A single-step genomic evaluation of maturing rate index in French beef breeds

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INTRODUCTION

Particularity of the maturing rate index :

This traits is interesting to :

▷ Maximise early beef production
▷ Reduce fattening time and added concentrates
▷ Reduce the environmental impact of finished products
▷ Facilitate 2-year-old calving through early development

Moderate heritability of 0.24 and genetic variability of 9%

Estimated phenotype after slaughter (at least 4 years old)

Genomic selection on the maturing rate index is essential

MATERIALS AND METHODS

Performance of maturing rate index : Estimated on adult females of 5 beef breeds using individuals weighings and the brody equation.
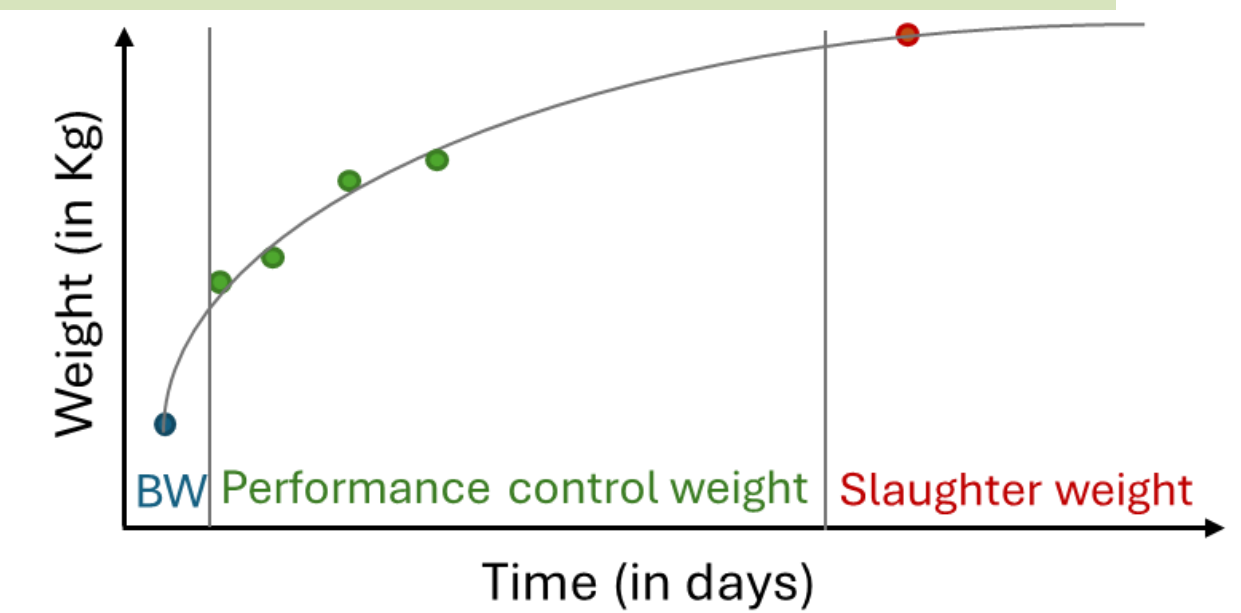
Brody equation:
$$Weight(time) = Weight_{adult} - (Weight_{adult} - Weight_{birth})e^{-maturing\ rate\ index*time}$$
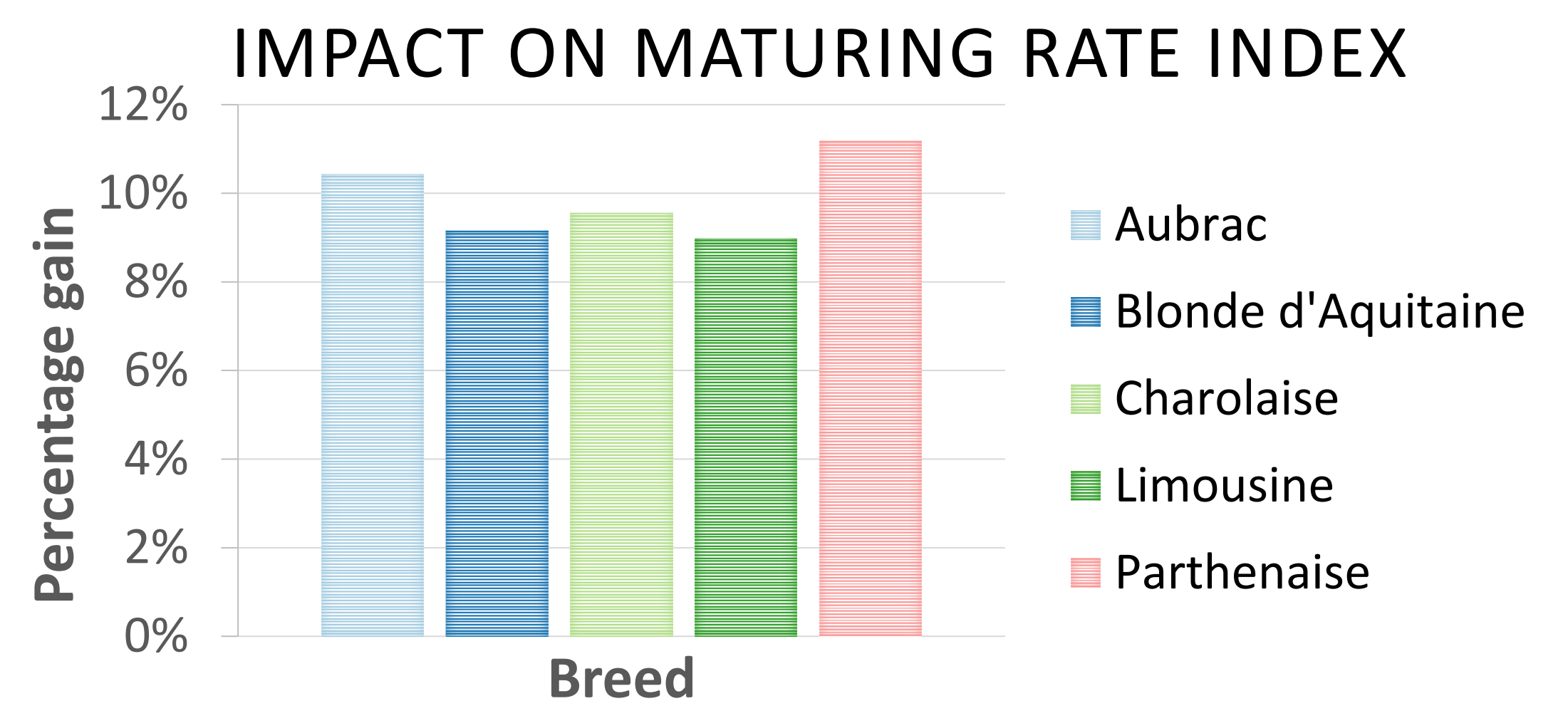
Genomic evaluation:

