FUNCTIONAL FOODS: CONSUMER PERCEPTIONS IN DENMARK AND ENGLAND
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EXECUTIVE SUMMARY

1. Functional foods are a relatively new product category on the market. The food industry has high expectations regarding the market potential for this type of food products that are characterized by providing certain health benefits. However, only few studies have to date looked into consumer perceptions, attitudes, and purchase decisions with regard to functional foods, and most of them were concerned with the related product category of genetically engineered food products.

2. The aim of this paper is threefold. First, an overview of the characteristics of functional foods is presented. Although no clear-cut definition of functional foods exists yet, this section attempts to provide information that allows a classification of the various types of functional foods offered on the market.

3. Second, the current market situation is described, with special emphasis on the Danish and the UK food market. The uncertainties concerning legislation, the difficulties with scientific documentation, opinion polls revealing consumers' sparse knowledge and rather unfavourable attitudes, and criticisms of other stakeholders all contribute to a situation of ambiguity and ambivalence.

4. Third, an exploratory study conducted with Danish and English respondents is presented. Using the laddering technique developed as an operationalization of means-end chains theory, the results confirm consumers' reluctance to adopt functional foods as part of their daily diet. But they also indicate differences in the perception of Danish and English consumers, with Danish consumers knowing less about functional foods and being more sceptical about their alleged benefits than English consumers.
**Introduction**

In recent years consumers have become increasingly interested in and conscious about their health and appearance. They also seem to have acquired a better understanding of the relationship between diet and state of health (Department of Health 1994; Euromonitor 1995; Levnedsmiddelstyrelsen 1986, 1996). In the light of this development, the food industry has developed and introduced a number of food products that, in one way or another, are meant to be healthier and more nutritious than conventional food products. However, food manufacturers deal with these issues in different ways. Until recently, manufacturers have focused solely on reducing the components that nutritional scientists have proclaimed undesirable. These products have then been marketed as containing reduced quantities of fat, cholesterol, salt, sodium or devoid of certain additives. Today, manufacturers also emphasise enriching food with an extra benefit, positioning them as functional foods (Potter 1990; 1991; Mikkelsen 1994; Wolf 1994).

Figure 1. What are functional foods?

Functional foods as a product category are also called nutraceuticals (Brown 1996; Buisson 1995) or Vitafoods (Vitafoods International 1996). The central aspect is the claim that these products have a medicinal impact in addition to the usual nutritional value (Brown 1996). The difference between functional foods and health foods (figure 1) is that health food manufacturers claim that their products have an influence on the general state of health, while functional food manufacturers market their products as being beneficial to a particular aspect of health and therefore useful for the prevention and treatment of certain diseases (Salji 1992). Amongst the factors adding to the food industry's interest in functional foods are technological development, an ever-increasing group of elderly people in the industrialised part of the world, and an interest in healthier eating habits of certain consumer segments.

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1 It should be noted, however, that the name “functional foods” is a marketing term and not a legal term in Denmark. Levnedsmiddelstyrelsen (The National Food Agency of Denmark) regards all food as functional.
DEFINITIONS AND FUNCTIONAL FOODS COMPONENTS

The definitions of functional foods are numerous, often rather broad and not particularly accurate:

• “The food has been enriched with substances that improve health and prevent a number of diseases” (Halskov & Larsen 1997a, p. 10);

• “...functional foods’ – those with an added health benefit beyond traditional nutritional value” (Brown 1996);

• “...functional foods, which are defined as any modified food or food ingredient that may provide a health benefit beyond the traditional nutrients it contains” (ADA Info 1996);

• “...foods that, by virtue of physiologically active components, provide benefits beyond basic nutrition and may prevent disease or promote health” (IFIC 1997a);

• “...accepted and tolerated experimental foods prepared by fortifying commercially available fruit or vegetable products with GRAS (generally recognised as safe) phytochemicals that are unique in structure, class pattern, or metabolism” (Jenkins 1993).

Functional foods have also been described as (eg Lake 1990; Potter 1991):

1. foods in solid form (ie neither tablets nor powder) generated from “naturally occurring” ingredients,

2. foods with “naturally occurring” substances from plants or animals – possibly in an “unnatural” concentration (eg, reduced-fat dairy products) or in foods that do not naturally contain these substances (eg, butter fortified with fish oil or yoghurt fortified with live cultures),

3. non-health hazardous foods that are to be eaten as part of the daily diet,

4. foods that stimulate body functions (eg, strengthening the immune system, preventing particular diseases).

Although there is disagreement about a formal definition of functional foods, certain factors are reiterated. Accordingly, functional foods can be described as representing

a food category in which the products are either a) modified or b) fortified with substances that have a preventive or therapeutic effect beyond their original nutritional value.

This definition includes food fortified with vitamins, minerals, and antioxidants, but it does not encompass dietary supplements in the form of powder and tablets. In 1994, the English Nutrition Foundation established that “functional foods are ascribed a potency greater than foods consumed principally for particular nutrient features (health foods), but less than assumed for products classified as medicines” (InterSect Alliance Inc. 1996). Well aware of the fact
that there are numerous definitions of functional foods and opinions about the characteristics of this product type, the above definition serves as our working definition.

**Functional foods: Modification**

Functional foods can be manufactured using genetic engineering, since biotechnology allows manufacturers to modify the genetic blueprint of plants and animals in order to reduce the concentration of harmful substances and/or to increase the nutritional content of the food in question (OECD 1992). According to Barkema et al. (1996) biotechnology “offers the greatest benefits in controlling farm product characteristics. With biotechnology, scientists can assess the genetic blueprint of plants and animals, insert a gene that produces a desirable trait, and then reproduce plants and animals that carry the gene. With consumers demanding food products with specific nutritional and quality traits, the advantages of biotechnology are enormous” (p 3). In the early 1990s, American scientists modified the gene that obstructs the ripening and putrefaction process in tomatoes so that farmers no longer had to pick the tomatoes while they are still green, because transportation would then be possible when the tomatoes are ripe. In animal production, it is possible now to genetically engineer fish with (extra) hormones, and scientists are also attempting to make fish resistant to particular diseases (Ebdrup & Furbo 1992; Levnedsmiddelstyrelsen 1997). Compared to genetically engineered plants, genetic engineering with animal production, however, is far more difficult. Still, McDonald’s is currently applying technology that replaces fatty acids with poly-unsaturates to produce the McLean Hamburger (Barkema et al. 1996).

**Functional foods: Fortification**

Functional foods can also be manufactured by fortifying the product with so-called phytochemicals – naturally occurring nutritional components in different types of fruit and vegetables – and by adding fish oils, live cultures, or nutritional components from grain (ADA Info 1996; Koch 1997). Even though these nutritional components can be found naturally in products, biotechnology is applied to isolate them, to increase their concentration, and to add them to a particular food product. The most typical types of fortification include (Mikkelsen 1994):

1. Vitamin and mineral fortification
2. Antioxidant fortification
3. Fibre fortification
4. Live culture fortification
5. Fat substitutes

Certain minerals do have health benefits. It has been shown that calcium and phosphor counteract osteoporosis, magnesium militates cardiovascular di-
seases, and iron helps the absorption of oxygen in the blood. The health effects of vitamins are many-sided, and the following list is by no means complete. Vitamin A prevents infection and counteracts abscesses and psoriasis; vitamin C counteracts anaemia and infections and supports the absorption of nutrients; vitamin D helps the body absorb calcium, potassium and phosphor; and vitamin E combined with vitamin C is an important antioxidant that protects cells against oxidative processes.

With regard to dietary fibres, these are divided into soluble and dissoluble ones. The soluble dietary fibres affect the carbohydrate and lipid metabolism, whereas the dissoluble dietary fibres prevent, for example, constipation. Live cultures, which are added to yoghurts and cheese, may have a prebiotic or probiotic effect. The prebiotic effect results from the induction of substances to the gut and intestines deteriorating the growing conditions for micro-organisms such as Salmonella and E. coli. The probiotic live cultures enhance the functioning of the large intestine, support the immune system, fight off pathogenic bacteria, and reduce the risk of cardiovascular diseases.

When food manufacturers use fat substitutes, dietary fats are replaced with non-dietary fats. To put it simply, fat substitutes reduce the calorie content in foods while maintaining certain fat characteristics. The positive characteristics of these products include a low dietary fat content. However, some scientists and public institutions doubt fat substitutes’ beneficial effects in the long run, since the consumption of too large amounts of dietary fibre may restrict the absorption of minerals in the body. Furthermore, protein-based fat substitutes can be harmful to allergic persons because the protein has been added to foods where they are not expected to be (Kaack 1997; Koch 1997; Poulsen 1997; Saadbye 1997).

Scientists and food experts doubt that foods fortified with phytochemicals can be said to be “functional”, but nonetheless both functional foods and food fortified with phytochemicals have been associated with the prevention and/or treatment of colds and the flu (Matthews 1995) as well as with the prevention of at least four frequent causes of death: cancer, cardiovascular diseases, high blood pressure, and diabetes (eg, Food Industry Bulletin 1994).

