



Consumer texture descriptions of a set of processed cheese



F. Hanaei^{a,b,c,d}, G. Cuvelier^{a,b,c}, J.M. Sieffermann^{a,b,c,*}

^aAgroParisTech, UMR1145 Ingénierie Procédés Aliments, F-91300 Massy, France

^bINRA, UMR1145 Ingénierie Procédés Aliments, F-91300 Massy, France

^cLe Cnam, UMR1145 Ingénierie Procédés Aliments, F-91300 Massy, France

^dSociété Scientifique d'Hygiène Alimentaire, 75005 Paris, France

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ABSTRACT

The aim of this study was to characterize the texture of a set of processed cheeses by consumers taking diversity in perception, handling the product and vocabulary into account. Hence, a free-text comment methodology using a personal approach was investigated to answer the following questions: Which are the terms frequently generated by consumers? Which are the main characteristics of products based on consumer descriptions? Are we able to identify the texture specificities of a product or a group of products?

A set of 20 products representing the texture diversity in the processed cheese market were studied. The term frequencies were studied for the entire product set. In total, 550 different terms were generated, among which, 9 terms Sticky, Shiny, Yellow, Smooth, Compact, Hard, Spreadable, Creamy and Easy to spread were the most frequently elicited by the consumers. In addition, the product profiles were obtained on the basis of the products' main characteristics. Specific terms and differences in frequencies were then studied for each product.

This approach made it possible to describe the products by means of the terms given by consumers. In particular, common characteristics among some products raise the question of the relationship between product description and formulation factors.

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Introduction

One aim of the industry is to anticipate the consumers' perceptions in order to allow the formulator to relate specific ingredients and/or process variables to specific changes in sensory perception.

Classical descriptive analysis is the most sophisticated and extensively used method for sensory characterization of products. In this method, panelists are trained to operate in unison, using an agreed-upon or predefined vocabulary (Lawless & Heymann, 1998; Meilgaard, Civille, & Carr, 1999; Stone & Sidel, 1993). In these procedures, either each panelist first generates his/her own descriptors separately and then group discussions allow panelists to develop a common vocabulary, or they are trained to use a pre-defined lexicon. Either way, they are then trained to evaluate the products using the same evaluation procedure and scaling method (Lawless & Heymann, 2010).

This method, as a result, provides a complete quantitative and qualitative description of products according to a group of

qualified trained panelists (Stone & Sidel, 1993). Using this methodology makes it possible to study human perception and measure the sensory reactions resulting from product consumption. In addition, it allows us to determine important attributes for acceptance as well as relating specific formulation factors to specific changes in sensory perception.

Even though a highly robust and detailed product description can be obtained using classical methods by highly trained panelists, creating well-trained panelists can be very expensive for small companies as well as for big companies with a wide range of products. In addition, training panelists can be very time-consuming, depending on the number of attributes and sample complexity (Varela & Ares, 2012).

Furthermore, using classic methods involves working with trained panelists who are no longer typical consumers. Although characterizing the products with trained panelists provides complete, consistent and reliable results, it could be different from consumer perceptions. This could be due to the fact that a trained panel characterizes products in different ways than naïve consumers. In addition to this, they may consider some differences that could possibly be irrelevant to consumers (Ares, Giménez, Barreiro, & Gámbaro, 2010; Bruzzone, Ares, & Giménez, 2012).

* Corresponding author at: AgroParisTech, UMR1145 Ingénierie Procédés Aliments, F-91300 Massy, France. Tel.: +33 0 169935138; fax: +33 0 169935174.

E-mail address: jms@agroparistech.fr (J.M. Sieffermann).

Moreover, the vocabulary of trained panelists may be different from the terms used by consumers (ten Kleij & Musters, 2003). Hence, working with trained panelists may lead to a risk of losing part of the information related to specificities of product handling and description. Therefore, the issue can be raised regarding the level of adequacy of formalized classic sensory approaches to anticipate all sensory perceptions of consumers, which is the main goal of the industry.

On the contrary, classical analysis combined with hedonic tests, carried out by consumers, known as preference mapping has been widely used to enhance the understanding of consumer preference and perception with the help of experts' terms. In 1996, Moskowitz refuted the term that consumers are incapable of validly rating sensory aspects with the characterization of 37 sauce products by experts and consumers. According to Faye et al. (2006), there is industrial pressure to understand how consumers describe the sensory characteristics of foods. This goes along with the aim of developing methods without training panelists in order to gather sensory information directly from consumers.

