# PANEL TRAINING FOR BOAR TAINTS SENSORY EVALUATION ANALYSIS

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**Abstract- Castration practice in male pigs to prevent boar taint is expected to be forbidden in Europe by 2018 which make important to study some new alternatives to commercialize meat from entire male. The levels of androstenone in fat from entire males range between 0.0 and 5 ppm (exceptionally can be higher) and depend primarily on weight, stage of maturity and genotype. Sensory training from an expert panel to evaluate the boar taint perception in entire male pork is an important tool to conclude the range of sensory boar taint perception once considered the different levels in animals in order to ensure a proper trade of these products.**

## I. INTRODUCTION

Sensory boar taint is widely reported to have a distinctive and unpleasant character which evokes repulsion and rejection when perceived through a combination of odour, flavour and taste in pork and pork products during cooking and eating (1). Skatole (SKA) and androstenone (AND) are the main boar taint compounds (2). Whereas nearly everybody is sensitive to SKA, the sensitivity to AND is genetically determined and differs between gender, age, and country, among others (3). Thus anosmic people, which imply defective or missing molecular receptors, is also presented in population what is related to the OR7D4 human odour receptor (4). AND is a pheromone, which is synthesized in the boar tests and subsequently released into bloodstream. Once androstenone is released it can be transported to the salivary gland or accumulate in adipose tissue, and then in meat (5). Castration of male pigs is expected to be forbidden in Europe in the future (2018), and it is therefore important to find new processing methods for this raw material avoiding negative consumer reactions. To evaluate the different strategies to mask boar taint in meat and meat products, sensory analyses is a good tool. Currently, the new challenges facing the food industry are progressively transforming sensory to a more proactive role, responsible for generating new product ideas based on unique sensory properties or unique consumer segments identified only through sensory behavior (6). It is a method by which a panel uses a developed sensory vocabulary to describe perceived sensory boar taint characteristics in meat products (7). The resultant profiles are perceptual maps of the variation in a sample type that can be employed alone or in combination with chemical/instrumental measurements and potentially consumer studies in the explanation and elucidation of underlying predictive and causal relationships (7). A correct training of the panel is determinant to carry out any study in this sense. So, the aim of this study is to verify a preliminary protocol to select and train a panel to detect AND.

## II. MATERIAL AND METHODS

*Samples preparation*

Sensory analyses were performed, according to the international standards (8) in a sensory evaluation laboratory. For preparing the AND solutions, AND (5α-androst-16-en-3-one, Sigma A8008) and SKA (3-methylindole, Aldrich M51458) were diluted in vaseline oil (Panreac). From this one, different dilutions on vaseline oil were done (0.2-2 ppm). For different tests, 37 ml of each solution was presented in amber glass bottles, at 35 ºC (9) Samples were coded with random three-digit numbers. For the selection of panel and training, five tests were done.

*Selection of sensory panelists*

Seventeen people belonging to two different Research Centres (University of

Murcia and Instituto Tecnológico Agrario de Castilla y León) were recruited internally trough a smell test of pure AND and SKA. The potential candidates were required to recognize both, odours with unpleasant sensation.

*Descriptors*

In the first session, smell and flavour descriptors and their relationship with AND and SKA were studied of two solutions of 1.5 ppm AND and 0.5 ppm SKA in vaseline oil. Anosmic candidates were rejected.

*Identification*

A selection was made of judges who were among those able to distinguish between AND, SKA and AND + SKA. For that solutions of 1.5 ppm AND and 0.1 SKA were used. Ten bottles were presented to each panellist. Five were identificated, and the other five, that were their replicate, had a three digit number. Each panelist had to mach the bottles with the same content (AND, SKA or AND + SKA).

*Threshold test*

Panellist had to order different AND solution from minor to maxime AND concentration, from two different ranges.

a-Solution from medium range: 0.4 ppm, 0.7 ppm, 0.9 ppm, 1.2 ppm.

b-Solution from high range: 0.8 ppm, 1.2 ppm, 1.6 ppm, 2.0 ppm

*Classification*

Panelist have to fix levels of AND in a scale, so they have to classify in three groups: low (0 y 0.2 ppm), medium (0.4-0.8 ppm) and high (1-1.8 ppm).

a. Solutions 0 ppm, 0.2 ppm, 0.7 ppm, 0.8 ppm, 1.6 ppm, 2.0 ppm.

b. Solutions 0 ppm, 0.2 ppm, 0.4 ppm, 0.7 ppm, 1.5 ppm, 1.8 ppm.

