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# Quantification of human exposure to antimicrobial resistant *E. coli* using a farm-to-fork model in broiler chicken production.

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## CONTEXT

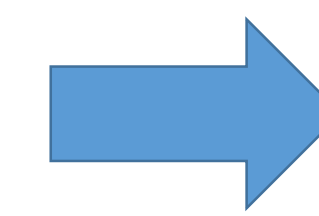
**PROJECT ENVIRE**

**CONSORTIUM AND FUNDING**

- Project duration: 2022-2025
- Germany, France, Lithuania, Poland, Tunisia
- Funded by the European Transnational Programme - **JPIAMR-ACTION**

**OBJECTIVES**

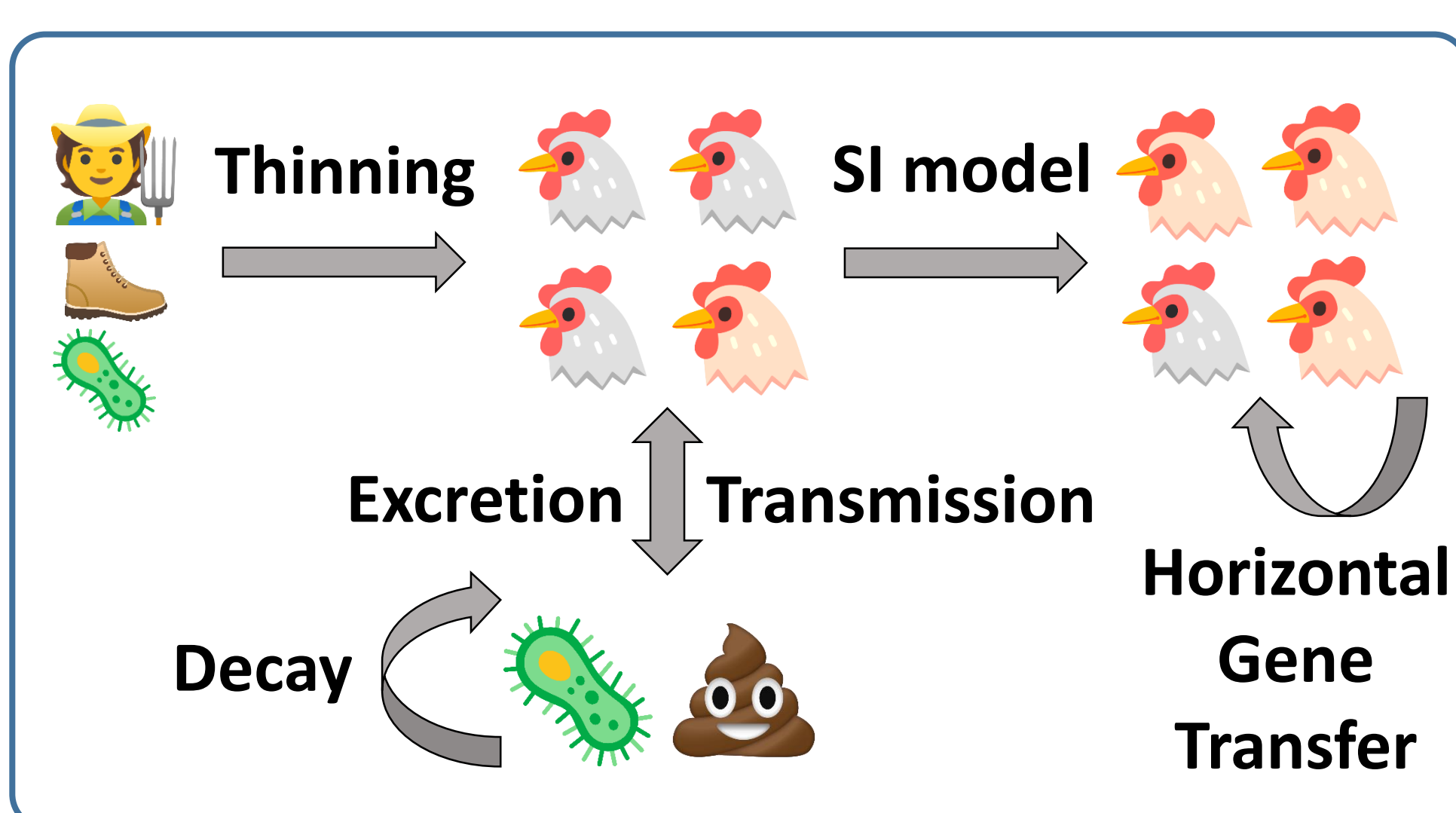
- Reduce antimicrobial-resistant (AMR) bacteria spread from broiler chickens
- Investigate the potential of various on-farm **intervention** measures
- Reduce transmission and human exposure to ESBL *E. coli* from broiler chicken



