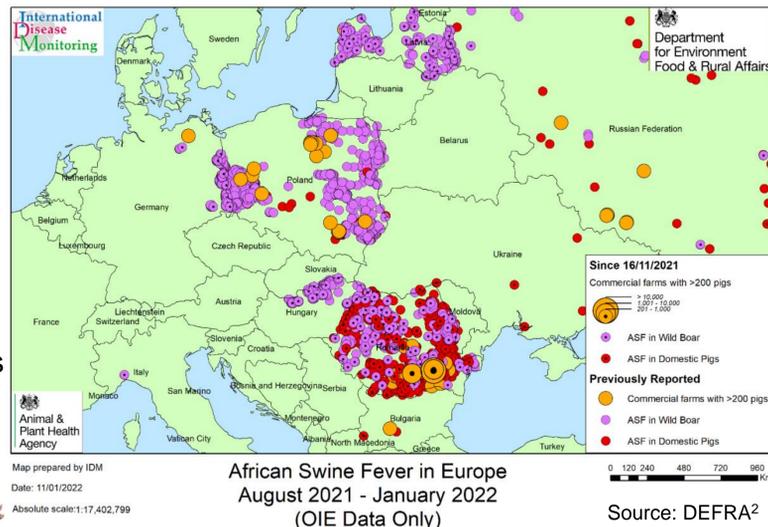
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Problem

- African swine fever (ASF) is a highly lethal viral disease of pigs¹
- Transmission:**
 - fomites and contact
- Cure or vaccine:** none
- Concerns:**
 - animal health and welfare
 - food security and economies

Situation in Europe²

- February 2021–January 2022
 - 1912 pig herd outbreaks
 - 8490 wild boar cases
- Italy latest to record new cases



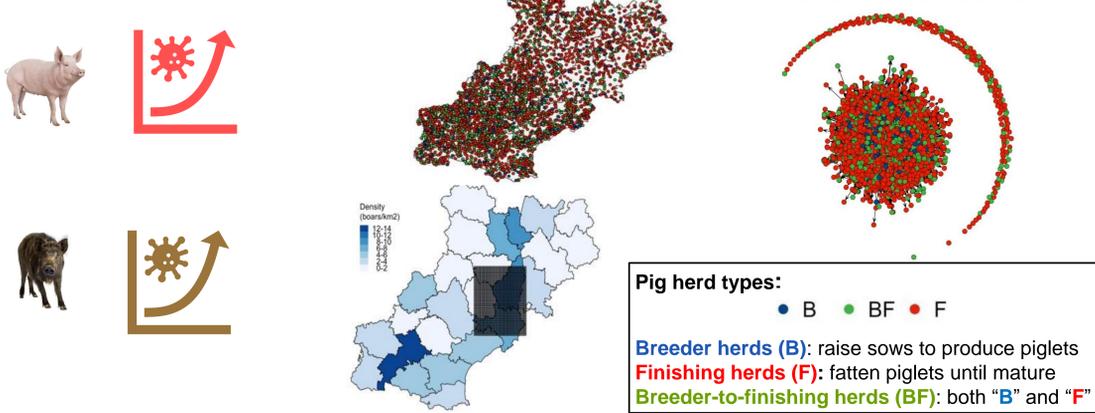
Modelling challenge

- ASF modelling challenge³ organized by the French National Research Institute for Agriculture, Food, and the Environment
- Aim:** To expand development of ASF models to inform policy makers in a timely manner
- Data:** A synthetic epidemic
 - involving pig herds and wild boar
 - generated by a model, M0³
- Three prediction periods
- Six participating teams: this work is that of UK Team



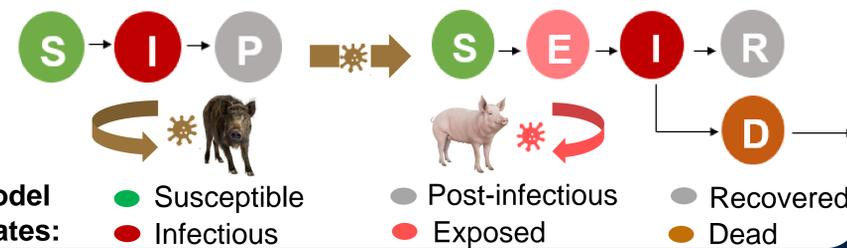
Challenge data

Detected incidence + Animal locations + Pig herd characteristics and trade network

