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A sensory study on loin quality from pigs slaughtered at 120 or 160 kg liveweight

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ABSTRACT: Effects of different slaughter weights (160 vs. 120 kg) on chemical, physical and sensory characteristics of pig loin were investigated. Physical and chemical traits were similar for the two typologies of weight, whereas lower values of moisture ($P<0.01$) and higher fat content ($P<0.05$) were found in heavy pig loin; furthermore increased slaughter weight resulted in redder, more yellow and intensive colour ($P<0.05$). A selected and trained panel carried out difference from control test showing that heavy pig loin scored higher for appearance and taste parameters ($P<0.05$), but lower for tenderness ($P<0.05$). Heavy pig loin was redder, more marbling, wetter, sweeter, and saltier and had higher metallic flavour and lower tenderness.

Key words: Slaughter weight, Heavy pig, Loin, Sensory evaluation.

INTRODUCTION – Usually in Europe pigs are slaughtered at about 100 kg of live weight (LW) and mainly destined to fresh meat production; instead, Italy oriented own production to a higher live weight animals (160 kg \pm 10 %) designed as “heavy pigs”. Recently, Italy approved the registration of fresh cuts of the whole heavy pigs carcasses called “Gran Suino Padano” (D.M. 05/09/2005) on products list of protected designation origin (PDO), looking forward to be registered by European Community. For this reason, it could be interesting to increase value of our typical products by characterising Italian fresh pork quality.

MATERIAL AND METHODS – The loins were obtained from 17 female pigs, 7 of which slaughtered at 120 kg live weight (LW) and 10 slaughtered at 166 kg LW. The whole loins were aged for 48 h at 4°C. All samples were vacuum-packed and frozen at -20°C for further analysis.

Chemical and physical analysis – Pork samples were analysed for moisture, protein, lipid and ash using standard methods (A.O.A.C., 2000). PH was measured 24 h post-mortem (ph24) using a pH meter (HI 9023 microcomputer, HANNA instruments, Portugal). Objective measures of pork colour (L^* , a^* , b^*) were collected using a Minolta CR-300; chroma (c^*) values were computed as $c^* = [(a^{*2} + b^{*2})^{1/2}]$.

Sensory evaluation – A difference from control test (Meilgaard *et al.*, 1999) was performed to debug a sensory profile carried out by a selected and trained sensory panel consisting of 11 members. The panel was trained in sessions where redundant terms were eliminated from the lexicon and the sensory descriptive terms pink colour, marbling, fat cover, superficial moisture, slice dimension (appearance), pig aroma, metallic flavour, pig flavour (aroma and flavour), salty, sweet (taste), tenderness, stringy, juicy, fibrous (consistency) were selected as the descriptors to be used by the panel during evaluation (Corino *et al.*, 2002). Each judge was first presented with a reference sample (loin sample from pigs slaughtered at 120 kg) subsequent the 2 samples were rated on a linear hedonic scale with reference; the centre of the scale corresponding to the reference sample (0 = “consider the sample as the same of reference”) and difference from reference sample was expressed in the range -5 = “consider the sample extremely less than the reference” to 5 = “consider the sample extremely more than the reference”.

Statistical analyses

Data from chemical and physical composition were analysed by one-way ANOVA in a completely randomized design structure using SPSS program (Inc., Chicago, 2002). Data from the descriptive-attribute sensory panel were analysed by 3-way-ANOVA with two-way interactions, applying Least Significant Difference (LSD) test, in a completely randomized design structure with slaughter weight as fixed effect, judges and repetitions as random effects (SPSS, 2002).

RESULTS AND CONCLUSIONS – A lower moisture ($P<0.01$) and higher fat content ($P<0.05$) were found in heavy pork loin (Table 1), according with Cisneros *et al.* (1996) and Candek-Potokar *et al.* (1998). Index a^* , b^* and c^* did result higher ($P<0.05$) in loin of heavy pigs according with Candek-Potokar *et al.*, 1998 Beattie *et al.* (1998). Sensory profiles of pig loins are reported in Figure 1.