**Market potential of functional foods**

Functional foods were introduced in the 1960s when biologist Paul LaChance added calcium to Tang – a beverage used by NASA astronauts. Before long Tang could be found on the American food market as the first of many functional food products (Brown 1996). Functional foods have gained a footing particularly in the East, eg in Japan and Singapore, and on the American market (Buisson 1995). CEO of Skånemejerierne in Sweden, Rolf Bjerndell, characterises functional foods in the US as “hotter” than the Internet (Halskov & Larsen 1997b). In Europe, however, the market is still in its infancy.

Keeping in mind consumers’ increasing interest in and demand for food products contributing to a healthy lifestyle, it is expected that innovative and visionary food manufacturers can benefit greatly from the functional food category. Claus Buhl, CEO of the advertising agency Buhl UnLtd A/S says: “Product development and the marketing of functional foods is really about life and death.
People actually do have high levels of cholesterol in their blood, high blood pressure, too much fat around the heart. And there is no doubt that there are huge consumer groups who would rather prevent and cure diseases through their diet than turning into clients in the public health system (p 4). One could therefore imagine that the expenses for treating welfare diseases such as cancer and cardiovascular diseases could be brought down significantly if the focus is shifted from treatment after the occurrence of the disease to prevention of diseases with functional foods (eg, Potter 1991; Wrick 1994). Accordingly, these products are expected to counteract nutritional deficiencies, reduce the risk of cavities and excess weight, treat and prevent cardiovascular diseases, cancer, osteoporosis, and digestive problems. Approximately 400,000 people currently suffer from osteoporosis in Denmark (Voice 1997), and 320,000 Danes are considered obese today (DR 1997b). It is most likely that food manufacturers have been inspired by these figures and begun to consider adding functional foods to their product ranges. A consumer survey in Britain, France and Germany also revealed that certain diseases were associated with a high degree of personal influence by the respondents (Food Industry Bulletin 1994, see table 1). Functional food manufacturers target products to individuals who either suffer from one of these diseases or who are prone to develop one. Consequently, the market potential is probably impressive. In this respect, food manufacturers face the challenge of radically changing consumers’ and politicians’ attitudes towards preventing and treating diseases with a varied diet that also includes functional foods.

Table 1. Degree of personal influence

<table>
<thead>
<tr>
<th>Condition</th>
<th>UK</th>
<th>France</th>
<th>Germany</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart disease</td>
<td>7,1</td>
<td>7,4</td>
<td>6,0</td>
</tr>
<tr>
<td>High blood pressure</td>
<td>6,9</td>
<td>7,1</td>
<td>7,3</td>
</tr>
<tr>
<td>Raised cholesterol levels</td>
<td>7,7</td>
<td>8,1</td>
<td>8,7</td>
</tr>
<tr>
<td>Bowel disorders</td>
<td>7,2</td>
<td>7,3</td>
<td>8,5</td>
</tr>
<tr>
<td>Cancer of stomach/colon</td>
<td>4,6</td>
<td>6,1</td>
<td>3,9</td>
</tr>
<tr>
<td>Osteoporosis</td>
<td>5,4</td>
<td>6,1</td>
<td>9,3</td>
</tr>
<tr>
<td>Tooth decay</td>
<td>8,3</td>
<td>8,3</td>
<td>8,4</td>
</tr>
<tr>
<td>Obesity</td>
<td>8,2</td>
<td>8,4</td>
<td>8,9</td>
</tr>
</tbody>
</table>

Note: Mean scores out of 10, base 605

Goldberg (1994) mentions two additional reasons why the market for functional food may grow in the future. Consumers’ acceptance is supposed to increase due to a higher number of clinical tests with human beings and an increased number of elderly people who have a vested interest in improving their state of health and prolonging their lives. As people grow older, their physiological functions such as the heart and lung capacity, the nervous system and the general metabolism become weaker (Schmidl & Labuza 1994). According to some food manufacturers and scientists, functional foods can counter this effect.

In short, society may benefit from functional foods in three different ways (Potter 1991; Graversen 1997b):
1. **Consumer perspective**: prolonging a healthy and active life

2. **Perspective of the state**: lowering health expenses in the long run and as a result redirecting resources to different areas

3. **Food manufacturer perspective**: high value-added products

At present, however, the market potential is difficult to assess because there is no agreement on what exactly constitutes a “functional” food. Finn Holm, Fødevare-Gruppen, estimates that functional food products at a value of DKK 300-400m are sold every year in Denmark, while turnover in Europe adds up to about DKK 18 billion (Halskov & Larsen 1997b). Shakla (1992) estimated the American functional food market at USD 2.5 billion in 1988 with projected growth rates of 17-20%, while the American Dietetic Association claimed that functional food sales were in excess of USD 6 billion the very same year (ADA Info 1996). The Foundation for Innovation in Medicine, a non-profit group of scientists in New Jersey, estimated the global market for functional foods at USD 250 billion, while Finn Holm believes this figure does not exceed DKK 54 billion (Halskov & Larsen 1997b). By the year 2000, some experts predict the level of sales on the European market to be USD 20 billion, 30 billion in Japan, and 60 billion in the US (DR 1997a).

**Product types**

The functional food category includes various types of foods, which seem to sell to different extents in various countries. The most frequently bought functional foods include cereals, sports and energy beverages, yoghurt and other dairy products, bread, biscuits, baby food, and pasta (Vitafoods International 1996). In Japan, beverages (enriched with antioxidants, dietary fibre, or live cultures) constitute approximately 70% of the market (PA Consulting Group, in Goldberg 1994), whereas cereals with a high content of dietary fibres and dairy products enriched with fish oils dominate the market for functional foods in the US. In Europe, most functional food products are either enriched with live cultures, fat substitutes, calcium, or dietary fibre (Halskov & Larsen 1997a; DR 1997a). Dairy products include among others “Bio Pruneaux” (Danone), “BA Live” (Loseley Dairy), “Ophi-lus” (Yoplait), “Cultura” and “Gaio” (MD Foods), and “Natural Light Yoghurt” (Arla Mejerierne). McDonald’s is currently selling their “McLean Hamburger”, while Proctor & Gamble manufacture crisps using “Olestra”, ice cream sweetened with “NutraSweet”, and yoghurt, cheese and dip with the protein-based fat substitute “Simplesse”. Foods rich in dietary fibre include “Common Sense Oat Bran Flakes” (Kellogg’s Company), “Fibi” (a high-fibre drink, Coca Cola), “Sun-C Appelsin Fiber Plus” (Cadiso Food A/S), and “Oatbran” (Oatbrand Co). In Denmark Mejerierne, Rynkeby and Cadiso Food A/S produce juice enriched with calcium (Morrison 1990; Goldberg 1994; Barkema et al. 1996; DR 1997a; Hesseldahl 1997).

The Danish food industry has developed and marketed only very few functional products (“Blå Gaio”, Omega-3 bread and calcium-enriched juice) after the introduction of “Gaio”, even though the demand for such products is supposed to be on the rise. As mentioned, the regulation pertaining to functional foods has kept manufacturers from using health claims in their marketing. The lacking R&D and the long-winded messages promoting “healthier” products therefore seems to have restricted market development.
Barriers to marketing functional foods

Food manufacturers face several barriers given the current situation on the functional foods market: legislation both at the national and EU level, particularly with regard to health claims, the need for scientific documentation, limited consumer knowledge, consumers’ sceptical attitudes towards biotechnology, and critical voices of other stakeholders.

Legislation

The legislation in this area is characterised by a great deal of confusion, the reason probably being the market’s early stage. According to Peter Greenwald of the National Cancer Institute, functional food manufacturers often encounter problems when marketing their products or attempting to take out a patent for the product or the ingredient(s) (Brown 1996). Frequently, functional food products contain regular ingredients that are nearly impossible to patent. A food manufacturer who scientifically proves that a food component has a medicinal effect can anticipate that the competition will react by “copying” this discovery because it cannot be patented. Cultura, a dairy product manufactured by MD Foods in Denmark, is a good example. Cultura was MD Foods’ first “functional” product, but the competition did not wait long before copying the underlying technology and starting the production of similar products, which resulted in lower profits for MD Foods (Halskov & Larsen 1997b). It can therefore be expected that many food manufacturers are reluctant to complete research efforts or venture on the market for functional foods because the investment is never safe – even when the manufacturer has a unique product.

From the consumers’ perspective, Cockbill (1994) suggests that three EU directives should apply to functional foods. The first set of rules is related to food-labelling. According to the Food-labelling Regulations 1984, the label on a product has to include the following information: the name of the food product, a declaration of contents, sell-by and/or consume-by dates and instructions for use of the food product. The second EU directive concerns foods for particular dietary purposes. The manufacturer must be able to produce scientific documentation for any one product benefit besides the ordinary nutritional value (AL Ref. 189/398, in Woods 1994). The use of health claims is covered by another set of EU regulations that apply to functional food products. However, at present (July, 1997), health claims are interpreted differently from one country to another. There is no legal definition for what constitutes a health claim, but the UN’s international food committee, CODEX, has issued a draft for a definition: “Health claim means any representation that states, suggests or implies that a relationship exists between a food or a nutrient or other substance contained in food and a disease or health-related condition” (InterSect Alliance Inc. 1994, p 4).

