Modelling fattening pig production systems: use of a dynamic, stochastic, mechanistic model

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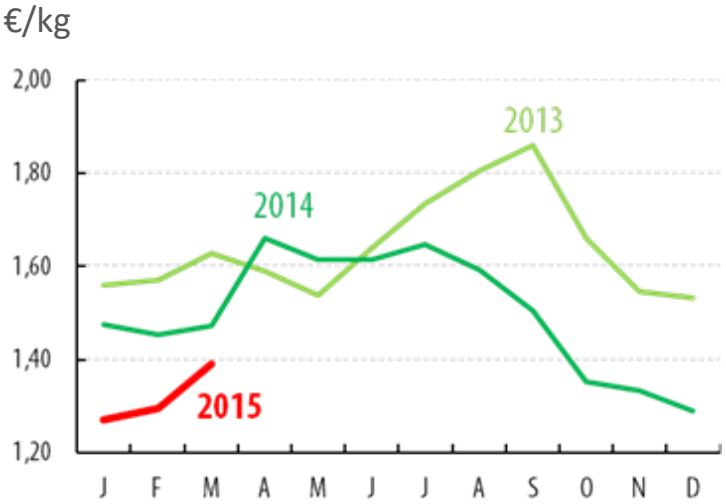
Introduction:

- European pig production faces economic and environmental challenges
- Fattening unit → major part of the total emissions and pig production costs



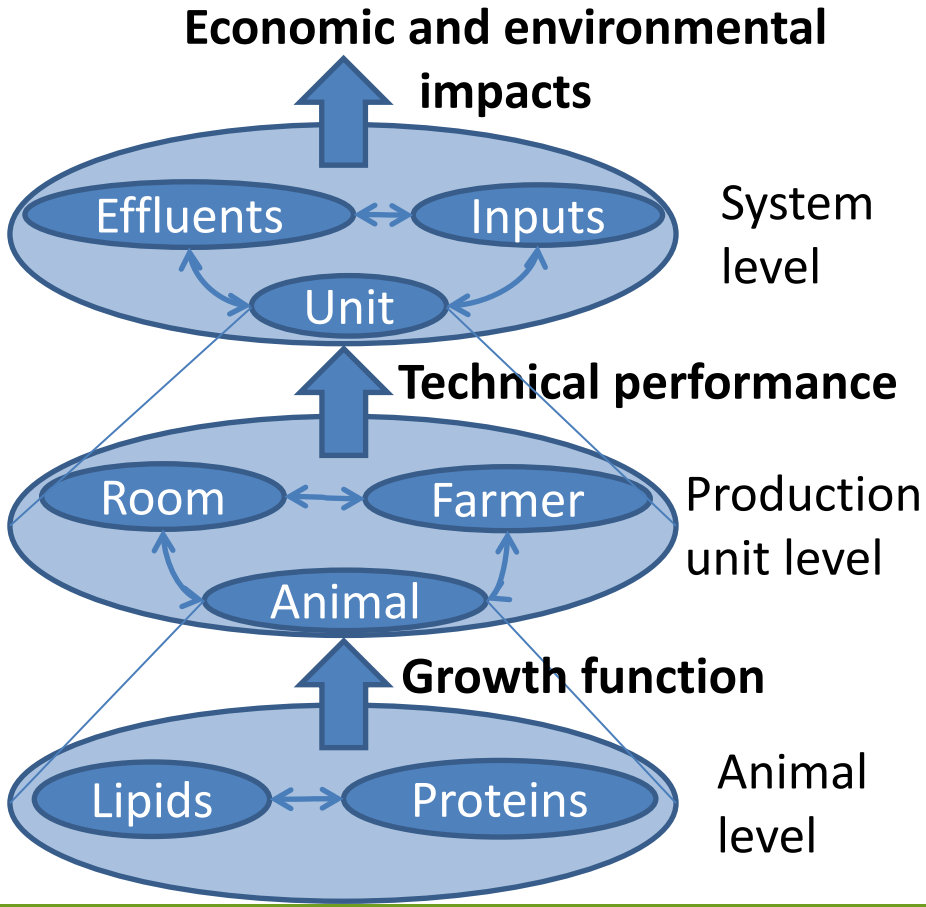
Evolution of French pork price

Introduction:

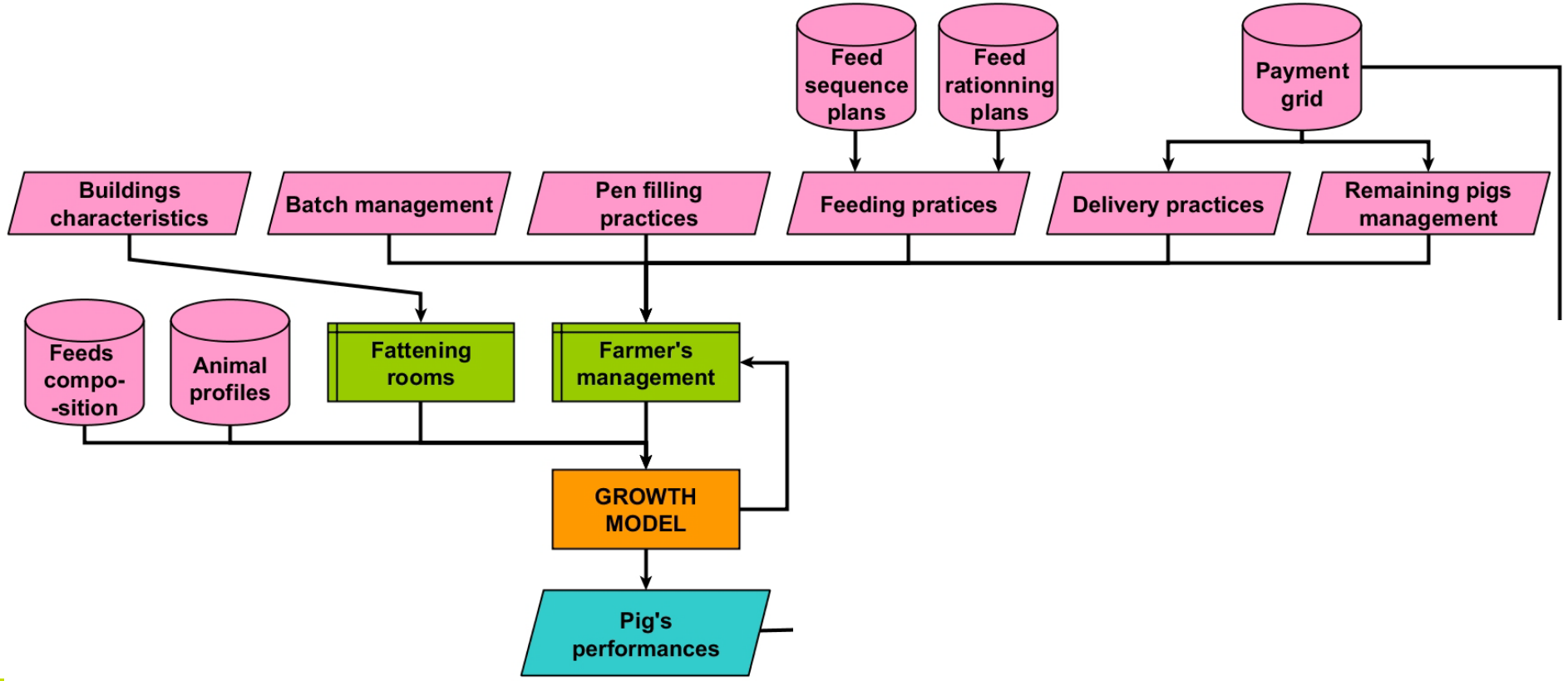
- Objective: To develop a pig fattening unit model
  - To simulate individual performance of pigs (variability) in interaction with the farmer's practices
  - To evaluate their effects on the technico-economic and environmental performance

Model characteristics:

- **Mechanistic**
- **Stochastic:** animal characteristics
  →individual-based model
  (Brossard et al., 2014)
- **Dynamic:** daily time-step



Model description:

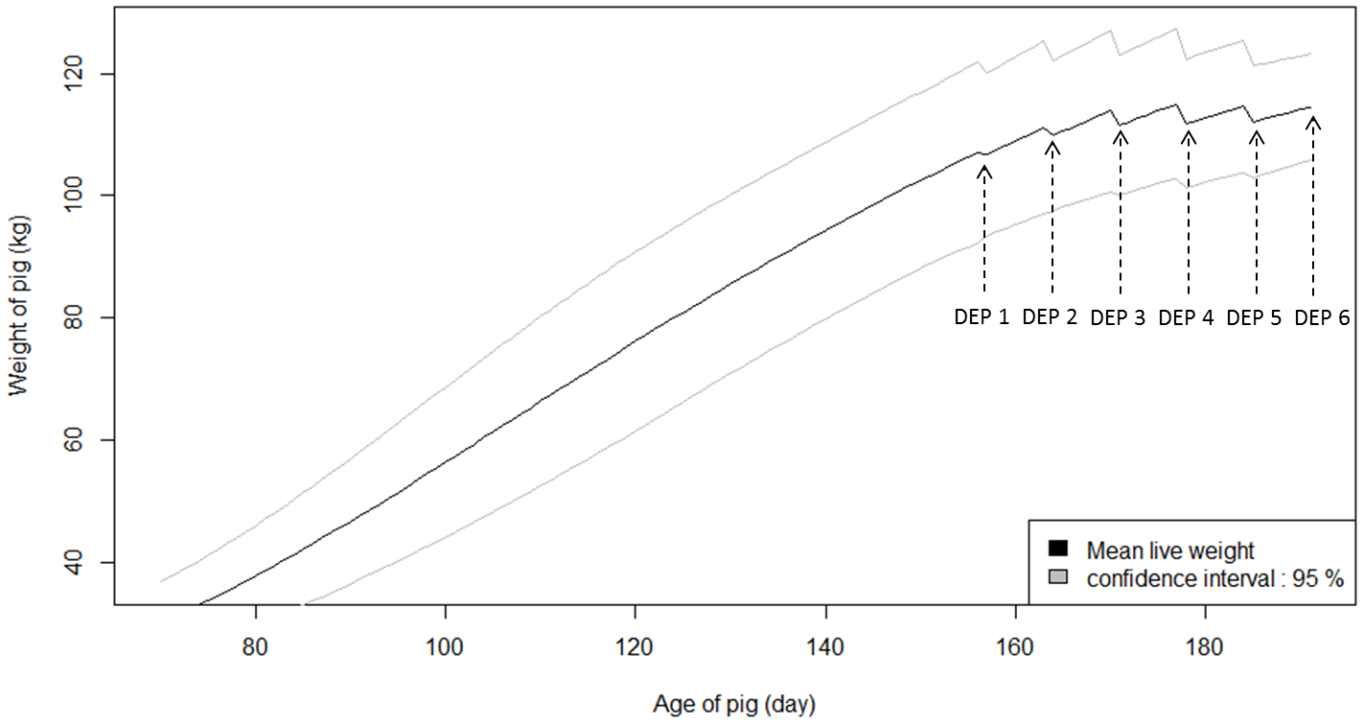


Model application:

- **Typical pig fattening unit:**
  - Batch interval (21 days)
  - Feeding strategy (ad libitum up to 2.5kg/day + Two-phase)
  - ~6400 pigs produced per year

Variability among pigs intra-batch

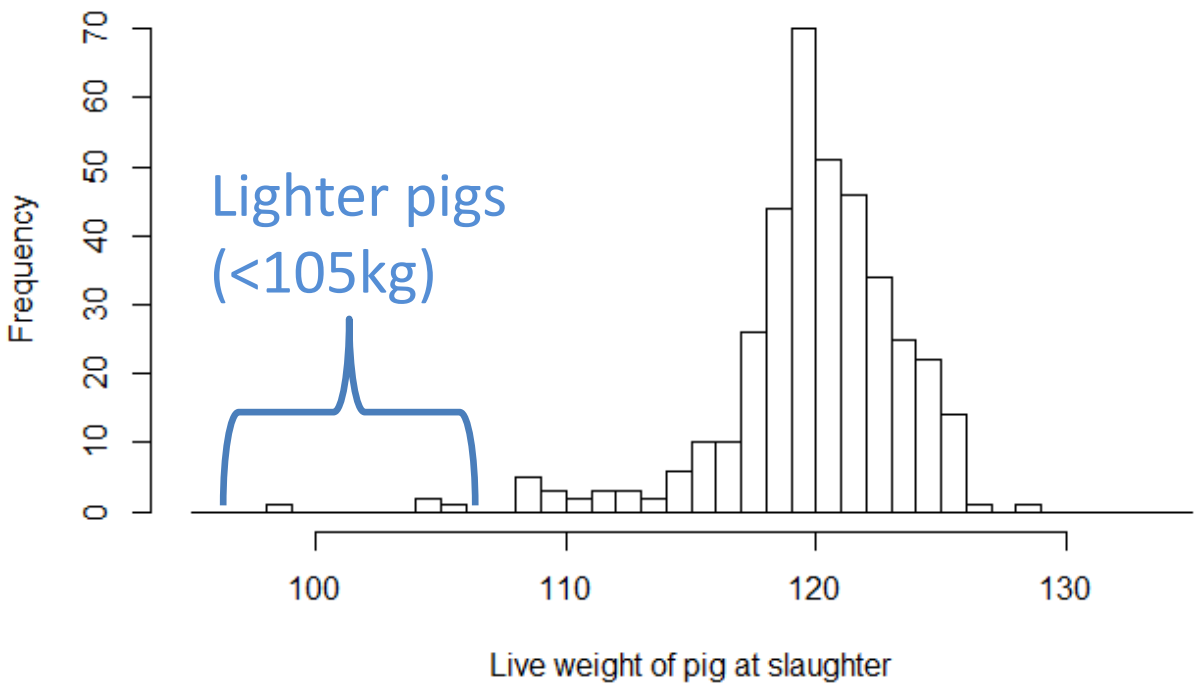
- Example of mean growth curve of pigs from a same batch and 95% population interval



