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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**

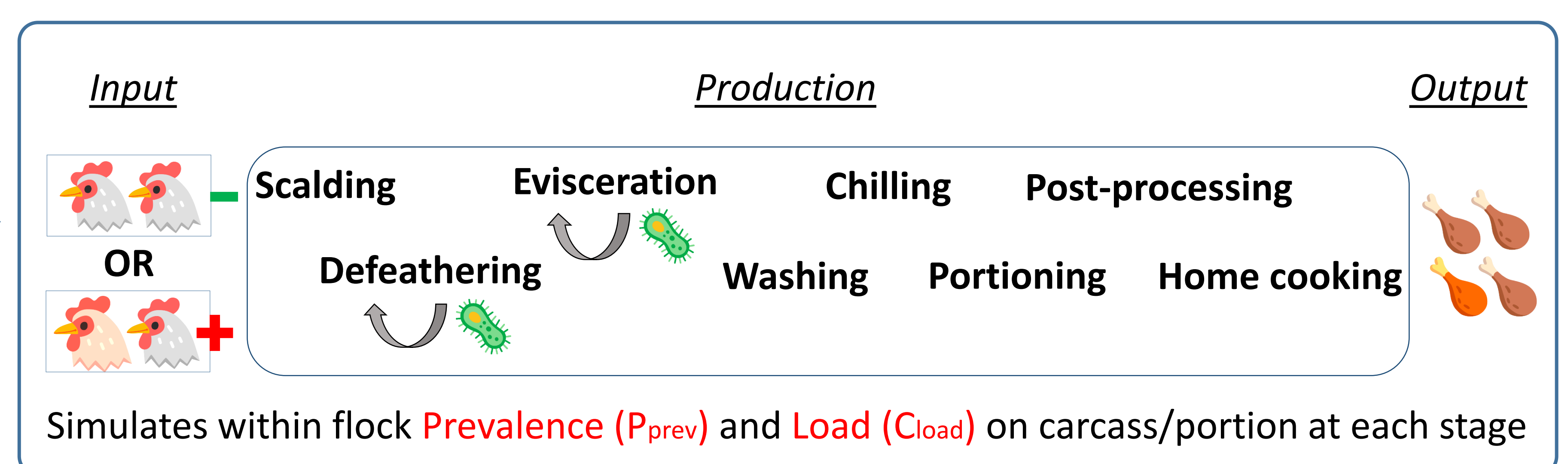
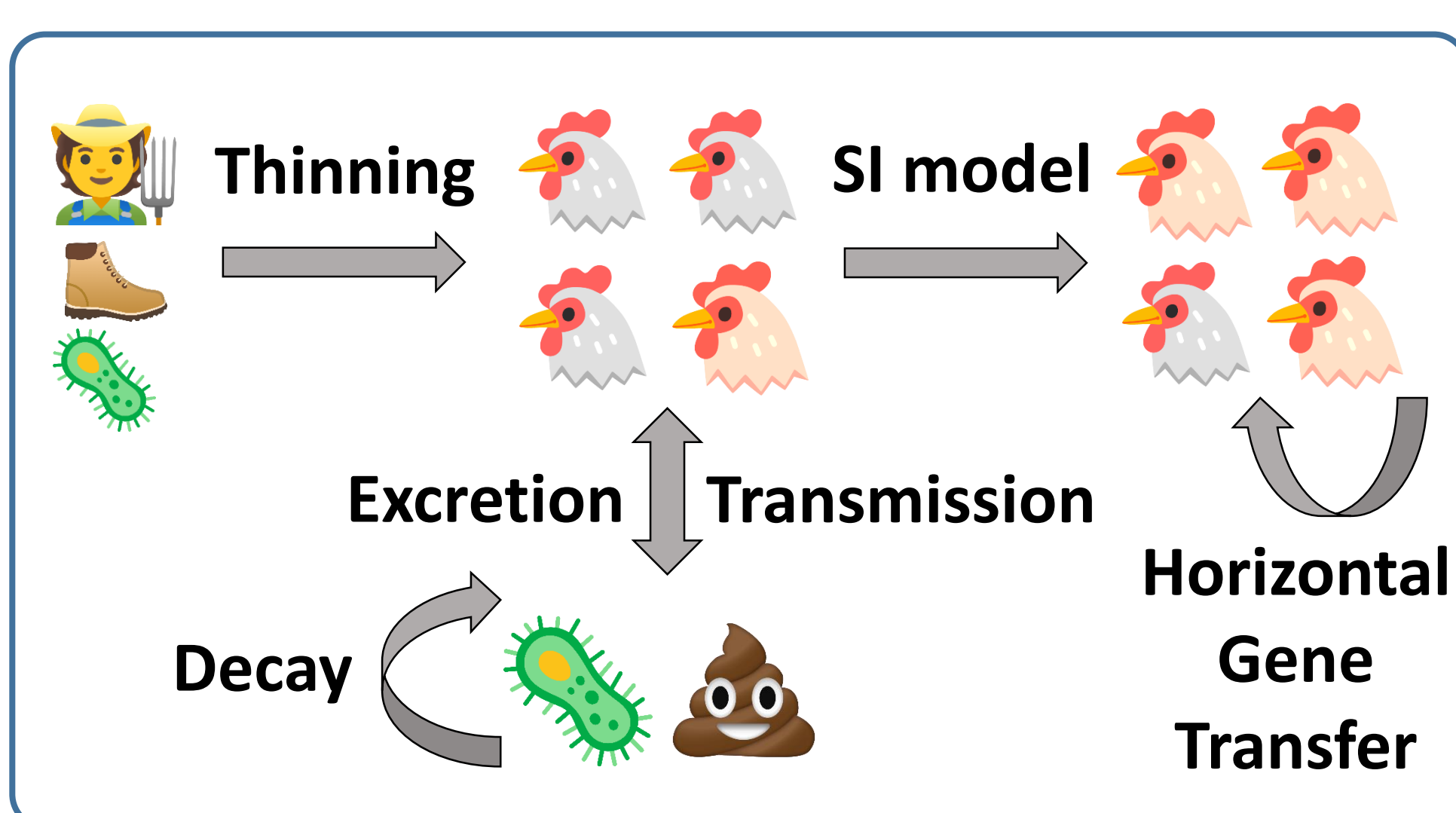
OBJECTIVES

