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Animal production

DESCRIPTION OF THE METHODOLOGY USED FOR THE SENSORY ASSESSMENT OF BOAR TAINT IN EU PROJECT AIR 3 PL942482

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Abstract
Several different methods have been used to determine the level of boar taint in entire males using sensory panels. This paper outlines the standardised methodology for preparing meat samples and sensory evaluation of boar taint worked out and based on an inventory of descriptions provided by the members of EU project AIR 3 PL 942482.
The methodology includes selection and training of 10 assessors in each country, standardised descriptions of preparing meat samples for odour and flavour, experimental design, environmental conditions and sensory assessment. The same methodology was followed by all participants.

Introduction
The contribution of varying levels of androstenone and skatole to the boar taint in meat from entire male pigs, and whether androstenone or skatole or their combination are the most important contributors is still a question much under debate (Bonneau, 1993). One reason for the discrepancies observed in different studies might be related to varying methods used for preparing the meat samples (Agerhem & Tornberg, 1995) and how the boar taint is assessed. There is evidently a need to standardise both the method for preparing the meat and the performance of the sensory evaluation of the boar taint. In the course of this project, EU project (AIR 3 PL942482), boars and gilts were produced in six European countries and the meat samples were selected on the basis of fat skatole and androstenone levels. Panels in seven European countries were then supplied with coded samples for sensory evaluation in two replicates a "winter"- and a "summer"-experiment. The standardised methodology (Agerhem and Dijksterhuis, 1995) was based on an inventory of descriptions provided by the members of the project. It was set up by a group of representatives from each of the seven participating countries, including H. Agerhem (SMRI, Sweden), F. Siret (C.T.S.C.C.V., France), M. Angels Oliver (IRTA, Spain), C. Beijerholm (DMRI), G. Dijksterhuis, (ID-DLO, the Netherlands), S. Marie (MLC, U.K.), K. Fischer (BAFF, Germany).

Materials
Boars and gilts were produced in six European countries in two seasons and the meat samples, *M. longissimus dorsi*, were selected on the basis of fat skatole and androstenone. Subsequently, for the purpose of sensory evaluation and consumer study 120 samples, 60 for each season, placed in 10 groups were established according to the level of androstenone and skatole content. Each country received 6 samples per cell, in total 60 samples for each season. The *M. longissimus dorsi* with fat, was cut out on the day after slaughter and divided into different joints for different purposes. For the sensory analysis, the joints were vacuum packed and stored at +4°C for three days and then frozen until the analysis. The joints were thawed the day before sensory evaluation for 4 hours at room temperature and then at +4°C overnight (approx. 14 hours). The joints were still cold then, but easy to cut.

Sample preparation and serving
The outer sides of the joint (1 to 1.5 cm) were cut away. From the remaining part subcutaneous fat was trimmed off in a standardised way so that 5 mm was left on the joint. The joints were then partly cut into 1.5 cm thick slices and the edges taken away.
Three pieces, each with subcutaneous fat on one of the edges, were cut out of each slice of the cutlet for the **flavour** evaluation. The pieces were placed into a glass beaker (100 ml) covered with aluminium foil and cooked in a preheated oven at 175°C for 12 minutes. The foil was removed from the beakers and they were immediately presented to the assessors together with a plate, a knife and a fork.
The remaining joint was further cut into 2-3 mm thick slices for **odour** evaluation. They were placed into a glass beaker (100 ml) covered with aluminium foil and cooked in a preheated oven at 175°C for 10 minutes. The slices were presented to the sensory panel immediately on removal from the oven for odour evaluation. The assessors had to remove the foil and smell. At the end of cooking, the temperature of the samples was about 80°C. The serving temperature was about 70°C. If needed the covered beakers had to be kept at 70°C until presented.

Environmental conditions
Standardisation of environmental conditions is important in sensory evaluation of boar taint as they have an effect on the test results. It was decided that some important matters concerning the laboratory situation should be uniform like individual booths for the assessors and that the room temperature should be kept between 18-25°C. Red lighting was recommended to mask the colour differences between the samples. The assessors were asked to rinse their mouth with crackers and tasteless non chlorinated drinking water or non carbonated mineral water at room temperature.