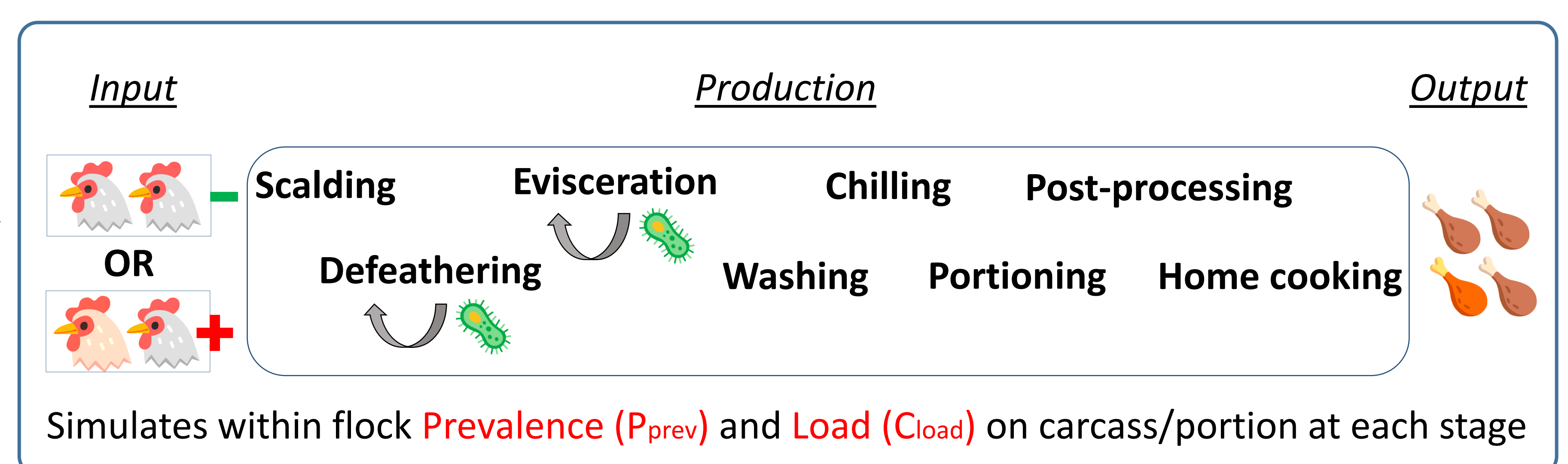
**WORKFLOW – WP 3**

- Quantitative Risk Assessment with pathways:
  - FOOD-BORNE
  - ENVIRONMENTAL
  - OCCUPATIONAL
- Incorporate on-farm intervention measures

## MATERIALS & METHODS **FOOD-BORNE FARM-TO-FORK PATHWAY**



Barn Load  
 Within Flock Prev.