- 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** ✓



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

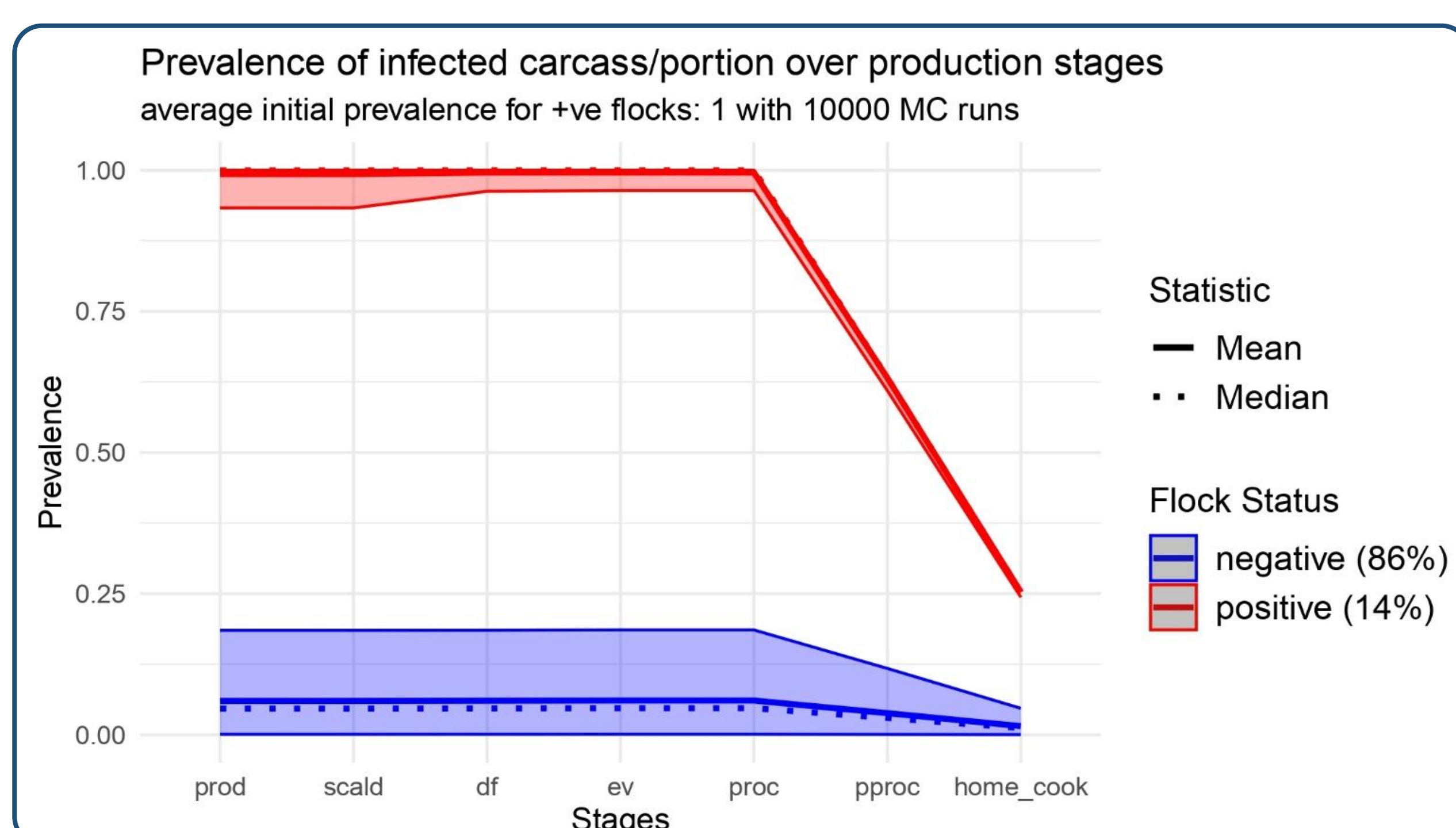
