DANISH CONSUMERS' ATTITUDES TOWARDS FUNCTIONAL FOODS

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EXECUTIVE SUMMARY

1. "Functional foods" is a relatively new term used to describe food products which have been enriched with natural substances/components with a specific physiological preventive and/or health-promoting effect. As yet, there are few actual functional foods in the Danish market, but in Japan and the USA, where these products are relatively common, sales are enjoying growth rates far above those for conventional products.

2. The aim of this study is to examine Danish consumers' attitudes to functional foods, including: whether enrichment with health-promoting substances results in a higher value perception among consumers; the relative importance consumers attach to enrichment compared with other product attributes; which beliefs consumers associate with enrichment; and, which beliefs influence and determine consumers' purchasing intentions and the relative importance of these beliefs.

3. The study consists of three analyses: focus-group interviews, the aim of which is to get an overview of the issue and generate input for the quantitative analyses. The quantitative analyses consist of a conjoint analysis and a survey based on the Theory of Reasoned Action. These analyses are based on concrete, non-existent examples of functional foods, a dairy product and a bread product, each of which has been enriched with three different substances: a) soluble food fibre, b) omega-3, and c) calcium and vitamin D.

4. The focus-group interviews show that the main beliefs which consumers associate with functional foods are the convenience of enrichment through daily diet, (un)naturalness, apprehension about changes in taste, higher price, uncertainty about belief in the effect of enrichment, dosage (when is there enough/too much of the enrichment substance), own ignorance and uncertainty about manufacturers' knowledge of the health effects of eating enriched products. The respondents have very little knowledge of functional foods and were fairly sceptical. However, attitudes to concrete examples of functional foods were much more positive than attitudes to the concept of functional foods.

5. The conjoint analyses show that, in general, consumers preferred the non-enriched variety, though with the exception of bread enriched with fibre, since the benefit of this is greater than for the conventional product. About 75% of consumers attach relatively more importance to enrichment than the other product attributes. For about 30% of consumers in the case of the dairy product and 50% in the case of the bread product, enrichment in one of the three forms resulted in a higher value perception, while about 25% and 40% respectively attached a lot of importance to the products not being enriched.

6. The cluster analysis identified several segments with a preference for the various enriched products. Two relatively large segments (25% and 20% of respondents respectively) had a higher value perception for the enriched than for the conventional product, especially as regards the calcium and vitamin D-enriched dairy product and the fibre-enriched bread product, and these segments also attach relatively more importance to enrichment than the other product attributes. The analysis also identified a large segment with a preference for the

calcium and vitamin D-enriched bread product, about 30% of respondents saying they preferred this product variety and 35% saying they attached relatively great importance to enrichment. Only very few respondents preferred enrichment with omega-3, which was also the case for enrichment with fibre in the dairy product.

7. In general, attitudes to enrichment are more positive as regards the bread product and product varieties enriched with substances already present in the conventional product. However, attitudes are generally more negative as regards enrichment with omega-3 than with the two other substances. On the whole, consumers' attitudes to functional foods depend on both the type of product enriched, the enrichment substance and the combination of these.

8. The questionnaire survey shows that consumers' purchasing intentions as regards the various enriched products are almost solely explained by their attitudes to purchasing the respective product varieties (attitude to behaviour, AB), and only to a very small extent by the subjective norm (SN). The beliefs which explain AB, and thus also purchasing intentions, are: perceived convenience of getting the enrichment substance through the daily diet (explains on average 42% of the explained variation in AB for the various product varieties), price (21%) perceived naturalness of the enriched products (18%), and the perceived positive health effect of eating the enriched rather than the conventional product (14%).

9. There are no systematic differences or similarities in the relative importance of the individual beliefs for AB as regards product, enrichment substance or the combination of these. There are, on the other hand, systematic absolute differences between the mean values for the product varieties. The means are thus generally higher (more positive attitude and higher purchasing intentions) for enriched varieties of the bread product and in those cases where products have been enriched with a substance that already occurs naturally in the conventional product. An analysis of variance shows that the perceived naturalness of the enriched product is the most explanatory belief for how positive respondents' initial attitudes are to the concrete product varieties.

10. As regards demographic differences, the study shows that the elderly and women are more positive about functional foods than the other respondents. No differences were found with regard to income or educational level.

11. The most important implications of the study are that the development of functional foods should take a starting point in concepts which consumers regard as relatively natural. In this connection, both the conventional product itself, the enrichment substance and the combination of these have a certain importance. Thus, consumers are most positive about functional foods which have been enriched with a substance already present in the conventional product. With regard to price, the analyses show that some segments are willing to pay more for functional foods if they think there is a health effect. The marketing of functional foods should emphasise the convenience of getting enrichment substances through the daily diet and naturalness, since these factors are the most important in determining consumers' intention to buy functional foods.

INTRODUCTION

Background

"Functional foods" is a relatively new concept, which has emerged as a result of the last few decades' increasing focus on and awareness of the influence of diet on health.

Up to now, the food industry has responded to consumers' demand for healthier foods by developing endless "light" products, which have been modified mainly by reducing the sugar, calorie and fat content. In addition, recent years have seen the development of more "natural" products – especially through a reduction in the number of additives and the breakthrough for ecological products.

Functional foods are a natural continuation of the above trend. The increased demand for healthier foods, together with new developments in food technology, have made it both intriguing and possible to add health-boosting substances to existing products. Functional foods is thus a term for products enriched with natural, i.e. occurring in nature, substances such as vitamins, fibre and plant extracts in order to increase the health effects of the conventional, basic product.

The definition of functional foods varies enormously in the literature, and while consequently there is no agreement on a formal definition, there are certain points in common. Functional foods can thus be defined as:

> *A product which has been modified or enriched with naturally occurring substances with a specific physiological preventive and/or health-boosting effect. The product must also be part of the normal daily consumption of food/fluids.*

Aims of the study

The aims of the study are:

To establish a decision-making basis for the development and marketing of functional foods by examining consumers' attitudes towards concrete functional foods, including:

- the extent to which enrichment with health-boosting substances results in a higher value perception among consumers;

- the relative importance consumers attach to enrichment compared with other product attributes;

- the consequences consumers associate with enrichment; and

- the beliefs which influence and determine consumers' intention to purchase functional foods.

Theoretical basis

In consumer behaviour theory, the purchase of groceries is regarded as habitual behaviour, where the consumer chooses between products in the evoked set, an activated set of products accepted by the consumer (Howard & Sheth, 1969). The extent to which enrichment will affect the composition of the consumer's evoked set depends on the relative importance attached to enrichment compared with other product attributes and the consequences (beliefs) associated with enrichment (see, for example, Ajzen & Fishbein, 1980).

The theoretical basis of this study is the cognitive paradigm and the behavioural model used is Ajzen and Fishbein's (1980) attitudinal model, the *Theory of Reasoned Action. The Theory of Reasoned Action* describes and explains individuals' attitudes towards a given behaviour and behavioural intentions based on the experienced consequences of this behaviour (Ajzen & Fishbein, 1980).

Since there is often little similarity between expressed attitudes towards behaviour and actual behaviour, the *Theory of Reasoned Action* uses an intermediate indicator – the intention of carrying out a given behaviour – which has proved to be a better predictor of behaviour (Ajzen & Fishbein, 1980; Ajzen, 1988). The intention is made up of the attitude towards behaviour (AB) and the subjective norm (SN, which is the individual's perception of relevant other person's attitude towards the behaviour).

Methods

Very little research has been done on consumers' attitudes towards functional foods, so empirical studies are essential to achieve the aims outlined above. The scarcity of a priori knowledge also makes external validation more difficult, which is why the study should include more than one method, so that the results of the different methods can be compared.

It would also be a good idea to include more than one product, allowing the results to be generalised and not solely applying to a specific product. Two different products – a dairy product and a bread product – have thus been chosen for this study, and the two products (subsequently referred to as basic products) are sufficiently different to allow a certain degree of generalisation of the results. In addition, three enrichment substances were chosen for the study: a) soluble food fibres, b) omega-3 fatty acid from fish oil, and c) calcium and vitamin D.

Based on the above, together with the aims and theoretical basis of the study, one qualitative and two quantitative methods were employed for the empirical study of consumers' attitudes towards functional foods. The qualitative study consists of two focus-group interviews, and the quantitative methods comprise a conjoint analysis and a survey based on the *Theory of Reasoned Action*. The conjoint analysis focuses on describing consumers' attitudes and assessing the extent to which enrichment leads to a higher value perception than the basic product without enrichment, while the survey focuses on explaining which underlying beliefs form these attitudes, and the extent to which these have a determinant effect on the purchasing intention.

The study is limited to the Danish market, and all the empirical surveys have been carried out in the Aarhus area.

THE CONCEPT OF FUNCTIONAL FOODS[1]

Basically, food can be enriched in three ways (Engel, 1996). The simplest way is to enrich products with vitamins, minerals, fibre, plant extracts and similar natural substances. The three enrichment substances discussed here are all of this type, which is also the most common form of enrichment in Denmark. Another way is to modify the composition of animal feedstuffs, thereby manipulating the basic product itself. The third method of enrichment is what can be called chemical enrichment, which is enrichment with live cultures (which have no taste themselves), e.g. Guerana, caffeine or extra protein.

Generally speaking, functional foods can also be classified as follows:

- **Upgrading**, i.e. the addition of more of a substance that is already present in the product.

- **Substitution,** i.e. one substance in the product is replaced by a similar, less unhealthy/more healthy substance (e.g. fat replaced by omega-3 fatty acid).

- **Enrichmen**t, i.e. the addition of a substance that is not present in the basic product.

- **Elimination,** i.e. the elimination of unwanted, unhealthy ingredients, which is typically how light products are made.

THE EMPIRICAL STUDY

The qualitative study

The first part of the empirical studies consisted of two focus group interviews. The main aim of the qualitative preliminary study was to give an insight into the problem and to create a basis for the operationalisation of the two quantitative studies.

The first focus group consisted of eight persons aged 25-55, six of whom were women. The other group consisted of six women aged 60-75. The selection criteria were that all ages should be represented, and that respondents should be able to generate useful and relevant information about their food consumption and purchasing. Thus, all respondents were those mainly responsible for the daily shopping in their respective households and regularly bought dairy and bread products.

In the analysis of the two focus groups below, the first part discusses general aspects of food products, including an examination of the relevance of *Perceived Behavioural Control* for this study. *Perceived Behavioural Control* is a compo-

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1 See MAPP working paper no 55 (Jonas & Beckmann, 1998) for a more thorough discussion of the concept of functional foods.

nent proposed by Ajzen (1985), and covers consumers' perceived control over behaviour. The second part of the analysis deals with attitudes towards functional foods, including the beliefs associated with eating functional foods. The analysis concludes with a discussion of the importance of the focus group results for the operationalisation of the quantitative studies.

General aspects of food products

The respondents regarded the general level of quality of food products in Denmark as satisfactory, though both groups said that shopping was becoming increasingly difficult. Typical comments were: *It's getting so complicated, you almost have to bring a manual when you go shopping* (woman, 47 years old), and *you can't be expected to know everything* (woman, 55). The general impression was that confidence in food standards is due more to confidence in the public health authorities than in food producers. Several respondents said that the media attention given to penicillin residues, salmonella, etc., in food has made them lose confidence in food producers. A few even went as far as to say that some producers had undermined the concept of light products and ecological products. Less scrupulous producers thus weaken confidence in the industry as a whole, the result of which is widespread scepticism towards industry initiatives.