The EU Commission decided to ban health claims in advertising and on packaging of functional foods in certain cases2. This directive is only effective when the functional food product is marketed in another member state (abroad) and – depending on the interpretation of the regulation – it is voluntary for the individual member state to enforce this regulation (InterSect Alliance Inc. 1996;

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2 “EU Framework Directive on the Labelling, Presentation and Advertising of Foodstuffs (AL Ref. 79/112) prohibits the use of health claims on food labels” (InterSect Alliance Inc. 1996, p 1).
DR 1997a). This means that when marketing a functional food product in a EU country, both particular EU regulations and any “local” interpretation of the regulation must be taken into account. The application of health claims is central for manufacturers of functional foods, but, according to Koch (1997), there is another problem not accounted for: “As the point of departure they (health claims) use the notion that one single food product can benefit an individual’s state of health. What we know today is that there is a relationship between good health and a particular eating pattern” (p 5). If health claims are permitted, consumers might be led to believe that they can obtain a good state of health if they eat functional foods.

Since there is no legal definition of functional foods, it is also very difficult to create legislation for the use of health claims in marketing foods because it has not been decided yet which products belong to the functional food category and which do not (Cockbill 1994). On the EU level, there is a great difference between which types of health claims member states use and tolerate. To overcome any discrepancy, the EU plans to conduct an investigation aiming at the definitions of functional foods and developing a framework for legislation pertaining to functional foods. The documentation backing the specific health claims is one major issue in that respect.

Denmark is considered to be among the countries that reinforce the regulations in the strictest way when it comes to health claims. To protect consumers against misleading communication and undocumented statements, the government has prohibited food manufacturers from using health claims in advertising. All things being equal, food manufacturers are likely to develop and market fewer functional food products as long as the use of health claims is prohibited. Four different levels of claims have to be considered (Sørensen 1997):

1. **Nutritional claims** – eg “this product contains fish oil (Omega-3 fatty acids)"

2. **Functional claims** – eg “this product contains fish oil, which increases the passage of blood”

3. **Physiological claims** – eg “this product contains fish oil, which lowers the blood cholesterol level”

4. **Health claims** – eg “this product contains fish oil, which reduces the risk of cardiovascular diseases”

In early 1997, only nutritional claims were allowed when marketing functional foods, but it is expected that regulation in this field will soon be modified. CODEX, the UN body, is anticipated to adopt regulation allowing the use of functional claims (Koch 1997; Sørensen 1997). In reality this means that the market for functional foods will be open because it will be easier for food manufacturers to sell the products emphasizing their benefits. The borderlines between the four different types of claims are, however, very vague, and the documentation regulations are so ambiguous that it is difficult to determine whether or not food manufacturers are actually breaking the law when marketing functional foods. MD Foods’ marketing of “Blå Gaio” is the most recent example. At the beginning of 1997, the Danish Margarine Industry Association (MIFU) filed a complaint against MD Foods claiming that their marketing efforts were mis-
leading the consumers: MD Foods claimed that their butter product was wholesome (RB 1997a). Furthermore, on the Internet MD Foods claimed that “Blå Gaio” can actually prevent cardiovascular diseases and MIFU considered this a breech of regulations (Sørensen 1997). It all ended with MD Foods being urged to refrain from its previous wording in their advertising. The phrase “til din krops naturlige balance” [for your body’s natural balance], was deemed illegal (RB 1997b). However, MD Foods can still claim that “Blå Gaio” is slightly more wholesome than other butter products on the market. This case exemplifies that the regulation pertaining to claims for foods in Denmark can be and is being interpreted in different ways.

In other countries such as Sweden, Australia and the United States, the regulation of claims for foods is less strict. Health claims are legal, but only under certain circumstances. In the United States, the FDA recognises six well-documented links between nutritional components and the state of health. The wording of each health claim, however, is dictated by the authorities (DR 1997a). FDA’s list includes the link between fatty acids and arteriosclerosis, poly-unsaturated fats and cancer, fish oils and the immune system, dietary fibres and cancer, calcium and osteoporosis, and sodium and high blood pressure (Woods 1994; Schmidl & Labuza 1994). In Britain, the EU regulations for marketing functional foods are in effect, but they are interpreted differently than in Denmark (InterSect Alliance Inc. 1996). There are three different levels of claims (NCC 1997):

1. **Nutritional claims** – eg “high fibre” or “low fat”

2. **Health claims** – eg “may reduce cholesterol as part of a low fat diet”

3. **Medicinal claims** – eg “may prevent coronary heart disease”

British law prohibits medicinal claims unless the product is categorised as a medicinal product (Rosendahl 1994; Woods 1994; Matthews 1995; NCC 1997): “Claims that a food is capable of preventing, treating or curing a human disease shall not be made unless it is licensed under the Medicines Act 1968” (Cranston 1984). In accordance with British law, health claims are legal. In their marketing, the manufacturer of Flora, a butter spread, uses the claim “As part of a healthy diet Flora can help lower cholesterol and maintain a healthy heart”. This is a health claim, but “maintain a healthy heart” does seem to imply that this is in fact a medicinal claim. The distinction between health claims and medicinal claims is thus blurred. Sørensen’s (1997) “definition” of a health claim – “This product contains fish oil which reduces the risk of cardiovascular disease” – seems very similar to the English medicinal claim. Therefore, it cannot be concluded that health claims and medicinal claims are prohibited or legal in either country because the health and food authorities in each country regard the terms differently. To avoid further confusion, politicians and health and nutritional experts recommend that a definition for “functional foods” should be found, and that the claims and the rules for marketing functional foods be harmonised at the EU level.
Scientific documentation

It has been established for a long time that consuming a diet high in fruit, high in vegetables, high in dietary fibre, and low in fat is healthy because it reduces the risk of contracting welfare diseases such as cancer and cardiovascular diseases. Still, science has not determined exactly which substances in this kind of diet have a preventive or curing effect (Ovesen 1997). It has therefore been difficult to prove that functional foods have a medicinal effect. Functional foods belong to a borderline category with conventional, wholesome products on one side and medicinal products on the other. For the sake of regulation and consumers, it is important that any new functional food product rests on a solid scientific foundation. For that reason Danish food manufacturers wanting to market functional foods must apply for a permission to enrich their products, and, in this particular area, the rules are very restrictive (DR 1997a; Graversen 1997b).

The functional foods product category is rather new – and as a consequence consumers most probably doubt the advantages of this type of product. But if the benefits can be scientifically documented, consumers might become more interested. At present, however, scientific documentation supporting functional foods' preventive and curative properties is rather insufficient. Furthermore, it has proven difficult to determine whether functional foods are in fact more wholesome than other, more conventional foods (Brown 1996; Halskov & Larsen 1997a). The lack of convincing scientific documentation is probably the main reason why health claims have not been allowed yet (Graversen 1997b). To exemplify the scope of food manufacturers' problems consider the alleged preventive effect of the antioxidants vitamin A and E and betacarotene. As mentioned, consuming a lot of fruit and vegetables is beneficial to health, but science has yet to determine that vitamin A and E and betacarotene – and not kindred substances – are in fact advantageous. Furthermore, science lacks evidence that phytochemicals protect against diseases. It cannot be taken for granted yet that a given substance that is beneficial to health when found naturally in a particular food is also advantageous to health when isolated and added to a different food product (Koch 1997).

Also still to be determined is the threshold consumption of functional foods to have a beneficial effect (CSIRO Division of Human Nutrition 1993). “It is not realistic to assume that people eat one litre of yoghurt every day. If such an amount is needed to attain such an effect, it may not be fair to make health claims for the yoghurt” (Mejborn 1997, p 12). In addition, scientific research aimed at making the connection between consuming various nutritional components and the state of health is often based on experiments with animals (ADA Info 1996). Even though the results might indicate the amount needed to improve health, there is no doubt that transferring the results to humans is often problematic. Finally, the link between the consumption of particular food components and the state of health is alternatingly confirmed and invalidated leaving the consumer confused and at times betrayed: “The medical research... is fairly extensive and all research is controversial as there are always studies with positive and negative results” (Lake 1990, p 27). Accordingly, ongoing research linking the consumption of particular functional food products with health is needed in order for food manufacturers to be granted the right to use health claims in their marketing efforts.
Consumers’ knowledge of functional foods

The third major obstacle facing food manufacturers on the functional foods market is consumers’ awareness of the existence of functional foods. Consumers might be aware that functional foods are different from other products, but they may not know exactly how these products differ from conventional products, or that these products can be consumed as a part of a varied diet. Furthermore, a survey published in the Food Industry Bulletin (1994) showed that consumers in Britain, France and Germany were quite sceptical about the actual benefits of functional foods. McNutt (1994) divides consumers’ knowledge of functional foods into a three-category spectrum: at one end are foods assumed to prevent cancer and cardiovascular diseases. These foods form part of a diet that is low in cholesterol, low in fat, and high in dietary fibre. At the centre are those foods which have a newly discovered function such as being beneficial for the immune system. Antioxidants and phytochemicals, which can be found in fruit and vegetables, are contained in these foods. Consumers’ awareness and knowledge about the preventive and curative benefits of these food components is limited. At the other end of the spectrum are those substances that scientists are currently studying: glycosides, phenolic acids, and isoflavones. Most consumers are not familiar with these terms: “most people would probably guess that these long names, these chemical-sounding words, are things that should be avoided as a health risk, rather than eaten because of potential health benefits” (McNutt 1994, p 526). A focus group study in Britain showed that short (one word or one phrase) claims on labels induced consumers to buy the functional food products, while longer, more complex claims merely added to the confusion: “There is no point in putting freak names on them that half of us can't even pronounce. Stick to the simple things” (NCC 1997, p 21), and “No hydrogenated fats. Smashing. If you knew what they were that would be helpful” (NCC 1997, p 26). Therefore, it is very much a question about “educating” consumers and giving them knowledge about the potentially preventive and curative benefits of products and substances, and at the same time communicating the message in a language that consumers understand.