▷ Univariate Single-Step model with HSSGBLUB software
▷ 7 fixed effects related to birth and slaughter + age at slaughter as a covariate.
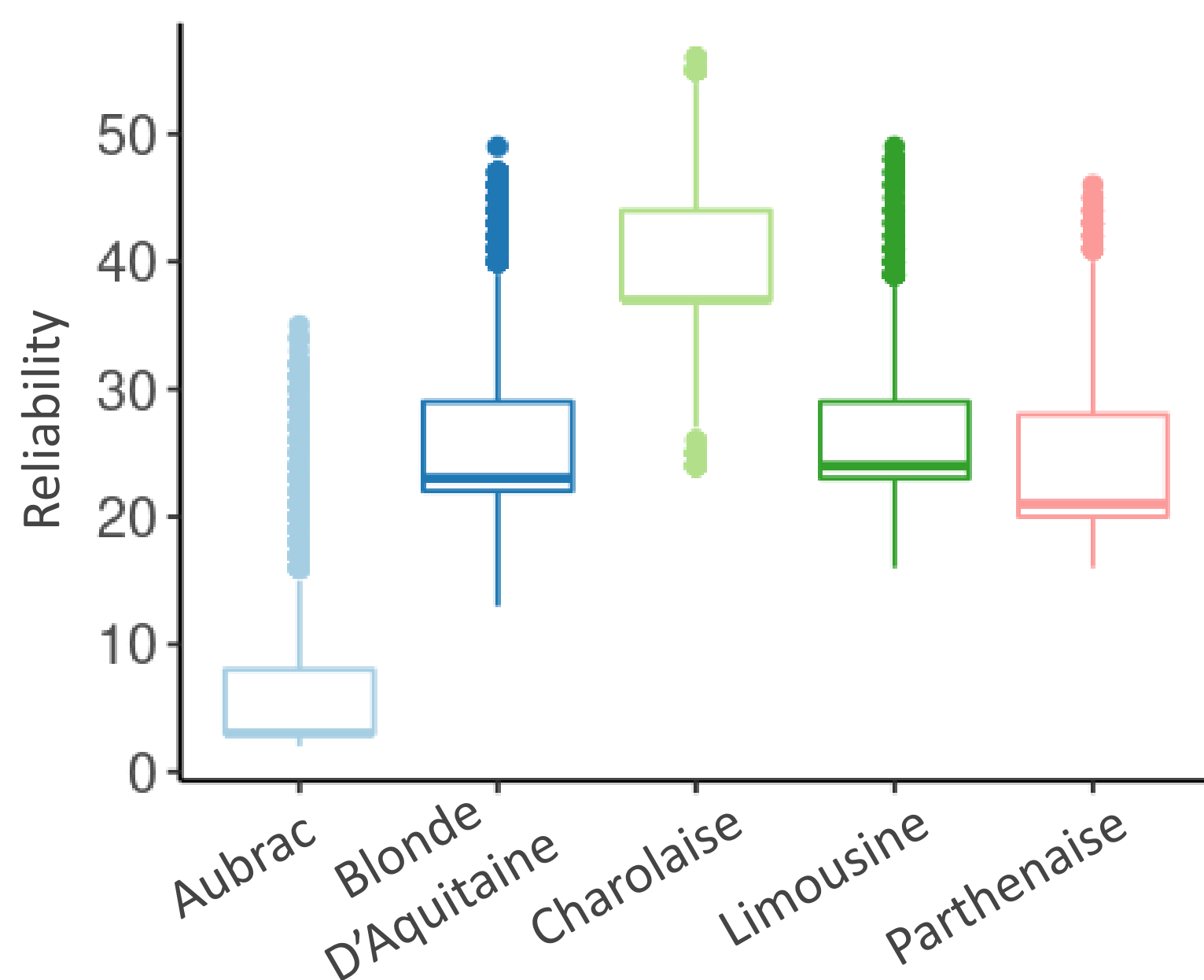
RESULTS AND DISCUSSION