The analysis clearly showed that consumers attached a lot of importance to convenience, the price/quality relation and taste. This merely confirms the findings of a number of existing studies (see, for example, Tuorila, 1987). Both groups were fully aware of the power of advertising. As one respondent put it: *Adverts can make us believe anything – they're so convincing* (woman, 55). It was also evident that public health campaigns to persuade consumers to cut down on fat have hit home, since all respondents were well aware of the harmful effects of too much fat, and most of them had tried to change their shopping habits accordingly. However, this conflicts with actual behavioural patterns after the various campaigns (see, for example, Nørbæk, 1995).

In general, respondents knew quite a bit about the importance of diet to health. The elderly in particular were willing to do a lot to keep healthy and thus remain active. This group also remarked on the difficulty of ensuring a varied diet in a small household. There was also a general willingness to pay for health, eg through buying vitamin pills, etc., but the credibility of the product concerned was crucial here. A typical remark was: *Does it work – can we trust the manufacturers?* (woman, 58). The elderly in particular relied heavily on "word of mouth" and impartial persons (eg doctors) as reference persons. The young were less willing to pay for health – among other things because they had less money. Nonetheless, studies show that it is especially the young who buy ecological products, which are usually dearer (Bech-Larsen, 1996b).

With regard to 'perceived behavioural control' the respondents did not see any problems concerning buying, preparing or eating functional foods; consequently the Theory of Reasoned Action was chosen as theoretical point of departure.

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Attitudes towards functional foods, including the consequences associated with enrichment

The respondents were unfamiliar with the term functional foods – not one of them knew anything about the concept. Everybody had heard of *Green Gaio* (yoghurt-type product with causido culture), however, and most had heard of *Blue Gaio* (spread with omega-3 fatty acis), but nobody had thought of them as being enriched. A few ate Green Gaio, but not everybody ate it because of enrichment – it was just as much because they liked the taste of it. The elderly appeared to be more aware of the health effect, however.

The term "functional foods" gave negative associations in both groups ("junk food" and americanisation), and functional foods were not regarded as an overall solution to problems of bad and unvaried diets. A typical remark was: *Whatever next?* (man, 25), which was fairly representative of the initial scepticism with which the concept was greeted. It was thus seen as unnatural, enrichment being equated with additives, and, as one respondent put it: *It makes me think of food being injected with a syringe* (woman, 26). This was more common among the young and middle-aged (focus group 1) than the elderly (focus group 2). As a respondent in group 1 said: *There are no limits to inventiveness when money's involved* (man, 31). This led to a discussion as to whether functional foods were a step in the wrong direction – the first step on a slippery slope. Several respondents observed that something should be done to change people's bad food habits instead, though they also admitted that this is not easy. The overall view of the respondents, therefore, was that, once enriched products come onto the market, most people will choose the easy way, which can also be seen as a form of impotence on the part of consumers. It can thus be concluded that a negative attitude towards functional foods as a concept does not necessarily mean that, in the long run, consumers will not buy these products.

In general, the elderly were more interested in the concept, and accepted enrichment if it involved healthy and natural substances: *If it's good for me, why not?* (woman, 66). Attitudes in both groups were generally more positive when it was added that the products were enriched with natural substances and not additives in the usual sense. *I'd willingly take fish oil if it meant avoiding artificial additives* (woman, 61).

Despite the general scepticism about functional foods as a concept, both groups tended to have much more positive attitudes towards specific examples (eg fruit juice with calcium, Green Gaio, and imaginary products such as bread with broccoli extract). This probably reflects an uncertainty about the concept and what it involves, and several respondents did in fact say that it would probably be more accepted when it became better known. At the same time, the difference in attitudes between the concept and product level confirms the belief that consumers' attitudes towards functional foods should be investigated at the product-specific level, since this will yield more valid results about attitudes towards specific enriched products.

Both groups recognised the need for such products (diseases of civilisation, the desire for "eternal youth", an active life in old age, etc.). The elderly were very conscious about having an active life and "lasting longer", and all the elderly respondents took various forms of dietary supplements, etc. They also appeared

to care little about price if they believed there was an effect, which, from a marketing point of view, is interesting in relation to functional foods. As one of the elderly put it: *We're easy targets* (woman, 71), in the sense that, it they think it works, the elderly will buy even quite expensive products. The elderly in particular observed that functional foods were a convenient way of getting daily doses of various substances.

The interviews revealed clear reservations about functional foods. Both groups said that control and information are important. This can prove to be decisive, since respondents felt they were not equipped to judge the various functional foods, which was reflected in such comments as: *We don't know enough to be able to see through the sales pitch* (woman, 68). The respondents were generally suspicious about manufacturers' motives (profit) and competencies (pseudo-science). *We're at the mercy of the manufacturers* (man, 31). The respondents also felt that it would be hard to assess the effect of enrichment, and belief in an effect was stated as being an important reason for buying the product.

The respondents wanted clear information about what enrichment was supposed to be good for and about whether the amount can be controlled (too much, when has one had enough, and what is the combined effect of several functional foods?). An impartial regulatory body would thus clearly increase credibility, and in this connection the elderly were unanimous in saying that if doctors recommended a product, eg on radio or TV, they would definitely buy it. A further barrier as regards functional foods was the fear of changes in taste.

Importance of the results for the design of the conjoint analysis and survey

The focus-group interviews identified the most important attributes and purchasing motives for the two basic products, together with respondents' attitudes towards functional foods. Based on this, a number of choices were made for the two quantitative studies. As regards the conjoint analysis, the most important attributes for the dairy product were: price, type (ordinary or ecological) and packaging (cardboard or plastic). The most important attributes for the bread product were: price, type (white or brown) and brand. In addition, enrichment will be included as a fourth attribute for both products.

For the survey, we chose beliefs concerning taste, price and naturalness as explanatory variables for the attitude component, AB, since these were common purchasing motives/perceived consequences in relation to functional foods (and the dairy product and bread product in general). Convenience was also a prominent purchasing motive for functional foods, respondents saying that it would be more convenient to take vitamins, minerals, etc., through their daily diet. Furthermore, we formulated beliefs concerning respondents' uncertainty about dosage (too much or too little) and a belief concerning whether the enriched products have a better effect on health than the corresponding conventional products. We have also included a belief on respondents' confidence in producers' competence, plus a belief concerning respondents' perception of their subjective knowledge about the health effects of enrichment.

6

Summary of focus group results

The results from the two focus groups show that the success of functional foods in Denmark will depend on the fulfilment of a number of conditions. Clearly, objective and well-documented information will be crucial, and (government) control of food producers will considerably increase trust in the various producers, and thus also functional foods as a whole. While consumers are generally sceptical about functional foods as a concept, attitudes are more positive at the product level. The elderly are a prime segment, inasmuch as they are more interested and less price sensitive. The very term "functional foods" gives many consumers negative associations, so a new and more neutral name would be advisable.

The focus groups showed that the main barriers to functional foods are:

- Distrust of manufacturers' motives and competence (credentials).

- Consumers' lack of ability to evaluate functional foods (Credence characteristics. See, for example, Andersen (1994) for an in-depth discussion of credentials and credence characteristics.)

  – Uncertainty about the health effects of enrichment (does it work; confidence in producers).

  – Uncertainty about dosage (too much or too little?).

- Consumers think they can taste the enrichment substances.

- Consumers generally associate functional foods with something unnatural.

Manufacturers must therefore be perceived to be credible, so that consumers feel confident about their products. If both products, documentation and information are credible and objective, even trusted experts (doctors, etc.) are likely to endorse the product, which will probably increase consumers' trust even more, especially the elderlies'.

The quantitative studies

Data collection

Since the empirical part of the study is based on two different methods, it would obviously be best to use the same respondents for both methods. Among other things, this will allow us to investigate (via the survey) which beliefs determine preferences (the conjoint analysis). It also means each respondent being interviewed for two conjoint interviews (one for the dairy product and one for the bread product), in addition to filling out a questionnaire, which all in all is rather a lot. It was therefore decided that this would be asking too much, and a different approach was chosen, where the cjoint interview as conducted at the supermarket and given a questionnaire and a stamped, self-addressed envelope to take home.

According to Wells (1993), consumer-psychological research all too often lacks ecological validity, since students are typically used as respondents. Moreover, the studies are carried out in an unrealistic context. In this study, we have tried to increase the ecological validity by carrying out the conjoint analysis close to the point of purchase, immediately after consumers leave it. Respondents are thus contacted at the exit, thereby ensuring that they have gone through the same cognitive decision processes (purchase of groceries) required in the study, which, ceteris paribus, will increase its ecological validity. In addition, two screening questions were used in order to ensure that respondents were relevant and suitable for the study, which also increased its validity. The screening questions were meant to ensure that respondents (a) were those responsible for daily shopping, and (b) regularly bought both basic products.

It can be seen from the above that the sample was not chosen by random selection. This is a fairly normal approach in experiments which often require the researcher to be present. In order to increase the randomness of the sample, we chose an approach where every third consumer to leave the supermarket was contacted. The respondents were contacted outside three different supermarkets: one in the centre of Aarhus, one in an Aarhus suburb and one in a town in the Aarhus hinterland.

The conjoint analysis

A conjoint analysis was chosen for several reasons. Firstly, it is well suited to the study of imaginary products, and secondly, experiments often give more valid results (Blunch, 1990). Conjoint analysis is a general term for a number of decompositional methods for determining preference structures (see, for example, Green & Srinivasan, 1978, 1990; Louviere, 1994).

Like the expectancy-value models which constitute part of its theoretical basis, conjoint analysis is also compensatory. Conjoint analysis thus has a theoretical basis in utility theory and expectancy-value models (see, for example, Ajzen & Fishbein, 1980; Rosenberg, 1956), as well as Lancaster's theory of consumer behaviour (Green & Srinivasan, 1978; Louviere, 1994). Lancaster (1966) assumes that consumers' utility of a product can be decomposed into a separate utility for each of the product's attributes, much like multi-attribute models, which assume that consumers' overall attitude towards a product is expressed by the sum of their attitudes towards the product's individual attributes. Multi-attribute attitude models are thus characterised by a "build-up" approach, whereas conjoint analysis takes a starting point in the overall attitude and then breaks this down (decomposes) into attitudes towards individual attributes.

While multi-attribute models and conjoint analysis have a common theoretical basis, they often have different aims. Thus, expectancy-value models mainly explain why and how a concrete attitude is formed, while conjoint analysis focuses more on the prediction/determination of consumers' attitudes based on trade-offs between the various attributes and the levels of these attributes, and, although explanations of why and how the attitudes have been formed are desirable, they are a secondary aim of the analysis (Green & Srinivasan, 1978).

Using conjoint analysis enables the transformation of consumers' subjective attitudes towards estimated parameters in the form of utility functions (Green & Srinivasan, 1978). The interesting thing about utility functions is that they make it possible to observe the consequences of a change in the level of an attribute for the overall preference. Conjoint analysis thus makes it possible to implicitly estimate the relative importance of individual pre-specified attributes. The advantage of the estimation being implicit is that it prevents respondents overestimating the significance of individual attributes, which is a risk with explicit estimation (Green & Rao, 1971). Another advantage of implicit estimation is that the method better reflects consumers' decision process in the actual purchase situation.

A further advantage of conjoint analysis is that it can be used to show how imaginary products will be received by consumers. As a result of this possibility, conjoint analysis is today widely used in, among other things, product development and concept testing (Crawford, 1997; Green & Srinivasan, 1990; Green & Krieger, 1987, 1991a).

Conjoint analysis is based on a linear compensatory assumption expressed as follows, and is, with the use of the OLS algorithm, parallel to regression with dummy (Grunert, 1996):

(1) $$U_i = \sum_k \sum_j \beta_{kj} X_{ijk} + e_i$$

where U_i = the total utility for product i

X_{ijk} = 1 if product i has level k for variable j, otherwise 0

β_{kj} = contribution to total utility of level k for variable j

e_i = error component for product i

The variables (X_j) are the various prespecified attributes included in the study design.