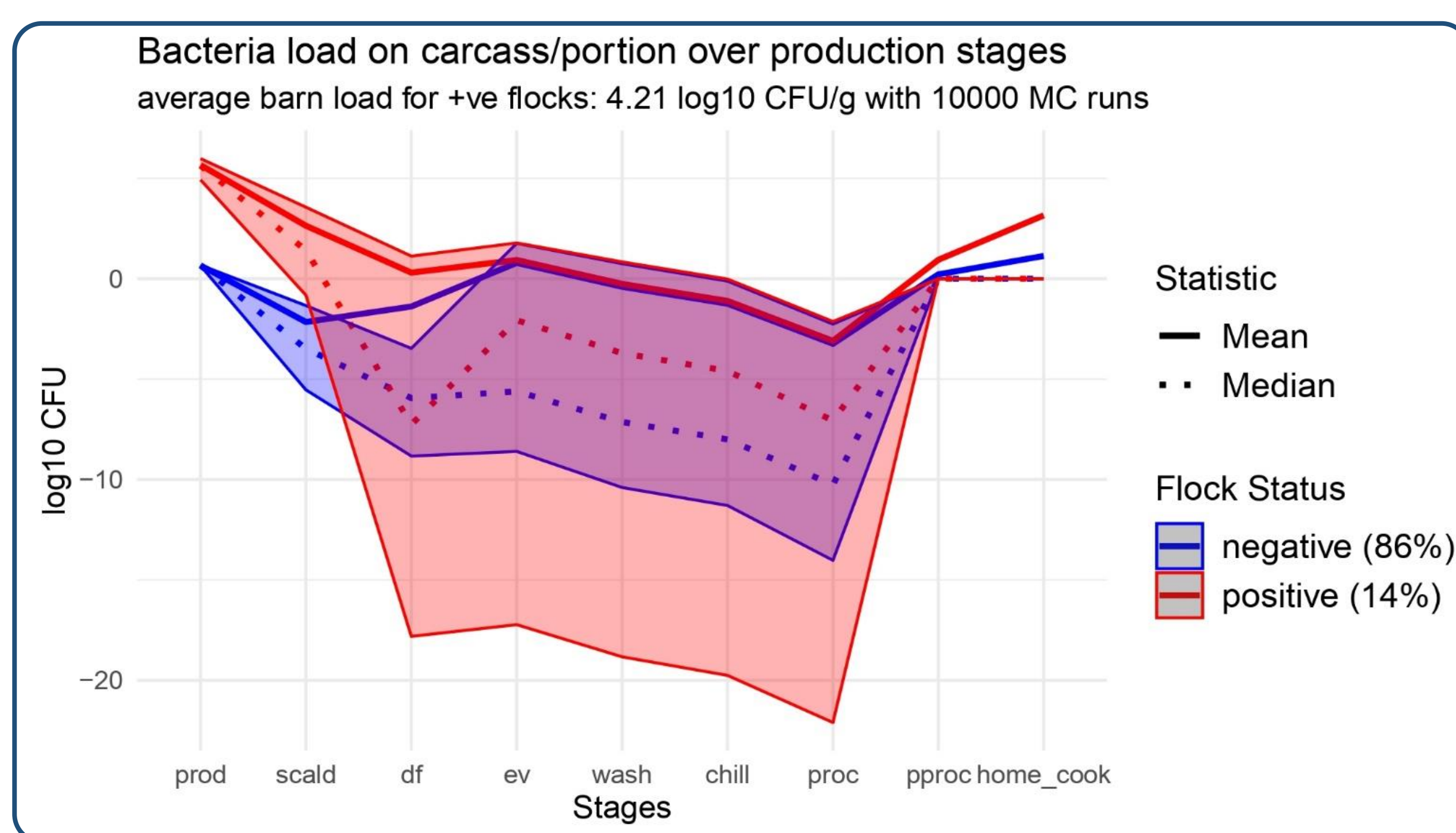
Collineau et al. (2020) in ESBL *E. coli* setup
 Updated with EU poultry farming practices
 Simulates the processing of 1 chicken flock

