African Swine Fever transmission in the EU
Modelling the domestic-wildlife interface

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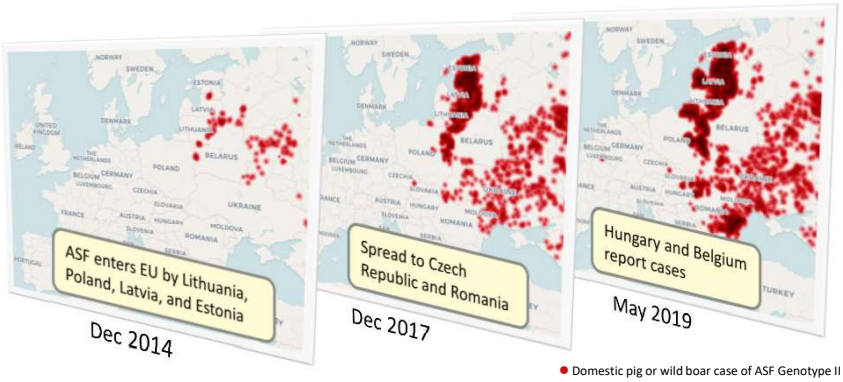
1. BACKGROUND

ASF is a **highly pathogenic** DS-DNA arbovirus (the only one)!

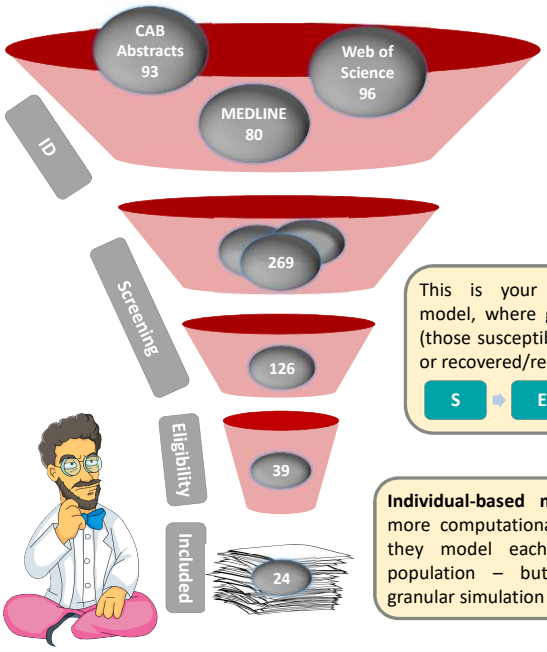
Both domestic pigs and wild boar affected with a **case fatality near 100%.**

Models have so far helped elucidate **key transmission variables** both within and between herds, but many questions remain unanswered…



Pittiglio, Claudia. Animation of the cumulative ASF cases and outbreaks since 2014. FAO. Viewed 2/20/2020. https://claudiapittiglio.carto.com/me

2. SYSTEMATIC REVIEW



ASF mechanistic model frameworks

- Deterministic, Stochastic
- Compartmental, Individual-based
- Transmission, Surveillance, Control

This is your basic **compartmental** model, where groups of a population (those susceptible, exposed, infectious, or recovered/removed) are modeled

S → E → I → R

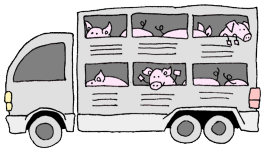
Individual-based models are much more computationally intensive – as they model each individual in a population – but allow a highly granular simulation of disease course.

3. RESEARCH QUESTIONS

- What are the **primary routes of propogation** during an ASF outbreak involving both domestic pigs and wild boar?
- What are the **interspecies transmission parameters** between domestic pigs and wild boar?
- What will be the **effective control strategies** to employ in the event of a sanitary crisis?
- **Can we stop the spread of ASF in the EU?**

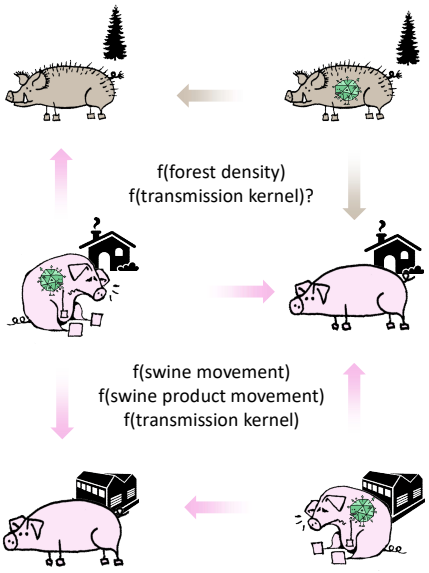
4. MODEL DEVELOPMENT

Utilizing both **spatial transmission kernels** and **direct and proxy variables** for pig farms, boar sounders, and animal movements, we will build a **stochastic individual-based model** of ASF transmission incorporating both the domestic and wildlife components.



Spatial transmission kernels will be parameterized from surveillance data.

Our model will be optimized through **MCMC adjustment** to data from recent outbreaks.



Delpont, Mattias. Pig, boar, and virion illustrations. Ecole Nationale Vétérinaire de Toulouse.

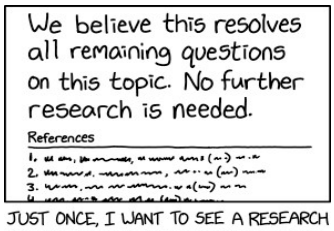
5. ANTICIPATED OUTCOMES

Creation of an ASF model that **couples transmission events** between the domestic and wild compartments.

Identication of **major determinants of recent outbreaks** when incorporating transmission between compartments.

Determination of the relative **efficacy of interventions** in an outbreak scenario involving both species.

Prediction of **where and how** ASF could spread following introduction to France by applying **nation-specific parameters** to our model.



XKCD. Comic #2268: Further Research is Needed. Created 2/14/2020.