Muscle composition of carcass and of body weight gain assessed by computed tomography in pigs: genetic effect

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Objectives: The general aim of EFFISCAN project was to investigate the interest of using computed tomography to access to new criteria related to body composition and feed efficiency. The specific objective of this study was to compare the lean meat content of carcasses and the muscle composition of weight gain between six purebred pig populations.

Materials and Methods: The trial was designed for 504 pigs: half of females from three paternal lines and half of uncastrated males from three maternal lines. The paternal lines were two Pietrain lines, either homozygous for the N allele (P_NN) or the n allele (P_ nn) of *RYR1 (halothane)* gene, and a Duroc (Du) line. The maternal lines were Large White (LW), and two Landrace lines (LR and LR_M6). Pigs were raised over 4 batches, distributed in 9 pens of 14 pigs. Feeding was ad libitum in a biphase sequence. Daily feed intake (DFI, g/d) was measured individually from 30 kg until slaughtering at a target liveweight of 120 kg. The day after slaughter, left halfcarcasses were scanned with computed tomography (CT).

Muscle volume and Lean Meat Content (LMC, %) were calculated according to the procedures described in Daumas and Monziols (2018). The LMC matched the definition given in the present EU regulation (2017/1182) for the classification of pig carcasses, where total dissection was carried out by using a CT procedure. The average daily muscle gain (ADGm, g/d) was calculated as the difference between the final muscle weight and the initial muscle weight divided by the growth duration. Conversely to weight gain, which is expressed in liveweight, the muscle gain was expressed in cold dead weight, because the final goal of pig production is to sell cold meat. The final muscle weight was equal to the LMC numerator. The initial muscle weight was assessed at 45% of the initial body weight (around 30 kg). The feed to muscle gain ratio (F:Gm, g/g) was calculated by dividing the total feed consumption by the muscle gain during the growth period (Daumas *et al.*, 2022).

Least squares means were assessed by a general linear model by pig. They were compared within paternal or maternal lines with a

Tukey test. Means with a different superscript letter differed significantly with a pvalue less than 5%.

Results and Discussion: Data was validated only for 234 carcasses: 119 females from paternal lines and 114 entire males from ma- ternal lines. The sample size for the paternal lines was 33 in Du, 40 in P_NN and 46 in P_nn. For the maternal lines it was 29 in LR_M6, 30 in LR and 55 in LW. The overall means of initial and final body weight were 33 and 123 kg.

Regarding paternal lines, as expected, LMC was the highest in P_nn (64.2^{a}), the lowest in Du (55.6^{b}) and intermediate in P_NN (61.1^{c}). ADGm was higher in both P (757^{a}) than in Du (655^{b}), while ADG was higher in P_NN (1050^{a}) than in P_nn and Du (1004^{b}). DFI was the highest in Du (2723^{a}), the lowest in P_nn (2438^{b}) and intermediate in P_NN (2586^{c}). P_nn got the best F:Gm (3.22^{a}), Du the worst (4.18^{b}) and P_NN an intermediate position (3.45^{c}), while P lines got the best F:G (2.45^{a}) and Du the worst (2.73^{b}). Regarding maternal lines, LMC was the highest in LR_M6 (61.6^{a}), the lowest in LR (57.3^{b}) and intermediate in LW (59.2^{c}). ADGm was higher in LW (757^{a}) than in LR (638^{b}), as well as ADG (1050^{a} vs 987^{b}). DFI was higher in LW (2673^{a}) than in LR_M6 (2433^{b}). LW and LR_M6 got a better F:Gm (3.74^{a}) than LR (4.20^{b}), while there was no significant difference between lines for F:G (2.53).

Conclusions: This study showed that F:Gm discriminated lines better than F:G. Computed tomography seems a suited tool to deter- mine tissue deposition and associated feeding efficiency in test station for breeding purposes.

Acknowledgements To the French Ministry of Agriculture for the financial support (CASDAR fund) of the EFFISCAN project (2019-2023).

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Key words: Breeding, Scanner, Lean meat content, Feeding efficiency, Growth