

PORK FLAVOUR: SENSORY PROFILING OF PORK IN SWEDEN AND DENMARK USING THE SAME METHODOLOGYAgerhem H.¹ Bejerholm C.² Claudi-Magnussen C.²¹ SIK, The Swedish Institute for Food and Biotechnology, Ideon, SE-223 70 Lund, Sweden; e-mail: halina.agerhem@sik.se ² The Danish Meat Research Institute, P.O. Box 57, DK-4000 Roskilde; Denmark**Background**

Interlaboratory sensory study of pork in five Nordic countries, Agerhem et al. (1997) showed that there is a need to standardise training procedures in a more exact way and that common standards, stable in time, should be used for training of sensory panels to get comparable results in sensory profiling of pig meat.

This study was performed as a part of the Nordfood project "Pork flavour". The project focuses on relationships between sensory qualities, consumer preferences and the chemical composition of pork. This paper presents results from the sensory profiling performed in two laboratories, using equal pork samples of different qualities. The interlaboratory study of pork (*M. longissimus dorsi*) was conducted in Sweden and Denmark. The standardised methodology worked out was based on an inventory of descriptions provided by the laboratories and due to Byrne et al. (1999) for WOF samples. Consumer preferences and instrumentally measured content of volatile components in the samples will be published elsewhere.

Objective

The objective of this investigation was to perform sensory profiling on pork of different qualities and establish, whether trained panels in the two laboratories rated sample differences in the same way using the same harmonised methodology.

Materials and methods

Trained panels from two laboratories Danish Meat Research Institute (Denmark) and Swedish Meats R&D (Sweden) participated in providing the methodology for the sensory study. The methodology worked out was based on an inventory of descriptors used by the two panels and also according to the methodology described by Byrne et al. (1999) for WOF samples. The first list had been generated together at a meeting and sent to the two participants for translation into their own language, discussion with the assessors and selection of appropriate terms. Training consisted of two parts: qualitatively, by learning the attributes and quantitatively, by learning to rate the perceived intensity of the attributes consistently on a line scale. The training took place using the same reference samples produced at the Danish Institute of Agricultural Sciences, Research Centre Foulum. Subsequently, a list consisted of seventeen common descriptors were established (Table 1).

Ninety-six female slaughter pigs (DDxLY) reared at the Danish Institute of Agricultural Sciences, Research Centre Foulum, were treated in order to produce meat of three distinct qualities, i.e. normal meat quality, high pH (ultimate pH 6.1-6.2) and RSE, slaughtered at an average weight of 102 kg. *M. longissimus dorsi* was aged for 1 and 7 days. The loins were cut into 2 cm slices and fried at 155±5°C to end-point temperature of 65 and 80°C. In order to develop warmed-over flavour, some of the cooked samples were stored at +4°C and then reheated to 65°C at 80°C before serving.

Sensory profiling was carried out in the two laboratories using the same harmonised method. The samples were evaluated in duplicate by 9 panellists. The experimental design balanced out the effect of order of presentation and the first-order carry-over effect (MacFie et al., 1989). The attributes were assessed as in a normal, conventional profiling exercise. The attributes were rated on an unstructured line-scale (0-100). The scale was anchored at the extremes with the labels "none" and "very strong". Each assessor evaluated the samples at individual speed using a continuous scale and a computerized system for data recording (PSA System-OPP and FIZZ respectively). Each panel used the same list of six descriptors and the same experimental design. The results were evaluated using principal component analysis (PCA) and The Unscrambler Camo, version 7.5).

Results and discussion

The list of the descriptors agreed by the two panels after several, common training sessions with standardised references is shown in Table 1. The results of the evaluation of data using PCA are shown in Figure 1. A reheated meat flavour was the predominant characteristic of the first principal component. The first PC explained 68% of the variation in the data set, which implies that the warmed-over flavour was the main effect in the pork samples. As shown in the score plot the two laboratories judged the samples in the same way as regards the attributes constituting the first principal component (PC).

The second PC separated the results of the two laboratories and explained 17% of the variation. As seen in the Figure 1, the samples were parallel shifted due to laboratory. The result of the Swedish panel tends toward juiciness, bitter taste and acid/old aroma, whereas the Danish judgements tend towards brownness. However, the order of the samples is identical, which indicates that there might have been a systematic difference in the frying conditions used by the two laboratories.

