Breed and sex effect on pork meat quality

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Introduction

Pork is one of the most traditional meats consumed by Portuguese people. From the 800 thousand tonnes of meat and meat products produced in Portugal, pork represents about 43% of total value. Also the idea that pork is not indicated for hypo-caloric or low in cholesterol diets is something not real and has been decreasing.

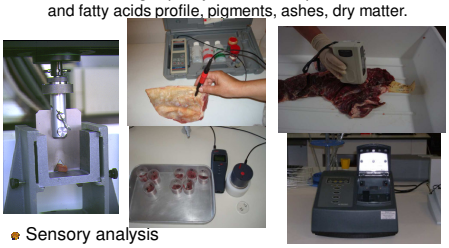
The Preto Alentejano is a local non improved swine breed which survived during the last years owing to a demand increasing of Iberian products and the protection of origin designation products. Commercial pig breeds have great prolificacy and precocity, raised purely on an intensive way, using a more advanced technology that translates into a possible improvement in terms of carcass yield.

Aim

The objective of this work was to study the effects of sex and breed in the characterization of pork meat from a commercial and a local breed (Preto Alentejano).

Materials and methods

- Animals:
  - 8 Females; 8 Males.
  - Commercial and Preto Alentejano breeds.
  - Live weight: 80-100 kg.
  - *Longissimus* muscle (5th thoracic vertebra – 10th lumbar vertebra).
- Physical and chemical analysis:
  - Water-holding capacity, and texture; protein, total fat and fatty acids profile, pigments, ashes, dry matter.



- Sensory analysis
  - Trained taste panel of 11 experts, in five sessions.
  - Samples prepared according a standard methodology.
  - Evaluated parameters:
    - odour intensity, toughness, juiciness, flavour intensity, flavour quality, and overall acceptability.

***Figure 1**: Taste booth showing all the components needed to perform a sensory analysis. On the right a paper sheet with the scales used to evaluate each sample.*

- Statistical analysis:
  - Experimental design was a factorial plan with 2 sexes and 2 breeds as fixed factors.
  - Physical-chemical data analyzed using Univariate Analysis of Variance procedure of the SPSS.
  - Sensory data analyzed using the Generalized Procrustes Analysis by XLSTAT.

Results

Physical evaluation

Table 1 shows the physical characteristics of pork meat of males and females of the commercial and the local breed. Commercial breed presented higher water losses than the local breed.

Table 1: Means for the effect of breed and sex on the physiscal evaluation of pork meat. WHC – Water holding capacity, measured as percentage of water losses.

		WHC	Texture (kgf)
Preto Alentejano	Males	63.46	4.54
	Females	55.19	4.73
Commercial	Males	68.84	4.52
	Females	66.15	4.35
Principal effects	Breed	*	NS
	Sex	NS	NS
	Breed*Sex	NS	NS

Chemical evaluation

Table 2 shows the chemical characteristics of pork meat by sex and breed. It can be observed that breed had a significant effect on protein content, total fat, pigments and dry matter.

Also a significant effect of breed and interaction was observed for total fat and pigments.

		Ashes	Protein	Total fat	Pigments	Dry mater
Preto Alentejano	Males	1.17	21.86	3.79	2.19	26.31
	Females	1.12	22.29	6.09	1.41	26.54
Commercial	Males	1.17	22.42	3.45	1.25	24.84
	Females	1.17	22.29	3.34	1.56	25.69
Principal effects	Breed	NS	*	**	***	**
	Sex	NS	NS	*	***	NS
	Breed*Sex	NS	NS	*	***	NS

***Table 2**: Means for the effects of breed and sex on the chemical evaluation of pork meat.*

NS – no significant, * - P<0.05, ** - P<0.01, *** - P<0.001.

Fatty acids

Figure 2 shows the pork meat fatty acids grouped by saturation degree of males and females from the commercial and the local breed. There was significant breed, sex and interaction effects on saturated fatty acids (SFA), breed and sex effects on mono-unsaturated fatty acids (MUFA) and only an interaction effect on poli-unsaturated fatty acids.

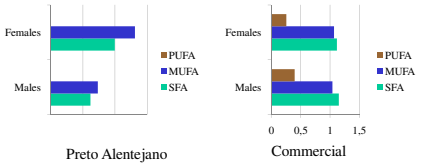


***Figure 2:** SFA, MUFA, and PUFA of pork meat from males and females of a commercial and a local breed.*

Main fatty acids

Figure 3 shows the effect of sex and breed on the main fatty acids detected on the pork meat.

There were significant breed and sex effects on C16, palmitic acid and C18:1, oleic acid. Also there was a significant breed effect on C16:1, palmitoleic acid.

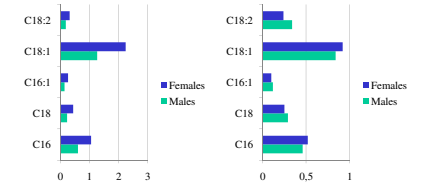


***Figure 3**: Main fatty acids of pork meat. Differences between sexes and breeds.*

Sensory analysis

Figure 4 shows that the two first principal axis explained 84.24% of total variation among meat samples.

Correlation between sensory parameters and the factors shows that almost all parameters are highly correlated with factor 1, except for odour intensity.

It can be observed a gradation of the different types of meat in the factor 1. Commercial breed appears on the left and Preto Alentejano on the right. Also can be observed that males appear on the bottom and females on the top of the graph, indicating a separation by factor 2.

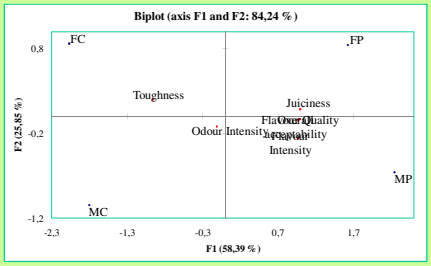


***Figure 4**: Consensus configuration: meat samples coordinates and correlations between sensory parameters and the first two factors.*

As the factor 1 explains 58,39% of total variability almost all the points are concentrated close to axe 1. All types of meat are clearly separated on the map (Figure 5), suggesting that experts could differentiate them.

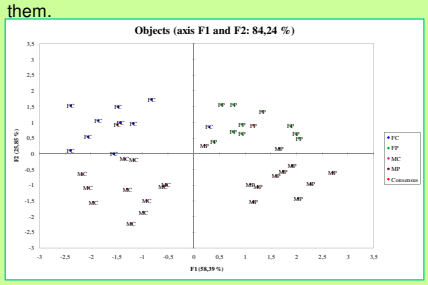


***Figure 5**: Consensus configuration by object (breed vs sex): coordinates of different types of meat for the different experts*

Conclusions

All treatments presented significant differences for total fat and pigments content.

No significant differences were found for protein, ashes, dry matter, WHC, and texture.

There was a predominance of MUFA, followed by SFA and PUFA. Differences were significant for sex and breed.

Taste panel found differences, mainly between breeds: experts scored Preto Alentejano meat as being juicier, more tender, with richer taste and more acceptable than Commercial meat.

The higher juiciness score of Preto Alentejano meat were probably attributable to the higher intramuscular fat content compared to Commercial meat.

The Commercial pork was characterized mainly by high toughness.

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