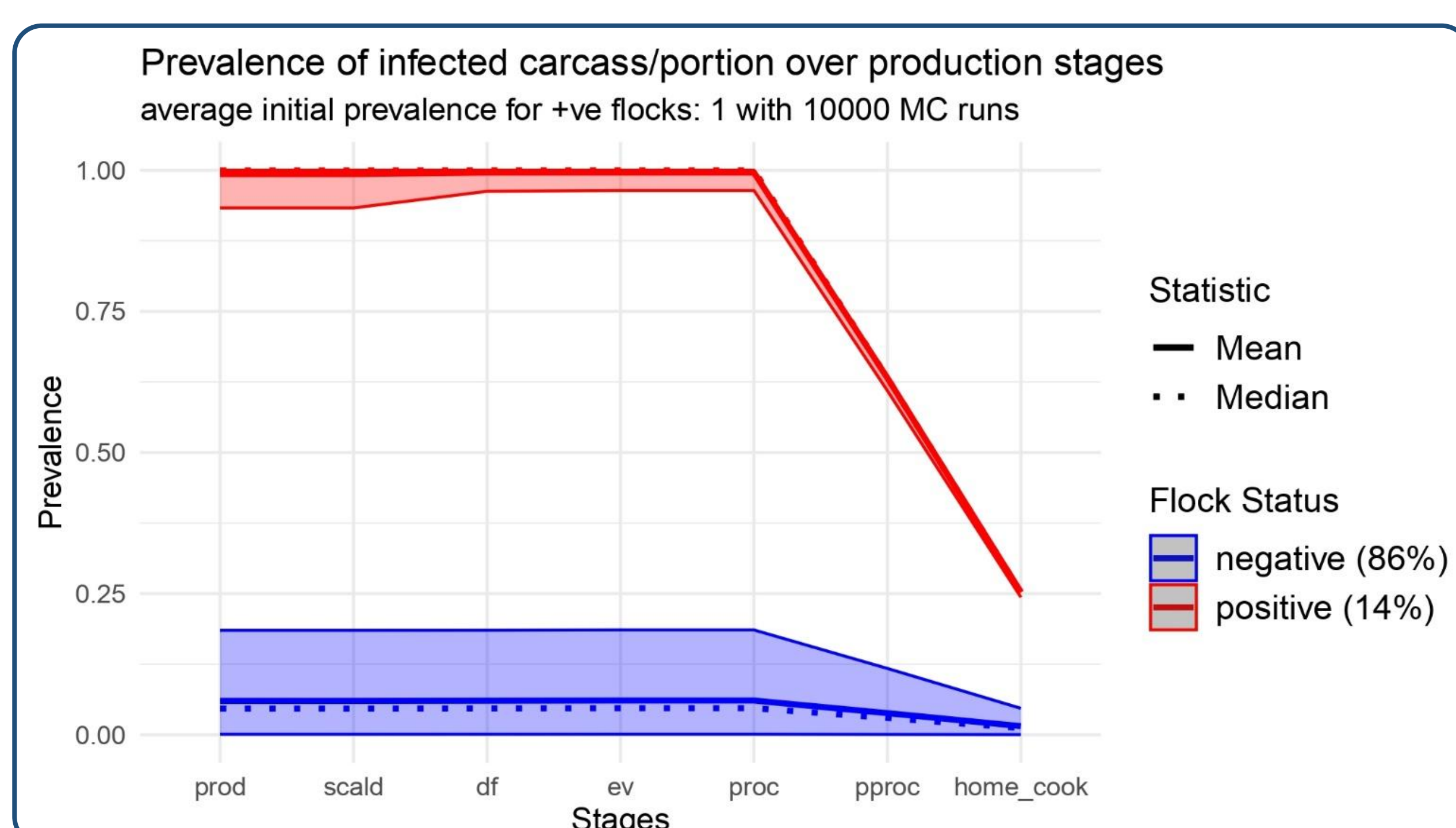
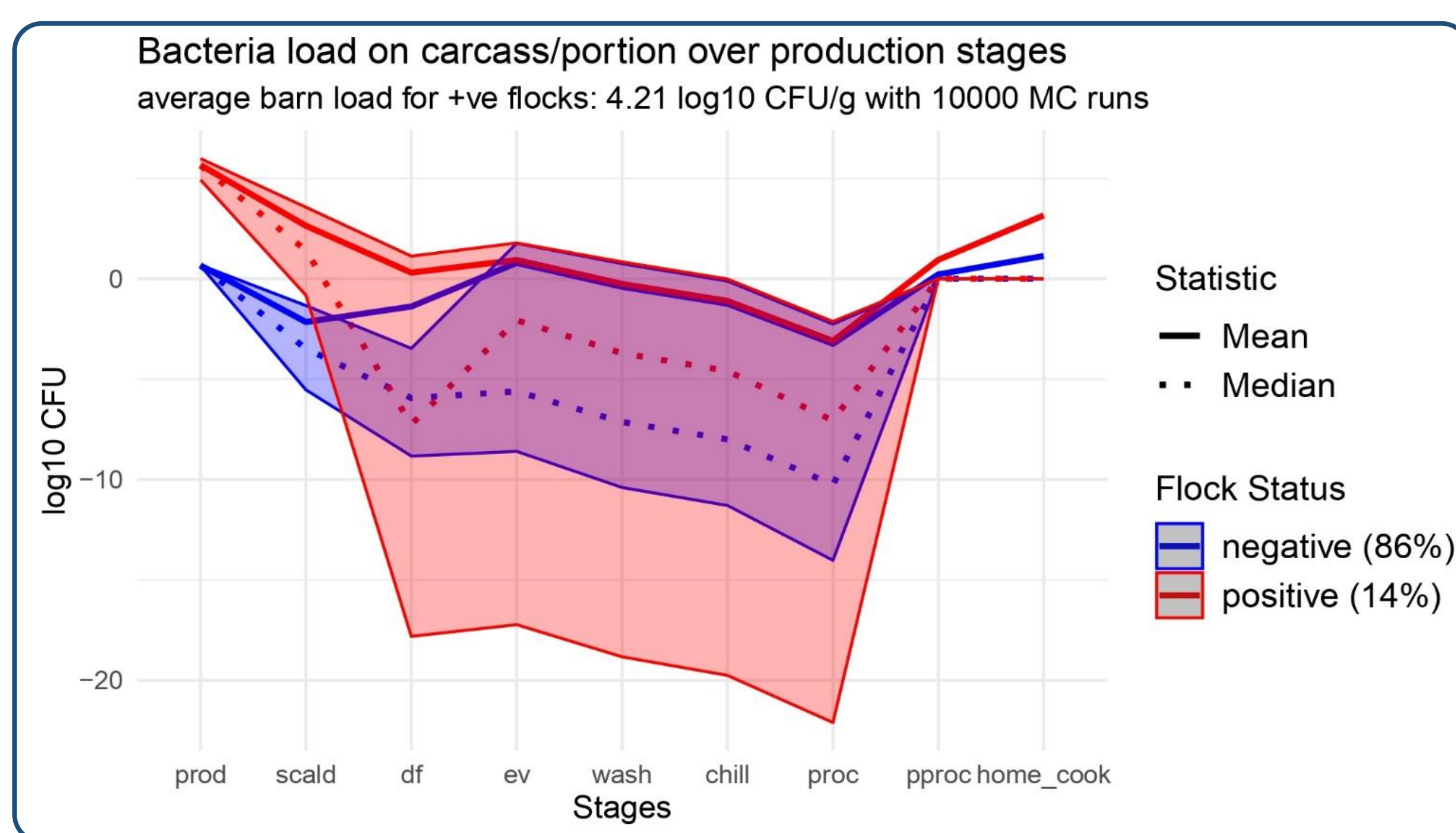
**DYNAMICS of ESBL *E. coli* in farm environment**  
 Transmission model Dame-Korevaar et al. (2020)  
 Horizontal Gene Transfer Fisher et al. (2019)  
 Susceptible-Infected model Becker et al. (2022)

