



Non-heritable genetic effects for boosting feed efficiency and growth in pigs



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INTRODUCTION

Total genetic effects (G) can be decomposed into additive (A), dominance (D) and epistatic effects (I)

$$G = A + D + I$$

Additive genetic effects

Heritable.
Explicitly modeled and used in animal breeding for selection purposes.

Dominance genetic effects

Non heritable.

Usually, not accounted in genetic evaluations, but they can:

(i) improve the prediction accuracy of the estimated genomic breeding values if properly modelled.

(ii) be used to perform planned matings (i.e. mate allocation) within breeds to boost the performance of the crossbred progeny.

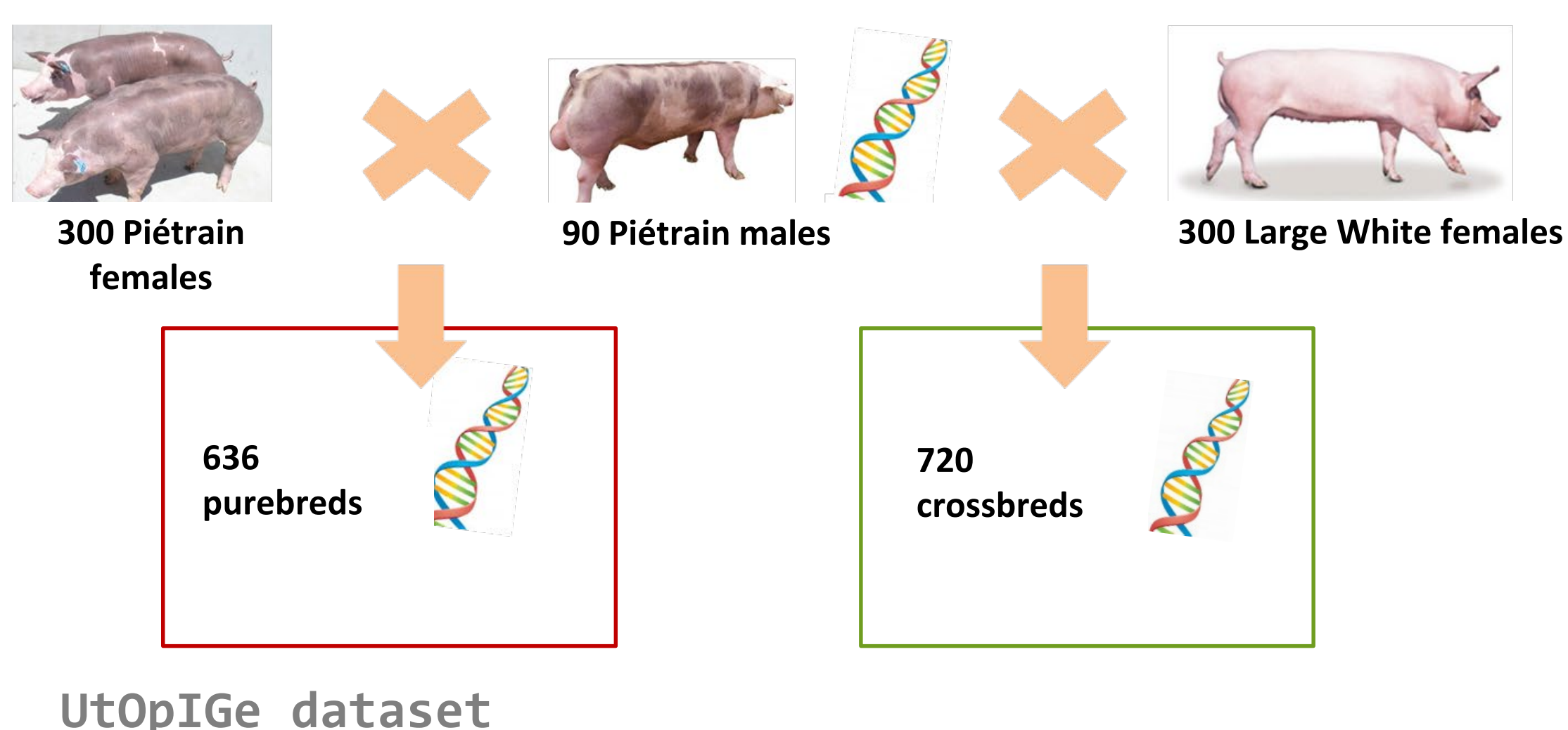
OBJECTIVE

Assess the contribution of **additive** and **dominance** effects to the expression of purebred and crossbred pig performances.

PHENOTYPES AND DATA

The 22 analysed traits can be classified into five groups of traits:

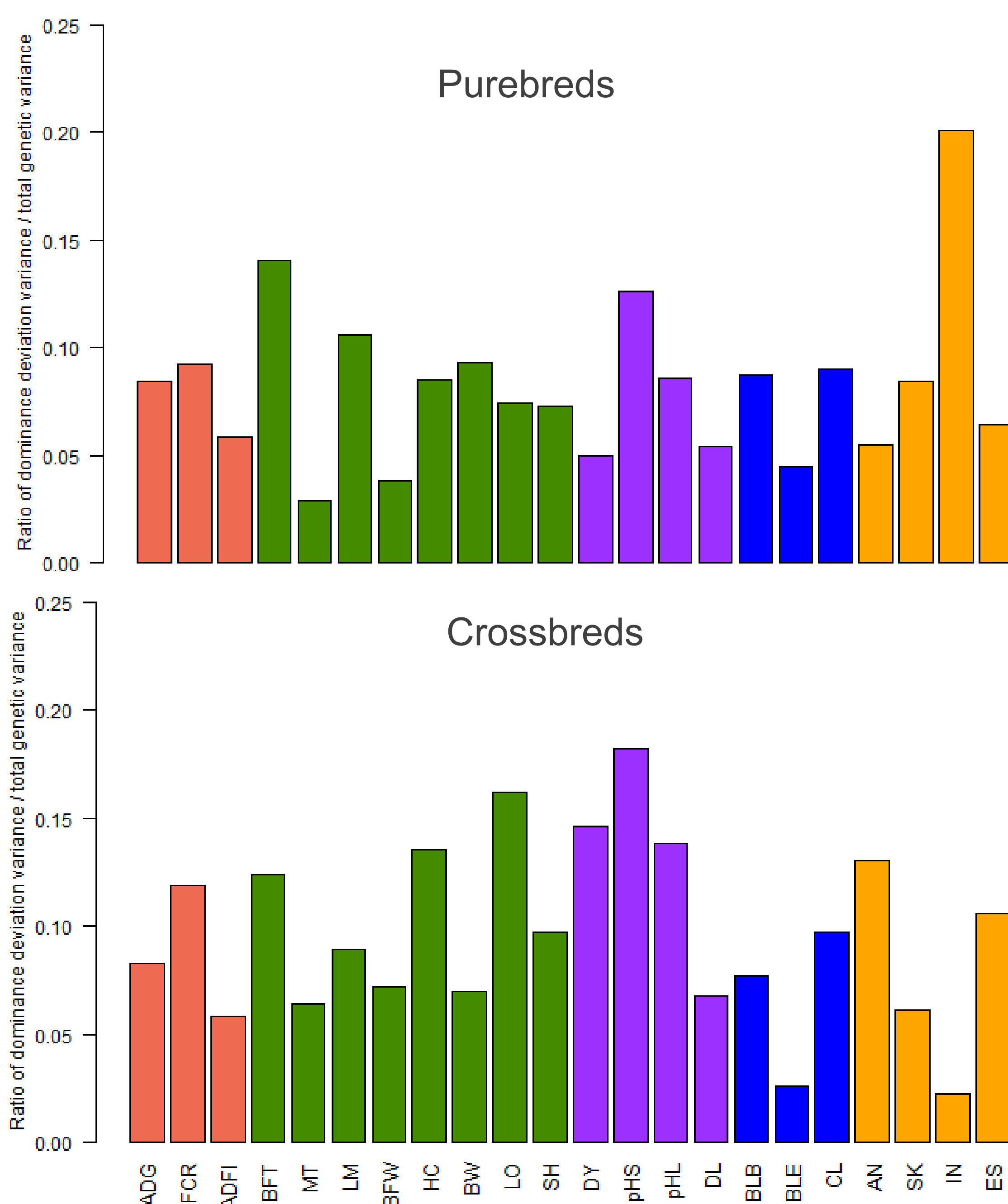
- Growth rate and feed efficiency
- Carcass composition
- Meat quality
- Behaviour
- Boar taint and puberty



RECOMMENDATIONS

For the traits of interest in this project, i.e. average daily gain, feed conversion ratio and average daily feed intake, the dominance genetic variance explained about 6-12% of the phenotypic variance in purebred and crossbred populations.

Results suggest that potential benefits from accounting for dominance effects may be small to improve feed efficiency and growth.



Proportion of phenotypic variance explained by dominance

Growth and feed efficiency

5-11%

Carcass composition

12-14% backfat thickness

9-10% lean meat

13-16% ham, loin and dressing yield

Meat quality

12-18% pH semimembranosus

8-14% pH longissimus dorsi

Behaviour

< 10%

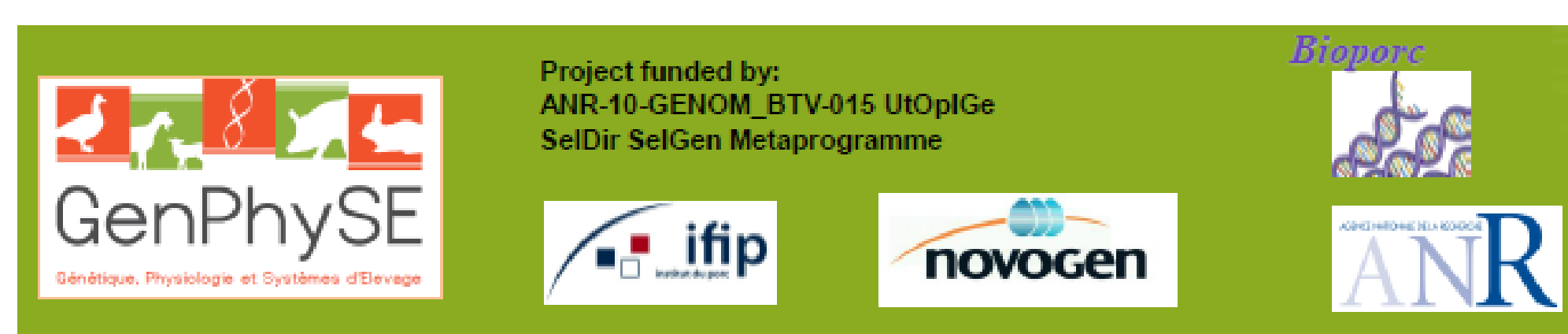
Boar taint and puberty

13 % androstenone

weird results for indole

6-10% in estradiol

ACKNOWLEDGMENTS



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.



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