The Greek physician Hippocrates said “Let your food be your medicine, and your medicine be your food.” It seems that only if consumers adopt this idea, will food manufacturers have an opportunity to market functional foods. This, however, might be the biggest challenge of all for functional food manufacturers: using public relations and advertising to inform consumers about functional foods and communicating the message in a credible way so that consumers are more inclined to choose functional foods over the conventional counterparts. Kirk et al. (1987, in Buisson 1995) sum up the problems: “Food manufacturers and marketers are not in a position to force feed the public, regardless of how good or nutritionally worthy they may perceive the product to be. While the food industry can contribute to moving things in a desirable direction, it does not create consumer needs and wants. On the contrary, if it is fortunate and skilful, it may identify and satisfy changes in the people's tastes. Timing is critical in the developing and marketing of a product” (p 204). Furthermore, food manufacturers generally have a credibility problem because consumers are sceptical about product claims. A comic in the Saturday Evening Post is a good illustrator, featuring a couple in a supermarket looking at a box of corn flakes. The man says to the woman: “It's labelled high fat, high sodium and low fibre I think we should reward their honesty and buy it” (McNutt 1994, p 531).
According to Claus Buhl (1997), it is a big problem that functional foods have not been defined clearly in the minds of consumers: “Functional foods is a conceptual mess. When asking consumers to name different products that are beneficial to the state of health, they list many peculiarities – from "Gaio" and other yoghurts to germ and fibre bread to different types of herbs, minerals and vitamins" (p 4). There are several reasons why consumers have trouble naming functional food products. First of all, due to the relatively underdeveloped product category, neither authorities nor manufacturers know for sure when a product can be said to be “functional”. Furthermore, scientists, the press, food manufacturers, and nutritional experts use different terms to describe the category, eg, functional foods, designer foods, pharmafoods, and nutraceuticals (McNutt 1994). Most likely this has added to consumers’ scepticism, leaving them unable to separate these “new” foods and the alleged functional benefits from more conventional foods. “There’s too much vocabulary out there, and nobody knows what is the meaning of what” (Childs 1994, in Chermouch 1994). Adding to consumers’ confusion is the “marketing of all sorts of health products” (Buhl 1997, p 4): too many long-winded messages have caused many consumers to remain sceptical about different types of health boosting products.

Consumers’ attitudes towards biotechnology

In the literature there is no specification as to what kind of modification or which substances we are dealing with when it comes to functional foods. It is, however, safe to assume that functional foods are generally produced by means of biotechnology. OECD (1992) defines biotechnology as “…the application of biological organisms, systems and processes based on scientific and engineering principles, to the production of goods and services for the benefit of man”. Food manufacturers utilise biotechnology to a) produce foods with an increased nutritional and sensory value and with improved functional benefits; b) make the processing more effective; c) convert by-products to useful material or fuel; and d) to improve plant resistance towards crop spraying, thereby reducing the use of pesticides (Kunkel 1993; Salji 1992).

There are many indications that consumers are unaware of this wide range of possible applications (eg Frewer et al. 1995; Lemkow 1993). Despite British consumers’ limited knowledge of possible applications of biotechnology (Frewer et al. 1995), it is associated with high risk rather than low risk and with doing more harm than good. Consumers seem to prefer “natural” products. Because biotechnology is not deemed “natural” (eg OECD 1992; Frewer 1995), the industry faces the challenge of informing consumers that they consider this technology to be natural and useful for human beings, and that it entails no risk. In addition, research indicates that consumers’ attitudes towards biotechnology are dependent on the situation in which the technology is applied. Arthur Caplan, director of the Center for Bioethics at the University of Pennsylvania Medical Center says: “The strongest cultural load against biotechnology shows on the dinner table The weakest shows in the medicine cabinet” (Durso 1996, p 6). Accordingly, consumers are more doubtful when it comes to food produced by using biotechnology (eg, functional foods) than they are about de facto medicinal products.

Even though consumers’ knowledge about biotechnology seems to be sparse, influenced by fear (eg, science fiction and horror movies), and confused by experts’
conflicting arguments at times, it is without doubt useful and healthy to ques-
tion arguments in a scientific area that many people find difficult to grasp and
understand. Macer (1993) suggests that society (and food manufacturers)
should appredate consumers' scepticism in order to improve “the bioethical
maturity of society” (p 33) and, in the long run, reduce the likelihood of misusing
this technology. Therefore it seems to be important to launch a debate about pos-
sible applications of biotechnology and genetic engineering in order to inform
and guide consumers. Public introductions to this debate include an information
meeting on 2 July, 1997 hosted by the Agricultural Council of Denmark (DR
1997c), the leaflet Genplejede fødevarer [Genetically modified foods] pub-
ished by Levnedsmiddelstyrelsen [The National Food Agency of Denmark], and
an investigation aimed at mapping the attitudes of Europeans towards genetic
gineering. Additionally, the public relations agency Burston-Marsteller is
planning to implement a global media campaign designed to change consumers’
reluctance towards genetically engineered food (Kongsted 1997).

Quantitative research conducted in Denmark, Ireland, Spain and in the United
States points to the fact that consumers predominantly associate biotechnology
with genetic engineering and reproductive technologies applied to human beings
(OECD 1992). Bruhn (1992) ascertains that consumers' reservations about bio-
technology are related to unpredictability of implications, perceived negative in-
fluence on nature, effects on the natural balance of the eco-system, and to moral
and ethical predicaments. Philosopher Nils Holtung from the University of
Copenhagen shares this concern: “When facing big changes it is difficult to see
results, ie genetic engineering can be a threat to the welfare of human beings and
animals” (Stensgaard 1997).

In 1979, a survey commissioned by the EEC compared attitudes to genetic engi-
neering between member states (see table 2). Danish and English consumers’
degree of concern differed greatly. 29% of the English consumers found genetic
engineering to be “worthwhile” while the corresponding Danish group con-
stituted only 13%. A total of 61% of the Danish consumers thought that the
research involved “unacceptable risks”, while merely 33% of the English con-
sumers held that opinion.
### Table 2. Attitudes to genetic research

<table>
<thead>
<tr>
<th>Country</th>
<th>Worth-while (%)</th>
<th>Of no particular interest (%)</th>
<th>Unacceptable risks (%)</th>
<th>Don’t know (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>European Community</td>
<td>33</td>
<td>19</td>
<td>35</td>
<td>13</td>
</tr>
<tr>
<td>Belgium</td>
<td>38</td>
<td>20</td>
<td>22</td>
<td>20</td>
</tr>
<tr>
<td>Denmark</td>
<td>13</td>
<td>10</td>
<td>61</td>
<td>16</td>
</tr>
<tr>
<td>Germany</td>
<td>22</td>
<td>16</td>
<td>45</td>
<td>17</td>
</tr>
<tr>
<td>France</td>
<td>29</td>
<td>22</td>
<td>37</td>
<td>12</td>
</tr>
<tr>
<td>Italy</td>
<td>49</td>
<td>20</td>
<td>22</td>
<td>10</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>37</td>
<td>31</td>
<td>18</td>
<td>14</td>
</tr>
<tr>
<td>The Netherlands</td>
<td>36</td>
<td>17</td>
<td>41</td>
<td>6</td>
</tr>
<tr>
<td><strong>United Kingdom</strong></td>
<td><strong>29</strong></td>
<td><strong>28</strong></td>
<td><strong>33</strong></td>
<td><strong>10</strong></td>
</tr>
</tbody>
</table>

Source: OECD (1992)

Note: The figures do not sum to 100 due to rounding

### Table 3. Attitudes toward biotechnology and genetic research (%)

**Science and technology change the way we live. Do you think that biotechnology and genetic engineering will improve our way of life in the next 20 years, it will have no effect, or it will make things worse?**

