Development of a dynamic simulation model to evaluate the influence of feeding strategies on fatty acid composition of pigs at slaughter

Lizardo[1] R., Tous[1] N., Esteve-García[1] E., van Milgen[2] J.

[1] IRTA – Mas Bover, 43120 Constantí, Spain; [2] INRA – UMR Pegase, 35590 Saint-Gilles, France

The quality of adipose tissue is directly related with fatty acid (FA) composition which is strongly influenced by genotype, sex, age, live weight and fatness of the pig. Fatty acids are synthesised *de novo* or of dietary origin thus feed intake, diet composition and energy partitioning may have a major impact. In order to predict the influence of dietary factors on fat and its FA composition a dynamic simulation model was developed. Growth is described by a model of protein and lipid deposition where the latter results from deposition of major dietary FA and *de novo* synthesized FA. Among other hypothesis, it is assumed that 90% of dietary FA are deposited without modification, and that the composition of *de novo* synthesized FA corresponds to 48, 29 and 19% of oleic, palmitic and stearic acids, respectively.

Data from 2 animal trials were used to calibrate the model, which was then evaluated by a sensitivity analysis, and by comparing results from simulations with those of controlled experiments, and of selected literature data. Comparison with experimental results showed that prediction of stearic and oleic acids tended to be higher whereas palmitic and linoleic acids tended to be lower than observed, which could be related with FA partitioning among different fat depots. Simulation with literature data showed reliable predictions of palmitic, stearic and linolenic acids ($a=0$, NS; $b=1$, NS) whereas oleic ($a\neq0$, $P<0.05$) and linoleic ($b\neq1$; $P<0.05$) acids showed a tendency to be overestimated at very low (<35%) or very high (>30%) contents, respectively. However, this was related with utilisation of quite uncommon levels (>12%) and oil sources (fish oils, butter). Elimination of these data from dataset leaded to better predictions ($a=0$, $b=1$; NS) for all major FA.

Even though hypotheses used in the underlying model may have a major impact on the outcome validation results indicate adequate backfat FA predictions. Therefore, modelling lipid growth can be a useful tool to assist pig experts assessing the impact of nutrition on the dietary, sensory and processing qualities of meat, thereby improving profitable feeding strategies.