According to Blunch (1990), conjoint analysis is unsuitable for the analysis of groceries characterised by a low degree of involvement and habitual purchasing behaviour, which must be assumed to be the case with the dairy and bread products. Consumers are likely to make some kind of decision as regards new product varieties, however, which are the focus of this study. The main thing for this study is thus not how consumers make decisions within a given evoked set (Howard & Sheth, 1988), but how they react to new product types. Thus, the way in which the conjoint analysis encourages consumers to compare various alternatives should not be assumed to be much different from an actual purchasing situation where the consumer notices a new product (Thøgersen, 1996). Moreover, a number of applications of conjoint analysis on groceries have shown that the method is usable and gives valid results (see, for example, Baadsgaard, Grunert, Grunert & Skytte, 1994; Bech-Larsen, 1996b; Grunert, 1996; Speece & Maclachlan, 1991; Thøgersen, 1996; Wittink & Cattin, 1989).

Design and data collection

The respondents were asked to rank product profiles of the dairy and bread product according to the likelihood of their buying the product varieties. The product profiles contained a colour photograph and a description of the respective product varieties. The attributes included in the conjoint analyses were identified during the focus-group interviews. The attributes for the dairy product are: price (consumers were confronted with three different prices: DKK 5.50, DKK 6.25, and DKK 7.00), type (ordinary, ecological) and packaging (cardboard, plastic). Those for the bread product are: price (DKK 17.00, DKK 19.25, and DKK 21.50), type (white, brown) and make (brand, discount label). In addition to these, enrichment (no enrichment, omega-3, fibre or calcium and vitamin D) is included as a fourth attribute for both products.

There is a total of 48 product combinations (2x2x4x3) for both the dairy and the bread product, which is too many for the respondents to cope with. A reduced design of 16 product profiles for each product was therefore created using the program "Conjoint Designer" (Bretton-Clark, 1990). In addition, a so-called hold-out card, for validating the results of the study, was also included in the design.

The conjoint interviews were carried out in the autumn of 1997. A total of 1029 persons were contacted, of whom 689 agreed to participate. Of these, the screening questions found 332 suitable respondents, of whom 218 agreed to participate in the actual study. 210 respondents returned the questionnaire, of which 205 were valid, and due to the desire to merge the two studies, the analysis is based on these 205 respondents.

Results

The program "Conjoint Analyzer" (Bretton-Clark, 1992) was used to estimate the utility function and the relative importance of the attributes. The program also estimates individual utility functions for the 205 respondents, and these show that, in general, respondents have been consistent in ranking the product profiles, both as regards the dairy and the bread product. Of the 205 respondents, 192 have an adjusted correlation coefficient (adj. R^2) of over 0.4 for the dairy product and 190 have a value greater than 0.4 for the bread product. The correlation coefficient is a measure of how well the variation in data is described by the selected attributes. Neither Bretton-Clark (1992) nor the other literature on conjoint analysis specify standards for the determination of a minimum for the correlation coefficient. Bech-Larsen (1996) and Thøgersen (1996) use a minimum of 0.3 and 0.4 respectively, though without explaining why. In this study, the limit is set at 0.4, which is why the remaining analyses are based on the 192 respondents for the dairy product and the 190 for the bread product. Since the respondents eliminated by screening only constitute about 7% of all respondents, their demographic characteristics have not been examined further. The aggregated adjusted correlation coefficient is 0.898 for the dairy product (SE = 0.018) and 0.837) for the bread product (SE = 0.018), which is highly satisfactory.

The distribution of the respondents by preference for different levels has been estimated by means of Bretton-Clark (1992), and is shown in tables 1 and 2.

Table 1. Distribution by preference for different levels. Dairy product. %

Type	ecological	ordinary		
	59	41		
Packaging	plastic	cardboard		
	36	64		
Enrichment	omega-3	fibre	calcium + D	no enrichment
	12	13	33	42
Price	DKK 5.50	DKK 6.25	DKK 7.00	
	91	6	3	

As table 1 shows, the most preferred level for the attribute enrichment is an unenriched dairy product, which is preferred by 42% of respondents. However, this also means that, ceteris paribus, 58% of the respondents prefer an enriched dairy product. The dairy product enriched with calcium and vitamin D is preferred by 33% and that enriched with fibre or omega-3 by 12 and 13 % respectively. It can also be seen that, other things being equal, 59% of respondents prefer the ecological dairy product, and that practically all respondents have a preference for the lowest price. There is also a clear preference for cardboard packaging.

Table 2. Distribution by preference for different levels. Bread product. %

Type	brown	white		
	66	34		
Brand	no name	branded		
	16	84		
Enrichment	omega-3	fibre	calcium + D	no enrichment
	13	37	24	26
Price	DKK 17.00	DKK 19.25	DKK 21.50	
	56	23	21	

Table 2 shows that the most preferred enrichment of the bread product is with fibre (37%), which is as expected given the results of the focus groups. The second most preferred is no enrichment, followed by calcium and vitamin D, though there is little difference between the two latter. The least preferred is enrichment with omega-3, which only 13% of respondents prefer. It can also be seen that two-thirds of respondents prefer brown bread, and all of 84% prefer the branded bread product. Just over half prefer the lowest price, with the rest being fairly evenly distributed between the other two levels. Other things being equal, 74% of all respondents prefer the bread enriched.

The figures in tables 1 and 2 should be interpreted from a ceteris paribus point of view, since the distribution does not take the variation of the other attributes into account, and the figures say nothing about the relative importance of the

attributes. And, of course, the distribution is also a function of the number of levels for the attributes in question.

Generally speaking, the preference distributions in the two tables show that, other things being equal, some consumers will prefer enriched products. The results also indicate that the naturalness of the enriched substance vis-à-vis the basic product is decisive, and that the relatively big difference between the two products in the percentage of respondents who do not want enrichment points to the importance of the basic product itself. These results confirm the results of the focus group interviews, where both groups indicated the naturalness of the enrichment substance in relation to the basic product and the basic product itself as being important in determining their preferences. At first sight, it might seem surprising that omega-3 is not preferred by more respondents. After all, omega-3 bread has been available for a while now, and the study was carried out just after MD Foods' intensive marketing of Blue Gaio, a spread enriched with omega-3 fatty acids. However, it soon became clear that a lot of respondents didn't know what omega-3 was. This ignorance about omega-3, and thus also its health effect, must therefore be assumed to be the main reason why this form of enrichment was so little preferred by the respondents. The conjoint analyses do not allow such an unambiguous conclusion, however, since, as mentioned above, their aim is first and foremost to describe consumers' preferences. A more detailed analysis of the causes of the preference difference will therefore be presented in connection with the analysis of the survey.

Homogeneity of the respondents

Before interpreting the estimated utility functions, it is necessary to examine whether respondents have homogeneous preferences as regards the attributes' relative importance and the individual levels. In order to evaluate this, both an aggregated and an individual utility function for the 190/192 respondents has been calculated using Bretton-Clark (1992). The aggregated relative importance (ARI) of the attributes is calculated in one sequence on the basis of all the data, whereas the individual relative importance (IRI) is calculated in two sequences. With the latter, the individual utility functions for all the respondents are calculated first, after which they are added up and a simple average calculated. IRI thus contains the entire "span" of relative importance, while this is evened out with ARI. By comparing the two estimates, it is possible to assess whether the respondents have homogeneous preferences. If the two estimates differ more from each other than can be explained by a measurement error (standard deviation), it means the respondents are heterogeneous (Bretton-Clark, 1992), and an interpretation based on ARI will not yield valid conclusions.

Tables 3 and 4 show the calculations of IRI and ARI for the dairy product and bread product respectively.

Table 3. Aggregated and individual importance of the attributes. Dairy product. %

	Individual Rel. Importance[a]	Aggregated Rel. Importance
Type	19.61 (1.23)	12.46
Packaging	18.72 (1.28)	19.45
Enrichment	45.64 (1.49)	29.66
Price	16.03 (0.99)	38.43
Total	100	100

a) Standard deviation in brackets.

Table 4. Aggregated and individual importance of the attributes. Bread product. %

	Individual Rel. Importance[a]	Aggregated Rel. Importance
Type	14.83 (0.91)	10.00
Brand	23.29 (1.31)	38.89
Enrichment	42.64 (1.55)	28.96
Price	19.24 (1.11)	22.15
Total	100	100

a) Standard deviation in brackets.

As can be seen from the two tables, with the exception of packaging for the dairy product, the respondents have clear heterogeneous preferences. This is also emphasised by the fact that the order of the attributes' relative importance is different for IRI and ARI for both products. This also indicates a segmented market (Bretton-Clark, 1992) for both products.

As mentioned, the heterogeneity of preferences means that interpretations based on the aggregated utility functions will not yield valid conclusions. The attribute enrichment is generally very significant for the respondents, however, the IRI of both products being greatest for enrichment. Only a segmentation can shed more light on this, since, as previously mentioned, the respondents' preferences are not homogeneous.

Segmentation

In a conjoint analysis, the segmentation of respondents can be carried out on the basis of the individual utility functions. The purpose of segmentation is, as mentioned, to identify segments which attach relatively much importance to enrich-

ment, plus to try to identify segments with homogeneous preferences as regards the individual levels, and if so, estimate their accompanying utility functions and identify their demographic characteristics.

The segmentation was carried out using the program "Conjoint Segmenter" (Bretton-Clark, 1993). This uses a hierarchical cluster analysis (Ward's method), where homogeneity is maximised within the individual clusters and minimised between them.

The program can handle from 2 to 15 clusters, and shows a dissimilarity measure for the number of clusters (see appendix 1). There are no specific rules or statistical methods for choosing the number of clusters (Bretton-Clark, 1993), and, as in many other cases, the trade-off between clarity and precision is partly what determines the choice. The dissimilarity measures can be used in the same way as a scree plot in factor analysis (Bretton-Clark, 1993), where a large decrease in the dissimilarity measure indicating that relatively greater homogeneity can be achieved by the addition of an extra cluster. The aim of the analysis should also be considered and has been decisive for the number of clusters chosen in this analysis, since it was important to identify a segment with a preference for every level of the enrichment attribute (including no enrichment). This means that, in the subsequent analyses, it will be possible to identify any demographic difference with regard to preferences for the respective enrichment levels, plus evaluate via the survey which beliefs are the most important for positive or negative attitudes towards the various enrichment substances. In order to ensure that enrichment has a certain relative importance for the respondents in the identified segments vis-à-vis the other product attributes, the cluster analysis is based on utility values for all the attributes, and not just enrichment.

In order to be sure of identifying a segment for every enrichment level (including no enrichment), it was necessary to have seven clusters for the dairy product and nine for the bread product. This gave the desired four segments for the bread product, though not separate segments for fibre and omega-3 for the dairy product. That the number of clusters for the dairy product was limited to seven is due to the fact that further segmentation would not result in separate segments for fibre and omega-3. Moreover, the mixed segment with a preference for both omega-3 and fibre is very small (n=22), which would make further segmentation pointless. It is not surprising that separate segments cannot be identified for fibre and omega-3, since, other things being equal, only 13% of respondents prefer each of the two substances in the dairy product (see table 1), while segmentation is based on overall evaluation in relation to all the attributes in the design.

A smaller number of clusters would make interpretation easier, and the method meant that existing clusters with homogeneous preferences for the enriched substances were divided because of heterogeneity in relation to other attributes. For reasons of clarity, in the tables below these clusters have again been combined, a calculation of ARI and IRI showing that it wouldn't affect homogeneity as regards the enrichment substances (see appendix 2). Since combining the clusters again merely means returning respondents to their original cluster, and doesn't affect homogeneity as regards enrichment, this is methodologically defensible.