<table>
<thead>
<tr>
<th>Country</th>
<th>Will improve</th>
<th>No effect</th>
<th>Will make things worse</th>
<th>Don’t know</th>
<th>No answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>European Community</td>
<td>50.4</td>
<td>9.6</td>
<td>11.2</td>
<td>28.4</td>
<td>0.4</td>
</tr>
<tr>
<td>Belgium</td>
<td>49.1</td>
<td>8.1</td>
<td>12.1</td>
<td>30.3</td>
<td>0.4</td>
</tr>
<tr>
<td>Denmark</td>
<td><strong>43.5</strong></td>
<td><strong>9.3</strong></td>
<td><strong>23.5</strong></td>
<td><strong>23.6</strong></td>
<td><strong>0.1</strong></td>
</tr>
<tr>
<td>Germany</td>
<td>43.7</td>
<td>18.6</td>
<td>12.2</td>
<td>24.6</td>
<td>0.9</td>
</tr>
<tr>
<td>Greece</td>
<td>39.1</td>
<td>2.5</td>
<td>5.9</td>
<td>52.5</td>
<td>0.0</td>
</tr>
<tr>
<td>Spain</td>
<td>57.9</td>
<td>3.3</td>
<td>4.3</td>
<td>34.5</td>
<td>0.0</td>
</tr>
<tr>
<td>France</td>
<td>53.7</td>
<td>10.1</td>
<td>12.9</td>
<td>23.3</td>
<td>0.0</td>
</tr>
<tr>
<td>Ireland</td>
<td>48.4</td>
<td>10.2</td>
<td>5.0</td>
<td>36.4</td>
<td>0.0</td>
</tr>
<tr>
<td>Italy</td>
<td>55.5</td>
<td>5.8</td>
<td>9.9</td>
<td>28.8</td>
<td>0.0</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>48.3</td>
<td>13.7</td>
<td>13.7</td>
<td>24.3</td>
<td>0.0</td>
</tr>
<tr>
<td>The Netherlands</td>
<td>48.3</td>
<td>7.9</td>
<td>19.4</td>
<td>24.4</td>
<td>0.0</td>
</tr>
<tr>
<td>Portugal</td>
<td>46.3</td>
<td>2.4</td>
<td>2.0</td>
<td>49.0</td>
<td>0.3</td>
</tr>
<tr>
<td><strong>United Kingdom</strong></td>
<td><strong>51.2</strong></td>
<td><strong>7.0</strong></td>
<td><strong>13.5</strong></td>
<td><strong>27.5</strong></td>
<td><strong>0.8</strong></td>
</tr>
</tbody>
</table>

Source: Lemkow (1993)
INRA Europe conducted a different quantitative survey in 1991 that showed similar attitudes among Danish and British consumers concerning genetic engineering (cf. Lemkow 1993). However, the surveys cannot be compared directly because the survey designs are not entirely similar. The results indicate that the differences between Danish and British consumers are not as pronounced as in the 1979 survey. Still, more Danish (23.5%) than British consumers (13.5%) believe that biotechnology and genetic engineering will deteriorate our lives in the next 20 years. More British consumers (51.2%) than Danish consumers (43.6%) think that the technologies will improve our standard of living.

Both in Denmark and in the United Kingdom there has been a lively debate as to whether products must be labelled with information about the content of genetically engineered ingredients. This debate exemplifies consumers’ – and politicians’ – reservations about biotechnology. Since 1991 the Danish Environmental Protection Agency has received 31 applications for field experiments with genetically engineered plants placing Denmark eighth in the EU (Felsby 1997). Consumers, however, do not seem to share food manufacturers’ enthusiasm. A Greenpeace poll in January 1997 showed that 65% of the Danish population are opposed to genetically engineered food, independent of whether food experts have yet to prove that this type of food might be a health hazard (Stensgaard 1997).

On May 15 1997 the EU legislation on the approval and labelling of genetically engineered food came into effect (Levnedsmiddelstyrelsen 1997): Food containing live genetically engineered cells (eg yoghurt with genetically engineered live cultures or a genetically engineered tomato) must be labelled to secure consumers’ free choice. The consequence for food manufacturers might be that genetically engineered food is differentiated and isolated from conventional products on the shelf, which will possibly result in reduced consumer confidence in genetically engineered food (Gardner 1994). Dan Glickman, US Secretary of Agriculture, regards EC plans to introduce more drastic rules for the labelling of genetically engineered food therefore as “unacceptable and clearly a trade barrier for American agricultural products” (Langvad 1997, p 8). On the other hand it might be argued that the new labelling regulation will benefit consumers because they are given the opportunity to make an informed choice between conventional and genetically engineered foods.

Research about consumers’ attitudes towards functional foods is, however, rather sparse and incomplete. Accordingly, it is so far unknown whether consumers’ attitudes towards biotechnology also reflect their attitudes towards functional foods.

Other critical voices

Even though the thought of “eat yourself healthy” seems appealing, health authorities, Forbrugerrådet [The Danish Consumer Council], and nutritional experts doubt that functional foods actually can benefit people. Lars Ovesen of Levnedsmiddelstyrelsen [The National Food Agency of Denmark] claims that functional foods are in principle unnecessary, because consumers have the possibilities and opportunities to compose a healthy diet with existing food products (Hesseldahl 1997). It should be mentioned, however, that surveys in Denmark and Britain have shown that consumers basically know what is healthy and unhealthy for them, but that they ignore it most of the time.
Accordingly, functional foods can indeed be said to be unnecessary, but because consumers “ignore the obvious”, these products could possibly benefit general health and ascertain that people get the amounts of micro and macro nutrients that the organism needs.

Danish television chef Claus Meyer believes that we are experiencing some sort of rectification of nutritional research, benefiting manufacturers’ and not consumers’ needs and wants. “To a great extent nutritional research in Denmark is financed by industry. Consequently, the industry asks the questions which the research is set up to answer.... but there are no guarantees that these are the questions that ordinary human beings would have asked” (in Hesseldahl 1997). Claus Meyer believes that functional foods are marketed mainly because food manufacturers can make big profits – and not because nutritional experts and consumers might have realised that the physiological needs can in fact be satisfied in an alternative manner.

Karin Andresen of Forbrugerrådet [The Danish Consumer Council] claims that attention is shifted from important matters such as making sure that consumers are given the choice of a wide variety of good, healthy, and nutritious foods when talking about and dealing with functional foods (Sørensen 1997). She is afraid that consumers eating functional foods believe that they do not have to eat fruit and vegetables: “The danger of functional foods is that attention is shifted from the diet as a whole. Maybe the consumer thinks that s/he will be healthier by eating a lot of a particular functional food product. That is not the way it works” (Halskov & Larsen 1997a, p 10). Critics maintain that consumers want to be indulged when buying a more expensive and an allegedly more healthy product than the conventional counterparts. Even though the absolution may be a mental state, one does not gain “physical” health when eating a functional product. “The one product that gives you health simply does not exist” (Ovesen, in Hesseldahl 1997).

Also, Levnedsmiddelstyrelsen disapproves of the idea that food manufacturers attempt to use consumers’ fear of disease to market their products. In addition, food manufacturers are accused of often refraining from mentioning any unpleasant product characteristics (Sørensen 1997). Ovesen says: “Food manufacturers focus too much on the product’s healthy characteristics and forget to inform consumers about possible side effects... If too much attention is given to the healthy characteristics, the consumer is lured into believing that the more I eat the healthier I get” (Hesseldahl 1997). When enriching food one might prevent vital nutrients from being absorbed in the body (eg calcium can obstruct the absorption of iron in the body), and in certain cases excessive supplements of minerals and vitamins can in fact be life threatening. Women in the childbearing age need extra iron, but too much iron can increase men’s subjection to cardiovascular disease (Thomsen 1997). Furthermore, the mineral content of functional products may be reduced due to the additional refinement of food processing. Given that the Danish soil has a low content of minerals, this is quite unfortunate (Thomsen 1997).
CONSUMER SURVEY IN DENMARK AND ENGLAND

The study

In order to shed light on consumers’ perception of a product category as “fuzzy” as that of functional foods, two surveys were conducted in Denmark (Copenhagen) and England (Croydon) with the objective to assess how consumers perceive “functional foods”. The main research questions were:

- what are the advantages and disadvantages;
- what are the principle motives for purchasing and consuming these products;
- what are respondents’ attitudes towards genetically engineered foods?

Means-end chains theory (e.g., Gutman, 1982; Reynolds & Gutman, 1988) was the starting point for determining 20 Danish and 20 English consumers’ attribute-consequence-value chains with regard to functional yoghurt, juice and butter in Denmark, and yoghurt, breakfast cereals and butter in England. Laddering, a qualitative interview technique, was used to link the elicited product attributes to higher order values (cf. IJ RTI, 1995).

Frederiksberg, a city within the city of Copenhagen, was chosen because the area in certain aspects reflects population characteristics of Denmark, and because the geographically limited area would diminish logistic problems. The wage level in Frederiksberg, however, is 8% above the country average. Compensating for this skewness is the fact that functional foods are more expensive than their conventional counterparts. It is thus assumed that well-off individuals are more likely to purchase this type of product than are individuals from lower income brackets. Croydon, just south of London, was chosen to represent the English consumer population. Gail Balfour of Martin Hamblin Research in London recommended this area due to its heterogeneity and representative make-up. Functional foods are not markedly more expensive than conventional foods in England. Following our previous argumentation, it was important that the level of income corresponded to the country average. This condition was fulfilled because the respondents represented the working, the middle, and the upper middle classes. The appendix describes the age and gender compositions of the samples in England and Denmark, and it outlines the screening procedure utilised during recruitment.

