



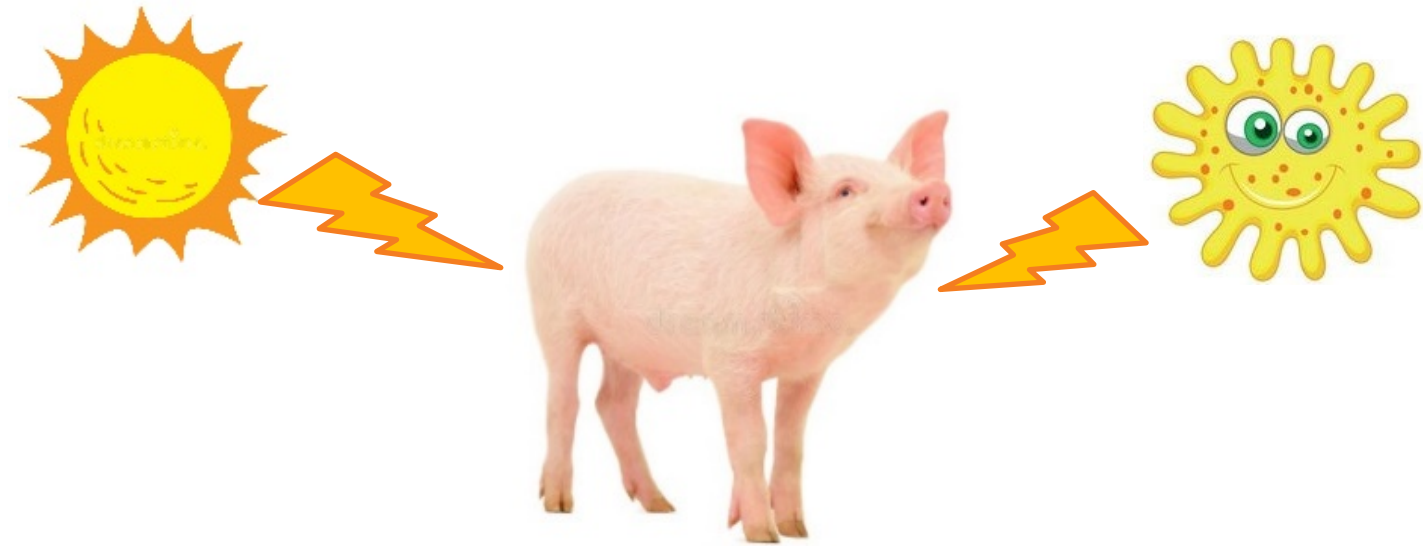
A model to quantify resistance and resilience capacities of growing pigs in response to perturbations

Hieu Nguyen-Ba, Jaap van Milgen and Masoomeh Taghipoor

INRAE, France

INTRODUCTION

- Pigs are confronted with many perturbing factors



- Perturbing factors often cause a reduction in voluntary feed intake
- Robustness is a complex trait, indicative of how pigs cope with these perturbing factors
- However, robustness is difficult to quantify

OBJECTIVES

Develop a model to:

- Detect the impact of perturbations on feed intake of pigs
- Quantify the response of the pig in terms of:
 - Resistance**
 - Resilience**

MODEL DESCRIPTION [1]