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Table 5. ARI for all respondents and segments. Dairy product. %

	All n=192	D1 n=35	D2[*] n=72	D3[*] n=45	D4 n=22	D5 n=18
Type	12.46	2.21	20.25	18.29	6.34	51.47
Packaging	19.45	65.53	6.84	1.88	33.92	2.15
Enrichment	29.66	17.48	52.75	42.94	52.25	17.11
Price	38.43	14.78	20.16	36.89	7.49	29.27
Total	100.	100	100	100	100	100

*) Segments consisting of two combined clusters.

Table 6. ARI for all respondents and segments. Bread product. %

	All n=190	B1 n=20	B2[*] n=45	B3[*] n=53	B4[*] n=38	B5 n=19	B6 n=15
Type	10.00	29.20	9.31	18.04	11.54	0.42	14.82
Brand	38.89	35.34	22.18	32.80	37.58	18.27	17.13
Enrichment	28.96	18.72	61.87	35.19	44.78	16.82	49.92
Price	22.15	16.74	6.64	13.98	6.10	64.49	18.13
Total	100	100	100	100	100	100	100

*) Segments consisting of two combined clusters.

As can be seen from tables 5 and 6, several segments for both products attach relatively much importance to enrichment. These segments will therefore be analysed more closely. The segments marked *) consist of the combined clusters, and thus are not homogeneous for all attributes. As mentioned, however, the respondents in these segments are homogeneous in the relative weight they attach to enrichment, which is what matters as far as this study is concerned. An even if the clusters were not combined, there would still be heterogeneity with regard to the other attributes. In practice, therefore, complete homogeneity is impossible to achieve if, at the same time, the clusters have to be kept at a manageable and meaningful number.

Now that segments with homogeneous preferences for enrichment have been identified, we can estimate and interpret utility functions for individual segments. This is done by means of the "Conjoint Analyzer" program (Bretton-Clark, 1992). The analysis will focus on those segments which, relatively speaking, attach the greatest importance to enrichment, ie segments D2, D3, D4, B2, B3, B4 and B6 (utility functions for the other segments are shown in appendix 3). It can be seen in table 7 (dairy product) that segment D2 (37.5% of respondents) attaches a lot of importance to the dairy product not being enriched, and even though this segment has a small positive utility from enrichment with calcium and vitamin D, the utility from a non-enriched product is significantly higher.

Table 7. Dairy product: Utility functions, relative importance of attributes and demographic characteristics for all respondents and segments D2, D3 and D4

	All n=192*	D2 n=72	D3 n=45	D4 n=22
Type; relative importance	13%	20%	18%	7%
– Ecological	0.5	1.2	1.2	-0.3
– Ordinary	-0.5	-1.2	-1.2	0.3
Packaging; relative importance	19%	7%	2%	34%
– Plastic	-0.7	-0.4	-0.1	1.8
– Cardboard	0.7	0.4	0.1	-1.8
Enrichment; relative importance	30%	53%	43%	52%
– Omega-3	-1.2	-2.2	-1.2	1.2
– Fibre	-0.7	-2.1	-0.3	3.0
– Calcium og vitamin D	0.8	0.2	3.6	-1.6
– No enrichment	1.1	4.1	-2.1	-2.6
Price; relative importance	38%	20%	37%	7%
– DKK 5.50	-10.3	-8.9	-17.8	-2.9
– DKK 6.25	-11.7	-10.2	-20.3	-3.3
– DKK 7.00	-13.1	-11.4	-22.7	-3.7
Demography:				
Age				
– 30 years	25%	34%	24%	9%
– 31-55 years	50%	50%	42%	59%
– 56- years	25%	16%	33%	32%
Sex				
– male	23%	30%	18%	0%
– female	77%	70%	82%	100%
Education				
– up to and including A-level	65%	60%	71%	54%
– higher education	35%	40%	29%	46%
Household income				
– < DKK 300.000	58%	57%	60%	55%
– > DKK 300.000	42%	43%	40%	45%

*) The aggregated utility function is included solely as an illustration. Due to heterogeneity, an interpretation of the aggregated utility function does not yield valid conclusions.

Segment **D2** also prefers the ecological dairy product in cardboard packaging, and, relatively speaking, is not very price sensitive. Younger respondents are overrepresented in D2 and respondents over 55 underrepresented, and there is also a slight overrepresentation of men.

Segment **D3** (23.5% of respondents) has a clear preference for the calcium and vitamin D-enriched dairy product. Two-thirds of the segment is very price sensitive while the other third is hardly price sensitive at all. As with D2, there is a slight preference for the ecological dairy product, but in this segment packaging

is unimportant. There is a clear overrepresentation of respondents over 55 in segment D3, together with women and persons with little formal education.

Segment **D4** (11.5%) prefers both fibre and omega-3, though with a significantly high utility for the former. This segment is indifferent to the type of dairy product, but attaches relatively much importance to packaging, and is the only segment to prefer plastic packaging. It is also the most price sensitive segment. The middle-aged and elderly are overrepresented, and the segment consists entirely of women. There is also an overrepresentation of respondents with a higher education.

Surprisingly, the preference for the ecological dairy product is no greater in the segment which prefers the non-enriched product than in the segment which prefers enrichment with calcium and vitamin D. It would only be reasonable to assume that consumers who prefer ecological food products, which are produced by relatively natural production methods, would also prefer non-enriched products, since there can be a conflict between (natural) ecological and enriched products, even though the enrichment substance is natural. However, the preference for the ecological dairy product is at the same level in both D2 and D3 (approximately the same relative importance, and part-worths). Thus, there doesn't seem to be a conflict when products are enriched with calcium and vitamin D. Enrichment with calcium and vitamin D is a relatively natural enrichment, however, and only represents an upgrading of the product. Enrichment with fibre and omega-3 is another matter. As table 7 shows, the segment which prefers enrichment with fibre and omega-3 (D4) also prefers the conventional dairy product, and for these respondents the attribute "type" is more or less unimportant. This therefore indicates an (expected) conflict between ecology and functional foods in cases where enrichment is not considered to be natural in relation to the basic product. This is also a reflection of a certain degree of interaction effect between the two attributes, though an assumption about a marginal importance of interaction effects are still considered valid. Nevertheless, the observed interaction between "type" and "enrichment" means that the relative importance of the two attributes can be slightly overestimated, since the same information is measured twice.

Table 8 (bread product) shows that segment **B2** (23.5% of the respondents) has a clear preference for the bread product without enrichment. The segment also has a positive utility from enrichment with fibre, however, though it is far less than that for the non-enriched bread. The segment can thus clearly be characterised as a segment which prefers non-enriched bread. The segment has an overrepresentation of middle-aged respondents and respondents with a higher education, while the elderly are underrepresented.

Table 8. Bread product: Utility functions, relative importance of the attributes and demographic characteristics of all respondents and segments B2, B3, B4 and B6

	all n=190[*]	B2 n=45	B3 n=53	B4 n=38	B6 n=15
Type; relative importance	10%	9%	18%	12%	15%
– Brown bread	0.5	0.6	1.0	0.8	1.0
– White bread	-0.5	-0.6	-1.0	-0.8	-1.0
Brand; relative importance	39%	22%	33%	37%	17%
– No name	-1.8	-1.3	-1.9	-2.6	-1.2
– Brand	1.8	1.3	1.9	2.6	1.2
Enrichment; relative importance	29%	62%	35%	45%	50%
– Omega-3	-1.2	-3.9	-0.3	-0.8	2.7
– Fibre	1.6	1.5	0.7	3.1	2.0
– Calcium og vitamin D	-0.5	-1.2	1.9	-3.1	-0.5
– No enrichment	0.1	3.6	-2.3	0.8	-4.2
Price; relative importance	22%	7%	14%	6%	18%
– DKK 17.00	-25.0	-8.0	-8.1	-9.8	-103.4
– DKK 19.25	-26.3	-8.4	-9.0	-10.3	-105.3
– DKK 21.50	-27.1	-8.8	-9.8	-10.7	-105.7
Demography:					
Age					
– -30 years	25%	24%	13%	34%	27%
– 31-55 years	50%	65%	38%	55%	53%
– 56- years	25%	11%	49%	11%	20%
Sex					
– male	23%	26%	13%	19%	24%
– female	77%	74%	87%	81%	76%
Education					
– up to and including A-level	65%	58%	72%	68%	53%
– higher education	35%	42%	28%	32%	47%
Household income					
– < DKK 300.000	58%	60%	60%	53%	40%
– > DKK 300.000	42%	40%	40%	47%	60%

*) The aggregated utility function is included solely as an illustration. Due to heterogeneity, an interpretation of the aggregated utility function does not yield valid conclusions.

Segment **B3** (27%) has a clear preference for enrichment with calcium and vitamin D, but it is also the segment which attaches relatively least importance to enrichment (35%, though this is more than the average for all respondents, ARI = 29%). The segment attaches about the same importance to brand as enrichment, and is not very price sensitive. Women, elderly respondents and those with little formal education are overrepresented in this segment.

Segment **B4** (20%) has a preference for enrichment with fibre. This segment also thinks it important that the bread is a branded product, and, like B3, is not espe-

cially price sensitive. The younger respondents are overrepresented in this segment, which also has a preponderance of women and middle-aged respondents.

Segment **B6** (8%) consists of respondents who prefer the bread product enriched with omega-3, but enrichment with fibre would also be viewed positively by this segment. The utility from omega-3 is significantly higher, however. As expected, this is a very small segment (other things being equal, only 13% would prefer enrichment with omega-3, cf. Table 2), so the results should be interpreted with caution. The segment is extremely price sensitive, which is the direct opposite of the corresponding segment for the dairy product, but it is not possible to give a reasonable explanation for this extreme price sensitivity on the basis of the present results. As regards demographic characteristics, the segment differs in having an overrepresentation of respondents with a higher education, and high-income households are also overrepresented. As mentioned, this is a very small segment, and all interpretations must therefore be regarded as highly uncertain.

In brief, the segmentation shows that, for some groups of respondents, enrichment will have a relatively large effect on preferences, and enrichment with calcium and vitamin D in particular results in a positive utility. This enrichment substance is the only one to result in a large group of respondents with positive utility for both products. There are also segments with a preference for enrichment with fibre, but the segment for the dairy product is very small indeed. Very few respondents prefer omega-3, and an independent segment can only be identified for the bread product, but even this is very small.

Regarding the two segments with a preference for non-enriched products (D2 and B2), a closer analysis reveals that only 24 respondents are in this segment. In other words, among the respondents who weight enrichment relatively highly, only about 13% (24:191) prefer both the dairy product and the bread product without enrichment. The relatively small proportion of respondents who do not want enrichment in either product indicates that the proportion of consumers who do not want enriched products under any circumstances is relatively small. For the sake of completeness, the 25% of respondents who do not attach much importance to enrichment for any of the products should also be included in this group, so that about 40% of respondents either do not attach much importance to enrichment or prefer non-enriched products. [2]

There are only 11 respondents in both segments D3 and B3 (preference for enrichment with calcium and vitamin D), which supports the earlier conclusion that attitudes depend on both the concrete enrichment substance and the concrete basic product, plus the combination of the two.

As previously stated, the respondents had little knowledge of omega-3, so one hypothesis for its poor showing must be respondents' general level of knowledge. For both products, respondents with a preference for omega-3 included a significantly higher proportion of respondents with a higher education, who must generally be assumed to have more knowledge about enrichment in general and omega-3 in particular. This indicates that knowledge of the effects of the enrichment substance is decisive, which in turn means that a positive attitude

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[2] This figure is not valid for functional foods in general, however, since it is dependent on the number of products assessed. Nonetheless, the two figures indicate that the proportion of consumers who do not want enrichment in any form, or who do not attach much importance to enrichment, is fairly small.

towards an enriched product will depend on knowledge of the enrichment substance, and that, from a manufacturer's point of view, functional foods should initially be kept at a relatively simple level. This point will be analysed in greater depth in connection with the questionnaire survey, which precisely deals with respondents' subjective knowledge and assessment of the health effects of the enrichment substances.