The average age for men and women in Croydon was approximately ten and eight years, respectively, above the average for men and women in Frederiksberg. Whether or not age is a decisive indicator for consumers’ level of knowledge about and preference for functional foods is difficult to determine. The sample consisted of 40 respondents, thus rendering any statistical inference impossible. The age spectrum 25-70 years was chosen because the aim of the survey was to determine consumers’ attitudes to a product category that in our opinion does not yet have a clearly defined target group. It also makes intuitively sense that an individual cares more about his/her state of health and the treatment and prevention of welfare diseases such as cancer and cardiovascular diseases when growing older. Furthermore, most people can be said to be
potential users of functional foods because diet surveys have shown that a mere 10% of the populations in Denmark and in England consume the recommended amounts of micro- and macronutrients (Levnedsmiddelstyrelsen 1986; 1996; Department of Health 1994). In terms of gender, the samples show an over-representation of women which is a direct consequence of the screening procedure: “...the person in the household responsible for purchasing food”.

23 respondents were recruited in Frederiksberg and 21 in Croydon. 20 interviews were conducted in each country because three and one, respectively, either forgot about the interview or decided not to participate after all. The recruiting process was much shorter in Denmark (6 hours) compared to in England (21 hours). The English respondents said that they were quite frequently “inconvenienced” by research agencies rendering consumers weary of market surveys. In addition, English consumers are less likely to let a stranger into their home due to higher crime rates. Lastly, it cannot be ruled out that the nationality of the interviewer – not being English – could have had an effect on the compliance rate.

To determine to what extent the respondents’ statements were dependent on the chosen interviewing technique, twenty respondents were interviewed using hard laddering and twenty respondents were interviewed using soft laddering (Grunert, Grunert & Sørensen 1995). Hard laddering refers to a technique where the respondent, after having answered one “why is it important to you that...?” question is not allowed to ponder about her or his answer, because the interviewer moves on to the next question until the level of higher order values is reached. In soft laddering, on the contrary, the interview resembles very much a dialogue between the interviewer and the respondent, with the attribute-consequence-value ladders being constructed out of the transcribed interview text.

Laddering results - Frederiksberg

In general, respondents’ knowledge about functional foods was very limited, and the notion of enriching food with vitamins, minerals, and live cultures to improve the state of health was perceived quite negatively. When asked how one group of products (functional foods) differed from another group of products (conventional foods), very few respondents identified the functional characteristics of the products. Often it was necessary to ask the respondent to study the package if the interview was not to be terminated immediately, and – if that did not help – the interviewer had to explain it to the respondent. As a result, it seems safe to conclude that functional foods did not represent a distinct category in the cognitive structure of the respondents. One respondent suggested a solution to the problem: “If they were to do this in a clever way, they ought to put the products in the section with health food... in that way I would know that that’s where I’m supposed to go – instead of putting the products in the usual places” (D17, age 38). In general, the respondents did not identify functional foods as belonging to a category where the products “are either a) modified or b) fortified with substances that have a preventive or therapeutic effect beyond nutritional value” (cf. working definition above). Moreover, respondents’ elicitation of the product’s functional attributes often resulted in the laddering interview not being continued beyond the first stage, because the attributes were not perceived as important to the respondent. As a consequence of the respond-
ents’ rather sparse knowledge of the functional benefits and the perceived importance of these, the hierarchical value map did not become very extensive.

Respondents’ general distrust of functional foods mostly concerned the products’ perceived unnaturalness and impurity. The high degree of processing and the addition of substances, which in reality were alien to the products, led respondents to think of functional foods as unnatural compared to conventional foods, and particularly more unnatural than organic food. However, respondents perceived functional foods as “more natural” than genetically engineered foods. One could have assumed that proponents of the ecological idea who focus on maintaining or achieving health through their diet (Jonas 1995), would appreciate manufacturers’ enriching foods in order to improve health. However, the data revealed a completely different picture (see figure 2).

Figure 2. Perceived naturalness of food

![Figure 2. Perceived naturalness of food](image)

“In a way I like that the food I eat is pure – that nothing has been added” (D5, age 32) and “I don’t think they should put more additives in the food... even though they are not really additives” (D18, age 28). The fact that the enrichment is considered an additive illustrates respondents’ view of functional foods as something synthetic and, therefore, probably unhealthy.

Respondents perceived the production of functional foods as a process where the nutritional value of the original ingredients is reduced. As a result the respondents did not perceive functional foods as healthier than conventional foods. “Something tells me that butter which hasn’t been tampered with is more wholesome... the more the butter is processed the more you ruin it” (D16, age 57). Many respondents indicated that their choice as consumers was restricted and assumed by the food industry: “Advertising has the power to dictate in what way I should eat a healthy diet, it’s almost like dismantling one’s bodily consciousness” (D5, age 32). In general, respondents thought that it should be up to oneself if – and to what extent – one wanted to be healthy. The food industry should not decide which substances were important to consumers and what kind of relationship with health the individual should have: “Sneaking something wholesome through the backdoor is like being placed under guardianship” (D14, age 37).

Functional foods’ attributes were often perceived as unimportant because the respondents did not regard themselves as potential victims of welfare diseases and because they preferred a varied diet: “When you say ‘functional foods’ I think ‘oh no’. I cannot live with that... I’ve got this notion that if I eat that I’m just so healthy. And I kind of feel bad about that because I don’t believe in it. I believe it is important to eat a mixed diet” (D9, age 29). Thus, many respondents thought that they got enough vitamins and minerals from eating a varied diet, rendering enriched foods unnecessary. The joy of preparing fresh raw materials disappears if one attempts to cover the nutritional needs through functional
foods – an opinion that chef Claus Meyer undoubtedly would agree with. Dietary supplements such as vitamin pills were preferred to adding vitamins and minerals to food. Respondents doubted that they would get the “proper” amount of nutrients through enriched foods, and they felt that they lost control of their state of health: “...when I eat a vitamin pill I know that I get the daily dose and I’m in control. I doubt that I get the vitamins and minerals that I need if I eat enriched food” (D20, age 37).

Every respondent in the Danish sample had either tried or heard of “Gaio” and “Cultura”, and approximately 50% were aware of the alleged positive benefit to digestion. Only one respondent knew about the cholesterol lowering feature of “Gaio”. Accordingly, the product was seldom bought because of its functional benefits but rather because of factors such as taste, creamy consistency, packaging, and advertising. “Cultura” was perceived as being both beneficial to digestion and a decent product. With regard to the calcium juice it was argued that many respondents did not know the product and did not believe that the added calcium was in any way beneficial to their health: “I don’t think that there’s any calcium left because it has been there for so long” (D16, age 57). Most of the respondents preferred to eat a varied diet and consume various milk products in order to cover their calcium need. Furthermore, some respondents considered it odd that calcium had been added to a juice product because they would normally associate calcium with dairy products: “Added calcium – I don’t think that’s important to me. If I wanted more calcium I would not think of juice right away” (D7, age 37).

“Blå Gaio”, the butter product, was only known to respondents through television advertising and through the coverage given to the product in the media. None of the respondents had tried “Blå Gaio”. The majority of the respondents perceived the addition of poly-unsaturated fats to “Blå Gaio” as unimportant because they did not consider themselves as being threatened by cardiovascular diseases or because they would rather go without butter than substitute their preferred brand with a brand that they were unfamiliar with. Many respondents claimed to have cut back on butter in recent years in order to reduce fat intake. Thus, the consumption of a butter product with fewer fatty acids would not have any decisive effect. In addition, many respondents perceived the idea of claiming that “Blå Gaio” is healthier as an attempt of the manufacturer to deceive consumers: “If people eat butter they know that it is extremely unhealthy for them, and it may result in clogging up the arteries....And then the food manufacturers develop something different... I think that’s cheating.... making me believe that everything is OK if I eat this instead of ordinary butter” (D14, age 37), or “...things aren’t right if you like a 5 cm spread on your bread and you just need to eat some “Gaio” in order not to die from embolism tomorrow” (D15, age 39).

The claim “Omega 3-fatty acids” was regarded as incomprehensible and was not associated with anything healthy: “And now they've added Omega-3 fatty acids. Same thing with shampoo – B5 and CC and all that stuff – but what exactly is it? They just wrap it up in pretty words instead of saying that they are really fatty acids” (D9, age 29). There was a tendency among the respondents to associate “Blå Gaio” with yoghurt and the Causido culture: “I’ve often thought about trying this one, but there is something about “Gaio”. It’s not butter... I guess it has got something to do with that healthy live culture I wonder how that would taste. I mean, does it taste like butter? With yoghurt it is completely different because
there are so many different products. I accept that there are many different flavours, but butter with strawberry flavour? Thank you, no” (D5, age 32). It therefore seems that the characteristics of “Gaio” – yoghurt, flavour, Causido culture – have been transferred to “Blå Gaio”, rendering some respondents uneasy and confused. Overall, the enrichment of “Cultura” and “Gaio” was thus regarded as more appropriate than the enrichment of juice and butter, even though substances alien to the given food product had been added to the product: “Adding a live culture is more natural than adding calcium... It is not rational – it is emotional” (D4, age 37).