In addition, for each test, a panelist was considered as trained when the percentage of corrects responses is up 70% for identification, threshold and classification test. Each test was done by duplicate in different combination, and each one of this was repeated four times.

## III. RESULTS AND DISCUSION

In the selection phase, 11 panelists were chosen from 17 initial people, which were sensible to AND and SKA (pure form). It is estimated that the percentage of sensitive consumer for AND is Spain is between 30.9-47.5% (10). In this study the percentage of sensitive people was higher (64.7%). Table 1 presents results from AND and SKA descriptor. They are similar to those presented by Dijksterhuis et al. (11), who described that androstenone was found to relate mostly to the urine attribute, while skatole related mostly to manure and, to a lesser extent, to naphthalene. Sometimes there are differences between panels, apparently literally translated terms clearly had different meanings in different languages, or were not applicable to meat products in some languages. In addition, differences between countries' panels are to be expected because the panelists come from different cultures with respect to eating and liking of fresh and processed pig meat.

Table 1. Descriptor given for androstenone (AND) and skatole (SKA)

| **AND** | **SKA** |
|---|---|
| Old urine | Naphthalene |
| Pig male | Urine |
| Penetrating/pungent odor | Feces/manure |
| Spicy odour in nose | Farm or block |
| Sweat | - |

Table 2. Percentage of correct responses for three tests: Identification, Threshold and Classification of training panel for AND perception.

| *Panelist* | *Identification* | | *Threshold* | | *Classification* | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 1 | 2 | 1 | 2 |
| **1** | 93.7 | 70.0 | 75.0 | 84.4 | 93.7 | 70.8 |
| **2** | 56.2 | 57.5 | 59.4 | 59.4 | 100.0 | 79.2 |
| **3** | 75.0 | 75.0 | 75.0 | 78.1 | 81.2 | 75.0 |
| **4** | 87.5 | 70.0 | 78.1 | 78.1 | 100.0 | 83.3 |
| **5** | 50.0 | 50.0 | 50.0 | 46.9 | 87.5 | 75.0 |
| **6** | 75.0 | 75.0 | 78.1 | 75.0 | 100.0 | 83.3 |
| **7** | 100.0 | 80.0 | 78.1 | 78.1 | 93.7 | 79.2 |
| **8** | 68.7 | 70.0 | 75.0 | 75.0 | 100.0 | 87.5 |
| **9** | 88.2 | 87.5 | 87.0 | 75.0 | 83.3 | 83.3 |
| **10** | 70.6 | 71.8 | 75.0 | 75.0 | 70.8 | 83.3 |
| **11** | 70.6 | 81.2 | 87.0 | 75.0 | 83.3 | 70.8 |
| **Total** | 76.0 | 71.6 | 74.3 | 72.7 | 90.3 | 79.2 |

Table 2 shows the results of correct percentage of sample for each panelist in

the identification, threshold and classification test. When panelist have defined the terms to each component, is important to test that they are able to discriminate between AND and SKA. Some studies have described that there was an interaction between them, so is important that all panelists may differentiate among them. The final aimof the threshold test is to determine the range of perception of AND. Panelist 2 and 5 have percentage of correct answer below the 70% for identification and threshold tests. However, panelists 2 and 5 improved their percentage of corrects answers during training. In the last test (classification of AND levels), they reached 100 and 79.2 %, and 87.5 and 75 % of correct responses, respectively. Classification tests help to fix the range of AND in three levels: low (0 - 0.2 ppm), medium (0.4-0.8 ppm) and high (1-1.8 ppm). This will enable that in the future analyses on meat and meat product, judges should be able determine the levels of AND. At the final of the training, all panelists had more than 70% of correct responses, as is described in UNE 87 024-1 (12), so the eleven candidates passed the training stage. However authors consider that further studies are necessary in this sense since other statistical ways such as Chi-square test could be useful to evaluate the panel training ratio.

## IV. CONCLUSION

First selection of panelist with pure AND and SKA is a fast and effective option. It is important to define differences between AND and SKA in vocabulary descriptor, to help their combination. During training is possible to improve AND detection. This training method could be useful to work in boar taint products detection in the future.

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