Conclusions

Both panels evaluated the warmed-over flavour as the main factor contributing to the flavour differences obtained in the pork samples, according to PCA. The two laboratories judged the samples in similar way as regards the warmed-over flavour related attributes (PC1) mainly due to the harmonised method and training of panellists. The second PC separated the results of the two laboratories by a parallel shift, whereas the individual order of the samples was identical.

Acknowledgements

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Table 1 Final list of 17 sensory descriptive terms^a with definitions developed for the evaluation of pork samples in sensory profiling

Term ^a	Definition
Colour	Visual stimulus associated with:
Brownness-C	The intensity of brown colour
Odour	Odour associated with:
Meat-O	Meat complex/lean/brothy
Pig-O	Piggy/animal
Metallic-O	Bloody/iron/metallic
Sweet-O	Brothy/sweet,
Off-O	Cheesy/liver/old
Acidic/sour-O	Sour/soured/acidic
Warmed over-O	Oxidised/butter/cod liver fat/wet cardboard
Flavour	Aromatic taste sensation associated with:
Meat-F	Meat complex/lean/brothy/organy/umami
Pig-F	Piggy/animal
Metallic-F	Bloody/iron
Warmed over-F	Oxidised/butter/cod liver fat/wet cardboard
Taste	Taste associated with:
Sweet-T	Sweet taste (sucrose solution like)
Bitter-T	Bitter taste (quinine chloride solution like)/bile
Acidic/sour-T	Sour taste (citric acid solution like)
Texture	Texture associated with:
Juiciness-Tx	Mouth feel/juiciness perceived during chewing
Tenderness-Tx	Oral texture/perception of sample disintegration during chewing

^a Suffix to sensory terms indicates method of assessment by panellists; -C = Colour, -O = Odour, -F = Flavour, -T = Taste, -Tx= Texture.

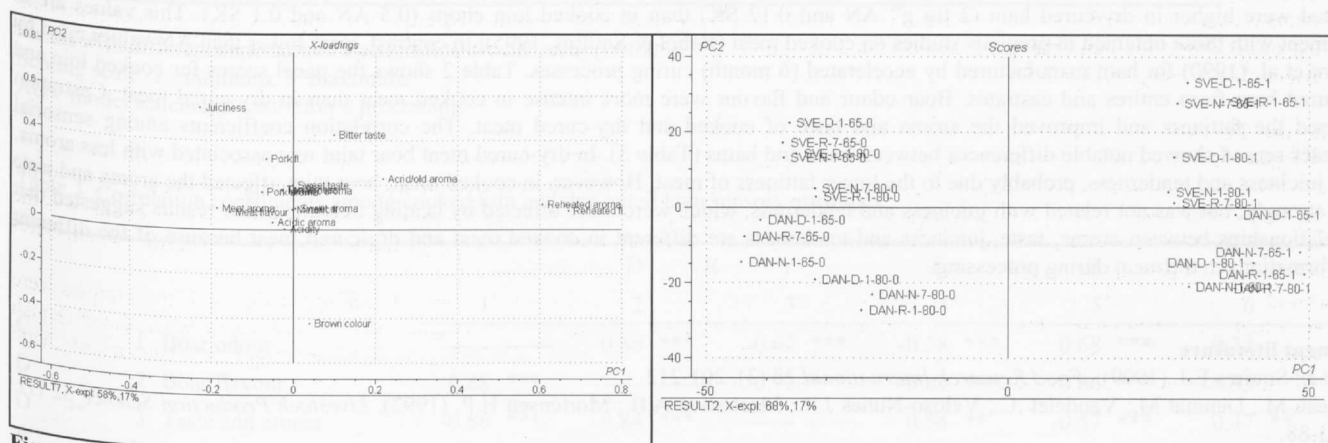


Figure 1. PCA analysis of results from the sensory profiling in Denmark and Sweden of pork samples of defined quality: SVE/DAN=laboratory (SMRD and DMRI, respectively) N/R/D=meat quality (normal, RSE, high pH); 1/7= ageing (1 and 7 days); 65/80=end oint temperature; 0/1=chill-storage and reheating; (0=no chill-storage and reheating; 1=chill-storage for 48 h and reaheating).

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