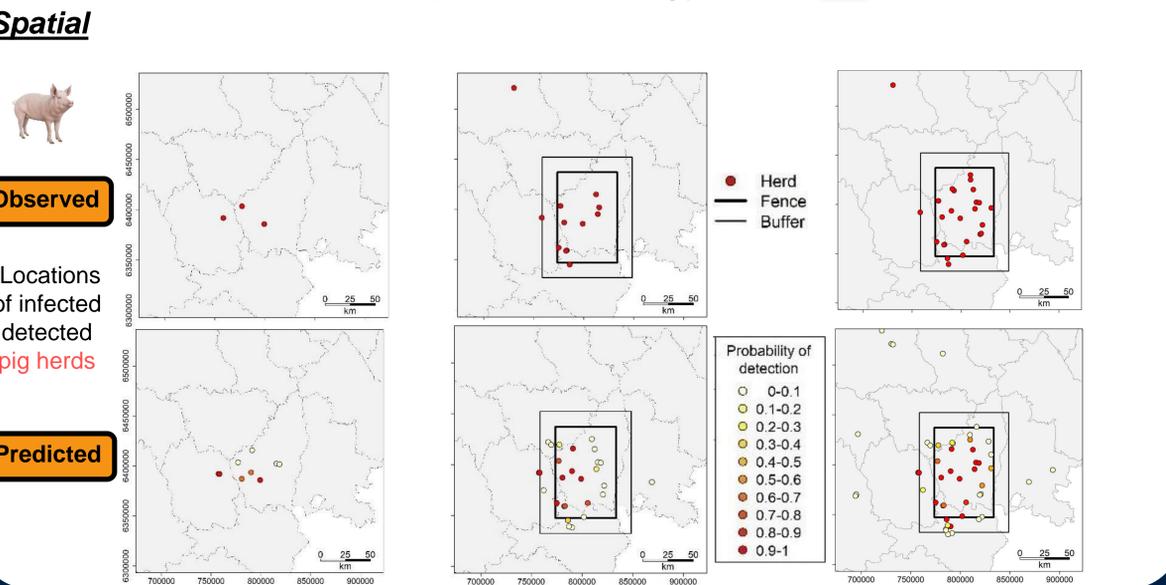
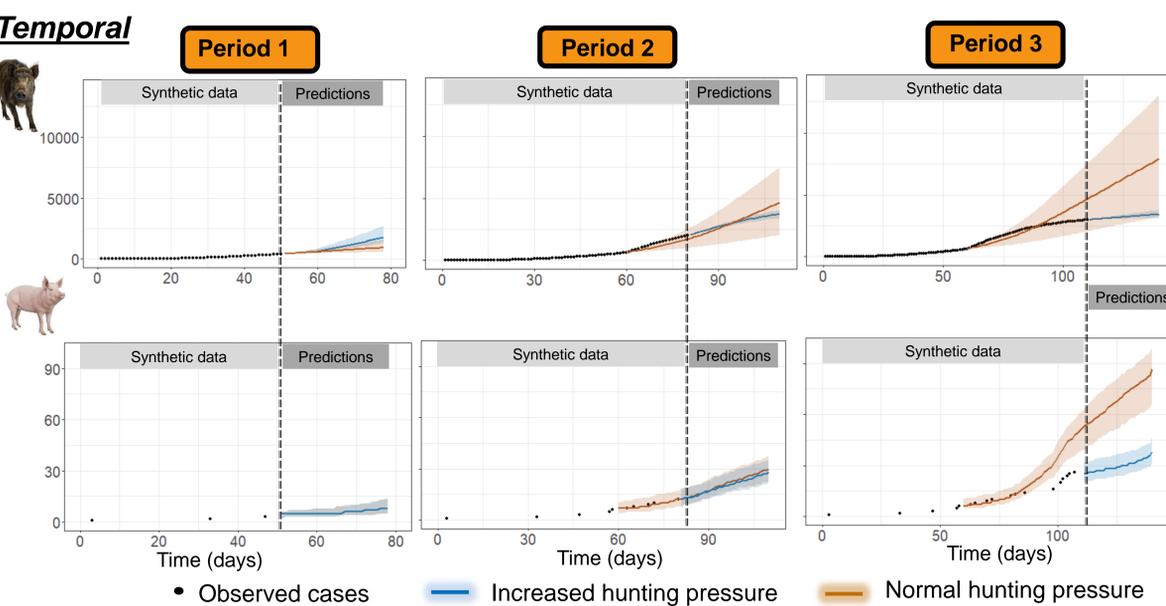


