

Adapting the feed, the animal and the feeding techniques to improve the efficiency and sustainability of monogastric livestock production systems

# Evaluation of a dynamic mechanistic growth model simulating the performance of broiler chicken

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## Introduction

- A generic dynamic mechanistic model has been developed to simulate the nutrient partitioning in broiler chicken
- It predicts the chemical body composition and the body weight of an average individual chick at any time point

## Aim

Evaluation of the broiler model in terms of body weight response to different energy and protein levels as well as dietary AAs

### Model concept





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## Material and method

### Model calibration

- FI and BW data of Ross 308 and 708 broilers were used from the breeder's guidelines (0-70 days of age)
- Initial parameters: precocity, meanPD, initialBW, FI1 and FI2
- Model testing with independent datasets

Challenging the model with diets containing:

- control, low protein supplemented with or without AAs and/or dietary fat (Li, 2017; Liu et al., 2017)
- graded levels of dig Lys (Lee et al., 2017), dig Met (Najafi et al., 2017) and dig Thr (Zhai et al., 2016)
- Determination of model reliability
  - calculating the root mean square prediction error (MPSE), relative MPSE and its partitioning among bias, regression and undefined errors



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### Results



#### Data from Li (2017)

- ▶ 56 d experiment
- weekly body weight data
- 3-phase diet
  - Starter
  - Grower
  - Finisher
- **3** dietary treatments
  - Control
  - Low CP
  - Low CP + CAA



#### Data from Liu et al. (2017)

- Duration: 7-28 d
- Treatments: 10 diets
  - 5 dietary protein level

154-400 g/kg

2 dietary ether extract

46 vs. 85 g/kg

Root MSPE	relMSPE (%)	B (%)	R (%)	E (%)
0.07	5.16	0.38	23.1	76.52

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### Output of the model with adjusted FI in various studies





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### Conclusion

- The broiler model predicts the response of the average bird to a certain diet with goodness of fit
- Since daily feed consumption is a multifactorial trait, the feed intake estimation appears less reliable in extreme situations
- By adjusting the simulated feed intake to experimental data, performance of the average bird occurs to be precisely predicted



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Thank you for your attention!

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