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Consumer perception of boar meat as affected by labelling information, malodorous compounds and sensitivity to androstenone

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ABSTRACT

This study aimed to assess the influence of two label conditions on the acceptance of boar meat. A central location test was conducted with 145 consumers each assessing 4 pieces of pork loin.
Samples varied with respect to two factors: actual meat type (boar vs. standard pork) and label information (young boar meat vs. pork). Androstenone and skatole levels in the tested boar meat ranged from 0.51 to 2.72 μg/g and 0.01 to 0.23 μg/g melted fat, respectively. Consumers' sensitivity to and appreciation of androstenone and skatole odour was determined through a smell experiment. The acceptance of taste, tenderness, juiciness, and overall liking was neither influenced by the label information nor by the meat type. Twenty-seven % of all participants were classified as insensitive to androstenone odour, whereas 52% perceived it as positive and 21% as negative. Consumers who disliked the androstenone odour indicated a higher disliking of boar meat.

1. Introduction

Liking or disliking a food product is not only dependent on physicochemical properties of a product but also on the consumers' expectations and attitudes as well. From a psychological point of view the underlying factors are called bottom-up and top-down processes, both of which influence the quality of a sensory experience. Bottom-up processes follow the characteristics of the stimulus that are perceived by the consumer's sensory organs. In contrast, top-down processes can be induced by a perceiver's beliefs, experiences, expectations and associations (Lee, Frederick, & Ariely, 2006). One of the first systematic investigations to examine the influence of external factors, i.e., association and labelling on taste perception, was the beer brand study of Allison and Uhl (1964). In the meantime, various studies have shown a considerable effect of product information on the preference for different foods. The given context information can include the brand (McClure et al., 2004), the origin (Oude Ophuis, 1994), the nutrient content (Aaron, Mela, & Evans, 1994) or even information related to processing characteristics (Van Wezemael, Verbeke, Kügler, & Scholderer, 2011). The direction and strength of the perceptual acceptability shift are not necessarily the same for all consumers (Aaron et al., 1994; Kähkönen, Tuorila, & Rita, 1996). In spite of such studies, the question persists as to whether product properties or context information are/is more important. With respect to meat it has been shown that labelling it as "organic" or "free-range" can increase hedonic ratings (Oude Ophuis, 1994; Scholderer, Claudi-Magnussen, & Lindahl, 2004).

Will consumer acceptance be negatively influenced by labelling meat as "boar meat"? To our knowledge there have been no studies investigating the immediate influence of context information on product acceptance with regard to the meat type, i.e., boar meat versus meat from gilts or castrates. As surgical castration of male piglets without the use of pain reducing means must be discontinued by 2012 and the castration should be banned by 2018 (European Declaration on alternatives to surgical castration of pigs, 2010), the production of so-called entire male pigs could become an alternative. It is, therefore, crucial that the consumer acceptance of boar meat is investigated to determine whether this is indeed a suitable alternative.

A widely known sensory problem with respect to boars is the occurrence of so-called boar taint, mainly caused by androstenone and skatole. Androstenone (5α-androst-16-en-3-one) is a sexual pheromone produced in the Leydig cells in the testes (Claus, Weiler, & Herzog, 1994). Skatole (3-methylindole) occurs during the microbial degradation of the amino acid Tryptophan in the intestinal tract and is at relevant concentrations perceived as a faecal odour (Annor-

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Frempong, Nute, Whittington, & Wood, 1997; Vold, 1970). Skatole has also been detected in the fat tissue of female and castrated pigs (Gibis, C.H., & Fischer, 1998; Tuomola, Vahva, & Kallio, 1996).

Several studies have shown that there is less acceptance for pork from entire males with certain levels of androstenone and skatole compared to castrates or gilts (Bañón, Andreu, Laencina, & Garrido, 2004; Font i Furnols, Gispert, Diestre, & Oliver, 2003; Lunde, Skuterud, Hersleth, & Egelandsdal, 2010). A recent review (Lundström, Matthews, & Haugen, 2009) considered sensory thresholds for acceptance to be 0.5 to 1.0 μg/g and 0.20 to 0.25 μg/g in fat for androstenone and skatole, respectively. A variety of factors, however, including fat content and preparation method of meat, play a role in affecting what amounts of the two chemicals in fat are accompanied by a decrease in consumer acceptance. As both androstenone and skatole are soluble in fat, perception and acceptability thresholds have been found to vary among products as well as in model systems (Annor-Frempong et al., 1997; Bañón, Costa, Gil, & Garrido, 2003). In addition, the perception of androstenone has been shown to depend, to a significant degree, on differences with respect to the olfactory receptor OR7D4 (Keller, Zhuang, Chi, Vosshall, & Matsunami, 2007). Some people perceive it as an unpleasant urine- and sweat-like odour, whereas others find it pleasant, i.e., perfume-like (Annor-Frempong et al., 1997; Patterson, 1968). It has been established that there is a partial anosmia to androstenone. Bremner, Mainland, Khan, and Sobel (2003) reported that the proportion of anosmic consumers ranges from 11 to 75%. Previous studies have indicated that the acceptance of pork from entire male pigs (with androstenone) depends on consumer sensitivity and appreciation of the androstenone odour (Bonneau & Chevillon, 2012; Font i Furnols et al., 2003; Lunde, Skuterud, Hersleth, et al., 2010; Weiler et al., 2000).