Validity of the conjoint analysis

Actual validity tests are rarely carried out in connection with conjoint analyses (Green & Srinivasan, 1990), most often only the adjusted correlation coefficient (R^2) being used as an indicator of the study's reliability and validity. The Bretton-Clark programs (1990, 1992) allow a so-called hold-out analysis to be carried out, which evaluates respondents' consistency as regards the ranking of the profile cards (Bretton-Clark, 1990). The present design includes a hold-out card, and the result of the hold-out analysis for the two conjoint analyses is shown in tables 9 and 10.

The hold-out analysis consists in a calculation of the correlation coefficient (Pearson's r) between the expected rank of the hold-out card and its actual rank, together with a calculation of the average absolute rank interval (AAR) between the actual and expected rank. Both calculations take a starting point in the estimated utility function. Since the respondents have heterogeneous preferences, the ideal would be to base the analysis on respondents' individual utility functions (Bretton-Clark, 1992), but this requires the use of three hold-out cards. So as not to make the conjoint interview too long, only one card has been used, so the analysis is carried out at the aggregated level.

Table 9. Hold-out analysis for the dairy product for all respondents and the five segments

	All	D1	D2	D3	D4	D5
Pearson's r	0.88	0.75	0.88	0.79	0.76	0.72
GAR	1.66	1.44	1.32	1.62	2.27	2.18

Table 10. Hold-out analysis for the bread product for all respondents and the six segments

	All	B1	B2	B3	B4	B5	B6
Pearson's r	0,77	0,82	0,77	0,67	0,90	0,71	0,74
GAR	2,00	1,57	1,79	2,13	1,40	1,93	2,24

While Bretton-Clark (1992) does not specify concrete standards for acceptable values for the two measures, several guidelines are not specified, on the basis of which the above values for the total function and the individual segments must be regarded as completely satisfactory for both products. Respondents appear to have been slightly less consistent in ranking the bread product, which agrees with the significantly higher aggregated correlation coefficient for the dairy product.

Concluding remarks on the conjoint analysis

The conjoint analyses show that about three-quarters of respondents (72% for the dairy product and 79% for the bread product) attach a lot of importance to enrichment (including no enrichment). A clustering also identified segments with a preference for the individual enrichment substances (though not separate segments for enrichment with fibre and omega-3 for the dairy product) and segments which did not want enrichment at all (38% for the dairy product and 24% for the bread product). However, a closer analysis of those respondents who attach relatively great importance to enrichment revealed that only about 13% of these did not want enrichment for either product. About 25% of respondents did not attach much importance to enrichment, and thus also functional enrichment, for either product. All in all, therefore, just under 40% of respondents either attach relatively little importance to enrichment or do not want it at all. As mentioned above, however, this figure should not be generalised, since it is dependent on the number of products included.

Furthermore, the analyses showed that the perceived degree of naturalness as regards the combination of enrichment substance and basic product influences respondents' attitudes, in that enrichment with calcium and vitamin D is the most preferred for the dairy product and enrichment with fibre the most preferred for the bread product. The basic product itself also proved to be decisive, a much higher proportion of respondents accepting enrichment in the bread product than in the dairy product. This can be connected with the degree of processing of the basic product, which is rather lower for the (fresh) dairy product than for the bread product. Against this, however, is the fact that respondents who have a negative attitude towards enrichment do not have a greater preference for the ecological dairy product – which must be considered less processed than the conventional product – than those with a positive attitude. The enrichment substance also influences attitudes, which is illustrated by the fact that relatively few respondents prefer omega-3 enrichment of either product. The low preference for omega-3 can seem surprising – especially as regards the bread product, since omega-3-enriched bread has long been available. However, as previously mentioned, the respondents had little knowledge of omega-3 and its effects on health, so it can fairly reasonably be assumed that people do not buy Omega-3 Bread (as the existing product is called) primarily because of enrichment but more, for example, for its taste. Most consumers thus regard Omega-3 Bread more as a name than as a form of enrichment.

With regard to demography, the elderly respondents are generally more positive about enriched products, which accords with the impression from the focus group interviews. Fibre-enriched bread is an exception, however, the younger and middle-aged respondents being overrepresented. In general, women are more positive about enrichment than men, which, as regards enrichment with calcium

and vitamin D, is hardly surprising given the media attention and public information campaigns about the importance of calcium for women, but women are also generally the most positive about the other enrichment substances.

The analysis of the conjoint study focused on determining how enrichment is weighted by the respondents, how important it is, and how the part worths for this attribute can be described, plus identifying segments with homogeneous preferences. The analysis has only focused on the underlying beliefs which determine the observed preference distribution and utility functions to a lesser extent. An analysis of respondents' underlying motives and attitudes is thus the starting point of the following section, which discusses the questionnaire survey and results.

The questionnaire survey

The aim of the questionnaire survey is to investigate and explain which beliefs determine respondents' attitudes towards the enriched products. The theoretical basis of the survey is the *Theory of Reasoned Action* (TRA). The survey is based directly on the model, so this and the following section will focus mainly on the model's applicability and operationalisation in relation to this study.

A large number of uses of TRA in relation to food products have proved the applicability of the model in this area and gives a relatively good explanation of purchasing intentions and/or behaviour (see, for example, Shepherd & Stockley, 1985; Sparks, Hedderly & Shepherd, 1992; Thompson, Haziris & Alekos, 1994). A meta-analysis of Sheppard, Hartwick & Warshaw (1988), based on 87 surveys (not only food products, but a large number of different areas), shows an average correlation between the model's components and the purchasing intention of 0.66. In its original form, the model consists solely of the components "attitude towards behaviour" (AB) and "subjective norm" (SN), but a number of other components have since been included by other researchers, eg "moral obligation" (Beck & Ajzen, 1991), "habit" (Tuorila & Pangborne, 1988), "past behaviour" (Bentler & Speckart, 1979), "perceived consumer effectiveness" (PCE) (Ellen, Weiner & Cobb-Walgren, 1991), and "perceived risk" (eg Frewer, Shepherd & Sparks, 1993, 1994).

Design and implementation

The design of the questionnaire has mainly followed the guidelines set out by Ajzen and Fishbein (1980) and Ajzen (1988), with the individual questions being based on the focus-group interviews.

The survey involves two products and three enrichment substances, so the questionnaire is divided into six parts, with the same questions for the dairy product enriched with omega-3, fibre, and calcium and vitamin D, and likewise for the bread product. There are 21 different questions in all, giving a total of 126 questions (6x21) for the whole questionnaire.

In order to achieve greater accuracy, the model's components (purchasing intention, AB and SN) are measured by three items, as recommended by Ajzen and

Fishbein (1980). However, some studies have shown that SN can be measured solely by one item (Ajzen, 1988), which is the approach taken in this survey, and the formulation proposed by Ajzen is used.

The items are measured solely by beliefs on a unipolar scale from 1 (completely disagree) to 7 (completely agree). The same scale is used to measure purchasing intentions, while AB is measured by three differently formulated evaluative statements, though also on a unipolar scale.

As previously mentioned, the 218 respondents were given the questionnaire to take home after the conjoint interviews. In addition to written guidelines enclosed with the questionnaire, respondents were also given a thorough introduction to the questionnaire at the supermarket, where it was also emphasised how important it was that they complete and return it, using the stamped, self-addressed envelope provided. Respondents were also asked for their telephone number, in case they "mislaid" the questionnaire. In order to motivate respondents further, each participant received groceries to the value of about DKK 70, half being given in advance as a thank you for returning the questionnaire. In all, 210 respondents returned the questionnaire (13 after telephone reminders), of which five were unusable, giving a final sample of 205 persons. This is a response rate of 94% (75% if we include all those who were contacted but did not wish to participate), which must be considered extremely satisfactory, and partly – if not fully – makes up for the fact that the survey is not based on a simple random sample.

Results

A regression analysis has been carried out for each of the six product varieties, the results of which are shown in tables 11 and 12 .

As can be seen from the two tables, the determination coefficient, r^2 (subsequently called the degree of explanation), which lies between 0.85 and 0.92, is satisfactory for all six product varieties. By comparison, in their meta-analysis of 87 studies, Sheppard, Hartwick and Warshaw (1988) found an average correlation of 0.66. The tables also show that the components AB and SN are satisfactorily explained by the accompanying items, the degree of explanation lying between 0.72 and 0.84.

Table 11. Multiple regression analysis for the dairy product enriched with fibre, omega-3 and calcium and vitamin D. N=205

	with fibre		with omega-3		with calc. + D	
	r²	beta co-efficient	r²	beta co-efficient	r²	beta co-efficient
INT - AB + SN	.880		.876		.920	
– AB		***.857		***.896		***.911
– SN		***.126		*.063		***.080
AB items	.795		.793		.840	
– CONVENIENT		***.224		***.345		***.605
– NATURAL		***.270		***.191		***.132
– PRICE		***.272		***.283		***.236
– TASTE		.027		.015		.007
– DOSAGE		***.128		*.083		.030
– EFFECT		***.249		***.213		.054
– PRO KNOWLEDGE		.019		.051		.002
– SUB KNOWLEDGE		.017		.019		.022
SN items	.773		.795		.805	
– FAM EXPEC		***.503		***.410		***.466
– FAM CONS		***.222		*.132		.092
– FRIENDS+COL		***.214		***.416		***.397

* significant at 0.05   ** significant at 0.01   *** significant at 0.001

In summary, the regression analyses show that the purchasing intention can be satisfactorily explained by the two components AB and SN, and that these are also satisfactorily explained by the related items. This confirms the applicability of the *Theory of Reasoned Action* to functional foods and that the included beliefs to a large extent cover the respondents' own salient beliefs.

The analysis INT – AB + SN shows that, for all six product varieties, respondents' purchasing intentions are almost solely explained by AB, and that between 85% and 97% of the variation in purchasing intentions can be explained by this component. The relative importance of the components is found by summing the beta coefficients and then calculating the relative importance of each component in relation to the summation. The fact that SN has little relative importance (the median values for all SN items for all product varieties are between 2.0 and 2.3) is not that surprising, and accords with the results from a number of other uses of the model with food products (see, for example, Sapp & Harrod, 1989; Sparks, Hedderley & Shepherd, 1992; Thompson, Haziris & Alekos, 1994; Tuorila, 1987). Given SN's relative insignificance, the following focuses on AB and related items.

Table 12. Multiple regression analysis for the bread product enriched with fibre, omega-3 and calcium and vitamin D. N=205

	with fibre		with omega-3		with calc. + D	
	r^2	beta co-efficient	r^2	beta co-efficient	r^2	beta co-efficient
INT - AB + SN	.856		.898		.867	
– AB		***.887		***.895		***.871
– SN		*.078		***.088		***.104
AB items	.728		.818		.779	
– CONVENIENT		***.464		***.480		***.529
– NATURAL		***.212		***.169		***.184
– PRICE		***.178		***.244		***.178
– TASTE		.045		.016		.031
– DOSAGE		.066		.032		.040
– EFFECT		**.151		***.177		*.111
– PRO KNOWLEDGE		.050		.040		.008
– SUB KNOWLEDGE		.016		.048		.007
SN items	.788		.763		.741	
– FAM EXPEC		***.597		***.623		***.567
– FAM CONS		*.122		.070		.038
– FRIENDS+COL		***.228		***.357		***.314

* significant at 0.05   ** significant at 0.01   *** significant at 0.001

AB thus mainly explains purchasing intentions, and what determines this can be seen from "AB items" in tables 11 and 12. Three beliefs are significant (p<0.001) for all six product varieties, namely CONVENIENT, NATURAL, and PRICE. EFFECT is significant in five cases (the exception being the dairy product with calcium and vitamin D), and DOSAGE in two (for the dairy product with fibre and omega-3 respectively).

