Presentation of PhD

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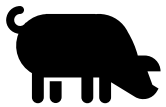
UMR ASTRE

25/04/2023

Context



Swine influenza

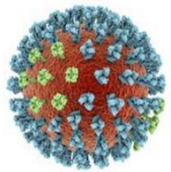
- Economic losses €
- Zoonotic disease
- Control : Existing different type of vaccines

Recurent disease

Better prevent

- influenza infections in poultry and pigs
- emergence of zoonotic diseases associated with animal influenza viruses



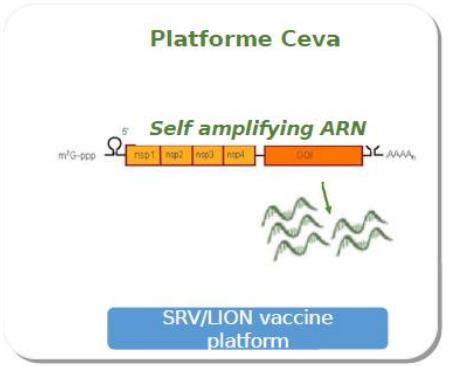



Ambitions

Objectives

Establish a mechanism/ platform for the **rapid, reactive and prospective developement of RNA vaccine** candidates against animal influenza viruses

Provide tools to optimize large-scale vaccine strategies at national and European level (including in Europe)



- BioFluARN project -thesis

Evaluation of the effectiveness of vaccination strategies at the chain value level : the case of swine influenza virus in France

- Period : 01/12/2022 to 30/11/2025
- Cirad-Montpellier
- Supervision of : Andrea Apolloni and Claire Hautefeuille (Cirad), and Gwenaëlle Dauphin (Ceva, Animal Health)

Evaluate the impact of different vaccination strategies

- Adapt to swine industry
- Epidemiological context: endemic situation
- Including new vaccine solutions (e.g. RNA vaccine)
- Describing the evolution of immunity level in each stage of the value chain

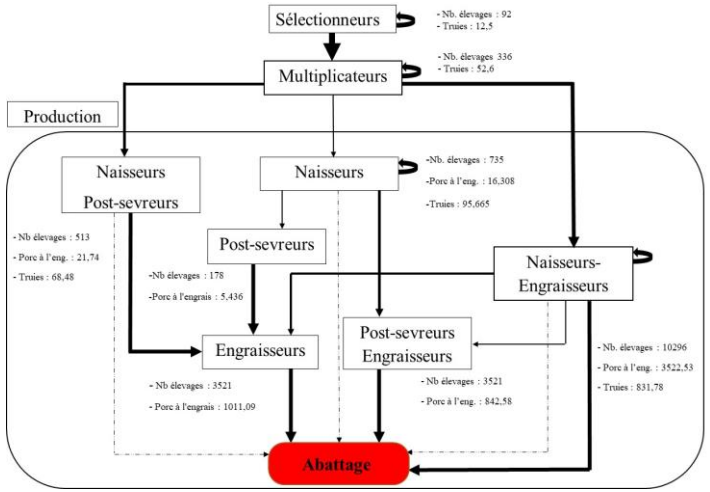
- Compare and identify the most efficient vaccine strategies(e.g. morbidity/cost-benefit balance)
- Provide vaccine characteristics to be developed (e.g. efficacy and duration of immune protection) and terms of application (e.g. Piglet vaccine)

Provide a generic tool can be adapted to different contexts (other countries/ other sectors)

Step 1

Literature review

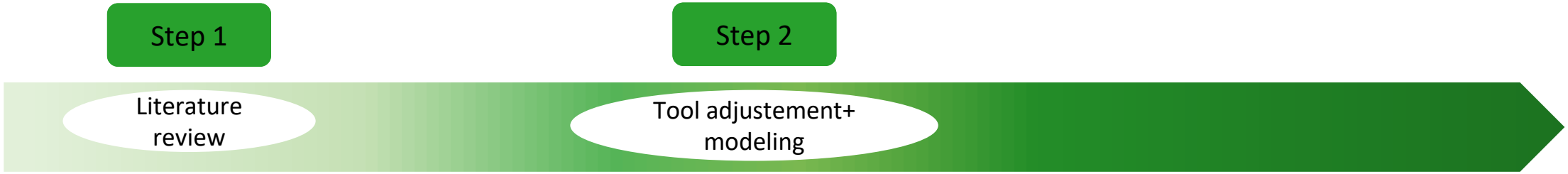
- French pork industry (farms level, chain value level)
- Swine influenza
- Viral strains
- Vaccine efficacy (in connection with the ESFLU network)
- Epidemiological models have already been developed
- Analysis of Ceva data



Organization of the swine industry in France

Description of the national swine industry

1. Farms types:
   - Number of farms
   - Number of animals in the farms
   - Geographical distribution
   - Farm size
2. Flow of animals between different farms types :
   - Age groups
   - Percentage and frequency



evacs-

Modeling immunity distribution profiles

- Evacs is a decision tool for the evaluation of the most efficient vaccination strategy to prevent and control animal disease circulation.
- It is used for avian influenza disease

Applied EVACS tool to swine flu

Step 1

Literature review

Step 2

Tool adjustement+ modeling

Modeling using Evacs tool

- Demography
- Type of breeding
- Swine industry

- Vaccine efficacy
- Duration of the immunity

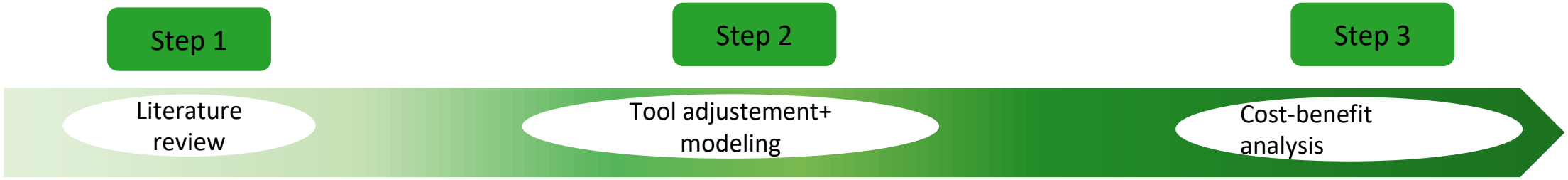
Introduction of the virus (SwIAV)

- Matrix model: follow immunity level during animal lifetime /Different vaccination strategies (quantity, target population, period)

- Epidemiological model:
  - Compartmental
  - Age groups
  - Flow between different stage

Post-vaccination coverage rates by age group within each stage

Input | Process | Output



- Compare vaccination strategies:
  Reduce the spread of the virus
  Financial benefits

Thank you for your attention