Genetic parameters of maturing rate index and asymptotic adult weight in French beef cattle

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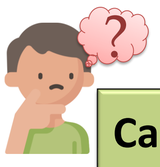
INTRODUCTION

Working on the early development of French beef cows is interesting to:

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



Can early development be estimated from on-farm weighing? Is genetic selection for early development possible?

MATERIALS AND METHODS

Phenotypes (5 beef breeds): Use of Brody equation from birth weight declared by breeders, performance control weights and NORMABEV carcass weights of adult females.

Brody equation:

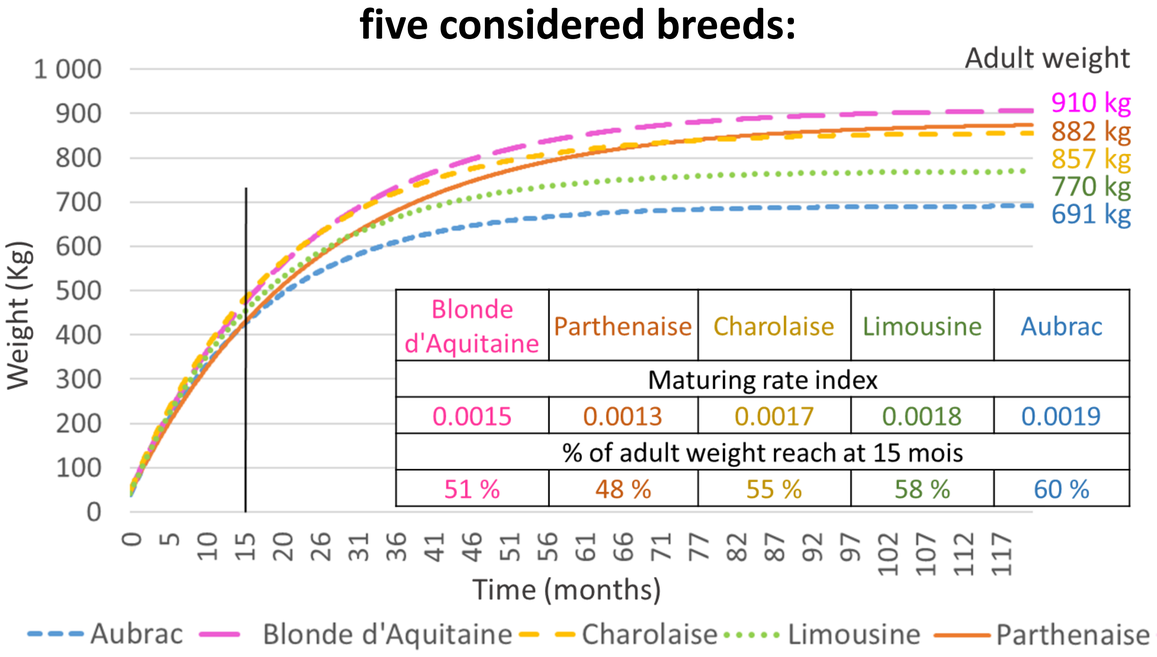
$$Weight(time) = Weight_{adult} - (Weight_{adult} - Weight_{birth})e^{-\text{maturing rate index}*\text{time}}$$

Genetic parameters:

- Estimated adult weight and maturing rate index: data corrected for fixed effects related to birth and slaughter.
- Birth weight and adjusted weights (AW) at 7m, 12m, 18m and 24m: corrected performances with a correction of genetic progress.

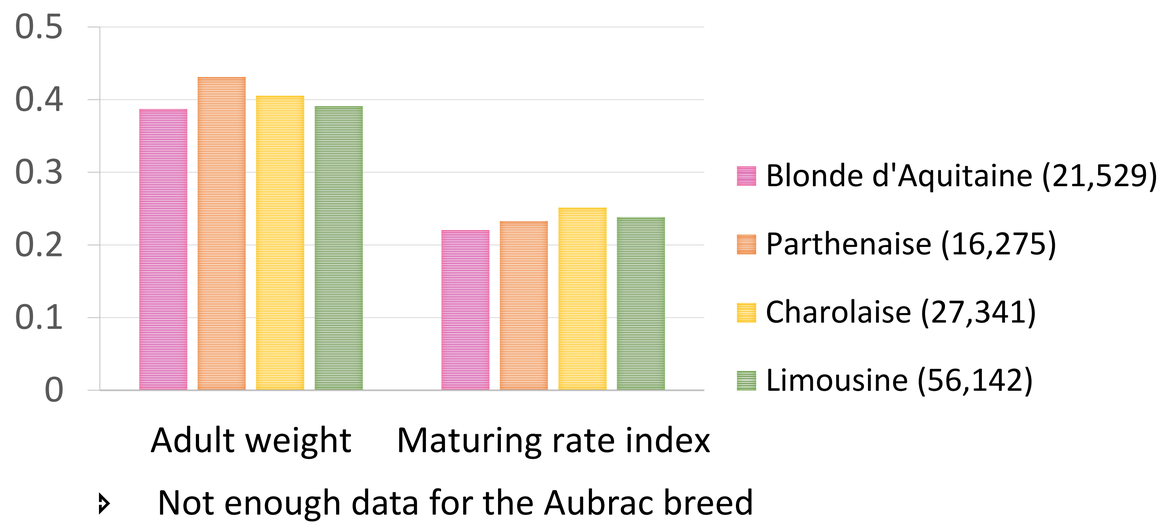
RESULTS

Average female performance in each of the five considered breeds:



Blonde d'Aquitaine	Parthenaise	Charolaise	Limousine	Aubrac
Maturing rate index				
0.0015	0.0013	0.0017	0.0018	0.0019
% of adult weight reach at 15 mois				
51 %	48 %	55 %	58 %	60 %

HERITABILITY ESTIMATES



- Not enough data for the Aubrac breed
- Standard deviation of error between 0.01 and 0.03
- Average genetic variation coefficient equal to 6.16% for adult weight and 9.09% for maturing rate index

Genetic correlation of maturing rate index with bodyweight at different ages (average of the 4 breeds):

	Birth weight	AW at 7m	AW at 12m	AW at 18m	AW at 24m	Adult weight
Maturing rate index	-0.12 (-0.18 to -0.07)	0.32 (0.29 to 0.37)	0.39 (0.32 to 0.45)	0.42 (0.27 to 0.69)	0.40 (-0.03. to 0.70)	-0.64 (-0,65 to -0,62)

DISCUSSION

The maturing rate index seems to be a good phenotype for early development. It would be possible to genetically select the maturing rate index (due to its heritability and genetic variance) without increasing birth weight (average genetic correlation of -0.12). The maturing rate index seems to be positively correlated with adjusted weights between 7 and 24 months. However, the lack of animals with adjusted weights at 18 and 24 months limits the accuracy of the associated correlations and therefore their possible interpretation. The highly negative genetic correlation between maturing rate index and adult weight shows that selecting for heavier adult animals reduces their maturing speed. The disadvantage of the maturing rate index are that the phenotype arrives at the end of the animals' lives and is very dependent on the weaning and post-weaning weights. To obtain breeding values for young animals, a genomic prediction needs to be developed.

CONCLUSION

Maturing rate index is …

- Measurable from commercial data, although it is highly dependent on weighing at weaning and post-weaning.
- Heritable and genetically variable, so direct selection is possible.
- Genetically correlated with other traits, allowing indirect selection in particular via reduction in adult weight.

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