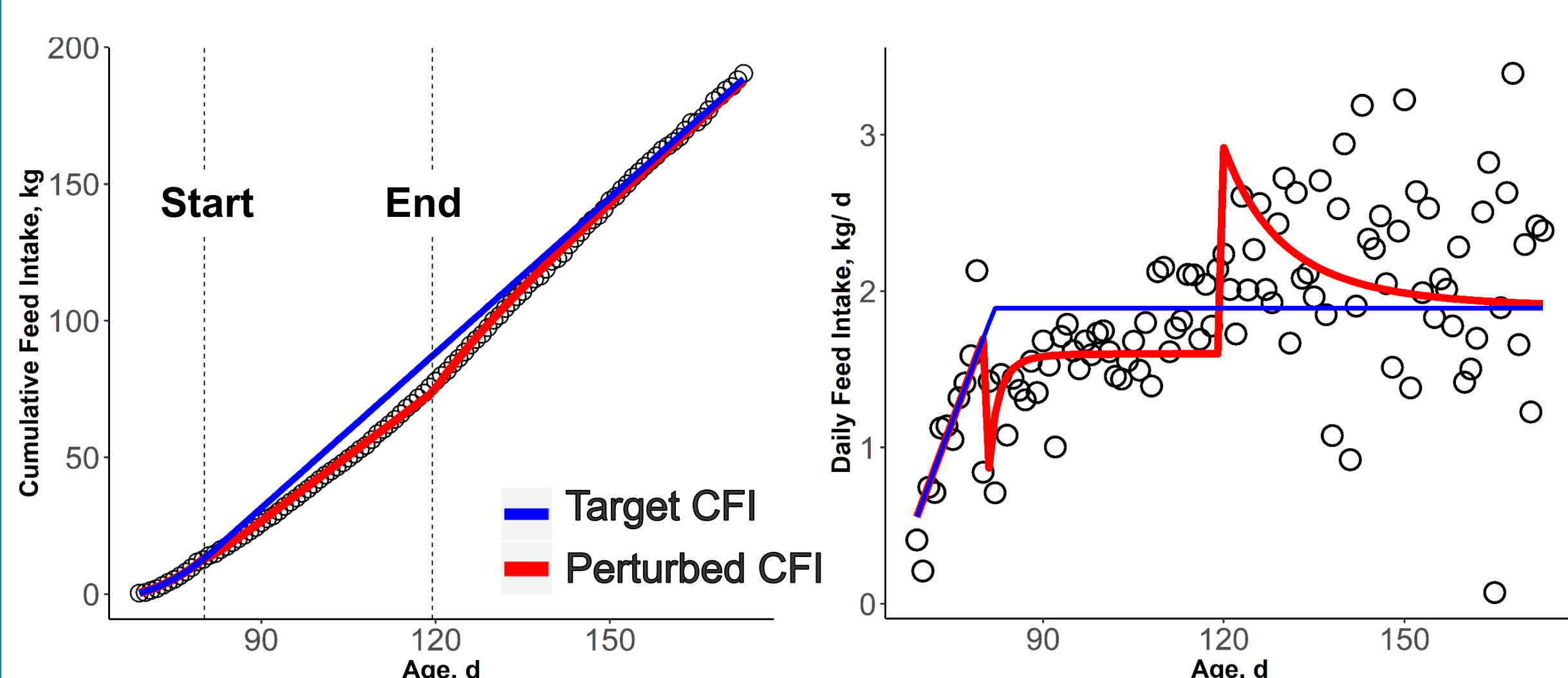
The model **NEEDS**:

- Daily feed intake of individual pigs



The model **CAN**:

- Estimate a target trajectory of cumulative feed intake that the pigs seek to achieve (target CFI)
- Detect the consequences of perturbations on deviations in actual feed intake from the target CFI
- Quantify the feed intake response through four parameters:
 - Start and end times of perturbing factor
 - Resistance: the immediate reduction in feed intake due to perturbing factor
 - Resilience: capacity to recover through compensatory feed intake



CONCLUSIONS

- This study provides a generic method to detect perturbations and quantify resistance and resilience traits
- Its input is only daily feed intake of individual pigs
- It can be used as a phenotyping tool to select for more robust animals