Relatively speaking, CONVENIENT is thus the most significant belief for attitudes towards buying enriched food products in five out of six cases, and, on average, explains 42% of attitudes for all six product varieties (see also figure 1). Only for the dairy product with fibre is CONVENIENT not the most significant belief, though even here it explains 20% of AB. PRICE is generally the next most explanatory item (21%), while NATURAL explains 18% on average. Together, the three beliefs explain an average of 81% of AB for the six product varieties. EFFECT explains an average of 14% and DOSAGE the remaining 5%.

As can be seen from the two regression analyses, TASTE has no importance for AB, and with it purchasing intentions. At first sight, this might appear surprising, but this result is analogous to a study of consumers' attitudes towards fresh fish (Grunert, Bisp, Bredahl, Sørensen & Nielsen, 1995), which found that the perceived wholesomeness of fish did not influence purchasing intentions.

Everybody knows that fish is good for you, so this attribute does not influence purchasing intentions. In our study, all respondents thus more or less agree about not accepting a non-defined change in taste, which is why taste will not have any influence on the variation in purchasing intentions, since it is important for all respondents.

Figure 1. Explanatory beliefs for purchasing intentions. All six product varieties. N=205
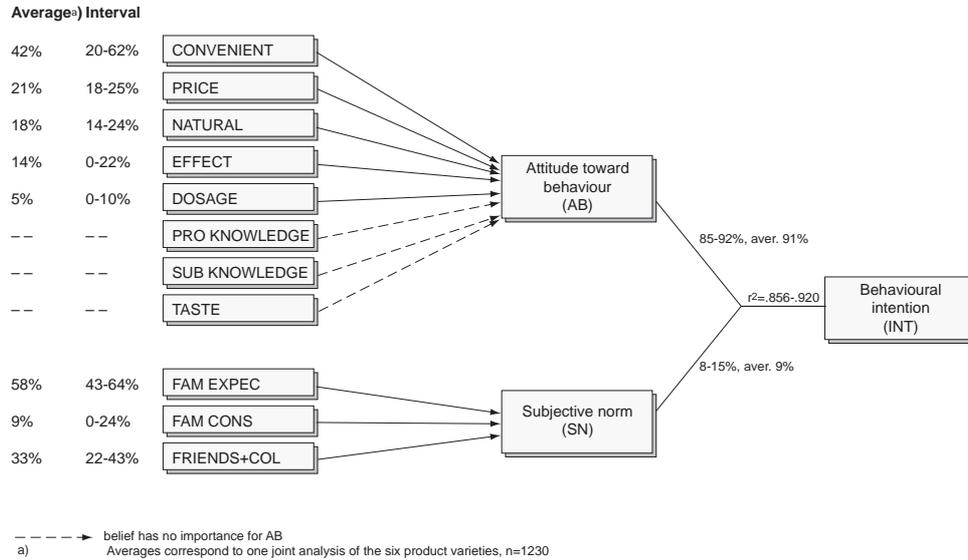
It is thus very much the same beliefs that determine attitudes towards the six product varieties, and thus also purchasing intentions. Table 13 shows the relative importance of the significant beliefs as regards AB for the six product varieties.

Table 13. Relative importance of significant beliefs as regards AB. %

	bf	bc	bo	df	dc	do	average
CONVENIENT	46	53	45	20	62	31	42
PRICE	18	18	22	24	24	25	21
NATURAL	21	18	16	24	14	17	18
EFFECT	15	11	17	22	--	20	14
DOSAGE	--	--	--	10	--	7	5

Note: bf = bread product with fibre; bc = bread product with calcium and vitamin D; bo = bread product with omega-3; df = dairy product with fibre; dc = dairy product with calcium and vitamin D; do = dairy product with omega-3.

As can be seen from the above, convenience is relatively very important for both products when they are enriched with calcium and vitamin D. This is probably connected with the widespread use of calcium tablets, which explains why precisely this form of enrichment is regarded as convenient. This also agrees

with the results of the focus group interviews. Price seems to be slightly more important for the enriched dairy product than the enriched bread product – except for the omega-3 bread product, where the relative importance of price is at the same level as the dairy product varieties. On the basis of the conjoint analyses, it was expected that EFFECT would have relatively more importance for enrichment with omega-3 due to respondents' poor knowledge of the substance, but as the above shows, this proved not to be the case.

NATURAL lies at a relatively stable level for all six product varieties (between 14% and 24%), and there is no discernible pattern in the variation of the importance of this belief. Based on the conjoint analyses, NATURAL could have been expected to be relatively more important for the dairy product than for the bread product, and, conversely, less important for product varieties where the enrichment substance is already present in the basic product. This is not the case, however, and all we can say is that the importance of perceived naturalness for purchasing intentions is not markedly different for the six product varieties.

As with NATURAL, the relative importance of the perceived health effect (EFFECT) of eating the enriched product rather than the basic product is also at a stable level, though it is less important for attitudes towards the two product varieties enriched with calcium and vitamin D (totally unimportant for the dairy product) than to the other product varieties. As regards the two other enrichment substances, EFFECT is slightly more important for the dairy product than the bread product, while DOSAGE is important for attitudes towards these two varieties of the dairy product (with omega-3 and fibre). The conjoint analysis shows that there is absolutely least preference for these two product varieties, which indicates that attitudes and the decision process are more complex than first supposed, and that they are formed on the basis of several beliefs when there is a relatively low preference for the enriched product. It is not possible to draw a clear conclusion, however, since attitudes towards omega-3 bread (the bread product variety which respondents prefer the least) are not influenced by more beliefs than for the bread product with fibre or calcium and vitamin D. It would thus be natural to conclude that the basic product itself is also decisive for the complexity of attitude formation, and that this is generally more complex for the dairy product, where relatively more respondents prefer the conventional product (cf. the conjoint analyses). However, this accords poorly with attitude formation for the dairy product variety with calcium and vitamin D, where AB is solely determined by three beliefs.

It is surprising that DOSAGE is unimportant for enrichment with calcium and vitamin D, since both focus groups stressed precisely dosage problems in connection with vitamin enrichment. That DOSAGE is significant for the dairy product with fibre and omega-3 respectively is also somewhat surprising, and there is no immediate explanation for these apparent contradictions.

At least as relevant as the significant beliefs are the unimportant beliefs, three of which are common to all six product varieties. Apart from TASTE, which was discussed above, food producers' knowledge (PROKNOWLEDGE) of the general effects of enrichment are unimportant as regards attitudes. This can seem surprising, especially in view of the results of the focus group interviews, where precisely these factors were prominent, but any assessment of the consistency of the results should take account of the level of abstraction of the respective methods.

The analysis of the focus group interviews showed that the respondents are generally more reserved about functional foods as a concept than about concrete examples of enriched products. Generally speaking, this inconsistency can be explained by the different levels of abstraction of the measurements, a problem which is often encountered (see, for example, Ajzen & Fishbein, 1980; Pieters, 1988, 1989). Functional foods as a concept is at a higher level of abstraction than concrete enriched products, which is reflected in the observed inconsistency between survey and focus groups. In general, the lower the level of abstraction specified, the more reliable the prediction measures for behaviour achieved (see, for example, Ajzen & Fishbein, 1980; Pieters, 1988, 1989). This is analogous to attitudes towards buying ecological products, which are not necessarily consistent with attitudes towards buying, for example, ecological eggs.

That respondents are more sceptical at the conceptual level than the product-specific level can be attributed to the degree of perceived risk at the two levels of abstraction. Thus, when assessing functional foods as a concept, attitudes are formed on the basis of a number of different, unspecified enrichment substances in a number of different basic products, which are not precisely specified either. This naturally results in a greater degree of uncertainty about the concept, and, in consequence, a more complex attitude formation than in the case of a concrete (well-known) basic product enriched with a concrete (possibly also well-known) enrichment substance. It can also be assumed that the associations to "junk food" which emerged in the focus groups in connection with the term functional foods have an effect on the relatively negative attitudes at the conceptual level.

In light of the above, it is therefore likely that producers' and subjective knowledge are of less importance in the survey than in the focus groups. That the beliefs are totally unimportant for attitudes is rather surprising, however, and indicates that consumers have a relatively high level of confidence in the two industries.

To sum up, the three beliefs CONVENIENT, PRICE and NATURAL are together highly determinant for AB, and on the whole the structure in the significant beliefs for the six product varieties is fairly identical. The observed differences are rather small and have no immediate logically intuitive explanation. On the basis of the regression analyses, it can therefore be concluded that – from a relative consideration of the importance of the individual beliefs – there are no systematic differences in attitude formation between the respective product varieties. However, this is not the same as concluding that the respondents perceive the various product varieties identically as regards the individual beliefs under AB. Thus, the regression analyses solely identify those beliefs – and their relative importance – that determine AB and with it purchasing intentions. The analyses say nothing about the initial level (mean value) of the individual beliefs. Table 14 shows the mean values for the purchasing intention, together with the beliefs under AB for each of the six product varieties.

As can be seen from table 14, the mean values for the purchasing intention for the various product varieties correspond to the preference distributions from the conjoint analyses. The two analyses thus validate each other (this is discussed in more detail in the section on the validity of the questionnaire survey and consistency with the conjoint analyses).

Table 14. Mean values for the purchasing intention and explanatory beliefs under AB

	bf	bc	bo	df	dc	do
INTENTION	5.1	3.8	3.6	3.3	4.2	3.2
CONVENIENT	5.1	4.0	4.0	3.7	4.4	3.8
PRICE	4.1	3.1	3.2	2.8	3.5	2.8
NATURAL	5.0	3.6	3.5	3.2	3.8	3.2
EFFECT	5.0	4.4	4.1	3.8	4.4	4.0
DOSAGE	4.3	3.9	4.0	3.9	3.9	3.9
PRO KNOWLEDGE	4.5	3.9	4.0	4.0	4.1	4.0
SUB KNOWLEDGE	4.7	3.9	4.0	4.0	4.1	3.8
TASTE	1.9	1.8	1.8	1.7	1.8	1.7

Note: bf = bread product with fibre; bc = bread product with calcium and vitamin D; bo = bread product with omega-3; df = dairy product with fibre; dc = dairy product with calcium and vitamin D; do = dairy product with omega-3.

All differences <0.3 are significant at $\alpha_k<0.05$. Higher values indicate a more positive attitude.

The table also shows that, in general, the mean values are higher for the basic bread product. Similarly, for the product varieties where enrichment consists in upgrading a substance already present in the basic product, the mean values are higher than for the two other product varieties of the respective basic products. All in all, these differences support the conclusion of the conjoint analyses concerning the importance of both the basic product and the enrichment substance, together with the combination of these.

With regard to the beliefs, the mean values reveal that, even though the regression analyses do not show large (systematic) differences in the structure or relative importance of the beliefs, in several cases the absolute values of the product varieties are significantly different from each other. The reason these differences do not show up clearly in the regression analyses is that the estimations are based on the belief's variance, and if the variance of the respective beliefs is not significantly different between the product varieties, differences in the level of the explanatory beliefs will not be registered in the beta coefficients. Thus, if the value of individual beliefs is changed for all significant beliefs from one product variety to another, the variance is not changed, which means that the absolute difference in attitude will not show up in a relative consideration of the respective beta coefficients. This is precisely the case for the six product varieties, since the average profiles for the purchasing intention and explanatory beliefs under AB are more or less parallel, but vertically displaced, as can be seen in figure 2.

