

# Applicability of an electronic nose to the sorting-out of boar tainted carcasses

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## Schlüsselwörter

Boar taint, electronic nose, carcasses classification

## Problemstellung und Zielsetzung

The aim of this project was to show the feasibility of a classification technique of pork carcasses based on their boar taint level using an electronic nose.

## Material und Methoden

In the present study, an electronic nose based on mass spectroscopy (SMart Nose, Smart Nose AG, Switzerland) coupled with either a manual pyrolyser (Pyrojector II, SGE International PTY Ltd., Australia) or a SPME (SUPELCO, Sigma-Aldrich, USA) automatic pre-concentration system was used. As a reference method, the concentrations of androstenone (A), skatole (S) and indole (I) in adipose tissues were determined by HPLC in all samples. Thirty-eight fat samples, from which 35 were boars and 3 castrates, with A and S levels ranging from 0.2 to 4.4 ppm and from 0.02 to 0.68 ppm respectively, were submitted to a trained sensory panel ( $n=8$ ) for an olfactory test. Furthermore, a representative panel of Swiss consumers ( $n = 374$ ) was selected based on their capability to smell A (no evidence of anosmia). The consumers' panel performed a blind home user test of meat, from the neck region, selected from a group of 106 boars and 10 castrates raised in a commercial farm. The age and carcasses weight at slaughter were, mean  $\pm$  sdev,  $169.5 \pm 14.1$  days and  $70.4 \pm 16.2$  kg respectively. For this test, boar samples were distributed into four classes depending on their concentration of A, with S and I constants ( $< 0.07$  ppm), a fifth class was constituted of castrates: A1: 0 to 0.25 ppm, A2: 0.25 to 0.5 ppm, A3: 0.5 to 0.75 ppm, A4: 0.75 to 1 ppm, and castrates C:  $\sim 0.3$  ppm of A.

## Ergebnisse und Bedeutung

The cross correlation coefficients between A, S and I levels and human response (olfactory test performed by a trained panel) were low A: 0.558, S: 0.186 and I: 0.046. Due to the very low volatility of A, S and I, the SMart Nose with headspace sampling mode shows to be inefficient. Model PCAs built on a set of fat samples from boars with high A levels ( $> 1$  ppm) and castrates, show 100 and 98% correct classification rates for the pyrolysis and SPME techniques, respectively. While pre-concentration with a SPME device is long ( $\sim 2$  hours for the subsequent steps per sample), pyrolysis takes only a few minutes ( $\sim 260$  sec per sample) being therefore more suitable for a possible future on-line application at the slaughterhouse.

Different organs were measured, over the entire heard of 106 boars, as tentative prescreening parameters: testis weight  $209.8 \pm 83.7$  g, bulb urethral gland (BU) length  $9.2 \pm 1.7$  cm, BU weight  $36.4 \pm 16.6$  g, salivary gland weight  $28.1 \pm 6.3$  g, and thickness of the adipose tissue  $10.2 \pm 3.9$  mm. However, only the length ( $r = 0.45$ ) and weight ( $r = 0.46$ ) of the BU were significantly correlated with the S concentration. The A, S, and I concentrations in the samples were: A:  $0.25 \pm 0.39$ , S:  $0.06 \pm 0.4$  and I:  $0.01 \pm 0.01$ . It is also interesting to note that, within the range of concentrations tested, more than 96% of the boars in this herd had less than 1 and 75% had less than 0.5 ppm of A. The consumers test did not show a significant difference between boars and castrates in the acceptability of meat. As a result no significant threshold of dislike could be derived from these data. The percentage of unsatisfied consumers was, based on odor: **A1**:  $9\% \pm 4.4$ , **A2**:  $13.2\% \pm 10.5$ , **A3**:  $15.2\% \pm 6.1$ , **A4**:  $14.6\% \pm 5.2$  and based on flavor: **A1**:  $7.1\% \pm 3.8$ , **A2**:  $15.1\% \pm 6.8$ , **A3**:  $14\% \pm 6$ , **A4**:  $14.7\% \pm 5.6$ . Surprisingly the percentages for C were  $9.8\% \pm 6$  and  $13.9\% \pm 6$ , respectively. This project has been extended to 2007 by Pro Schwein to develop a functional classification method with a SMart Nose coupled with a pyrolyser provided with an automatic sampling.

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