

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: ~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 (~2 hours for the subsequent steps per sample), pyrolysis takes only a few minutes (~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 herd 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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