**DYNAMICS of ESBL *E. coli* in processing**  
 Collineau et al. (2020) in ESBL *E. coli* setup  
 Updated with EU poultry farming practices  
 Simulates the processing of 1 chicken flock

**Flock Risk from 1 chicken portion consumed**

- Prob. of ESBL *E. coli* carriage by consumer
- Conditional on  $P_{prev}$ ,  $C_{load}$  after cooking
- $P_{DR}$ : Dose-Response Furusawa et al. (2024)

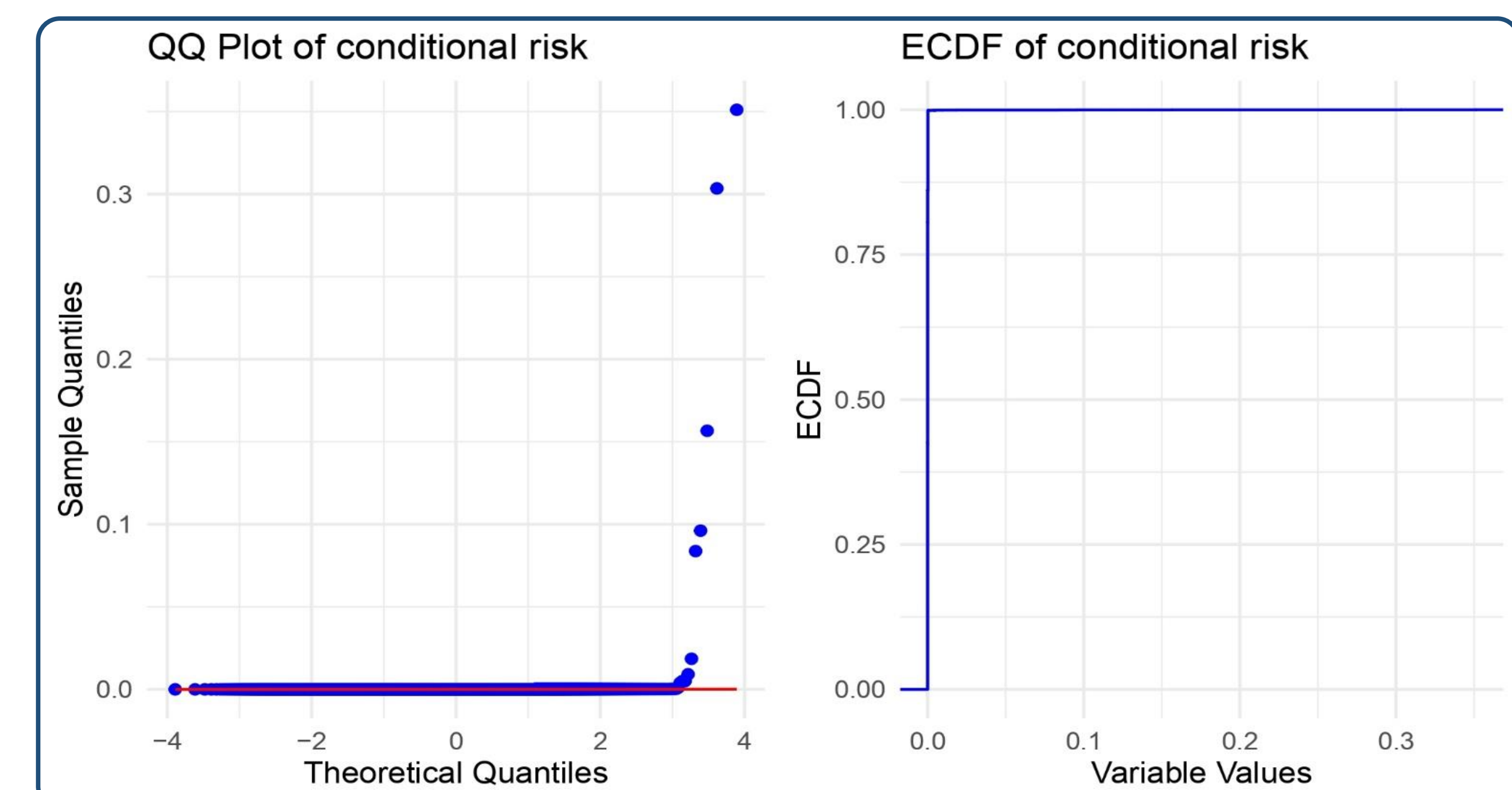
## RESULTS & PERSPECTIVES



**Average risk of ESBL *E. coli* carriage by consumer from 1 chicken portion consumed**

$$R_{\theta}^{portion} = \int P_{DR}(c_{load}) \cdot p_{prev} \cdot p(p_{prev}, c_{load}) \cdot dp_{prev} dc_{load}$$

**To estimate:** 10k independent flocks simulated with Monte Carlo runs  
 Average risk in a baseline scenario defined by input parameters  $\Theta$ : **1.4e-5**



**HEAVY TAILED Distribution**

Quantile metrics?  
 Difficult to interpret?

**Food-borne QRA module perspectives**

**Validation:** Simulation results are comparable with Faverjon et al. (2022)  
**Calibration:** Input parameters  $\Theta$  can be adapted to different EU country protocols  
**Work in Progress:** Integration of ENVIRE experimental data on interventions