Profile panel
The methodology included selection of 10 assessors in each country, which proved able to perceive androstenone (0.5 ppm, in lard) and skatole (0.2 ppm, in lard). The same recipe for preparation of the lard samples was used in each country. Twelve triangle tests made up of a control sample and either the androstenone or skatole solution were presented in a standardised way. A full triangle design was used. When assessors correctly identified the odd stimulus in 9 out of 12 triangles (testing at α=1%) they were considered to perceive the substance involved. (Gacula & Singh, 1984, Meilgaard *et al.*, 1987, O'Mahony, 1986).
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 real meat samples from boars with different levels of skatole and androstenone, using each country's own material. Each laboratory decided separately whether or not the assessors were trained sufficiently. To check the repeatability of the separate assessors a method based on a graphical technique was recommended, i.e. plots of an assessor ability to detect differences versus his/her repeatability. The method includes Analysis of Variance to produce p-values and mean square of error for each assessor and each attribute separately (Lea. *et al.*, 1995), Figure 1.

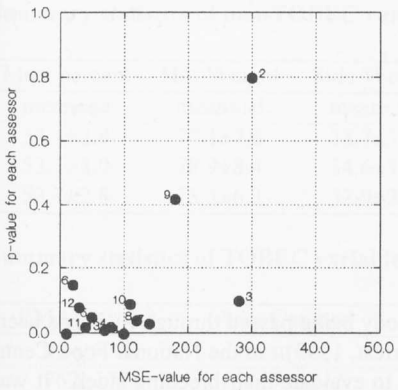

Figure 1. p-value against MSE of ANOVA to test assessors discriminability and repeatability.

In Figure 1 the assessors 2, 3 and 9 are outliers and they need additional training.

Assessment of odour and flavour

In each country 10 assessors evaluated 60 samples in 12 sessions, 6 sessions on odour and 6 on taste, at each season. All six panels used the same list of eight descriptors . The first list consisting of 14 descriptors had been generated together at a meeting held at SMRI in Kaevlinge, Sweden and sent to each participant for translation into their own language, discussion with the assessors and selection of appropriate terms. Subsequently, a list consisted of eight common descriptors the same for odour and flavour evaluation (pig, urine, manure/stable, naftaline/mothballs, rancid, sweet, sweat, abnormal taste/odour) were established.

Scale

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".

Design

To avoid carry-over effects, the assessments of cooking odour and flavour were conducted separately. The experimental design balanced out the effect of order of presentation and the first-order carry-over effect (MacFie *et al.,* 1989).

Concluding remarks

In such a study, especially when a large number of laboratories and samples are involved, it was difficult to standardise every point of the methodology. It was practically impossible to have assessors which have been selected and trained in exactly the same way. The meaning of different terms in the various countries represented the largest obstacle in establishing the list of common attributes to be used and understood in the same way in the different countries. The results from the study are not yet ready to be published.

References

Agerhem, H., Dijkersterhuis, G.B. (1995). EU boar taint project: Sensory evaluation by trained panels. Final Proposal.
Agerhem, H., Tornberg, E. (1995). A comparison of the off-flavour of meat from entire male pigs cooked to two different internal end-point temperatures. Annual Meeting of the E.A.A.P.
Bonneau, M. (1993). 44th Annual Meeting of the E.A.A.P., 16-19 August 1993, Aarhus, Denmark.
Gracula, M.C., Singh, J. (1984). Statistical methods in food and consumer research. Orlando: Academic Press.
Lea, P., Røtbotten, M., Næs, T. (1995). Measuring validity in sensory analysis. Food Quality and Preference. In press.
MacFie, H.J., Bratchell, N., Greenhoff, K., Vallis, L.V. (1989). Designs to balance the effect of order of presentation and first-order carry-over effects in hall tests. Journal of Sensory Studies 4, 129-148.
Meilgaard, M., Civile, G.V., Carr, B.T. (1991). Sensory evaluation techniques, Volume I. 2nd ed. CRC Press Inc.: Florida.
O'Mahony, M. Sensory evaluation of food. Marcel Dekker Inc.