Mathematical model

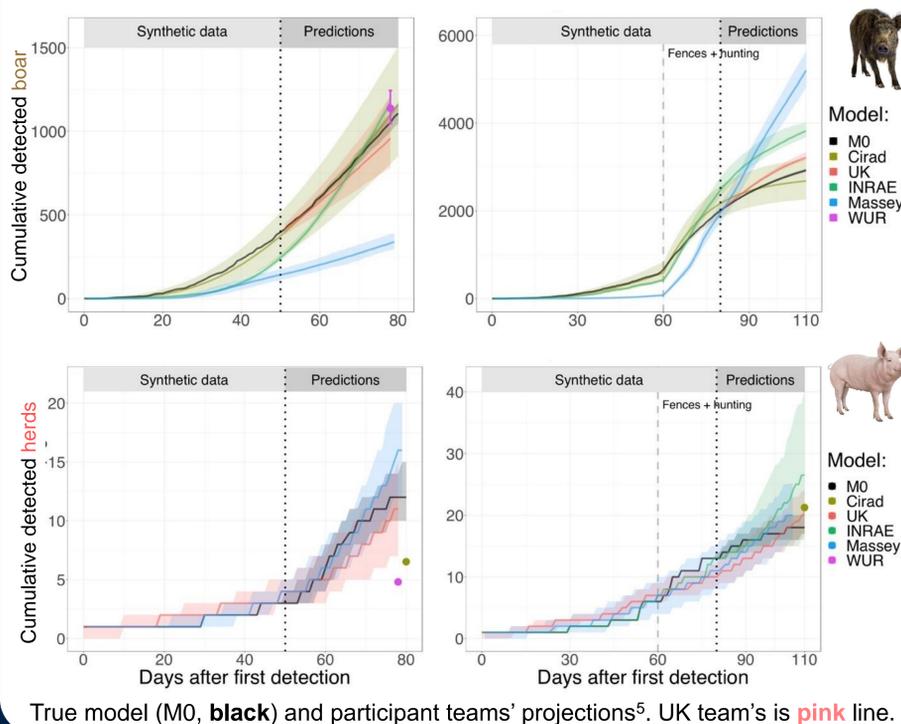
- We developed a spatio-temporal stochastic modelling framework for ASF transmission among wild boar and pig herds⁴
- Model structure (below) allowed to evaluate impacts of alternative management measures on epidemic outcome



Model projections by UK Team



How did our projections fare?



Conclusions

- What did we find?**
 - Wild boar infection dynamics highly impacted pig herd dynamics
 - Timescale considerations necessary in evaluating interventions
- Why is our work important?**
 - Could inform policy decisions on ASF control in a real outbreak
 - Could incorporate economic factors for cost-benefit analysis

Acknowledgements
The authors would like to thank the ASF challenge organizers for the opportunity to engage in such an important and interesting endeavour as ASF transmission modelling.

References
¹ OIE (2021). African swine fever Technical Disease Card
² DEFRA (2022). Ref: VITT/1200 ASF in Europe. <https://bit.ly/3rZhnFx>
³ Picault et al. *bioRxiv* 2021.12.20.473417
⁴ Halasa et al. (2016). *Front. Vet. Sci.* 0,6.
⁵ Ezanno et al. (Submitted manuscript).

Main author contribution
Emmanuelle A. Dankwa contributed to: Conceptualization, Methodology, Formal analysis, Data Curation, Writing – Original Draft, Writing Review & Editing, Visualization