The transition of sensory descriptive analysis towards more rapid and flexible methods in terms of time and training requirements has been imperative. Several methods have been developed which can be used with semi-trained and even naïve consumers (Varela & Ares, 2012). Many studies comparing the new methods with classic ones have resulted in sensory maps similar to those of classic analysis by trained panels (Albert, Varela, Salvador, Hough, & Fiszman, 2011; Blancher, Chollet, Kesteloot, Hoang, & Cuvelier, 2007; Cartier et al., 2006; Cássia et al., 2012; Faye, 2004). Therefore, profiles obtained from consumers can be a good alternative to expert profiles since they meet the requirements regarding discrimination, consensus and repeatability (Husson, Dien, & Page, 2001). Some of the new descriptive methods developed over the last twenty years to gather information regarding food perceptions include: Free Choice Profiling (Williams & Langron, 1984), Sorting (Lawless, Sheng, & Knoops, 1995), Projective Mapping (Pages, 2005), Flash Profile (Dairou & Sieffermann, 2002; Sieffermann, 2000), Polarized Sensory Positioning (Teillet, Schlich, Urbano, Cordelle, & Guichard, 2010). Besides, other word-count based methods such as open-ended questions (Ares et al., 2010; Ten Kleij & Musters, 2003), and the free comments method (Lawrence et al., 2013; Symoneaux, Galmarini, & Mehinagic, 2012) have recently been developed as complementary methods to preference mapping. They are aimed at understanding the consumers' perceptions through direct collecting of their words.

In food perception and description, texture is a key factor that plays an important role in the consumers' hedonic reactions. It can become a focal point of criticism and rejection of foods if it is not as expected by the consumer (Bourne, 2002). Food formulation has a great impact on desirable or undesirable changes in food texture. Hence, a dairy food manufacturer must understand the factors controlling the texture of products in order to formulate products with desirable texture (Lawless & Heymann, 1998) while anticipating consumer perceptions. Bourne (2002) classified the subjective measurements of texture as 'oral' and 'nonoral'.

Even though sensory texture characterization of dairy products has been widely investigated in various studies (Adhikari, Heymann, & Huff, 2003; Benedito, Gonzalez, Rossello, & Mulet, 2000; Brighenti, Govindasamy-Lucey, Lim, Nelson, & Lucey, 2008; Ercan, Korel, Karagül Yüceer, & Knik, 2011; Lee & Resurreccion, 2002; Weel et al., 2002; Weene, Van Gemert, Van Doorn, Duksterhuis, & De Wijk, 2003) few studies have been carried out on developing descriptions of dairy product texture directly with consumers. Regarding processed cheese, several studies have been carried out on sensory characterization in relation to processing factors and chemical composition. Their effects on structure,

texture and rheological properties have been studied in order to improve our understanding and obtain acceptable products (Adhikari, Cole, Heymann, Hsieh, & Huff, 2009; Drake, Truong, & Daubert, 1999a; Everard et al., 2007; Fagan et al., 2007; Pereira, Bennett, McMath, & Luckman, 2002; Piska & Štětina, 2004; Černíková et al., 2010). In all these studies, classic profiles were used for product characterization and, to our knowledge, there has been no work on the description of processed cheeses directly through consumers' terms.

The main goal of the present study was to characterize the texture of a set of processed cheese products by consumers in order to take into account the diversity in perception, handling and vocabulary. Hence, free-text comment methodology was applied while letting the consumers apply and use the products as they wished. Individual product descriptions by each panelist, using their own individual approach, were then used to answer the following questions: Which are the terms frequently generated by consumers? Which are the main characteristics of products based on consumer descriptions? Are we able to identify the texture specificities of a product or a group of products?

Materials and methods

Testing conditions

Sample

A set of 20 products were produced on the basis of a 3-factor experimental design (4 texturing agents, 2 concentrations and 2 processing conditions including a control with no texturing agent) to develop a range of textures quite close to one another while representing the texture diversity in the processed cheese market. Approximately 20 g of each product were sampled and sealed in small rectangular plastic containers (dimensions: 5.5 × 1.5 × 4.5 cm). Conditioning in the form of individual portions was applied in order to provide the same form of product presentation for all types of texture. The products were then stored in a refrigerator at −4 °C.

The samples were served directly coming out of the refrigerator in sealed containers identified by alphabetic codes according to a balanced design. One product was duplicated in order to evaluate the repeatability of the consumers.

Assessors

A group of 60 consumers was recruited by putting announcements in different places such as super markets, Ecole Centrale Paris, AgroParisTech, the website of Société Scientifique d'Hygiène Alimentaire (SSHA) and by word-of-mouth in order to take diversity of perceptions into account. Since all products had to be produced the number of panelists was limited by the available amount of the product.

In addition to the availability and motivation of these assessors, the main criterion for recruitment was to select people who were consumers of cream cheese and processed cheese products. Another criterion was to select people with no experience in descriptive sensory analysis. So, among the candidates, especially from AgroParisTech, only staff or students who had never been trained for descriptive analysis and had never participated in descriptive analysis related to cheese characterization were selected. The consumer group consisted of 80% females and 20% males, aged between 18 and 69 years of age (mean age: 37 years of age).

Sensory procedure

The aim was to obtain the main and the specific characteristics for each product by an individual approach. According to Drake

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