

Development of a new crossbred based evaluation for carcass quality traits of Piétrain boars in the Walloon Region of Belgium

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Why?



OBJECTIVE

To develop a **genetic evaluation model** to estimate the genetic merit of Piétrain boars for some **carcass quality traits** based on data recorded on **live crossbred progeny** and relatives at **different ages**
 To implement a tool that allows to **select boars** that produce carcass with a **high meat percentage**

MATERIAL AND METHODS

DATA

- Recorded at the **central test station** and **on-farm** on live animals
- Two traits: **backfat thickness (BF)** and **meat percentage (%meat)**
- 60,546 records** from 56,822 different pigs
- Recorded on **females**, entire and castrated **males**
- Breed types**: Piétrain, Landrace and Piétrain X Landrace

MODEL

- Multitrait animal model with **random regressions** using linear splines with knots at 175, 200 and 250 days

$$y = Xb + Q(Za + ZP) + e$$

y: vector of **observations** (BF and %meat)

b: vector of **fixed effects** (sex, contemporary group and heterosis)

a: vector of random **additive genetic effect**

p: vector of random **permanent environment effect**

e: vector of **residuals**

Q: matrix of linear **spline coefficients**

X, Z: incidence matrices

- Heterosis effect**: modeled as fixed regression on heterozygosity coefficient

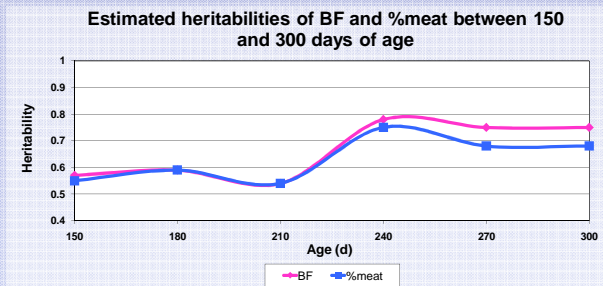
METHODS

- REML** and **Gibbs sampling** algorithm for variance components estimation
- BLUP** for breeding values estimation and residuals computation

How?



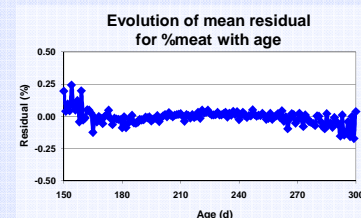
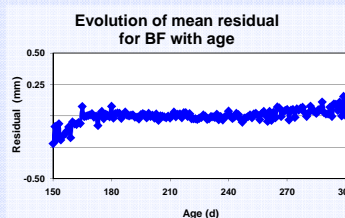
RESULTS



Estimated heritabilities are **high and increase with age**:
 - From 0.56 to 0.75 for BF
 - From 0.55 to 0.69 for %meat

BF and %meat are **highly genetically correlated**

Age (d)	Genetic correlation
150	-0.90
180	-0.90
210	-0.94
240	-0.94
270	-0.93
300	-0.93



The means of the residual distribution for the two traits are **not significantly different from zero** at any age:

P Value = 0.7977 for BF
 P Value = 0.1476 for %meat

CONCLUSIONS



- Genetic improvement** of carcass quality of Piétrain boars is **possible** by genetic selection with **backfat thickness** and **meat percentage** because of their **high heritability**.
- Backfat thickness and meat percentage are **highly genetically correlated**, so selection could be based only on one of these two traits to select boars that produce progeny with a high meat percentage.
- To have accurate genetic selection, **backfat thickness** should be **preferred** to meat percentage because it is a trait **directly measured** while meat percentage is predicted from backfat thickness and loin muscle depth measurements.
- According to the **study of residuals**, the genetic evaluation **model developed seems to fit well the data**. Therefore the estimation of breeding values of boars could be accurate.
- According to solutions for **heterosis effect**, **crossbred animals have better performances** compared to the whole population.

Acknowledgments

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