DISTRIBUTION OF INTRAMUSCULAR FAT CONTENT AND MARBLING WITHIN THE LONGISSIMUS MUSCLE OF PIGS

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Introduction

It is generally accepted that increasing levels of intramuscular fat (IMF) have a positive influence on the juiciness, tenderness and flavour of pork. However, a careful examination of the literature reveals contradictory results. Some studies indicate a positive relationship between the sensory qualities of pork meat and the amount of intramuscular fat (IMF), whereas, others show no such relationship. This discrepancy could be due to differences in the sampling location, given the high variability reported in the distribution of IMF along the *longissimus* (LD) muscle, which is the muscle mostly used for the evaluation of pork quality. Thus, there is a need to identify the location along the LD which best reflects the IMF content of the muscle. Identification of such a site would facilitate selection of breeding stock for the improvement of eating quality, as the uniformity of meat quality assessment procedures would be greater if all assessments involved the examination of samples from that site.

Material and Methods

Fifty crossbred pigs (3 way cross: Duroc (D) x crossed Yorkshire*Landrace (YL) sow), of which 22 were gilts and 28 were barrows, each of which weighed around 107 kg (±5 kg) were used in this study. In order to obtain a large variation in IMF content in the longissimus muscle, pigs were selected according to the backfat thickness, between the 3rd and 4th last rib level at 5 cm off the midline, measured ultrasonically.

At 24 h after slaughter, loins taken from the left carcass side were deboned and sliced perpendicular to their longitudinal axis into 14 cuts of approximately 2 cm thickness, starting from the 3rd from last lumbar vertebra (site 1) to the 5th thoracic rib (site 14), as shown in Figure 1. A marbling score was obtained for each slice by reference to the National Pork Producers Council (NPPC) photographic marbling standard scales (from 1 = devoid to 10 = abundant). Then, samples were minced, vacuum-packed and stored at –20°C until they were analysed for IMF content.

Results and Discussion

Selecting pigs on the basis of their backfat thickness as determined by ultrasound provided carcasses with subcutaneous adipose tissue that ranged from 10.5 to 34.7 mm, with a mean value of 17.6 mm between the 3rd/4th last rib. That range is representative of the commercial pig population.

The average total IMF content of the LD muscle was 2.78%. This content fell within the range of values (2-4%) which is considered sufficient to provide meat with marbling characteristics and eating qualities desired by consumers. The IMF contents varied along the LD muscle, with the highest values being in the middle of the thoracic region (site 10-12) and in the middle to caudal lumbar region (site 1-3). The IMF content of gilts and barrows varied differently along the LD muscle, being consitantly higher in barrows than in gilts.

The average marbling score was 2.62, which corresponds to slight to modest amounts of of visible fat (score 2-3 in the NPPC standards). The marbling scores along the LD muscle roughly followed the distribution of IMF contents. The correspondence between these two variables was evidenced by their good correlation (r = 0.86), proving the efficiency of the NPPC marbling standards as a tool for the prediction of the IMF content of pork meat. Similar to the results for IMF content,

sex had a significant effect on marbling distribution along the LD muscle, with higher values being obtained in barrows (2.77) than in gilts (2.35).

The IMF content at the grading site region (site 7-9) showed the highest prediction rate (R^2 = 0.94-0.95) with the average IMF content of the LD muscle. Similar results were obtained when the coefficient was calculated for the marbling score at every location.

In conclusion, this study showed that both intramuscular fat content and marbling score vary along the porcine LD muscle. Indeed, both variables were higher for the middle section of the lumbar region and for the middle section of the thoracic region than for the other anatomical sections of the LD muscle. The area of transition between the posterior section of the thoracic region, near the grading site, can be recommended as the best site for measuring the average IMF content and marbling score of the LD muscle in pigs, because within this region an IMF or marbling measure best represents the IMF and marbling for the LD muscle as a whole.

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Figure 1