Detection of androstenone flavour in meat products among consumers selected by a new androstenone test

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Abstract

This study investigated the ability among consumers to detect androstenone in cooked ham containing 9.15 mg/kg androstenone. The ham was made of lean meat (2 % fat) from entire male pigs with different levels of androstenone (range 0.55 -9.15 mg/kg). The consumers were, prior to testing, screened for their ability to perceive androstenone by a new sensitivity test. The consumers (90) evaluated cold, sliced (5˚C) hams on bread and warm (60˚C) ham slices and melted cheese sandwiches. Consumers divided into sensitive and non sensitive consumers using a sensitivity test evaluated the slices of cooked hams. The consumers that were sensitive towards androstenone, gave reduced preference for the odour and flavour of the cold, sliced ham on bread presentation form.

Introduction

Castration of entire male pigs is widely used in Norway and in many other countries, but castration of male pigs is expected to be prohibited in Norway in the future. Castration is done to prevent an unpleasant odour and flavour that can occur in meat from boars. Extensive work has shown that boar taint is mainly associated with the presence of two compounds, skatole and androstenone (Patterson, 1968, Vold, 1970). Androstenone is a steroid closely related to testosterone. The production of androstenone in the testis increases with maturity of the male pig. Earlier studies have shown that consumers have different ability to perceive androstenone (Wysocki & Beauchamp, 1984). Many consumers are insensitive to androstenone, but some consumers are highly sensitive and will react negatively upon exposure (Kline, Schwartz & Dikman, 2006).

Material and methods

The hams were selected based on androstenone and skatole levels measured in pure back fat. The hams were made of *Semimembranosus*, *Biceps femoris*, Semitendinosus and Gluteus medius. The different androstenone and skatole values that were evaluated are presented in Table 1.

Table 1. The table shows the androstenone and skatole values in the different hams evaluated in the study. The values are given in part per million (ppm)

Sample	Androstenone	Skatole
1	0.56	0.15
2	0.59	0.05
3	2.25	0.01
4	3.96	0.01
5	9.15	0.01

The hams were injected with 13% pump to give 2% NaCl, 60 mg/kg sodium nitrite and 0.2 % sodium diphosphate and 0.2% sodium ascorbate. The hams were vacuum-thumbled (Forma 3-chamber thumbler) at intervals at 4°C over night. The hams were cooked for 2 hrs: first 1 hr at 65°C then the temperature was increased to 78°C and the hams cooked until a core temperature of 72°C.

The processed hams were sliced into slices of 2 mm thickness. The ham and melted cheese sandwiches were made of to slices of white bread, two slices of cheese (Norwegia 27% fat, Tine, Norway) and one slice of ham. All the samples were vacuum-packed. All consumers perceived one ham and melted cheese sandwich, and two slices of ham from each of the samples evaluated. The consumers were screened for their ability to perceive androstenone using a new test (Lunde et al, 2008, manuscript). Sensitive (39) and non sensitive (51) consumers, grouped according to the sensitivity test, evaluated the samples for liking of odour and flavour. The consumers evaluated the hams cold (5˚C) on bread and warm (60˚C) in ham and

melted cheese sandwiches. When the samples were evaluated warm the consumer also evaluated liking of odour during frying.

Results and discussions

The sensitivity test grouped the consumers into two groups, sensitive and non sensitive consumers. A significant ($p \leq 0.05$) difference between sensitive and non sensitive consumers' evaluation of the cold ham sample with the highest androstenone value (A=9.15) for both odour and flavour was found. The flavour results are presented in Figure 1. When the consumers evaluated the different hams (same hams as evaluated cold) in ham and melted cheese sandwiches, no significant ($p>0.05$) differences between any of the samples (Figure 2) were observed. This suggest that the cheese or bread flavour must have dominated so much that the higher release of androstenone flavour at 60˚C is not detected.

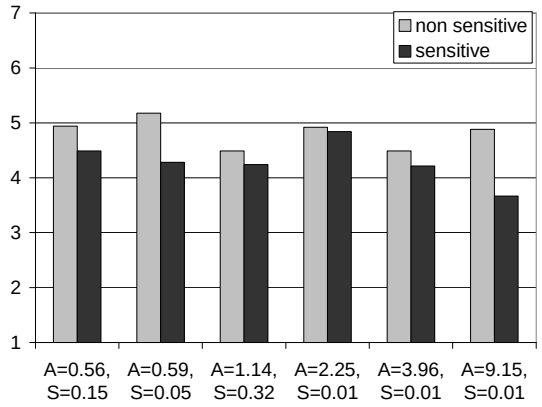

Figure 1. Liking of flavour for the different hams evaluated cold.

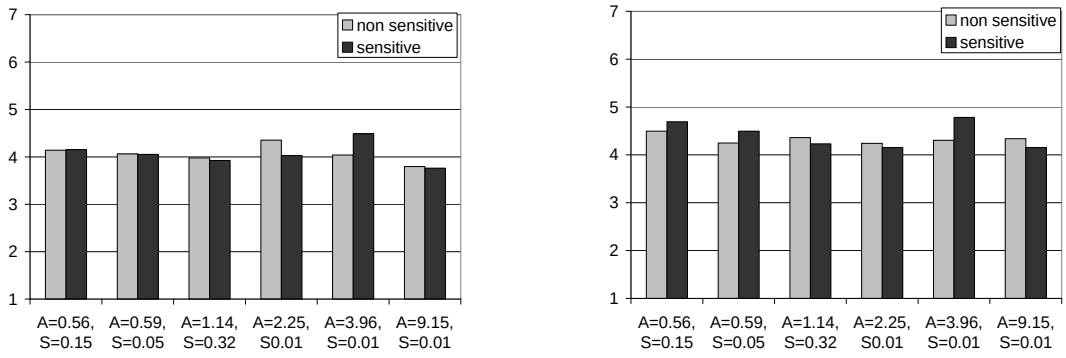

Figure 2. Liking of odour during frying (to the left) and liking of flavour (to the right) for the different ham and melted cheese sandwiches.

Conclusions

The sensitivity test divided the consumers into sensitive and non sensitive consumers. The consumers sensitive towards androstenone gave reduced preference for the odour and flavour of cold ham containing 9.15 ppm androstenone.

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