



## Understanding Sensory Perception of Fat is Recipe for Success

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A Leatherhead Food  
Research white paper

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# Understanding Sensory Perception of Fat is Recipe for Success

In this white paper, Antoine G. de Bouillé explains how our knowledge of fat perception is really only the ‘tip of the iceberg’. Understanding more about how consumers perceive fat from a sensory perspective holds the key to successful product innovation and reformulation.

We are at the start of our journey in understanding how we respond to fat from a sensory perspective. The greater our knowledge of how consumers perceive fat, the more product developers can place consumers centre stage of innovation and the more successful fat reduction strategies will be.

## Fat and the sensory experience

Fats give food and drink products particular sensory characteristics because they can act as texturizers, lubricants and aroma carriers.

**Appearance:** Fat creates a glossy or moist visual texture. It also contributes to the browning process, giving an appealing golden brown colour to many foods, such as bread and some baked products.

**Texture:** Fats impact the texture of foods, giving the sensation of creaminess, softness, melting in the mouth, juiciness and thickness. They are important in obtaining a tender and flaky baked product, for example, in biscuits or pie crusts. Fat also provides a lubricating mouthfeel and is an essential component of emulsions (mixtures of two

liquids that are normally immiscible, for example oil and water).

**Flavour:** Fat can absorb and preserve flavours. It is, for example, possible to infuse aromatic herbs in oil. There are also a lot of flavour compounds which are only soluble in fats. It can also impact the nutritional content of products, for example, where fat-soluble vitamins are concerned.

## Is fat the sixth basic taste?

Our sensory perception of fat is a complex process, because it involves all of our senses (sight, hearing, touch, smell and taste).

Fat perception varies from individual to individual. It is known that people who are classified as ‘supertasters’<sup>1</sup> taste fat in a different way to medium or non-tasters. In particular, there is evidence that supertasters perceive texture and creaminess differently from other tasters. Leatherhead is currently conducting research to understand differences in texture and fat perception.

A recent study<sup>2</sup> showed that the way we taste fat is so complex, it could even be classified as

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<sup>1</sup> Classified by their responsiveness to a bitter compound called 6-n-propylthiouracil, or PROP for short

<sup>2</sup> Running, C.A., Craig, B.A., Mattes, R.D., (2015). Oleogustus: The Unique Taste of Fat. *Chemical Senses*, 1-10

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a sixth basic taste in addition to sweet, salty, sour, bitter and umami. The study demonstrated that medium and long-chain nonesterified fatty acids (NEFA) have a distinct sensation called 'oleogustus'.

### **Replicating the sensory experience of saturated fats**

Fats are broadly divided into four groups: monounsaturated fat; polyunsaturated fat; saturated fat and hydrogenated trans-fat. The majority of public health guidelines recommend consumers reduce their intake of saturated fats to reduce incidence and mortality of cardiovascular disease.

Removing saturated fats from products presents many reformulation and sensory challenges. Saturated fats give structure, texture and stability to products. A like for like substitution with unsaturated fatty acids is not normally possible because this leads to textural changes. Where this is done, carbohydrates or proteins are typically added to restore texture.

The oily sensation which fats give to foods is difficult to obtain with other ingredients. Research has been done on the oiling properties of proteins and fibres<sup>3</sup>, but a greater understanding of how fats are perceived on the tongue is needed to help in developing fat alternatives.

Product developers also have to find ways to replicate the way fats act as flavour and aroma carriers. In terms of flavour release, the main

issue is not the flavour intensity but the time release of flavours that is particularly difficult to reproduce (when flavour is released during consumption).

### **Fats are back in favour**

Fats have received a lot of bad press in the last decade, which contributed to the rise of the low fat diet and consumers mistakenly trying to eliminate fat from their diet. There is now growing recognition that, rather than cutting all fats from your diet, individuals should focus on the type of fat consumed. There is greater awareness of the health benefits of polyunsaturated and monounsaturated fats<sup>4</sup>. Polyunsaturated fats, for example, reduce blood cholesterol levels and provide long chain fatty acids, essential for the body. These fats are found in corn and sunflower oils, nuts, seeds, soybeans and fatty fishes.

