



## What is satiating? Consumer perceptions of satiating foods and expected satiety of protein-based meals



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### ABSTRACT

Designing food items with high satiating capacity is an area of increasing interest. It would be desirable for consumers to be able to make informed choices about individual products based on understanding the energy balance and the meaning of satiety.

In the present work, the perceptions that consumers have of the word “satiating” and of different protein-based dishes were investigated in two populations (100 subjects related to the field of food science and technology and 100 unrelated to it). The Word Association (WA) technique was used, asking the consumers for the first four words that came into their mind when they thought of “satiating food”. This was followed by a Free Listing (FL) exercise that asked them to list four satiating food items. They also completed a Nutritional Knowledge Questionnaire. To evaluate the consumers' perception of the expected satiating capacity of different protein-based meals, they were shown eight photographs of equicaloric dishes composed of one piece of protein (beef, pork, chicken or fish) and one of two different side vegetables (salad or boiled potatoes). The expected satiety scores ranked fish last among the protein foods and potatoes last among the side vegetables. The results indicated that “satiating” food was related more with the immediate sensation of “stomach full” than with the cessation of hunger. This was reinforced by the mention of negative sensations of discomfort after a copious meal. Hearty dishes and meat were the meals most associated with satiating food items.

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### Introduction

Hunger and fullness (satiety) are the sensations that appetite control manifests at the phenomenological level (Bilman, van Kleef, Mela, Hulshof, & van Trijp, 2012). They are jointly controlled by a variety of sensory, cognitive and physiological signals in response to the consumption of food(s) (Blundell et al., 2010). Satiety, as defined by de Graaf (2011), is a subjective feeling of a reduction in the motivation to eat. Foods differ in the extent to which they induce feelings of satiety, based on their composition among other factors (Holt, Brand-Miller, Petocz, & Farmakalidis, 1995).

In recent years, an academic debate has been initiated regarding the benefit of making or not making satiety-related claims on food items. This debate springs from a certain concern that satiety claims will be interpreted as going beyond their literal meaning to imply direct weight control or even weight loss benefits (Bilman et al., 2012). According to Mela (2011), improved understanding of where satiety is delivering benefits for consumers will give better focus to academic and industrial research in this area. Bilman et al. (2012) have explored a number of satiety claims to discover whether and how consumers may (over) interpret satiety claims, and whether and to what extent consumers

recognize that to attain possible satiety-related or weight loss benefits, personal effort is required. According to Stubbs (2013), at present there is insufficient evidence to suggest that consumers can make an informed choice about many individual products based on their understanding of the science of satiety and energy balance. Less has been written about beliefs and satiety (Vadiveloo, Morwitz, & Chandon, 2013).

To the authors' knowledge, no studies have examined consumer perceptions of the word “satiating” in relation to its literal meaning. The Merriam-Webster Dictionary. Merriam-Webster.com (2011) defines satiety as 1) the quality or state of being fed or gratified to or beyond capacity: surfeit, fullness; and 2) the revulsion or disgust caused by overindulgence or excess. The synonyms offered by this dictionary are: replete, sated, full, satiated, stuffed and surfeited. Interestingly, some related-words are: overfed, overfull, and overstuffed. “Satiating” is not in the dictionary.

It would therefore seem pertinent to ask consumers what comes to mind when they think about satiety, or what food items they think are satiating. Which of the dictionary meanings is uppermost in their mind, 1) or 2) (which could convey some negative connotations)? This knowledge would be a crucial aid to understanding how consumers perceive this term as a food attribute and to inferring what they expect of a product which is described as satiating. In addition, the results would give some clues about which kinds of food/components/macronutrients they perceive as most satiating.

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Shortcomings in individuals' understandings and knowledge, and lack of consensus between professionals and laypeople is common; the public's understanding of health-related problems tends to be less biomedical and scientific, with individuals more often focusing on the constraints arising from daily life and their cultural beliefs (Melby & Takeda, 2014). In consequence techniques that provide an indirect approach to consumers' attitudes, will allow researchers to transcend communication barriers (Steinmann, 2009; Vidal, Ares, & Giménez, 2013). Qualitative techniques such as Word Association and Free Listing are less structured than survey research based on fixed questionnaires (Lawless & Heymann, 2010), and thus they allow deeper probing of consumer behavior. These techniques are being increasingly used not only in consumer science to investigate consumers' perception of food products (Ares & Deliza, 2010; Hough & Ferraris, 2009; Roininen, Arvola, & Lahteenmaki, 2006), but to investigate consumers' perception of concepts (Antmann et al., 2011).

At the same time, given that dietary protein contributes more strongly than carbohydrate or fat to short-term satiety in humans, as indicated by both quantitative and subjective measures (Anderson, Tecimer, Shah, & Zafar, 2004), and that the benefits of high-protein reduced-energy diets include enhanced satiety (Paddon-Jones et al., 2008), consumer expectations about the satiating effects of different protein-based meals could be of interest. It is a well-established fact that orosensory and learned cues are an important component of short-term satiety (Bertenshaw, Lluch, & Yeomans, 2013), so consumers probably consider protein-based meals energy-giving, but do they also think that certain sensory characteristics have an effect on satiety?