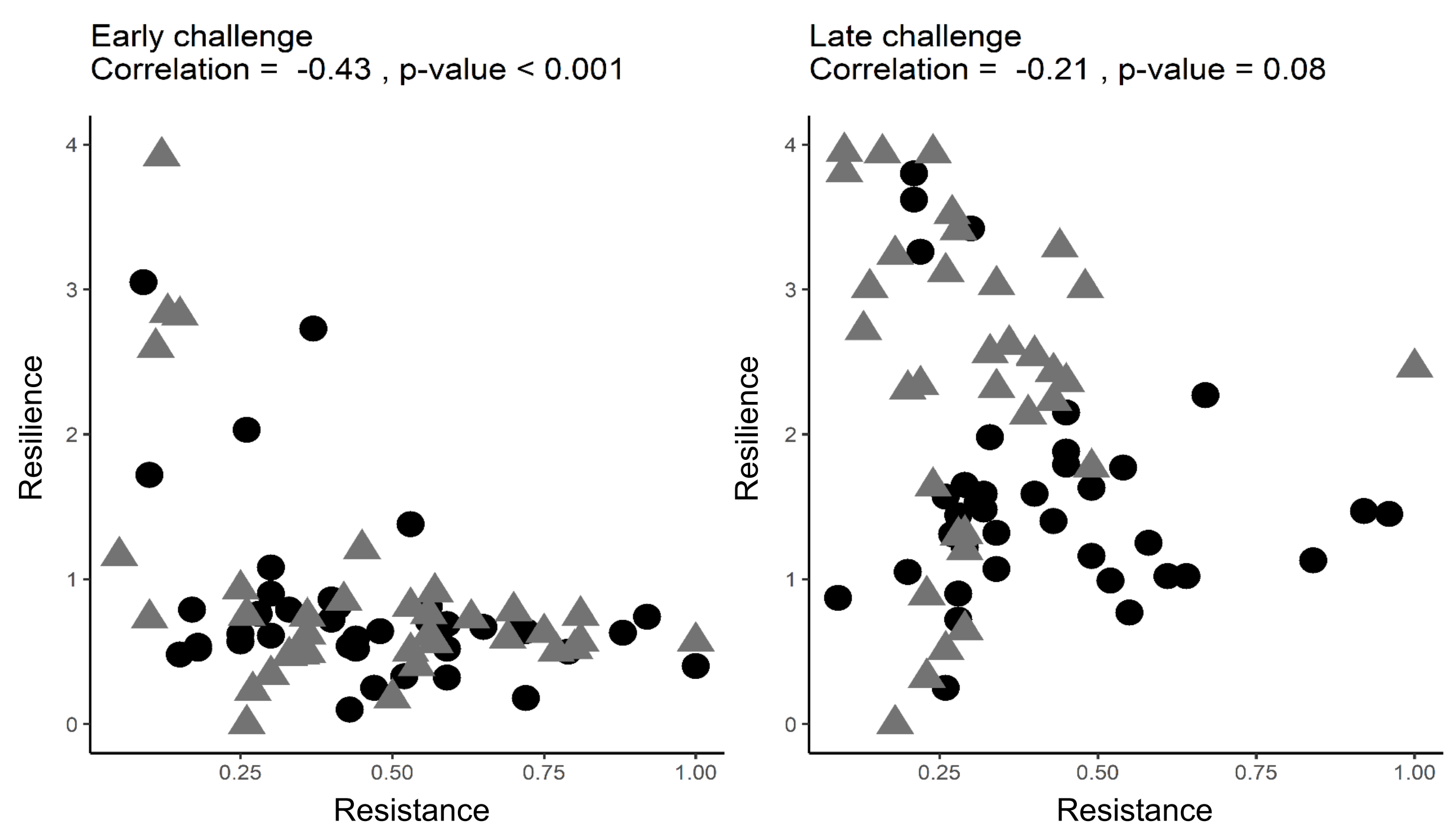
MODEL EVALUATION

The model was applied to a dataset of an experiment [2] to:

- Quantify resistance and resilience of pigs in response to diets contaminated with Deoxynivalenol
- Compare these traits among pigs

Results show:

- Pigs differ in their feed intake response to the contaminated diet
- Modest correlation between resistance and resilience
- Resistance and resilience are different elements of robustness



REFERENCES

[1] Nguyen-Ba H, Van Milgen J and Taghipoor M 2019. *Animal*. DOI: 10.1017/S1751731119001976

[2] Serviento AM, Brossard L and Renaudeau D 2018. *Journal of Animal Science*. DOI: 10.1093/jas/sky378

Feed-a-Gene



Feed-a-Gene is a European H2020 project involving 23 partners which aims to adapt feeds, animals and feeding techniques to improve the efficiency and sustainability of pig, poultry and rabbit production systems. It is coordinated by INRAE (France), started in March 2015 and will last 5 years. The project aims to reduce the environmental impact of monogastric livestock production by improving and diversifying animal diets and feed technologies and by integrating new selection criteria for these animals. The Feed-a-gene project further aims to develop new management systems for precision feeding and precision farming and to evaluate the overall sustainability of the different management solutions proposed in the project.



The Feed-a-Gene Project has received funding from the European Union's H2020 Programme under grant agreement no 633531.