Leatherhead research shows consumers are now attuned to the fact that the label 'low-fat' does not necessarily mean that products are healthier than full fat versions. 'Low-fat' claims are becoming synonymous in consumers' minds with products which are high in sugar, the assumption being that sugar has replaced the fat in the product in order to maintain the taste. Moreover, a study<sup>5</sup> showed that consumers are turning against reduced-fat options in some categories because they do not deliver from a sensory perspective; the study reported that consumers preferred the

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<sup>3</sup> Chojnicka, A., de Jong, S., de Kruif, C.G. & Visschers, R.W. (2008). Lubrication properties of protein aggregate dispersions in a soft contact. *Journal of agricultural and food chemistry*, 56, 1274-82.

<sup>4</sup> Scott-Thomas, C. (2011). Consumers seek healthy fats as low-fat trend fades. <http://www.foodnavigator-usa.com/Markets/Consumers-look-for-healthy-fats-as-low-fat-trend-fades>

<sup>5</sup> Childs, J.L., Drake, M. (2009). Consumer perception of fat reduction in cheese. *Journal of Sensory Studies*, vol 24, issue 6, 902-921.

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flavour and texture of full fat cheeses rather than reduced-fat ones.

### **The fat-finding mission**

Reducing the saturated fats in food and beverage products remains a key priority for the industry, but product developers should not be focusing on the removal of fat at the expense of other nutritional elements of the product. It is also clear that consumers demand reduced fat products which match the sensory profile of their full fat counterparts. If reduced fat options do not deliver on taste, then they won't be putting them into their shopping baskets.

Understanding how consumers perceive fat is a vital piece of the jigsaw and more research is needed in this area to equip product developers with the tools to meet their reformulation challenges. Leatherhead is responding to this industry need and will share relevant research findings with members.

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## **How Leatherhead can help**

Leatherhead can help you in product fat reformulation by investigating how your products are perceived in the mouth by trained panellists and consumers. We can combine this sensory information with microscopy techniques to understand the macro and micro structure of food and beverage products. Leatherhead can also help you understand the sensory perception of your product as it changes during consumption to capture key texture characteristics such as mouthfeel and after-feel which are essential in fat perception and product reformulation.

## **About the author**

Antoine is a Senior Sensory and Consumer Scientist at Leatherhead in the Applied Research team. He leads Sensory, Consumer and Market Research projects working with both the trained and consumer panels and also carries out the statistical analysis of the data generated. Antoine delivers Sensory and Statistics training courses and carries out statistical evaluation across Leatherhead's platforms. He gained his engineering diploma in the ENITIAA of Nantes (National Engineering School in Food Industry) and did his master thesis on TDS data computing (Temporal Dominance of Sensation).

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## About Leatherhead Food Research

Leatherhead Food Research provides expertise and support to the global food and drink sector with practical solutions that cover all stages of a product's life cycle from consumer insight, ingredient innovation and sensory testing to food safety consultancy and global regulatory advice. Leatherhead operates a membership programme which represents a who's who of the global food and drinks industry. Supporting all members and clients, large or small, Leatherhead provides consultancy and advice, as well as training, market news, published reports and bespoke projects. Alongside the Member support and project work, our world-renowned experts deliver cutting-edge research in areas that drive long term commercial benefit for the food and drink industry.

Leatherhead Research is a Science Group (AIM:SAG) company. Science Group provides independent advisory and leading-edge product development services focused on science and technology initiatives. It has six offices globally, two dedicated, UK-based R&D innovation centres and more than 350 employees. Other Science Group companies include Oakland Innovation, Sagentia and OTM Consulting.

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