60th International Congress of Meat Science and Technology, 17-22rd August 2014, Punta Del Este, Uruguay

EFFECT OF COOKING METHODS (VACUUM VS FRYING) ON BOAR TAINT PERCEPTION

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Abstract - Boar taint is an unpleasant odour that can occur when fat or meat from entire male pigs is heated and volatile compounds, androstenone (AND) and skatole (SKA), are released. Due to the influence of the cooking conditions on the boar taint perception, the sensory perception of odour (pork odour, skatole odour, androstenone odour); flavour (pork flavour, skatole flavour, androstenone flavour) and texture (juiciness, hardness, chewiness) on fresh loin pork cooked under two different cooking methods, [vacuum cooking (80 ºC) and frying (180 ºC)], was evaluated. For this study pork from two levels of AND pork entire male were evaluated: medium (M; 0.69 ppm AND + 0.03 ppm SKA) and high (H; 2.49 ppm AND + 0.01 SKA), both with SKA level below the 0.1 ppm perception threshold. The samples cooked in a frying-pan raised a minimum level of perception for the AND odour and flavour attributes. Meat samples with higher levels of AND (2.49 ppm) were less juicy that those with medium (0.69 ppm). For all samples SKA was not detected. In conclusion, perception of boar taint in cooked meat from entire animals is influenced by cooking method, being minimized with frying at 180 ºC.

I. INTRODUCTION

In most EU countries, 80 to 100% of the male pigs are castrated, but in recent years a higher social concern as regarding animal welfare has been necessary to look for new management alternatives to surgical castration. Boar taint is an unpleasant odour that can occur when fat or meat from entire male pigs is heated (1). The usual terms for description can be 'male pig', 'animal', 'urine', 'faecal' and/or 'sweat' which are largely related to negative human sensory perception (2). It is widely considered that two volatile compounds are largely usual in boar taint namely, 3-methyl indole and 5a-androst-16-3-one, commonly referred to as skatole and androstenone, respectively (3), which are temperature-dependent. Previous studies indicated the influence of the cooking conditions on the boar taint perception (1). Although some cooking strategies as pan or oven are usually considered in boar taint cooked meat from entire male pigs, different cooking conditions among studies lead to unclear results (1). Thus some works as regarding the effect of concrete time/temperature/cooking method on the perception of boar taint are lacking. In this sense the goal of this study was to evaluate the effect of the cooking methods (vacuum vs frying) on the boar taint perception.

II. MATERIAL Y METHODS

The study analyzed the effect of two different cooking methods: vacuum cooking (80 ºC sample packed in a plastic bags under vacuum atmosphere), and frying (180 ºC in a frying pan with 40 ml olive oil, preheating time 1 min), on sensory profile of loin (*Longisimus thoracis et lumborum*) from entire males pigs, with two levels of AND and SKA level below the 0.1 ppm perception threshold: medium (M; 0.69 ppm AND + 0.03 ppm SKA) and high (H; 2.49 ppm AND + 0.01 SKA). The parameters studied were odour (pork odour, skatole odour, androstenone odour); flavour (pork flavour, skatole flavour, androstenone flavour) and texture (juiciness, hardness, chewiness). The panel was formed by eight panellists chosen from the University of Murcia, experienced in the profile assessment of AND perception. They were trained according to ISO (2012) (5). The samples were cut into 2x2 cm and then they were wrapped in aluminium foil coded with

a random three digit number and stored in a sand bath at 60 ºC until tasting. Mineral water and unsalted bread were provided for mouth rinsing between samples. Sensory analysis was carried out according to ISO (2003) (6) using an unstructured scale of 10 cm. All data were analyzed using SSPS version 19.0 software (SPSS Inc., Chicago, IL).

III. RESULTS AND DISCUSSION

Table 1. Sensory scores (mean value ± s.d) in entire male pork cooked under two different methods (vacuum vs frying) in loins from two different AND level: M (medium, 0.69 ppm) and H (high, 2.02 ppm).

Sensory attributes	Cooking methods			
	Vacuum		Frying	
	M	H	M	H
Pork odour	5.7±1.2^{by}	6.5±0.7^{bx}	7.5±1.0^{a}	7.9±1.1^{a}
SKA odour	0.0±0.0	0.0±0.0	0.0±0.0	0.0±0.0
AND odour	5.5±0.7^{ay}	5.9±0.7^{bx}	0.3±0.4^{by}	1.6±0.6^{cx}
Pork flavour	6.5±1.1	6.1±0.9^{b}	7.3±1.4	7.3±0.7 ^{a}
SKA flavour	0.0±0.0	0.0±0.0	0.0±0.0	0.0±0.0
AND flavour	3.5±1.0^{ay}	4.8±0.6^{bx}	0.3±0.4^{cy}	2.3±0.7^{cx}
Juiciness	4.9±0.9^{bx}	3.5±0.7^{by}	5.6±0.6^{ax}	3.4±0.6^{by}
Hardness	5.1±0.8^{aby}	5.7±1.0^{bx}	4.7±0.7^{by}	5.2±0.7^{bx}
Chewiness	5.6±0.9^{a}	5.9±0.9	4.8±0.6^{by}	5.5±0.6^{x}

M: 0.69 ppm AND + 0.03 ppm SKA; H: 2.49 ppm AND + 0.01 SKA
a, b, c: Cooking effect (P<0.05); x,y: AND effect (P<0.05)
AND: androstenone; SKA: skatole

Table 1 presents results of sensory test evaluation of loins with two levels of AND and two heating treatments. The samples cooked in pan had minimum level of AND odour, being 0.29 and 1.66 for M and H in a 10 cm scale, respectively. The frying process reduced in a 94.7 % and 71.9% for M and H samples, respectively, in comparison to vacuum the AND odour (P<0.05). The AND flavour perception was reduced 89.9% for M sample and 52.2% for H (P<0.05). Vacuum conditions and lower temperature used in this treatment (80 ºC) involved the increase of volatile compounds in samples, increasing the panel AND odour and flavour perception. SKA was not identified in samples of both AND levels and cooking treatments. This is due to levels of SKA were lower than the 0.1 ppm perception threshold (0.03 and 0.15 ppm for M and H respectively). These results are slightly higher compared with previous researches that reported SKA detection threshold reported could vary between 0.026 and 0.1 µg/g fat (7, 8).

Juiciness was higher in M loins than in H loins, for both cooking treatments (P<0.05). This attribute is related with water and fat content. Previous studies have reported higher fat % with an increase in juiciness (9). Castrated pigs had higher levels of fat since castration favours intramuscular meat fattening (10), which was probably related to the juiciness perception.

IV. CONCLUSION

Perception of boar taint (AND odour and AND flavour) decreased when frying method is used in comparison with vacuum. In addition, meat from animals with higher levels of AND (2.49 ppm) was less juiciness that those with medium (0.69 ppm).

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