Number of animals used in genomic evaluation

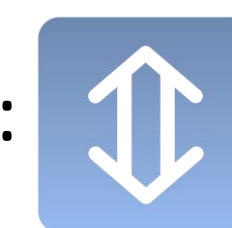| Breed	Animals in pedigree	Animals phenotyped	Reference population
Aubrac	23 155	7 269	414
Blonde d'Aquitaine	171 204	93 718	3 856
Charolaise	811 536	460 627	7 360
Limousine	449 507	270 417	2 179
Parthenaise	61 851	38 929	1 060

Reliability of GEBVs of genotyped candidates in each breeds:

⚠ The reliability of candidates is fairly low, so it is important to take this into account during selection, particularly for the Aubrac.

💡 Increasing the size of the reference population by genotyping females with performance data would be a good strategy for improving the accuracy of estimates

### Impact of a +1 standard deviation selection on performance

IMPACT ON MATURING RATE INDEX

Legend: Aubrac, Blonde d'Aquitaine, Charolaise, Limousine, Parthenaise

This impact is equivalent to :

an average gain of -1.3 months to reach 50% of the adult weight across all breeds
(-1 to -1,7 month)

OR

% of adult weight at 15m
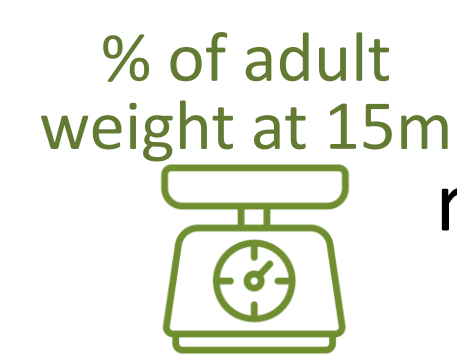
an average gain of 3.2% of the adult weight reached at the age of 15 months across all breeds
(+3% to +3,5 %)

BUT ALSO
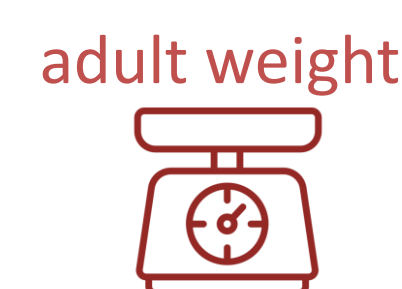
adult weight

an average loss of -40.6 kg of the adult weight across all breeds
(-35 kg to -50,7kg)

CONCLUSION

▷ Selecting on the maturing rate index is of interest for the productivity and profitability of the cattle beef farm
▷ A genomic evaluation is important to select as early as possible
▷ Evaluation requires regular genotyping of females to improve the reliability of GEBVs