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)

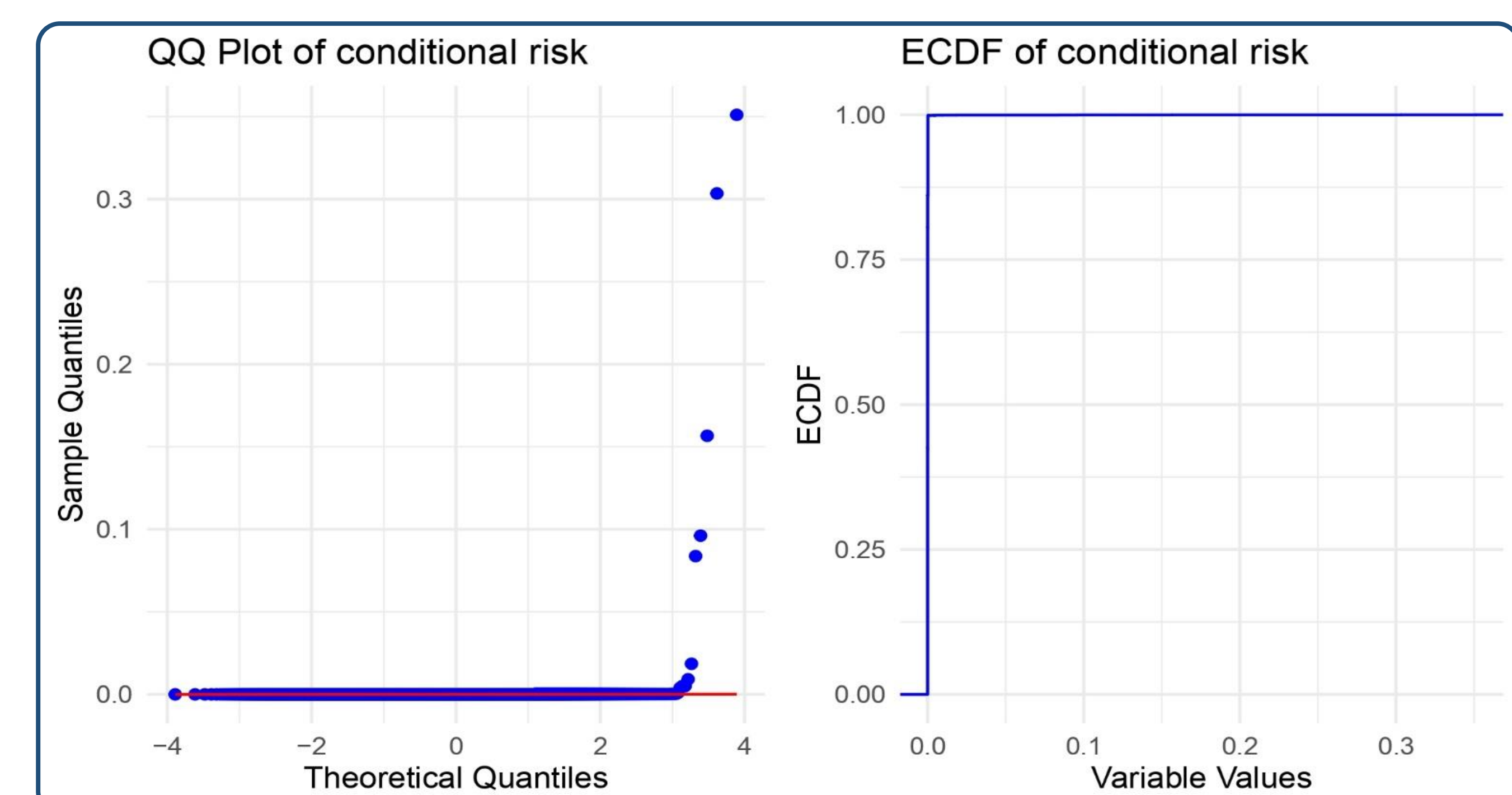
RESULTS & PERSPECTIVES



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 Θ : **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 Θ can be adapted to different EU country protocols
Work in Progress: Integration of ENVIRE experimental data on interventions



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