# BOAR TAINT PERCEPTION IN COOKED AND DRY-CURED MEAT

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**Key words:** boar taint, dry-cured ham, cooked pork.

## Background

Boar taint is a well-known off-flavour in pork associated mainly with the levels of androstenone (AN) and skatole (SK) in the fat. Previous studies have shown that processing makes tainted meat more acceptable. Boar taint does not have a negative effect on the eating quality of cooked ham, if it is consumed cold (Bonneau et al., 1992). In other products, such as dry sausages, cured bellies or dry-cured ham, which are processed without heating, consumers can detect boar taint (Claus et al., 1985; Diestre et al., 1990). Cooking reduces AN and SK content, although little is known about how these compounds are degraded during the dry-cured process (Babol & Squires, 1995).
Dry-cured meat is very popular in Spain. A recent study showed that Spanish consumers are more sensitive than others to boar taint (Weiler et al., 2000). However, the sensory role played by boar taint in these products is practically unknown, since there are no specific studies of aspects such as the intensity with which it is perceived its contribution to aroma and taste or its relationship to other sensorial attributes.

## Objectives

The objective of this study was to compare the sensorial role of boar taint in cooked and dry-cured pig meat products. Threshold levels of AN and SK to difference boar odour and flavour between entires and castrates were also determined. The effects of castration and processing on the eating quality were studied. Finally, the relationships among boar taint and other sensory attributes were investigated.

## Methods

24 cooked loin chops (175ºC for 10 min) and 24 dry-cured hams (15 months) from entire males and castrates were studied. Pigs were castrated at 15 days and were raised together in the same farm and slaughtered in the same abattoir at 5.5 months when they had attained a live weight of 105.0 ± 9.1 Kg. Loins and hams were obtained from the same animals. AN and SK content of the fat was determined using reverse phase HPLC (Hansen-Moller, 1994). Samples were classified according to AN and SK fat levels (Table 1) (Font-i-Furnolls et al., 2000).
A comparative sensory analysis was carried out according to ISO 4121 (1987). A trained sensory panel evaluated 6 common sensory attributes in samples of cooked loin and dry-cured ham: boar odour and flavour, freshly cooked or dry-cured aroma and taste, juiciness, tenderness and fattiness. The threshold values of AN and SK was determined by simple AOV. The effects of castration and processing on the sensory attributes of the meat were determined by means of general AOV. The relationships between variables were established by using Pearson correlations.

## Results and discussion

The eating quality of processed meat was affected negatively by boar taint (Table 1). Threshold values for boar odour and flavour to be detected were higher in dry-cured ham (2 $\mu g\ g^{-1}$ AN and 0.12 SK) than in cooked loin chops (0.5 AN and 0.1 SK). This values are in agreement with those obtained in previous studies on cooked meat (Babol & Squires, 1995), in contrast, were lower than AN values cited by Diestre et al. (1990) for ham manufactured by accelerated (6 month) curing processes. Table 2 shows the panel scores for cooked loin and dry-cured ham from entires and castrates. Boar odour and flavour were more intense in cooked meat than in dry-cured meat. Castration favoured the fattiness and improved the aroma and taste of cooked and dry-cured meat. The correlation coefficients among sensorial attributes scored showed notable differences between loins and hams (Table 3). In dry-cured meat boar taint was associated with less aroma, taste, juiciness and tenderness, probably due to the lower fattiness of meat. However, in cooked meat, boar taint affected the aroma and taste more strongly, but was not related with juiciness and tenderness, which were more affected by heating treatment. Our results suggested that the relationships between aroma, taste, juiciness and tenderness are different in cooked meat and dry-cured meat because of the different transformations in the meat during processing.

## Pertinent literature

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Table 1. Androstenone and skatole fat content and boar taint scores for samples used in sensory evaluation

