

DETECTION PSE MEAT AND INFLUENCE OF HAEM PIGMENT CONCENTRATION

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SUMMARY

The meat quality of 205 pig carcasses was studied and its relationship with haematic pigments content.

Meat was classified as PSE, Normal and DFD using FOP, QM and pH measurements in the *Semimembranosus* (SM) and *Longissimus dorsi* (LD) muscle at 45 minutes and 24 hours after slaughter. Haematic pigment in *Semimembranosus* muscle was determined by Trout's method (1991). The ranges in mean values of the pigment were studied in relation with the meat quality detected. Differences in pigment quantities were also found between the sexes and different qualities of meat.

INTRODUCTION

The production of pigs with a higher percentage of lean meat has given rise to problems in quality with pale, soft and exudative meats (PSE).

The development of instrumental methods has permitted the determination of meat quality in the slaughter line, in most cases without destruction of the carcass, by means of pH, light scattering and electrical conductivity measurements.

Meat colour, one of the organoleptic characteristics which directly affects quality, is determined by two factors: the concentration and chemical state of the haematic pigments in muscle, principally myoglobin, and the proportion and development of glycolysis (Potthast, 1987). A low concentration of pigments can be important because this tends to increase the paleness of PSE meats (Warriss et al, 1990).

The aim of this work is twofold: to study the quality of meat in Murcia Region and its relationship with haematic pigment concentration.

MATERIAL AND METHODS

The study was based on a homogeneous group of 205 pigs from the same stock and pig farm from a commercial cross of negative halotane breeds.

To determine the meat quality (PSE, normal and DFD) of these animals, internal scattering of light by means of optic fibre (FOP- Premier Electronics Northern LTD., England), electric conductivity with a Quality Meter (QM- Tecpron, Munich, Germany) and pH (Crison 506 pH meter with Xerolyt Ingold penetration electrode) were measured in the

slaughter line at 45 min and 24 h post mortem in the *Semimembranosus* (SM) and *Longissimus dorsi* (LD) muscles.

The criteria followed to classify the meat according to the FOP, QM and pH values are shown in Table 1, and closely follow the values used by other authors (Diestre et al., 1989; Barton-Gade, 1989; Honkavaara, 1989; Chizzolini et al 1991...).

Haematic pigments were determined in the *Semimembranosus* muscle using Trout's method (1991) with a phosphate buffer at pH 6.5, 10% Triton-X 100 and sodium nitrite. Pigment concentration was calculated from absorbance of the sample at 409 nm.

A statistical study of the results was carried out by multivariant methods (multiple correlation) and variance analysis.

TABLE 1. Standards measures of meat quality.

	PSE	Normal	DFD
FOP ₄₅	> 40	≥18	< 18
FOP ₂₄	> 45	25-30	< 25
QM _{45/24}	> 10	> 5	< 5
pH ₄₅	≤ 5.6	> 5.6	
pH ₂₄			> 6.2

RESULTS AND DISCUSSION

Of the 205 carcasses studied only one presented PSE characteristics according to FOP, QM and pH. 43.36 % of the carcasses were DFD and 54.14 % normal. The mean measurements of FOP, QM and pH at 45 min and 24 h post mortem are shown in Table 2.

The absence of PSE meat might have been due to the use of negative halotane commercial cross breeds in the experiment.

Many of the meats classified as DFD were on the borderline os normality, so that they can be considered as moderately DFD. If pH was taken as the sole criterion for classification, practically all could be considered normal. However, it must be said that the percentage of DFD meat was above that encountered by othe authors (Van der Wal et al., 1989; Warriss et al., 1989; Chizzolini et al., 1991).

TABLE 2. Means (M) and standars deviations (SD) of meat quality characteristics (SM & LD muscle).

	Nº	PSE M	SD	Nº	NORMAL M	SD	Nº	DFD M	SD
FOP ₄₅	1	24.00		95	12.23	5.06	86	10.19	4.11
QM ₄₅	1	13.65		73	4.93	1.28	69	4.47	1.07
pH ₄₅	1	5.48		105	6.45	0.29	92	6.61	0.27
FOP ₂₄	1	21.00		83	26.81	7.42	81	22.27	6.00
QM ₂₄	1	7.05		73	6.08	1.87	67	4.70	1.24
pH ₂₄	1	5.52		97	5.84	0.16	88	5.96	0.21

P ≤ 0.05

Variance analysis showed hardly any significant differences between sexes according to the parameters studied.

The mean concentration of pigment in the meat analysed was 1.133-mg/g, being 1.070 mg/g for normal and 1.204 mg/g for DFD meat. Thus for a level of significance of 86 % an interval of pigment values was established (mg/g) ($1.012 < \text{normal} \leq 1.128 \leq \text{DFD} < 1.280$) which could be taken as an additional criterion to those already in existence to classify meats. (Table 3).

The sequence for the mean pigment values ($P < 0.05$) of the sample according to sex and meat quality was "males-normal (0.997) < males-DFD (1.125) < females-normal (1.178) < females DFD (1.274)" (mg/g), significant differences being observed between the mean values of boars-normal and sows-DFD with respects to the rest. This coincides with the findings of Warriss et al.(1990), who also found a significant relationship between pigment concentration and sex.

The haematic pigment content hardly seems to be related with the FOP, QM and pH measurements as can be seen from the correlation coefficients found in all casses ($r < |0.083|$).

TABLE 3. Haem pigment concentration values (mg/g).

	Nº	Normal M	SD	Nº	DFD M	SD
Total	111	1.070	0.411	93	1.204	0.411
Males	66	0.997*	0.315	47	1.135	0.483
Females	45	1.178	0.506	46	1.274*	0.499

* $p \leq 0.05$.

CONCLUSIONS

In an experiment to classify meat quality according to FOP, QM and pH measurements 45 min and 24 h post mortem in the SM and LD muscles of 205 animals, 111 were found to be normal, 93 DFD and 1 PSE.

Mean haematic pigments concentration was 1.070 mg/g for normal meat and 1.204 for DFD. These values allows us to establish haematic pigment concentration ranges which are highly significant (86%) in relation to the quality detected. Similary, significant differences are observed between sex groups and meat quality.

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