Thus, the main objectives of our study are to determine the:

a) impact of label information concerning the meat type ("young boar meat" vs. "pork") provided prior to consumption on the hedonic evaluation of meat;
b) German consumers' acceptance of cooked boar meat (pork from entire male pigs) compared to a control (meat from castrates and gilts);
c) influence of consumers' agricultural backgrounds and knowledge about castration on the hedonic evaluation;
d) consumers' androstenone and skatole sensitivity and appreciation and the subsequent effect on hedonic evaluation of the meat.

2. Material and methods

Fig. 1 illustrates the chronological order and contents of our experiments (step A to D). 15 sessions with not more than 10 participants in each were offered during June and July 2010 in the Laboratory for Sensory Analysis and Consumer Research at the University of Göttingen (equipped according to ISO 8589:2010, sensory analysis: general guidance for the design of test rooms).

2.1. Tasting of meat samples

145 inhabitants of either the city or county of Göttingen served as volunteers. Each evaluated four meat samples following a monadic sequential procedure. Participants were informed that they would assess pig meat (step A, Fig. 1). The samples varied in two ways: actual meat type, i.e., boar vs. castrate or gilt (hereafter referred to as "control"), and label information, i.e., "pork" vs. "young boar

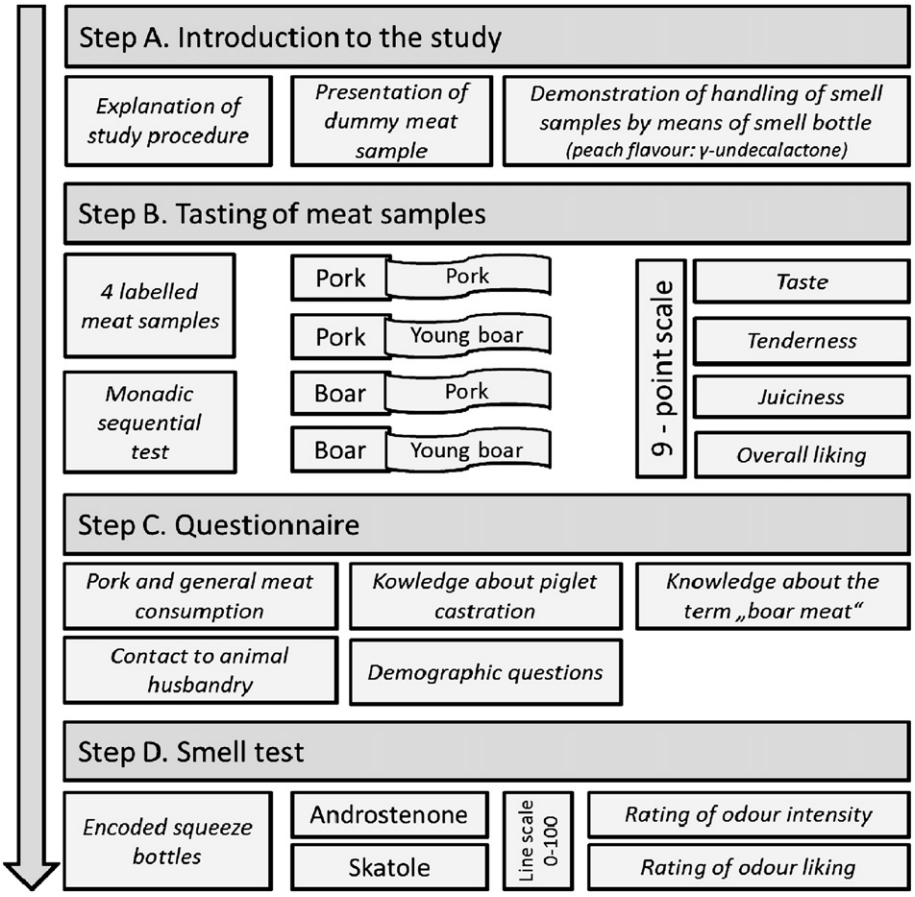

Fig. 1. Procedure of the consumer study.