The figure shows a clear connection between product variety and the level of beliefs, and, furthermore, the beliefs are strongly mutually correlated. A calculation of the correlation coefficients between the explanatory variables thus shows that the correlations lie between 0.84 and 0.98 on what can be characterised as an aggregated level, in that each product variety is regarded as a single observation based on the average for all 205 respondents.

Figure 2. Average profiles for significant beliefs and purchasing intentions for the six product varieties
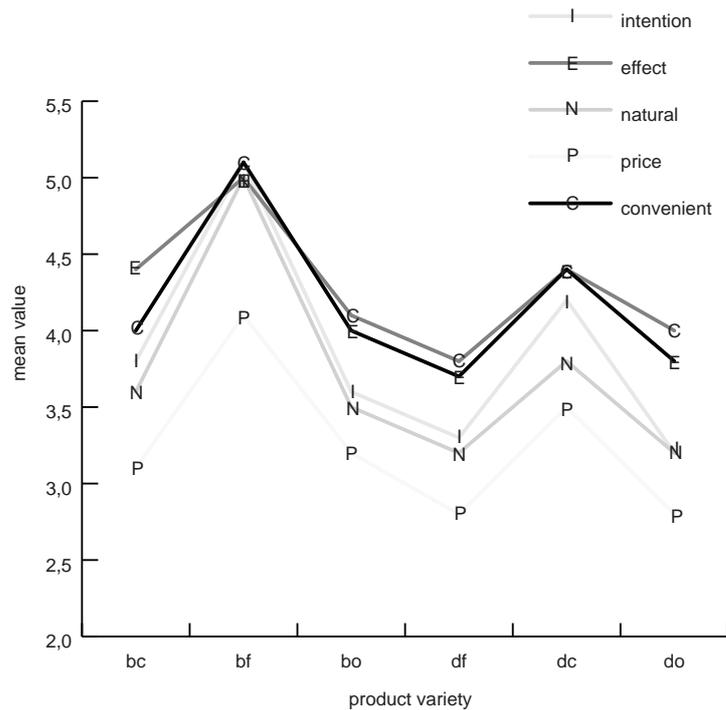
The figure is interesting, since it indicates that, at an aggregated level (summed for all respondents), attitudes, and thus also the relative importance of individual explanatory variables, will be based on a given level for each product variety (different functional foods), but since the most important explanatory variables for AB are strongly correlated at the aggregated level, the mutual weighting of the explanatory beliefs will not vary significantly, which was also the case in connection with the regression analyses.

In continuation of the above, it would be interesting to see which belief(s) determine the given level of the explanatory beliefs for the respective product varieties. Intuitively, perceived naturalness of the combination of basic product and enrichment substance is the most obvious single belief, since the level for the explanatory variables for product varieties where enrichment consists in upgrading is higher than for the other product varieties. This can be tested statistically by means of multivariate analysis of variance (MANOVA), where the product variety is the explanatory variable and the beliefs under AB the independent variables.

The analysis of variance confirms the hypothesis that NATURAL is the most significant belief in relation to the product varieties. MANOVA ("tests of between-subject effects") thus shows that the four beliefs CONVENIENT, NATURAL, PRICE and EFFECT are all significant in relation to "product variety", but that NATURAL is the most significant. The main results of the MANOVA are shown in table 15.

Table 15. Multiple variance analysis, with product variety as the explanatory variable for the beliefs CONVENIENT, NATURAL, PRICE and EFFECT

	sum of squares	df	F	significance	Eta^2	r^2
CONVENIENT	296.397	5	12.047	.000	0.47	0.43
NATURAL	440.505	5	18.395	.000	0.70	0.66
PRICE	251.695	5	10.851	.000	0.42	0.39
EFFECT	171.463	5	8.855	.000	0.35	0.31

In the table, the values for F, Eta^2 and r^2 are especially noteworthy, since these clearly indicate that NATURAL is the most likely variable to be dependent on the product variety. Eta^2 is a correlation coefficient analogous to Pearson's r, but Eta^2 also includes correlations which assume a curved course. Together, the three measures lead to the conclusion that perceived naturalness is the most significant single belief for the level of attitudes towards the various product varieties.

This means that, if consumers at the aggregated level perceive the enriched product as natural, they will also view the product positively as regards the other explanatory variables (only applies to CONVENIENT, PRICE and EFFECT, these variables being significant for AB) because of the observed (almost linear) correlation between the variables at the aggregated level. It is important to stress, however, that this applies solely to the aggregated level, inasmuch as the correlations are not linear at the "individual" level at which all 205 observations are included.

To sum up, the analyses in this section show that the purchasing intention is more or less determined by AB, which in turn is primarily determined by the three beliefs CONVENIENT, PRICE and NATURAL. The respondents' perception of the positive health effect (EFFECT) of the enriched product vis-à-vis the basic product only has a relative importance of 14%, which is rather lower than expected. There is no clear pattern in the relative importance of the beliefs in relation to the basic product or enrichment substance, but an evaluation of the mean values of the explanatory beliefs for the product varieties shows that there is an absolute difference in level between the product varieties. In general, the mean values are higher for varieties of the bread product than for the dairy product, and for varieties where enrichment consists in upgrading, which indicates that it is the perceived naturalness of enrichment that determines attitudes towards the other variables. This is confirmed by a multivariate analysis of variance. It can thus be concluded that the level of the attitudinal variables for the product varieties is determined by respondents' perceived naturalness of the enriched product.

Correlation between attitudes and demography

The aim of this section is to identify any demographically-dependent differences in attitude towards functional foods, reflected via purchasing intentions and the explanatory beliefs under AB. As in the previous section, the analysis here

focuses on the beliefs under AB because of the relatively modest importance of SN for purchasing intentions.

In analyses of differences in attitude between demographic characteristics, a nominal scale is used for the independent variables, which indicates an affiliation to prespecified groups. The demographic variables measured in this analysis are sex, age, income and educational level. A (multiple) variance analysis is the most suitable method in analyses where nominal scales are used for the independent variables and interval scales for the dependent variables (Blunch, 1990).

Table 16 shows purchasing intentions in relation to demographic characteristics. In the case of *sex*, women have a significantly higher purchasing intention than men for all six product varieties. As regards *age*, the older respondents are generally the most positive – only for the bread product with fibre is the difference not significant. The middle-aged are least positive, though for four out of the six product varieties the difference between the middle-aged and youngest respondents is not significant, so the results for age are also consistent with the results of the conjoint analyses.

With regard to educational level, the table shows that those with the shortest education have a significantly higher purchasing intention for all six product varieties, while household income only affects purchasing intentions in the case of the bread product with fibre or omega-3, where the group with the highest income has a higher purchasing intention than respondents with a lower household income.

Table 16. Mean values for purchasing intention, by demographic characteristics

	df	do	dc	bf	bo	bc
SEX						
– male	2,7	2,4	3,4	4,5	3,0	3,1
– female	3,5	3,5	5,0	5,3	3,9	4,0
AGE						
– - 30 years	2,9	2,9	4,2	5,3	3,6	3,5
– 31-55 years	2,9	2,8	3,9	5,1	3,2	3,5
– 56 years-	4,4	4,4	4,9	5,0	4,8	4,8
EDUCATION						
– up to and incl. A-levels	3,7	3,6	4,5	5,3	3,9	4,1
– higher education	2,5	2,6	3,7	4,9	3,4	3,2
INCOME						
– < DKK 300.000	3,3	3,2	4,2	5,0	3,6	3,8
– > DKK300.000	3,3	3,3	4,2	5,3	3,9	3,8

Note: bf = bread product with fibre; bc = bread product with calcium and vitamin D; bo = bread product with omega-3; df = dairy product with fibre; dc = dairy product with calcium and vitamin D; do = dairy product with omega-3.

All differences <0.3 are significant at $\alpha k < 0.05$. Higher values indicate a higher purchasing intention.

The differences in beliefs and weights between the demographic groups have been found via multiple variance analysis and discriminant analysis.

The main conclusions of the analyses are that women's more positive attitude towards the enriched products can be explained by their greater willingness to accept a higher price, and that women regard the products as more natural and find it more convenient to take the enrichment substance through their daily diet. On average, these three beliefs explain about 90% of the difference between men and women for the six product varieties.

As for age, the more positive attitude of the oldest segments (over 55) can be explained mainly by the fact that these consumers find it more convenient to get enrichment substance through their daily diet than the other consumers. Furthermore, the elderly regard the enriched products as more natural than the other respondents, and are willing to pay more for these products.

With regard to educational level, the analyses show that the relatively more positive attitude among respondents with a lower educational level is due to the fact that these respondents are generally more positive about PRICE, NATURAL and CONVENIENT.

Differences in attitude between segments identified by the conjoint analyses

The aim of this section is to identify the beliefs which help discriminate between the "positive" and "negative" segments found by the cluster analysis in connection with the conjoint analyses. Unlike in previous sections, this analysis is thus based solely on respondents with a relatively unambiguous attitude, respondents not directly for or against enriched products being excluded. By this means, the analysis can identify those beliefs which explain that respondents have a marked positive or negative preference to enriched products in general, together with the beliefs that explain the difference between the individual product varieties.

As in the previous section, the independent variable is based on a nominal scale, and indicates a group affiliation (positive or negative preference), while an interval scale is used for the explanatory variables (items under AB), which is the reason for using MANOVA and discriminant analysis again.

Before discussing the analysis itself, it would be useful to examine the extent to which the segments' mean values for the purchasing intention correspond to group affiliation – in other words, whether respondents' preferences in the conjoint analyses are consistent with purchasing intentions in the questionnaire survey. The survey shows that the six segments with a positive preference for enrichment all have a significantly higher purchasing intention ($p < 0.001$) than the negative segments. The two surveys are thus consistent with each other, so it is perfectly valid to regard the groups as positive and negative segments in the questionnaire survey too.

In order to discover which beliefs generally discriminate between positive and negative segments, all segments with a clearly positive or negative preference for each of the six product varieties are placed in one data set and a variance and discriminant analysis carried out (there are 117 observations in the negative group and 195 in the positive, ie 312 observations out of a total of 1230, cf. the conjoint analyses, tables 7 and 8). The analysis of variance is significant,

and, not surprisingly, the discriminant analysis shows that the beliefs CONVE-NIENT, NATURAL, PRICE and EFFECT are significant, but PROKNOW-LEDGE is also significant in relation to the discriminant function.

While the discriminatory beliefs are thus more or less the same as the most significant in the regression analyses, the relative importance differs between the two analyses. The most significant belief for the discriminant function is NATURAL, which has a relative importance of 27%. CONVENIENT has a relative importance of about 24%, while PRICE and EFFECT are each about 22% and PROKNOWLEDGE 5%. It can be seen from this that NATURAL and EFFECT have a greater relative importance in this analysis than in the regression analyses (NATURAL 18% and EFFECT 14%, cf. figure 1). At the same time, the relative importance of CONVENIENT for the discriminant function is only about half (relative importance of 42% in the regression analysis), while the relative importance of PRICE is the same in the two analyses.

The difference in attitude between the absolute most negative and absolute most positive respondents is thus more a question of the perceived naturalness of enriched products and the effect of enrichment vis-à-vis the conventional product than is the case in the regression analysis of all respondents, where CONVENIENT is the most dominant belief. Thus, the explanatory beliefs do not determine the purchasing intention with the same relative importance for the negative respondents as for the group of more or less indifferent respondents (neither in the positive nor negative segments). The more negative respondents are towards enriched products, the less natural they perceive them to be, and the less they believe in an enrichment effect. Conversely, CONVENIENT is relatively more important for the indifferent, and since the positive and negative segments combined only represent 312 out of 1230 observations, the differences between the absolute negative and absolute positive are "levelled out" in the regression analyses. CONVENIENT is thus of relatively great importance to AB, and with it the purchasing intention. This does not mean that the validity of the regression analyses is disputed, however, only that, for the truly negative respondents, NATURAL and EFFECT are relatively more important for attitudes than for the sample in general.