The objectives of the present study were 1) to gather information on how consumers understand the term "satiating" in relation to food and to identify what type of food and what characteristics they associate with a satiating product, and 2) to ascertain their perception of expected satiation from different protein-based meals (veal, pork, chicken and fish) and relate it to studies on the satiating effects of consuming these foods.

## Materials and methods

### Consumer test

#### Consumers

Two consumer subpopulations of 100 persons each were included in the study: (1) Food Science and Technology undergraduate students at the University of Murcia (Spain) (FS&T), (2) people from the city of Murcia with no relation to Food Science and Technology (non-FS&T). The participants were recruited using purposive convenience sampling with predetermined quotas (Guerrero et al., 2010). Convenience sampling of consumers is a normal practice in qualitative studies when the aim of the research is to reach a gross estimate of results related to a research subject. It involves recruiting available participants who meet specific criteria (Carrillo, Varela, & Fiszman, 2012). The participants were aged between 22 and 66 years old. The test was carried out over 15 days in standardized tasting booths (ISO, 2007). The idea behind this recruitment was to compare two populations with different degrees of knowledge regarding nutrition.

#### Techniques

**Word Association (WA).** Word Association (WA) is a quick and simple qualitative method that originated in the fields of psychology and sociology (Ares, Giménez, & Gambaro, 2008). It is a useful tool for exploring consumer perceptions for new or undefined concepts. In addition, WA may be less laborious than many other qualitative methods, such as personal interviews. Roininen et al. (2006) stated that indirect associative techniques are able to grasp affective and less conscious aspects of respondents' mindsets. The WA technique is based on the assumption that if a person is faced with a stimulus and asked what ideas come

freely into his or her mind, the answer will provide relatively unrestricted access to that person's mental pictures of the stimulus. The strength of an associated word is measured by how many participants produced the word. Words that are produced by many participants are assumed to have a stronger association with the target word than words that are produced by a few participants (Son et al., 2014).

**Free Listing (FL).** Free Listing (FL) is another simple but powerful technique that had been employed to characterize cultural domains (Bernard, 1994). It was introduced to food consumer science by Hough and Ferraris (2009); according to these authors a cultural domain is a set of items or things that are all of the same type or category, in other words, it is a mental category like "animals" or "fruits". Cultural domains are sets of items that are all alike in some important way (Borgatti, 1999). These sets can be lists of observable physical elements or more conceptual ones. FL is one of the most popular methods for collecting these lists (Libertino, Ferraris, López Osornio, & Hough, 2012). Typically, FL data are analyzed by order and frequency: items appearing earlier in lists are assumed to be more typical of the domain, and high frequency items to show consensus (Melby & Takeda, 2014). In order of collating only the more typical items, in the present study consumers were asked to list only four satiating food items, so only frequency of mention and no response order was analyzed.

#### Questionnaire

After the purpose of the survey, the number of items in the questionnaire and the estimated time required to complete it had been explained to the participants, they were asked their age, their sex and whether they studied or worked in the academic area of Food Science and Technology. The consumers were given sheets of paper with written instructions to complete a four-part questionnaire that consisted of:

Part 1. Question 1. The instructions given to participants were the following: Please write down the four first words that come into your mind when you think of "satiating food".

This was a Word Association task to discover the words, descriptions, associations, thoughts or feelings generated by the term "satiating food". The question was answered by writing one word in each of the four text boxes displayed in the first sheet.

Part 2. Question 2. The instructions given to participants were the following: "Please list four satiating food items". It was a Free Listing exercise. The question was answered by writing one word in each of the four text boxes displayed in the second sheet.

Part 3. Sheets corresponding to Parts 1 and 2 were removed and each consumer was shown one set of eight photographs (see the [Dish preparation](#) section), presented monadically in randomized order. The consumers had to rate the "expected satiation" elicited by each photograph on a 9-point scale (from 1 = slightly satiating to 9 = very satiating).

Part 4. The consumers answered the Nutritional Knowledge Questionnaire, which consists of eighteen questions designed by [Parmenter and Wardle \(1999\)](#).

#### Dish preparation

Eight different dishes were prepared with four protein foods. The chicken breast, veal minute steak, pork loin or fish filet (gilthead sea bream), all griddled, were combined with either boiled potatoes or salad (lettuce, tomato and sweet corn) and with 10 ml of olive oil to make them up to  $597.1 \pm 13.0$  kcal. [Table 1](#) shows the ingredients, caloric value, calculated according to the Spanish Food Composition Database ([BEDCA, 2013](#)) and weight of each ingredient and the total calories of the different dishes. Although the dishes contained different weights of the ingredients in order to reach the same amount of calories, they

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