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Short Communication

Food Structure to Texture

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INTRODUCTION

Understanding the relationship between food texture perception and food structure is of increasing importance for companies wishing to produce texturally attractive food products. The perception of texture is a complex process involving the senses of vision, hearing, somesthesis and kinesthesis. Texture perception takes place partly during the dynamic process of food breakdown in the mouth and is affected by oral processes, such as motility, saliva production and temperature. To take account of these factors, a multidisciplinary approach is proposed for studying the relationship between food structure and texture perception, combining sensory research, physiology studies and research into food physicochemical characteristics. Recent developments in these three areas that give potential for a better understanding of texture perception and its relationship with food structure are discussed [1].

Food appreciation is determined in large part by the sensory perception of the food product. As consumers are faced with an increasingly wide range of products and have greater spending power, the role of sensory appreciation becomes more important in determining consumer buying behaviour. In particular, a necessary (if not sufficient) condition for repeated purchases of a food product is that it 'tastes nice'. The corollary of this is that if food companies are to succeed in the market place they need at least to be able to monitor sensory properties of their products during production processes and product development. The companies with a competitive advantage will be those that are able to manipulate actively and control sensory properties. This can only be done if the relationship between food structure and sensory properties is well understood. These properties include appearance, taste, aroma and texture. This article focuses on texture perception and its relationship to food structure. Texture perception is an important factor in consumer sensory appreciation. It determines the identity of the food product; [1] that after blending food products the lack of texture cues resulted in only 40% of the products being identified correctly from their flavour alone. Texture is of dominating importance for certain categories of food, particularly those with a bland flavour such as rice and pasta, or which have the characteristics of crispiness and crunchiness, for example snacks and many fresh fruit and vegetables. Texture is also relatively often cited as a reason for not liking a food, with stringy, doughy or slimy foods possibly raising a fear of choking [2]. Recent developments have led to renewed interest in understanding the relationship between perceived texture and food structure. In functional foods, low-fat products, vegetarian products (for example, with gelatine-replacements) and products with natural ingredients, the use of different ingredients leads to changes in food structure that are often perceived by consumers as giving a less attractive texture or mouthfeel. Redesigning these products to produce texturally appealing foods presents a new challenge to companies [3,4]. In this paper the state of the art in research into the relationship between perceived texture and food structure is discussed and a way forward is suggested for the future

Physiological research relevant to texture perception involves studies at the micro-level on receptor behaviour and studies at the macro-level on oral processes and, in particular, motility. Most research on the tactile senses (somesthesis) has concentrated on the skin rather than the oral cavity. A study of the perceived surface texture of objects, using multidimensional scaling, resulted in a 3-D space, with a roughness–smoothness, a hardness–softness and compression/elasticity dimension. Most research has concentrated on the perception of roughness. A distinction can be made between texture on the mm scale, (with a spatial resolution of 0.5 mm) and finer textures (0.1 mm). It is thought that vibration may underlie the sense of roughness for very fine textures. In the oral cavity thresholds for light touch are lowest on the tip of the tongue and the hard palate, compared with the blade of the tongue. The dorsal region of the tongue does not hold Pacinian corpuscle, which are receptive to vibration, and is hence insensitive to vibration. This may affect perception of fine textures (see above). However, clearly much workneeds to be done on touch perception in the oral cavity and its relation to touch perception on the skin [5,6].

CONCLUSION

The relation of food structure to texture perception is not straightforward and its study is complicated by the dynamic

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nature of texture perception and by the presence of large individual differences in oral processes. It is increasingly realized that a multidisciplinary approach is required, integrating the three research areas described. The development of dynamic methods for measuring sensory perception and better techniques for measuring oral processes at the macrolevel offer new opportunities for following the breakdown of food structure and texture perception during consumption. This information should be used to design a combination of rheological studies with studies of the microstructure that take account of the circumstances *in vivo.*

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