The discriminant analyses for the six product varieties show that there are no great differences between them.

Summing up, the discriminant analyses of the segments identified by the conjoint analyses show that the relative importance of NATURAL and EFFECT is greater for the segments with a clear preference for or against enriched products than for the sample as a whole. Compared with the positive respondents, therefore, the negative respondents regard functional foods as less natural and believe significantly less in an increased health effect of enrichment. PRICE and CONVENIENT are also important, though the latter far less than for respondents as a whole.

Validity of the questionnaire survey and consistency with the conjoint analyses

A comparison of the results of the two quantitative surveys shows that they largely validate each other, ie the results are not dependent on the measurement instruments used. Thus, the purchasing intention for the various product varieties agrees completely with the preference distribution from the conjoint analyses. The surveys are not completely independent, however, since they are based on the same respondents. Thus, the external validation, as the comparison of the two surveys' results can be described, is only reliable if the sample is approximately representative and not subject to "non-response bias".

Non-response bias is minimal if the evaluation is based on the response rate. However, it would be more correct to base the evaluation on the relation between the number of contacted, screened, suitable and participating respondents than on the response rate for participating respondents alone. As mentioned in the section on the conjoint analyses, 1029 persons were contacted, of whom 689 agreed to participate – ie 340 refused. Of those screened, only 48% were suitable. Since a similar proportion of those who did not wish to participate can also be assumed to be suitable, we can calculate a corrected participation figure of 80% of those contacted. The conjoint analyses thus have a "response rate" of 80, while that of the questionnaire survey is 75, which is satisfactory for this type of survey. The sample is a so-called convenience sample, however, and therefore not necessarily representative of the population (the Aarhus area).

In connection with the interviews, we also compiled statistics for those who did not want to participate in the survey. These statistics, which solely concern age and sex (the former obviously being an estimate), show that, as regards sex, a significantly larger proportion of men refused to participate in the study, which is tantamount to a certain bias. As regards age distribution, there is no significant difference between those interviewed and those who refused to participate.

The representativeness of the sample can be assessed on the basis of the demographic variables, and a comparison of the figures in the study with statistics for the municipality of Aarhus (Statistics Denmark, 1997) shows that there is an overrepresentation of women in our study (75% in the study, against 52% in Aarhus). This is not surprising, however, since the sample (cf. screening) is made up solely of persons who are responsible for the daily shopping, which, in reality, means mostly women. The overrepresentation of women is therefore not regarded as a serious bias, but, as mentioned above, a large proportion of men declined to participate, so bias cannot be ruled out entirely. Nonetheless, the results are not considered to be affected to any serious extent.

With regard to age, there is an underrepresentation of younger respondents (25% in the survey, against 32% in Aarhus), and an overrepresentation of elderly respondents (25% and 20% respectively), and while the age distribution in the survey is not markedly different from the population, a slight bias cannot be denied. Since the surveys have shown that it is mainly the elderly who have a positive attitude towards enriched products, there is a risk that the proportion of positive respondents is slightly overrepresented in this study. As with the age distribution, however, the relatively limited overrepresentation of elderly is not considered to critically affect the validity of the study. Nevertheless, since both

biases pull in the same direction, there must assumed to be an overrepresentation of positive respondents as regards functional foods. As mentioned above, however, both biases are relatively limited, so the validity of the study is not critically affected.

The sample does not differ significantly from the population either in educational level or income.

Questionnaire survey – concluding remarks

The questionnaire survey shows that consumers' purchasing intentions as regards functional foods are mainly explained by AB, and that this is chiefly explained by the beliefs CONVENIENT, PRICE, NATURAL and EFFECT in that order. Since there is no systematic difference in the relative importance of the beliefs between the various product varieties, neither as regards the basic product nor the enrichment substance, it can be concluded that attitudes are formed in much the same way across different functional foods.

The above only applies to the relative importance of the beliefs, however, since the actual level (mean values) of attitudes towards the beliefs differs significantly between most of the product varieties, and MANOVA shows that perceived naturalness of the enriched product is the main determinant of the actual level.

Somewhat surprisingly, SUBKNOWLEDGE and PROKNOWLEDGE are completely unimportant, and DOSAGE only marginally important, and this only for two of the six product varieties. These beliefs were very prominent in the focus groups, but the inconsistency can be explained by the level of abstraction of the two methods: the three beliefs were mentioned chiefly in connection with the concept of functional foods, and not so much at the product-specific level, which is the starting point of the survey.

As far as the demographic differences are concerned, the analyses show that, in general, women, the elderly and those with a low level of education were more inclined to buy functional foods. The discriminant analyses show that women find it more convenient to get enrichment substances through their daily diet, they are more willing to pay extra, and find functional foods more natural. The same goes for the elderly, and these also believe more in a positive health effect of enrichment.

The analysis of the segments with a clear preference for one or other of the enrichment substances, or no enrichment (positive and negative segments), which were identified by the conjoint analyses, shows that the difference between the segments' attitudes is primarily explained by the beliefs NATURAL and EFFECT. Furthermore, these two beliefs have relatively greater importance for attitude formation in the segments (both positive and negative) than for all the respondents as a whole. PRICE and CONVENIENT likewise discriminate between positive and negative segments, but appreciably less than the two former beliefs.

Marketing implications of the study

The focus group interviews revealed a widespread lack of knowledge about both the concept of functional foods and the basic idea behind the products. Moreover, the name had negative associations. Present and potential producers of functional foods thus need to make consumers more aware of the concept and what lies behind it. This also means putting more effort into convincing consumers that, basically, functional foods are just food products that are enriched with natural substances, and trying to overcome consumers' negative associations to "junk food" and additives.

For the individual food producer, it is crucial that product development takes a starting point in products which consumers regard as relatively natural. Not all basic products are equally suitable in this respect, however, the enrichment of products with a low degree of processing resulting in less positive attitudes than more processed products. Upgrading seems to be the most preferred form of enrichment among consumers by far, which indicates that the development of functional foods should be kept at a relatively simple level – at least, as long as consumers know so little about the concept. If functional foods were promoted more aggressively as products that are enriched with natural substances, it would lead to more acceptance of and openness towards new functional foods, which in turn would allow producers to develop more "unnatural" combinations and introduce them with a greater likelihood of success. For the present, however, the key word for product development should be naturalness, which, as shown in this study, is emphasised by the importance attached to the basic product and the combination of basic product and enrichment substance.

With regard to the marketing of functional foods, the analyses show that the most important attributes that should be emphasised are convenience and naturalness, which is an interesting result given legislation on health claims for food products. The restrictions on marketing in current legislation are thus not the barrier industry considers them to be today, since consumers' beliefs in the health effect of functional foods is not decisive for attitudes and purchasing intentions. It should be pointed out in this connection, however, that the enrichment substances included in this study are all relatively familiar to consumers (though omega-3 somewhat less than the others), so enrichment with less familiar substances might lead to another conclusion, where belief in an effect would be more determinative for consumers' attitudes. However, as long as products are kept at a "simple" level, with relatively familiar enrichment substances, producers should emphasise convenience and naturalness.

The study also shows that women and the elderly are relatively more interested in functional foods than the other consumers, so product development and marketing should primarily focus on these segments. To this end, more research must be done on which health claims (and thus also enrichment substances) the elderly prefer, and, it goes without saying, marketing should concentrate on the media which cater for the elderly.

No clear conclusions can be drawn about price. In the focus groups, the elderly in particular expressed a willingness to pay more for functional foods if they thought there was a positive health effect. Notwithstanding, the conjoint analyses show that, for the segment with a preference for the dairy product enrich-

ed with calcium and vitamin D, where elderly respondents are overrepresented, price is relatively very important. However, one-third of the respondents in this segment are not very price sensitive at all, and a closer examination reveals that precisely this third consists almost solely of the elderly. For the dairy product enriched with fibre or omega-3, the segment with a preference for these enrichment substances in milk is not very price sensitive. For the segments with a preference for the bread product enriched with fibre or calcium and vitamin D, prices is not decisive, both segments having a very low price sensitivity, and price is considerably less important than for respondents in general.

The discriminant analyses confirm that the segments with a preference for enriched products are more willing to pay, so even though no clear conclusions can be drawn – mainly because of the high price sensitivity of two-thirds of the respondents with a preference for the dairy product enriched with calcium and vitamin D – the results of the study indicate that consumers with a positive attitude towards concrete enriched products are willing to pay extra for them. This is an important factor in view of the relatively large product development costs involved in functional foods.

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Dairy product	
2	123409316970496
3	634610974720
4	305123459072
5	17506717696
6	903820800
7	**189211824**
8	95440416
9	28978662
10	13930317
11	2618059
12	2188802
13	2071808
14	1061604
15	118010

Bread product	
2	141807824404480
3	1184508542976
4	53784633344
5	16033716224
6	702782848
7	68929648
8	23530926
9	**12490137**
10	8093366
11	7430854
12	638159
13	496378
14	180361
15	77280

APPENDIX 2. CLUSTER HOMOGENEITY AFTER AGGREGATION

Dairy product

Individual and aggregated importance of enrichment after the aggregation of clusters. %

Segment	Individual Relative Importance[a]	Aggregated Relative Importance
M2 (no enrichment)	54.71 (2.45)	52.75
M3 (calcium + D)	44.42 (2.82)	42.94
M4 (fibre/omega-3)	54.80 (3.61)	52.25

a) Standard deviation in brackets

Bread product

Individual and aggregated importance of enrichment after the aggregation of clusters. %

Segment	Individual Relative Importance[a]	Aggregated Relative Importance
F2 (no enrichment)	60.46 (2.40)	61.87
F3 (calcium + D)	35.64 (2.36)	35.19
F4 (fibre)	45.77 (3.50)	44.78
F6 (omega-3)	52.60 (3.34)	49.92

a) Standard deviation in brackets

As can be seen from the above tables, the respondents in the aggregated clusters have homogeneous preferences for enrichment. The aggregation is thus justified, since enrichment is the focus of the analysis.

Bread product: Utility functions, relative importance of attributes for segments B1 and B5

	B1 n=20	B5 n=19
Type; relative importance	29%	0%
– Brown	1.9	0.0
– White	-1.9	-0.0
Brand; relative importance	35%	19%
– No name	-2.3	-1.3
– Brand	2.3	1.3
Enrichment; relative importance	19%	17%
– Omega-3	-1.4	-0.5
– Fibre	1.0	1.4
– Calcium og vitamin D	0.1	-1.0
– No enrichment	0.3	0.0
Pris; relative importance	17%	64%
– DKK 17.00	-72.6	-30.5
– DKK 19.25	-74.5	-35.0
– DKK 21.50	-74.6	-39.6

Dairy product: Utility functions, relative importance of attributes for segments D1 and D5

	D1 n=35	D5 n=18
Type; relative importance	2%	51%
– Ecological	0.1	-3.1
– Ordinary	-0.1	3.1
Packaging; relative importance	66%	3%
– Plastic	-3.9	-0.1
– Cardboard	3.9	0.1
Enrichment; relative importance	17%	17%
– Omega-3	-0.5	-0.3
– Fibre	-0.9	1.0
– Calcium og vitamin D	0.2	0.3
– No enrichment	1.2	1.1
Price; relative importance.	15%	29%
– DKK 5.50	-6.4	-12.8
– DKK 6.25	-7.3	-14.5
– DKK 7.00	-8.2	-16.2