Evaluation of sensory quality of calf chops: A new methodological approach

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ABSTRACT

A new method to evaluate the sensory quality of calf chops was developed by discussion with experts. Resulting method comprised four parameters: quality related to odor, texture, flavor and persistence. For each parameter, the sensory characteristics perceived are marked and, by using decision trees, corresponding quality is directly scored, so making the assessment more objective. Global sensory quality is calculated by weighting these four partial qualities. Due to sensory characteristic collection, the method also provides an exhaustive description of each sample.

To check the appropriateness of the method, 127 calf chop samples were evaluated by a panel specifically trained to apply it. Results confirmed the suitability of the method to describe the samples and differentiate among them according to their quality level. This innovative approach can be very useful for quality control and also to study the effects of different factors on meat sensory quality.

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1. Introduction

Sensory quality is most important in food products. In fact, in addition to their nutritive properties, eliciting a pleasure sensation when consumed is desirable and, also, a key aspect determining their success in the market. Although different physical–chemical measurements can provide valuable information about the sensations that meat will induce, the use of a sensory panel is the definitive way to evaluate them (Russell, McAlister, Ross, & Pethick, 2005).

In this sense, sensory quality control is a very important tool to make sure that the product meets the expected characteristics. Some examples are the Quality Index Method (QIM) for different sea food products (Baixas-Nogueras, Bover-Cid, Veciana-Nogués, Nunes, & Vidal-Carou, 2003; Barbosa & Vaz-Pires, 2004; Huidobro, Pastor, & Tejada, 2000; Sveinsdottir, Hyldig, Martinsdottir, Jørgensen, & Kristbergsson, 2003), or the methods to assess the sensory quality of virgin olive oil (International Olive Council, 2011a), table olives (International Olive Council, 2011b) or cactus pears in syrup (Cerezal & Duarte, 2004).

Quality labels reflect the increasing demand of quality guarantees by consumers (Guerrero, 2001), mainly associated to traditional products, related to a region, elaboration procedure or raw materials (Ballester, Dacremont, Le Fur, & Etiévant, 2005; Bertozzi, 1995; Cayot, 2007; Parr, Green, White, & Sherlock, 2007; Pérez Elortondo, Bárcenas, Casas, Salmerón, & Albisu, 1999). Sensory characteristics and assessment of their appropriateness are particularly important.

However, though there are many food products sold with distinctive labels, the scientific reports or technical publications describing the specific methods used for their quality control are few. Some of them include the method for Specific Designation of Asparagus from Navarra (Torre, 2002), PDO Idiazabal cheese (Pérez Elortondo et al., 2007), young red wine from Rioja Alavesa (Etaio et al., 2010a) and Txakoli white wine from Bizkaia (Etaio et al., 2012). Also, the guide to define the procedure to assess the sensory quality of oils applying to use a PDO (International Olive Council, 2005) represents an interesting approach, going further on that the cited method so as to classify the virgin olive oil and defining the concrete attributes that the PDO olive oil must present.

In the case of meat, sensory analysis can be approached with three main objectives: sensory quality control, sensory description and the study of the effect of different factors on sensory characteristics and, thirdly, the study of consumer preferences. The majority of reports refer to these last two approaches. On the one hand, there are many reports using descriptive analysis to describe meat and meat products using trained panels (Campo et al., 2006; Choi, Jung, Choe, & Kim, 2012; Lind et al., 2009; Okumura et al., 2012; Revilla & Vivar-Quintana, 2006; Teixeira, Batista, Delfa, & Cadavez, 2005). In the majority of the cases analysis is focused on measuring the effect of different factors on sensory characteristics. Also, sensory quality concept is sometimes mentioned, often as "eating quality", although without defining clearly what quality is and without a specific procedure to evaluate it. On the other hand, there are several reports dealing with the preference and acceptance level by consumers (Hutchison, Mulley, Wiklund, & Flesch,

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2010; Pethick, Hopkins, D'Souza, Thompson, & Walker, 2005; Sierra et al., 2010; Troy & Kerry, 2010; Voges et al., 2007). These tests quite quickly allow information about the liking degree for different products. These data can be very interesting for commercial purposes but do not provide detailed information about product characteristics and, also, the acceptance degree can be influenced by personal likings and other aspects such as culture or age of the participants. Moreover, there are several reports combining descriptive and consumer data about meat (Maughan, Tansawat, Cornforth, Ward, & Martini, 2012; Monsón, Sañudo, & Sierra, 2005; Muela, Sañudo, Campo, Medel, & Beltrán, 2012; Shackelford et al., 2001; Wiklund, Johansson, & Malmfors, 2003). Some prediction models for expected eating quality have been proposed (Cho et al., 2010; Pleasants, Thompson, & Pethick, 2005). However, even with these approaches, the definition of product quality depends entirely on consumers' liking.

