Developing a multihost African Swine Fever transmission model at the domestic-wildlife interface





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BACKGROUND ASF cases, SE Romania, Jun 2018 - Aug 2019 Romania is currently experiencing an **ASF** Domestic pig (DP) ASF is a **highly** epidemic • Wild boar (WB) To ascertain the **contribution of** pathogenic DNA wild boar in epidemic spread, arbovirus and to devise **multihost control** Epidemic strategies, a multihost spread cannot mathematical model is n total swine There is **no treatment**, **no** be explained by constructed 50,001 to 100,000

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 Force of infection exerted by an infected domestic pig herd upon other herds via a transmission kernel*

2. Force of infection exerted by an infected wild boar cell upon neighboring cells

3. Force of infection exerted by an infected wild boar cell upon the domestic pig herds within cell

FORCE OF INFECTION EQUATIONS

$$\lambda_j(t) = \sum_i \lambda_{i \to j}(t) + \sum_p \lambda_{p \to j}(t) + \lambda_j^{ext}$$

$$\lambda_q(t) = \sum_i \lambda_{i \to q}(t) + \sum_p \lambda_{p \to q}(t) + \lambda_q^{ext}$$

 λ force of infection p*i* infected herd q*j* susceptible herd

p infected cell
 q susceptible cell

*A transmission kernel quantifies the effect of distance on transmission probability

- Backyard DP herd
 Commercial DP herd
 Infected DP herd
- WB cell
- Infected WB cell
- DP herd force of infection
- → WB cell force of infection

4. Force of infection exerted by infected domestic pig herds upon the container wild boar cell



Domestic pig herds are represented as centroids of villages and high-biosecurity industrial operations

Backyard herd (village)
 Commercial herd (industrial site)



Wild boar habitat is simulated through rasterized CORINE land cover (CLC) satellite imagery, with cells sized to group home ranges

Habitat suitability = P(WB|CLC)



ANTICIPATED OUTCOMES



Creation of a maleable ASF
transmission model adaptable
to other regions high in
backyard farming

Determination of **optimal control strategies** to address ASF outbreaks involving both domestic and wild compartments

Determination of the contribution of wild boar to ASF spread through the region Identification of control strategy outcomes across host compartments



Delpont, Mattias. Pig and boar illustrations. Ecole Nationale Vétérinaire de Toulouse. 2021