Another aspect was the price of the products. If the respondents were to buy “Blå Gaio” and “Rynkeby Kalcium Plus” because of the functional benefits, they expected the price to be equal to that of the conventional counterparts. Thus, the additional price for the alleged health effect was not perceived as justified.

Furthermore, the documentation for functional foods’ health effect must be in order, and it should be possible to identify foodstuffs beneficial to health on the packaging, in advertising, and other media. This indicates that the respondents wanted to see the rules pertaining to the marketing of functional foods changed – as long as there is sufficient documentation. As mentioned earlier, functional foods did not represent a distinct category in the minds of our respondents as being more beneficial to health than conventional products. The fact that it is illegal to use health claims on the packaging and in advertising is the most likely reason for this: “If that’s why they want us to buy those products, I don’t think that their marketing is very good” (D15, age 39). It thus seems that the rules governing claims on foodstuffs have left this new food category almost unnoticed.

Moreover, many respondents regarded themselves as brand loyal when it came to butter and juice. Unless the taste was the same and the price not higher, they would never dream of buying and trying the functional products. They assumed that functional food products lose their taste during processing – compared to conventional products: “Well, I haven’t tasted this one [“Blå Gaio”], but I assume that it doesn’t taste as good as real butter” (D7, age 37). It therefore seems that attributes such as taste and price are of greater importance than the products’ functional benefits. This could, however, also be the direct consequence of the respondents not having tried the functional products.

Figure 3 shows the Danish respondents’ attribute-consequence-value chains with regard to functional foods, ie the manner and order in which cognitive categories about the functional benefits are organised in the consumers’ minds. The cut-off level is 3, which means that 21.5% of all direct and indirect links in the implication matrix are represented in the map. The level was determined on the basis of Gengler and Reynold’s (1995) recommendations, aimed at retaining as much information as possible without rendering the hierarchical value maps confusing and incomprehensible.

The rather low percentage of represented links presumably has something to do with the survey being based on a product category and not a single product. All things being equal, respondents cannot be expected to list a greater number of attributes, consequences and values than would be the case if the survey was based on a single product. In this way, the number of cells in the implication matrix increases, and the direct and indirect links are “spread across” more
cells. To increase the number of links depicted in the hierarchical value map two things can be done: First, the number of summary codes by merging these two categories could be reduced. In this case, however, this procedure was not applicable with most summary codes. The individual summary codes were so different that the joining of several summary codes would appear meaningless and flawed. There are instances where this procedure would work, but another problem appears: the percentage represented in the hierarchical value map does not increase enough to justify the merging of several summary codes and the inherent loss of information that such a merging results in. Second, the cut-off level could be reduced. Due to the Danish respondents’ sparse knowledge of and interest in functional foods the applied cut-off level is already low. Reducing the cut-off level even further would thus be a mistake. As a result we chose to maintain a cut-off level of 3 and not merge the summary codes.

Figure 3. Hierarchical Value Map for Frederiksberg, cut-off level 3

A hierarchical value map can be interpreted in two ways: either as an estimate for a group of homogeneous respondents’ cognitive structures, or as a tool allowing to analyse the main results from a laddering study without having to scrutinise each and every ladder. In order to determine how a given hierarchical value map should be interpreted, a homogeneity test must be conducted. This test consists of an index value expressing the difference between the highest frequency for a given direct relation between the beginning and the end of a given ladder. A high index value thus indicates that few or no respondents mentioned all elements in the common ladder, while a low index value points to the fact that the ladder is a reflection of most or all respondents’ answers (Grunert, Grunert & Sørensen, 1995). Hence, a low index value supports the homogeneity hypothesis, which allows the quantification of the laddering data (Vallette-Florence & Rapacchi, 1991). Testing each individual ladder in the hierarchical
value map for homogeneity showed that the ladder A4-K10 had an index of 9 while the remaining seven ladders had indexes of 3 or less. Even though the index for one of the ladders was high, it does not mean that the entire map represents two distinct groups of respondents. Accordingly, the homogeneity hypothesis is supported, and as a consequence the hierarchical value map for Frederiksberg seems to be a fair estimate for a group of homogeneous respondents' cognitive structures.

As is apparent from figure 3, only two attributes – calcium and live culture – were represented in the Danish respondents' cognitive structures. Accordingly, the respondents did not deem the functional characteristics of “Blå Gajo” important. The calcium enrichment was important for several reasons: calcium can prevent osteoporosis (K2), and it strengthens bones and teeth (K4). Among other things this means that one does not have to be limited in the way one leads one's life (K8) resulting in the attainment of life quality (V3). It also means the possibility of maintaining a good state of health (V2). The calcium enrichment was also associated with a high degree of control over one's state of health (K6), which can be explained as the ability to actively counter disease and maintain an acceptable state of health. This consequence was also linked to the value “health” (V2). Finally, the calcium enrichment was important to children's growth (K16) and because of the physical and mental well-being that the enrichment resulted in (K9). This, in turn, led to the feeling of being in balance (V4) and a notion of freedom (V5) not restricted by disease and other physical problems. The hierarchical value map apparently depicts a different picture of consumers' attitudes to calcium enrichment than was previously discussed. It is important to remember, however, that the hierarchical value map in Figure 3 is only based on the answers from ten respondents at a cut-off level of 3. Consequently, it is not a contradiction that the “calcium path” dominates the hierarchical value map of the hard laddering while many of the respondents in the soft laddering interviews had reservations about calcium-added juice. The link between the addition of a live culture to the yoghurt (A4) and the consequence “helps digestion” (K10) was strong, but not linked to any upper level values. On the other hand, the attribute “live culture” (A4) was directly linked to the aspiration and/or ability to live a long life (V1).

Several of the ladders in figure 3 are based on only three or four links. However, constructing the map with a cut-off level of 4, many links disappear (see figure 4). One should therefore be careful when interpreting the hierarchical value map for Frederiksberg, since the links between the individual elements in the ladders are not very strong.

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3 Ten respondents were interviewed using soft laddering and ten respondents were interviewed using hard laddering.
Laddering results - Croydon

The interviews in Croydon lasted between 25 and 55 minutes. Compared to the Danish respondents, the English respondents were more familiar with functional foods and their characteristics. The major part of the respondents either identified various functional foods products as alternatives to conventional foods, or they recognised the products' functional characteristics when asked “what makes these products (functional foods) different from these products (conventional foods)?” It was also evident that the English respondents knew more about the relationship between different nutrients and health than the Danish respondents.

While the level of knowledge about functional foods was fairly high, the products' functional characteristics were not equally important to the respondents. Almost one third of the respondents said that the functional benefits were not important to them – either because they preferred to eat a varied diet; because they felt that the higher prices were not justified, or because they considered the claims to be untrue. These results indicate that both Danish and English respondents have doubts about functional foods. The remaining respondents had positive attitudes towards the enrichment of food, either because they regarded it as a means to secure a better state of health and a longer life or because they themselves, or their relatives, had been exposed to welfare diseases. The reference to relatives and “doctor’s orders” was more prevalent among the respondents in Croydon compared to the respondents in Frederiksberg.

Even though many of the English respondents regarded the functional characteristics of the products as important, taste was still of high importance, and only in a few cases were the respondents willing to substitute taste for the “health benefit”: “...I mean, I would buy it for that reason (the functional benefits), but not if it didn’t taste right” (E18, age 52).
The respondents’ knowledge and acceptance of the enrichment of the products varied quite considerably. Awareness of the purpose of enriching the two yoghurts (“Loseley BA Live” and “Sainsbury’s Natural Low Fat Bio Yoghurt”) with live cultures was not high compared to the enrichments of the other products in the English sample and compared to live culture enrichment of yoghurts in Denmark. Accordingly, a mere 25% of the respondents in England knew that functional yoghurt products were beneficial to the digestive system. The respondents were more familiar with the functional characteristics of “Flora” and “Vitalite”, and the claims “high in poly-unsaturates” and “rich in vitamin E” were considered important product characteristics. Almost all respondents knew that a higher content of poly-unsaturated fats and a simultaneously lower content of saturated fats reduces the risk of cardiovascular diseases. Compared to the Danish respondents’ knowledge of the alleged benefits of Omega-3 fatty acids, the respondents in Croydon were more knowledgeable. It should be mentioned, however, that “Blå Gaio” was newly launched on the Danish market at the time of the survey, and the respondents only knew about the product via advertising and the adverse publicity in the media.