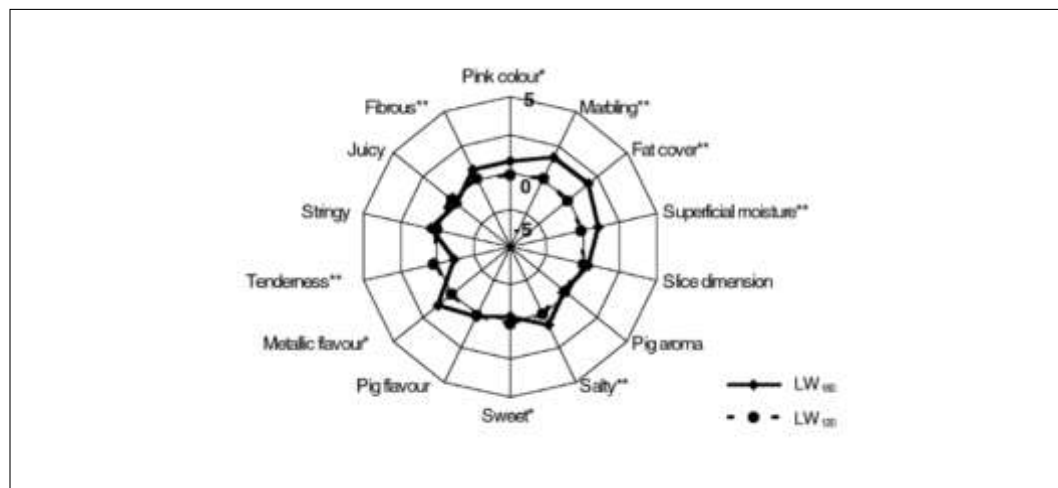
Table 1. Influence of different slaughter weights (120 kg LW: LW₁₂₀ and 160 kg LW: LW₁₆₀) on chemical and physical loin characteristics.

Item	LW ₁₂₀ ^a	LW ₁₆₀ ^a	p ^b
Dry matter, %	25.85 ± 0.24	27.07 ± 0.25	**
Protein, %	22.71 ± 0.28	22.86 ± 0.37	NS
Intramuscular fat, %	1.32 ± 0.17	2.50 ± 0.50	*
Ash, %	2.88 ± 0.32	3.32 ± 0.29	NS
Weight, kg	3,24 ± 0.14	4,23 ± 0.23	**
Length, cm	55,20 ± 0.90	68,36 ± 1.37	***
pH	5,9 ± 0.03	5,8 ± 0.11	NS
L*	48,3 ± 0.84	47,1 ± 1.72	NS
a*	5,1 ± 0.49	6,9 ± 0.48	*
b*	1,2 ± 0.21	2,3 ± 0.41	*
ChromeChroma	5,3 ± 0.51	7,3 ± 0.54	*

^a Values are expressed as mean ± standard error.

^b Significance level of the effect on chemical-physical characteristics: NS, $p>0.05$; *, $p<0.05$; **, $p<0.01$, ***, $p<0,001$.

Figure1. Influence of different slaughter weights (120 kg LW: LW120 and 160 kg LW: LW160) on sensory profile of pig loin. Significance level of the influence of different slaughter weights on sensory profile: *, $p<0.05$; **, $p<0.01$.



These results show clearly that the discrimination is done by aspect and taste descriptors. The heavy pig loins are characterized by a more intensive pink colour, probably caused by the increase of pigment content of older pigs

(Latorre *et al.* 2004) and by an higher *marbling* and *fat cover*, according to chemical analysis. Also the higher *fibrous* and a lower *tenderness* could be consequent to increased age at slaughtering (Fang *et al.*, 1999).

The *metallic flavour* is more intensive, probably a consequence of increased blood pigment content like myoglobin, as well as colour.

This research highlights that the increase of pig live weight at slaughtering could influence chemical, physical and sensory characteristics. 9/14 of sensory descriptors have characterised heavy pig loin, mainly descriptors of aspect and taste; instead descriptors of aroma, flavour and consistency in mouth are discriminant just for metallic flavour, tenderness and fibrous descriptors.

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