Regarding the sensory quality control of meat, no reports have been found about the methods to evaluate the sensory quality according to how the sample fits a previous definition of how it must be. This kind of approach means that it is necessary to define previously the sensory quality concept applied to the product. And for this definition, the participation of experts with a great knowledge of the product is essential. Also, in addition to being very familiar with the product, experts know how to describe the sensations in words better than consumers, using a vocabulary with higher precision and accuracy (Bende & Nordin, 1997; Chollet & Valentin, 2000; Hughson & Boakes, 2001). This is especially important in the case of meat products with quality label, which, in addition to fulfilling different requirements (origin, breed, animal feeding, characteristics of the carcass…), are expected to present sensory characteristics that distinguish them from similar products. In this sense, the involvement in different protected geographical indications (PGI) of different breed-production systems, due to the differences for eating quality has been pointed out (Serra et al., 2008).

The aim of the present work, was to develop a method to evaluate directly the sensory quality of calf chops in order to become a tool for sample categorization and also to be used in meat research, relating different factors (i.e. those related to animal feeding, meat processing…) with sensory quality of the product. Once developed, application of the method to analyze 127 calf chop samples was carried out.

2. Materials and methods

2.1. Samples

All the calves evaluated were provided by the Hazi cooperative. According to the needs of each phase of the research, the carcasses at the slaughterhouse, were evaluated and three chops between 7th and 11th ribs were frozen and taken to the laboratory. Chops had a thickness of 2 cm and were matured for 7 days at 7 °C.

2.2. Method development with experts

The steps to develop the method to evaluate the sensory quality of calf chops and the steps necessary to apply it (mainly those steps related to the panel management) are schematized in Fig. 1.

The method was developed through six discussion sessions with a group with great knowledge of the product. This group included butchers (3), university lecturers involved in meat research (3), stockbreeders (3), technicians from technology centers (5) and restaurateurs (2). Duration of each session was about 2 h.

To lead the discussion, the following questions were formulated by the sensory analyst in charge of the group: "What are the parameters that determine the sensory quality?", "what are the top characteristics for each of these parameters?", "what attributes describe it?", "how are the other levels under the top characteristic?", "what quality grades are they related with?", "what technique should be used to evaluate each parameter?", "what criteria should be used for scoring?",
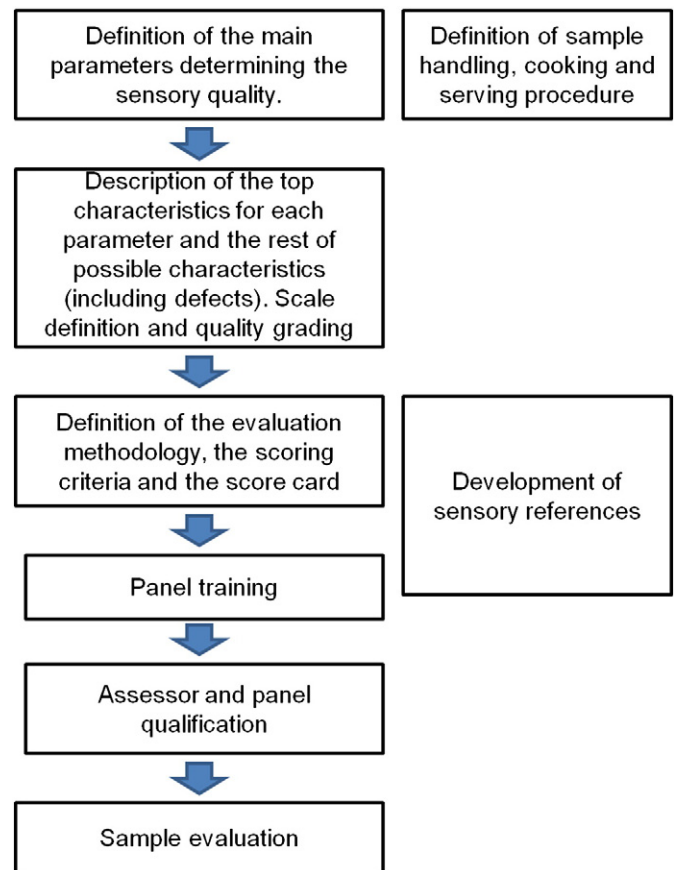

Fig. 1. Summary of steps to develop the method and set up the panel.

and "what should be the weight of each parameter over the total quality?". After each session notes were drawn up and sent to the experts together with the points and proposals to discuss in the next session. At the beginning of each session the decisions taken in the previous session were shown to continue the discussion.

Although these sessions were mainly theoretical, three samples from different farms and with different fat cover were evaluated in each session to facilitate the discussion.

The discussion focused exclusively on cooked chops. It was agreed not to take into account the appearance aspects because they can be very influenced by sample handing (freezing-defrosting…) and cooking.

2.3. Reference development

References reproducing the sensory attributes included in the method were developed. The purpose of the use of references was to homogenize the concepts among the assessors, so all of them understood the same when they use a specific term, and also to be used for panel training and qualification. This task started during the definition of the method with the group and concluded with the panel during the training, mainly to adjust the intensity of several references.

Composition and concentration of odor and flavor references were defined after several sessions in which potential references were evaluated, discussed and re-formulated. To facilitate the reference management, the samples were used throughout several days or weeks. Majority of references, mainly those with very low water content, were kept refrigerated and some of them needed to be kept frozen (milky and fat). Refrigerated samples were placed in the room 3 h before the session started and frozen references were transferred the previous day from the freezer to the fridge and then managed as the other references. To check the appropriate preservation of the sensory characteristics, references were presented without identification during the