When comparing the three product categories that were tested – yoghurt, butter, and cereal – the English respondents were most familiar with the enrichment of cereals. Accordingly, more than half of the respondents thought that all breakfast cereals on the market were either enriched with vitamins or with minerals: “I thought corn flakes are always fortified with vitamins and iron, and actually I think they generally are” (E12, age 45). The tendency amongst respondents to confirm the presence of fortified cereals on the market indicates that this type of product is not new to the market. Sainsbury claims “fortified with vitamins and iron” on the package, and many respondents knew that iron was beneficial to the blood. Kellogg’s “All-Bran Plus”, which is fortified with calcium and the antioxidants C and E, is a high fibre breakfast cereal. The knowledge of the purpose of the calcium fortification was close to 100%, but for some respondents this was not the motive for buying the product. Accordingly, calcium was frequently considered “unusual” in a breakfast cereal, which already is eaten with calcium-rich milk: “…then, if you drink milk you should be getting calcium” (E3, age 46). This tendency to consider calcium enrichment as unusual was, as mentioned earlier, also found amongst the Danish respondents.

As regards the antioxidant fortification, more than 50% of the English respondents were unaware of the vitamins’ specific functional benefits. However, most knew that antioxidants were in some way beneficial to health. About 75% of the Croydon respondents did not consider this sort of fortification important because they believed that they got enough vitamins in their regular diet: “I assume antioxidants detoxifies your body, but I have never really worried about detoxify my body. Fine just by eating a varied diet” (E4, age 25); or “You can only benefit from a certain amount of vitamins, and when you got that lot, which you get naturally in everything you eat, having it extra doesn’t do you any good at all” (E5, age 56). The other respondents generally had positive attitudes towards the antioxidant fortification and felt that one ought to eat extra vitamins if one had the opportunity: “Well, anything you can get that's got extra vitamins is very good for you” (E15, age 58).

Kellogg’s “All-Bran Plus” also has a high-fibre content, but with reference to the working definition for functional foods, this is not a functional characteristic because extra fibre has not been added to the product. However, the laddering
interviews were conducted using this attribute as a starting point, because many respondents considered fibre as generally important to health and because the consumption of dietary fibres has been associated with the prevention and treatment of certain types of cancer. Being aware of the benefits of dietary fibres to digestion was significant amongst the English respondents. It can be concluded that the English respondents regarded the functional benefits of the butter products as most important, the functional benefits of cereals as second most important, and the functional benefits of yoghurts as least important.

Figure 5 shows the English respondents’ attribute-consequence-value chains with regard to functional foods as a result of the hard laddering interview.

The hierarchical value map was constructed with a cut-off level of 4 resulting in 21% of the total number of links in the implication matrix being depicted. Even though this level is rather low, a higher cut-off level would merely lead to a very complex and incomprehensible hierarchical value map. As was the case with the Danish sample, the respondents in England identified a fairly large number of attributes, consequences and values, rendering the number of links represented in the map low. The percentage could be increased by merging several summary codes, but due to a high number of significantly different statements from the respondents, this solution was not applicable. In addition, the interview concerned a product category, which means that respondents are likely to elicit a higher number of attributes and more motives (consequences and values) for the importance of each individual product attribute than would be the case if the interview had focused on one product. The number of cells in the implication matrix therefore increases, and the likelihood that several respondents choose the same ladders decreases. The test of homogeneity showed that the ladders A2-K1-V2 and A3-K16 had indexes of 6 and 4, respectively, while the indexes for the other
The most important ladders in the hierarchical value map for Croydon revealed the following: A low cholesterol content (A2) was associated with avoiding heart attacks and blood disease, which in turn was linked to the value “live a long life” (V1) and “health” (V2). The attribute “low in fat” (A1) was linked to the same summary codes as was A2. The consequence “keep cholesterol level down” (K3) was, however, placed in between A1 and K1. Accordingly, it can be argued that the respondents ate low fat and low cholesterol functional products in order to avoid heart disease and live a long and healthy life limiting the risk of dying young. The other part of the hierarchical value map, the consumption of fibre and live culture-enriched foods (A5 and A4), was connected to strengthening the digestive system (K10), which in turn was important to respondents for health reasons (V2). Finally, the respondents regarded the calcium fortification (A3) as important because it could strengthen their teeth and bones (K4). This consequence was also linked to the value “health”, but the association was rather weak (a total of six links). To sum up the interpretation of the hierarchical value map, six out of eight attributes (“low in fat”, “low cholesterol content”, “calcium”, “live culture”, “high fibre bran” and “antioxidants”) were associated with the maintenance of a good state of health, while four attributes (“low in fat”, “low cholesterol content”, “live culture” and “antioxidants” were also linked to aspirations to live a long life.

**DISCUSSION**

Comparing the hierarchical maps for Frederiksberg and Croydon, it becomes evident that the English respondents' cognitive structures were more complex than those of the Danish respondents. The level of knowledge about and the acceptance of functional foods amongst English respondents was more widespread. However, the selection of products in Croydon compared to Frederiksberg led to the elicitation of a greater number of attributes and, in turn, a greater number of ladders. We have compensated for this “irregularity” by constructing the hierarchical value map for Frederiksberg with a cut-off level of 3 and the map for Croydon with a cut-off level of 4. Compared to the Danes, the English respondents knew more about the purpose of fortifications, and they regarded these fortifications as more important than did the Danish respondents. Low fat and low cholesterol foodstuffs and high-fibre products represented the most important types of functional foods in England, while calcium and live culture fortified products were the most popular in Denmark. To a very large degree, the English respondents associated the functional products with the aspiration to live a long and healthy life, while the Danish respondents did not associate functional attributes with upper level values to the same extent.

The two laddering techniques clearly led to different results. The hierarchical value maps derived from the hard laddering interviews was much more comprehensive and detailed than the hierarchical value maps resulting from soft laddering. We suggest two reasons for this: First, in hard laddering interviews respondents seem to make more extensive use of their cognitive structures, probably as a consequence of being continuously pushed to answer the “why is it
important to you that...?"-questions. Second, even though respondents were asked basically the same questions, the interviewing techniques are so dissimilar that respondents' statements are bound to differ as well.

However, also another phenomenon was observed: The group consisting of respondents interviewed with hard laddering had a tendency to perceive functional foods as positive, while the other group of respondents was more inclined to be sceptical about the food category. A possible explanation could be that respondents in the hard laddering situation only had an opportunity to express whether a product attribute was important or not, but are not allowed to explain why it was important. On the contrary, respondents undergoing the soft laddering interview are explicitly encouraged to tell everything they want to about the product, i.e., both negative and positive evaluations can be assessed.

Based on these preliminary results, it thus seems more advantageous to use the soft laddering technique in studies that focus on products or product categories that only recently have been introduced and about which respondents have only limited knowledge and/or experience. Hard laddering, on the other hand, can be recommended if product attributes are already well-established so that the focus of the interview is to assess consumers' self-relevant consequences and values in connection with a given product.

**Concluding remarks**

Functional foods represent a product category that consumers do not seem to embrace as enthusiastically as the food industry had hoped for. The results of this study indicate that consumers' attitudes must change dramatically before the estimated market potential can be achieved. Particularly the Danish respondents expressed a strong reluctance towards modification and fortification of foods, which they regarded as unnatural and impure. The dominating opinion was that a varied diet, perhaps supplemented with vitamin pills is a much better way to meet nutritional needs. Quite a few also felt that it is the individual's responsibility whether s/he eats a healthy diet or not, instead of others deciding for them and thus exerting control. The English respondents, however, revealed a very different attitude. Functional foods are for them a convenient way to meet the requirements of a healthy diet, and most of them regarded the possibility of enriching food as positive. This finding seems to point at cultural differences in the perception of food and diet, indicating that food industry's offers are not necessarily accepted in a similar way across cultures.
REFERENCES


APPENDIX

Respondents - Frederiksberg

Women: 16  Youngest woman: 28  Oldest woman: 59  Average: 42.4
Men: 4  Youngest man: 31  Oldest man: 49  Average: 38.5

Respondents - Croydon

Women: 16  Youngest woman: 31  Oldest woman: 64  Average: 50.06

Telephone recruitment

“Hello, my name is Morten Jonas from the University of Odense in Denmark. We are currently conducting a survey on diet and health and in relation to that I would like to speak to the person in the household responsible for purchasing foodstuffs. Is that you?”

NO: “May I speak to the person in charge of purchasing foodstuffs?” NO: Sorry about the interruption”

YES: “Good, we are currently interviewing a number of Danish and English people about their attitudes to diet and health, and I was wondering if it would be possible that we interview you face-to-face at some point during the period from May 25 to June 1. I should bring it to your attention that we will not attempt to sell anything – we are merely interested in your attitudes to diet and health. The interview will last about 30 minutes.

NO: “Sorry about the interruption”

YES: “Great. I just have a few question for you then.”

0. Gender? female ___ male ___

1. How old are you? ____ years (if <25 or >70 TERMINATE)

2. How many adults are in the household? ____ one ____ two+

3.1. One adult in the household:

What is you annual gross income? __________

3.2. Two adults in the household:

What is the household’s annual gross income? __________
4. Could I have your name and address, please? (note phone number)

Name: __________________________

Address: ________________________

Phone#: ________________________

5. From May 25 to June 1, when is it convenient for you to be interviewed?

Day/Date: ________________________

Time: ___________________________