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Consumer attitude towards sodium reduction in meat products and acceptability of fermented sausages with reduced sodium content

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Abstract

Lowering salt content in meat products is possible from a technological and sensorial point of view, although little information is available about the consumers' attitude and acceptance of these products.

Attitude towards low salt meat products, following the Theory of Planned Behaviour (TPB) proposed by Ajzen, was evaluated by 392 consumers. Acceptability of small calibre fermented sausages with 50% molar substitution of NaCl by six different mixtures of KCl (0–50%) and K-lactate (0–50%) and the control (22 g NaCl/kg) was determined by 98 consumers. The preference of the previous best two treatments was compared to the batch control by 279 consumers.

In general consumers had a positive attitude towards low salt meat products, being higher for women than for men. Women showed stronger ideas and higher Perceived Control on the Behaviour towards reduced sodium meat products than men. Smokers showed lower intense beliefs than non-smokers. Consumers with a basic level of education were more affected by what other people important for them thought they should do. The final model obtained using the Theory of Planned Behaviour showed a good predictive capacity ($R^2 = 0.60$) and a good internal consistency. Regarding the acceptability study, batches with substitution levels of 50% and 40% by K-lactate, showed lower overall acceptance than the control batch. Significant differences in acceptability were found regarding the gender and place of residence of the consumers. The preference study showed no differences between the batch control and batches with 50% KCl and 40% KCl + 10% of K-lactate substitution levels. According to these results and from a sensorial point of view, it is possible to reduce NaCl content in small calibre fermented sausages by 50% and obtain a product acceptable for consumers.

Keywords: Reduced sodium content; Meat products; Fermented sausages; Consumer attitudes; Acceptability and preference

1. Introduction

Epidemiological studies indicate a positive association between dietary salt intake, blood pressure and prevalence of hypertension (Dahl, 1972; Law, 1997), suggesting that the daily sodium intake should be less than 2400 mg (Kotchen & McCarron, 1998; Oparil & Calhoun, 2000). Although sodium restriction is widely recommended to prevent hypertension, this approach is intensely debated (Freedman & Petitti, 2001). Recent studies show that sodium restriction might be beneficial only for a fraction of the population, defined as salt-sensitive (Morris, Sebastian, Forman, Tanaka, & Schmidlin, 1999).

In general, consumers seem to be concerned about the harmful effects that a high level of sodium in their diet could have (Lynch, 1987), and there is a tendency to reduce the amount of sodium chloride (NaCl) in food. This can most easily be achieved by avoiding added salt, salted foods and in particular processed foods, which contain high amounts of sodium (Hermansen, 2000). In Spain, meat products represent an important part of the total

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sodium intake (20–30%) as a result of their large consumption (Anonymus, 2004). For this reason, reduction of sodium in meat products could be of great interest from a health point of view.

NaCl is an essential ingredient in processed meat products, contributing to the water-holding capacity, colour, fat binding properties and flavour. Moreover, salt decreases water activity (a_w) and this significantly affects the shelf-life (Sofos, 1984; Wirth, 1989). Nevertheless, according to Terrell (1983), sodium content in meat products can be lowered by NaCl reduction or substitution with other ingredients, and/or by altering the processing techniques. Several studies state that potassium chloride and sodium and potassium lactate could be used as partial substitutes of NaCl in meat products. KCl has similar properties to NaCl, but its addition to meat products is mainly limited by its bitter taste (Askar, El-Samahy, & Tawfik, 1994). In meat products, K-lactate is used to enhance flavour and extend shelf-life. However, the total substitution of NaCl by K-lactate is limited by its bitter taste (Brewer, McKeith, Martin, Dallmier, & Meyer, 1991; Gou, Guerrero, Gelabert, & Arnau, 1996). Even though, reduction of sodium in meat products is possible from a technological and sensorial point of view (Askar et al., 1994; Gelabert, Gou, Guerrero, & Arnau, 2003; Gou et al., 1996; Kim & Brewer, 1996), little information exists on consumer ideas and feelings towards reduced salt meat products.

Food choice and food purchase are complex phenomena influenced not only by the sensorial characteristics of the product and its price, but also by other factors, such as consumer attitudes towards the product (Axelson & Brinberg, 1989; Stafleu, Graaf, & Staveren, 1991/2). One of the models most widely used to examine the relationships between beliefs, attitudes and behaviour is the Theory of Reasoned Action (Fishbein & Ajzen, 1975). In this approach, behaviour is seen as predicted by Behavioural Intention, which can be assessed with a questionnaire. Behavioural Intention is predicted by the personal Attitude to the behaviour and the Subjective Norm (the individual's perception of other important people for them think that they must do). The addition of the Perceived Behavioural Control (the extend to which the individual feels competent to perform the behaviour) to the Theory of Reasoned Action has given rise to the theory of planned behaviour (TPB) (Ajzen, 1991). This relationship may be expressed by the following equation:

$$\text{Behavioural intention} = W_1 \times \left(\sum \text{attitude to the behaviour}\right) + W_2 \times (\text{subjective norm}) + W_3 \left(\sum \text{perceived control}\right)$$

where W_1, W_2 and W_3 represent the relative weightings of the three components, respectively.

In addition, the Attitude to the behaviour is determined by the sum of the individual's Salient Beliefs (b_i) about the consequences of performing the behaviour multiplied by the individual's Evaluation (e_i) of those consequences:

$$\text{Attitude to the behaviour} = \sum b_i e_i$$

Similarly, the Subjective Norm is determined by the sum of the individual's Normative Beliefs (N_b), that is, beliefs concerning the particular behaviour multiplied by the individual's Motivation to Comply with the wishes of those significant people (M_c). Fishbein and Ajzen express this relationship as follows:

$$\text{Subjective norm} = \sum N_b M_c$$

The aim of this study was to measure consumer attitudes towards reduced salt meat products using the TPB model. In addition, and taking into account that sometimes consumers tend to behave in a different way from what they believe (Guerrero, Colomer, Guàrdia, Xicola, & Clotet, 2000) the acceptability and preference for reduced salt fermented sausages was checked with the same consumers.

2. Materials and methods

The study was carried out in two consecutive stages: the first step was to examine consumer attitudes towards meat products with a reduced sodium content using the Theory of Planned Behaviour of Ajzen (Ajzen, 1991) and afterwards, to evaluate the consumer's acceptability and preference for fermented sausages with reduced sodium content.

2.1. Study of consumer attitude

2.1.1. Questionnaire

Salient Behavioural Beliefs were obtained from a previous questionnaire filled in by 102 consumers not involved in the study and representing different socio-demographic levels from Catalunya. In this questionnaire, consumers had to list the advantages and disadvantages of consuming meat products with reduced sodium content following the method proposed by Likert and Thurstone (Axelson & Brinberg, 1989).

A 45-item questionnaire was elaborated following the TPB model (Ajzen, 1991): 2 items on Behavioural Intention, 5 questions on Attitude, 1 question on Subjective Norm, 4 items on Normative Beliefs and their corresponding questions about Motivation to Comply with them, 3 items on Perceived Control, and finally 13 Behavioural Beliefs, selected from the previous questionnaire, and their evaluation (Table 1). The internal consistency was checked in a pre-test where the questionnaire was filled in at home by 114 consumers from IRTA's panel (for more details about the pre-test see Guerrero et al., 1998).

After the pre-test a second study was carried out. This questionnaire, which had the same items as the first one plus one question about the complexity of the questionnaire and one question about smoking habits of the con-