

## **Modelling vaccination strategies for ASF control among wild boars:** a computational approach

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## The Pythagorean theorem



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#### What about ASF vaccination process in mechanistic epidemiological modelling?

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# Considering detailed vaccination processes to manage the complex mechanisms of transmission in order to eradicate ASF



#### **In literature**

Vaccination processes

Effectiveness against infection

Effectiveness against transmission

included in existing processes

reduction in susceptible population

considered in the infection dynamics

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| The AAA'S Science, Edd. M. No. 3, September 2007 (*C.).<br>DOI: 10.1003/1210644119084-7  | NO  |   |  |
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| Dense: Emerging Concepts for Versile Development and<br>Guest Editors: Starley Mon, Only Emmons, and Netse M   | Research Article                                    |   |  |
| Modeling the Effects of Vaccinati  | on and Treatment on Panden                          | nic Influenza   |  |
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## Vaccination process Antibody-building



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# Swifco-rs

- spatially explicit stochastic individual-based model
- existing model in Rust
- specific implementation architecture → Entity-Component-System (ECS)



# Swifco-rs

- → Parameters at a fine-grain → effectiveness against infection, against transmission, duration of protection...
- → Parameters for vaccination management → zone, coverage, number of campaigns...
- → **Individual-based** → tracking of each individual, historical transmission...











| Scenario          | infection<br>protection | infectious<br>protection | nb campaigns<br>per year | Adults<br>coverage | Piglets<br>coverage |
|-------------------|-------------------------|--------------------------|--------------------------|--------------------|---------------------|
| no vaccination    |                         |                          |                          |                    |                     |
| "common" vaccine  | 0.8                     | 0.4                      | 2                        | 0.6                | 0.6                 |
| "variant" vaccine | 0.5                     | [0.1-1.0]                | 2                        | 0.6                | 0.6                 |

time step week time duration 15 years repetition 500

#### **Results** Swine Lake



## Considering detailed vaccination process

- understand spread mechanism with vaccination at a fine grain
- evaluate different vaccination strategies
- "The worst is not necessarily the least good."
  - depend on the context (objectives, etc.)



- ➡ Manage vaccination campaign according to vaccine specifications
- ➡ Public policy strategies aiming to the eradiction of ASF (in Saxony)





# Thank you for your attention!

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