DEP: pigs delivery to slaughterhouse

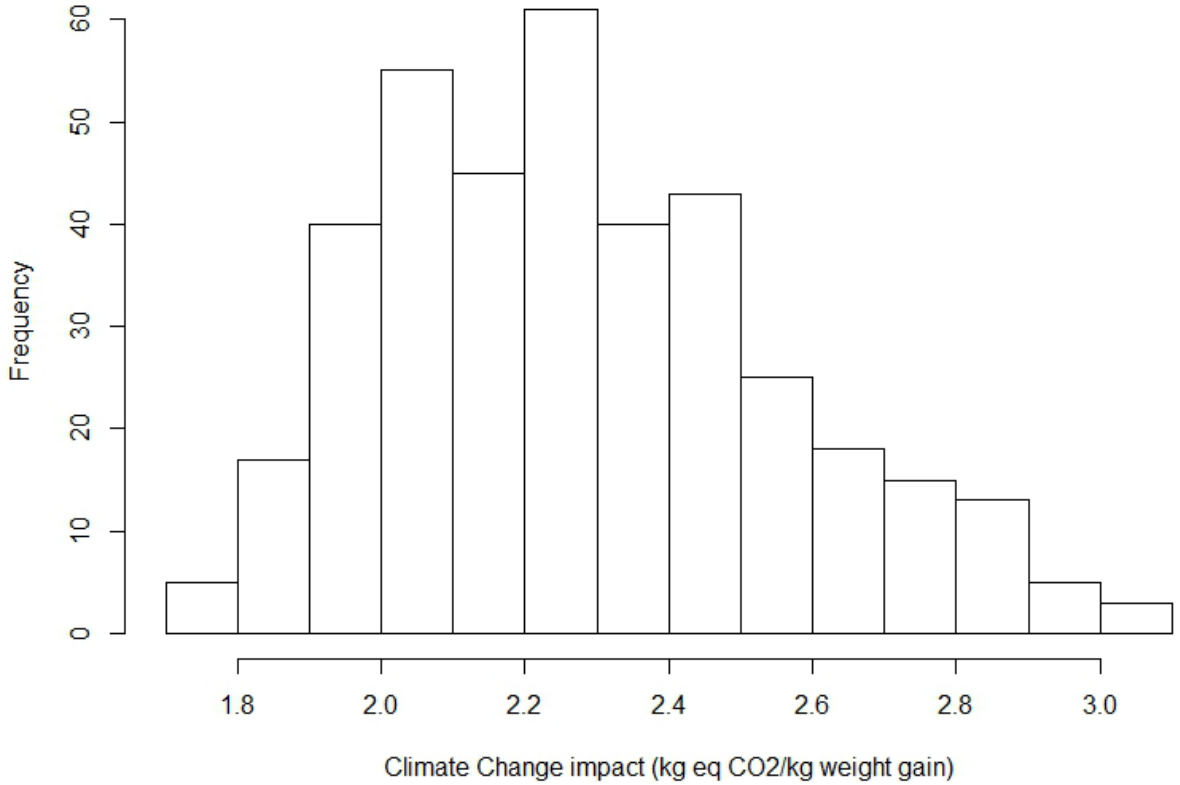
Variability among pigs performance

Parameter (unit)	mean (±sd) between pigs
Slaughter weight (kg)	119.8 (± 3.7)
Pigs in range of slaughter weight (%)	99%
Slaughter age (day)	176 (±11)



Variability among pigs climate change impact

- Impact per kg of weight gain



Variability between- and within-batch

Parameter (unit)	Average and variability mean (±sd)	
	Between pigs (within batch)	Between batches
Average daily gain (kg)	0.86 (±0.1)	0.86 (±0.02)
Feed conversion ratio (kg/kg)	2.72 (±0.30)	2.73 (±0.06)
Slaughter age (day)	176 (±11)	176 (±1.9)
Slaughter weight (kg)	119.8 (± 3.7)	119.6 (±0.8)

- Variability → pigs potential, mortality

Conclusion and perspectives:

- A fattening unit model →evaluation of effects of practices on technico-economic and environmental performance
- In progress : a virtual experiment study and a sensitivity analysis
- Coupling with a farrowing unit model

Thank you for your attention !

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