| | | BACKFAT | | PROCESSED MEAT | | | |
|---|---|---|---|---|---|---|---|
| | N | ANDROSTENONE | SKATOLE | ODOUR COOKED | FLAVOUR COOKED | ODOUR DRY-CURED | FLAVOUR DRY-CURED |
| Castrates | 24 | 0.256 ± 0.097 | 0.029 ± 0.018 | 1.47±0.36 $^{a}$ | 1.15±0.21 $^{a}$ | 2.41±0.63 $^{a}$ | 1.80±0.52 $^{a}$ |
| Entires | 24 | | | | | | |
| LL | 4 | 0.328 ± 0.129 | 0.024 ± 0.016 | 2.23±0.21 $^{a}$ | 1.83±0.23 $^{abc}$ | 3.01±0.20 $^{ab}$ | 2.20±0.37 $^{ab}$ |
| LM | 4 | 0.251 ± 0.069 | 0.123 ± 0.054 | 3.27±0.23 $^{b}$ | 1.27±0.23 $^{ab}$ | 3.75±0.30 $^{ab}$ | 2.04±0.37 $^{ab}$ |
| ML | 4 | 0.694 ± 0.116 | 0.033 ± 0.018 | 3.47±0.12 $^{b}$ | 2.53±0.12 $^{cd}$ | 2.79±0.57 $^{ab}$ | 2.46±0.43 $^{ab}$ |
| MM | 4 | 0.569 ± 0.072 | 0.106 ± 0.029 | 3.66±0.33 $^{b}$ | 2.06±0.24 $^{bc}$ | 3.25±0.20 $^{ab}$ | 2.47±0.27 $^{ab}$ |
| HL | 4 | 1.551 ± 0.562 | 0.043 ± 0.027 | 4.60±0.40 $^{c}$ | 3.53± 0.90 $^{d}$ | 3.40±0.30 $^{ab}$ | 2.48±0.03 $^{ab}$ |
| HM | 4 | 1.987 ± 0.614 | 0.131 ± 0.055 | 4.93±0.04 $^{c}$ | 3.53±0.50 $^{d}$ | 4.26±0.09 $^{b}$ | 3.84±0.04 $^{b}$ |

Entire fat samples: H: high; M medium; L Low levels of AN/SK (mg $g^{-1}$).
Means with different superscripts are significantly different (P≤0.05).
Scoring scale: 1: minimum; 5: maximum.

Table 2. Mean scores for sensory attributes of cooked loin and dry-cured ham from entire and castrate males

| | ENTIRE | | CASTRATE | |
|---|---|---|---|---|
| | COOKED LOIN | DRY-CURED HAM | COOKED LOIN | DRY-CURED HAM |
| Boar odour | 3.69 ± 0.91 $^{a}$ | 3.43 ± 0.63 $^{a}$ | 1.47 ± 0.36 $^{b}$ | 2.41 ± 0.63 $^{c}$ |
| Boar flavour | 2.45 ± 0.91 $^{a}$ | 2.49 ± 0.62 $^{a}$ | 1.15 ± 0.21 $^{b}$ | 1.80 ± 0.52 $^{c}$ |
| Taste and aroma | 2.37 ± 0.51 $^{a}$ | 3.05 ± 0.22 $^{b}$ | 3.26 ± 0.27 $^{bc}$ | 3.18 ± 0.19 $^{c}$ |
| Juiciness | 1.99 ± 0.55 $^{a}$ | 2.65 ± 0.24 $^{b}$ | 2.33 ± 0.42 $^{a}$ | 3.03 ± 0.30 $^{c}$ |
| Tenderness | 2.46 ± 0.68 $^{ab}$ | 1.89 ± 0.15 $^{c}$ | 2.65 ± 0.71 $^{a}$ | 2.25 ± 0.26 $^{b}$ |
| Fattiness | 1.88 ± 0.52 $^{a}$ | 1.97 ± 0.52 $^{a}$ | 2.34 ± 0.52 $^{b}$ | 2.40 ± 0.52 $^{b}$ |

Means with different superscripts are significantly different (P≤0.05).
Scoring scale: 1: minimum; 5: maximum.
AOV model statement: castration x processing.

Table 3. Correlation coefficients among cooked loin and dry-cured ham sensory attributes.

| | | DRY-CURED | | | | | |
|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 |
| COOKED | 1 Boar odour | ------ ------ | 0.86 *** | -0.62 *** | -0.58 *** | 0.68 *** | -0.34 |
| | 2 Boar flavour | 0.88 *** | ------ ------ | -0.72 *** | -0.60 *** | 0.66 *** | -0.35 |
| | 3 Taste and aroma | -0.86 *** | -0.84 *** | ------ ------ | 0.54 ** | -0.57 *** | 0.47 ** |
| | 4 Juiciness | -0.23 | -0.25 | 0.16 | ------ ------ | -0.81 *** | 0.64 *** |
| | 5 Tenderness | -0.02 | 0.05 | 0.03 | 0.63 ** | ------ ------ | -0.55 ** |
| | 6 Fattiness | -0.20 | -0.03 | -0.01 | 0.22 | 0.38 * | ------ ------ |

Level of significance: *(P≤0.05), **(P≤0.01), ***(P≤0.001).