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

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Objectives: The general aims of SCANALI and EFFISCAN projects were 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 determine tissular growth performance of growing pigs and to test the effects of feeding level and sex.

Materials and Methods: Two feeding levels, ad libitum vs restricted (85% of ad libitum), and two sexes, female vs castrated male, were included in a balanced design. Two batches, one in winter and the other in summer, were used with four pens of six gilts or castrates per treatment each. The pigs were crossbred between Pietrain boars and Large White x Landrace sows and were heterozygous for the *RYR1* gene (halothane). Feed consumption was registered by pen. It was intended to deliver the pigs to slaughterhouse at the usual liveweight. The day after slaughter, left half-carcasses 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. The feed to muscle gain ratio (F:Gm, g/g) was calculated by dividing the feed consumption by the muscle gain during the growth period. These concepts were discussed in Daumas *et al.* (2022).

Least squares means of growth and feed efficiency criteria were assessed by a general linear model by pen, while least squares
means of LMC were assessed by pig.

Results and Discussion: Data was validated on 134 pigs. The overall means of initial and final body weight were 26 and 120 kg respectively.

Looking to the new criteria, feed restriction decreased ADGm by 87 g/d (465 vs. 552; P < 0.001), increased LMC by 2.3 percent points (61.7 vs. 59.4; P < 0.01) and had no significant effect on F:Gm (4.39 vs. 4.45). The effect of sex was significant on F:Gm and LMC, but not on ADGm. Compared to females, castrates had a higher F:Gm (4.57 vs. 4.27; P < 0.01), a lower LMC (59.0 vs. 62.2; P < 0.001) and a similar ADGm (508 vs. 509).

Looking to the usual criteria, the effect of feeding level was significant on the final body weight (BW), the daily feed intake (DFI), the average daily gain (ADG), and the feed to gain ratio (F:G). Feed restriction decreased BW by 6.7 kg (116.8 vs 123.5; P < 0.001), DFI by 0.40 kg/d (2.00 vs. 2.40; P < 0.001) and ADG by 189 g/d (757 vs. 946; P < 0.001). It increased F:G by 0.11 kg/kg (2.70 vs. 2.59; P < 0.01). Compared to females, castrates had a higher DFI (2.28 vs. 2.12; P < 0.01) and ADG (872 vs. 831; P < 0.05), but not F:G (2.67 vs. 2.62).

Conclusions: This study showed that a severe feed restriction, meeting the amino acid requirements, improved carcase leanness without negative effect on the feed to muscle gain ratio. The use of computed tomography is to be recommended in feeding trials and more generally in animal production trials to determine tissue deposition, and associated feeding efficiency and final tissular body composition.

References:

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