Healthy ice cream anyone?

The relentless increase in obesity in the developed world presents both a problem and an opportunity to ice cream manufacturers.

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Over the last three decades, nutritionists and public health authorities have become more aware of the fact that an intake of nutrients at the level needed to prevent a deficiency is not always sufficient for the attainment and maintenance of optimal health. As a result, dietary guidelines are now aimed at reducing the frequency of chronic nutrition-related diseases, including obesity, cardiovascular disease, hypertension, diabetes type II, osteoporosis and several forms of cancer.

At the same time, health practitioners have come to realise that a healthy human diet should contain substances that exert beneficial effects in the body (nutraceuticals) that do not belong to the group of well-known classical nutrients (nutriceuticals) that includes vitamins, minerals and trace elements.

Functional foods

Elevated dosage levels of nutriceuticals – higher than those needed to prevent classical deficiencies – may help both to reduce the risk of chronic diseases and improve certain bodily functions. The possibility of reducing the risk of disease and improving bodily functions has stimulated the development, in recent years, of foods and ingredients that are termed 'functional'.

These developments and applications have shifted attention to the composition of individual foods rather than to the composition of the total diet. Thus, as part of a balanced total diet, functional foods can now play a significant role in the reduction of disease risk and the improvement of bodily functions.

The first generation of functional foods actually existed before the functional food concept was developed. Skimmed and semi-skimmed milk and diet margarine are all examples of foods that have been modified in line with our growing knowledge of the diet-health relationship. Functional foods now include fortified foods (those with added nutrients) and complex foods such as meal replacers, which are designed to provide a balanced and nutritional alternative to a traditional meal.

There is an expanding market for such foods. They offer traditional nutritional value, and they also frequently carry descriptive nutritional claims (not health claims), such as 'low in fat' and 'rich in vitamin C', or nutrient function claims, such as 'rich in vitamin D, which helps strengthen bones'. In general, the first generation of functional foods helps consumers maintain a good nutritional status and select a diet that fits well into current dietary guidelines.

The second generation of functional foods (secondary functional foods) has been specifically developed to either reduce the risk of chronic nutrition-related diseases or enhance certain bodily functions to promote well-being. Such foods include nutraceuticals as food ingredients, and these may include probiotics, prebiotics, phytoestrogens, phytostanols, phytosterols, bioactive proteins, bioactive peptides, conjugated linoleic acids (CLAs) and several long-chain polyunsaturated fatty acids. These ingredients are not identified as essential nutrients, but they are considered to be bioactive substances with a health benefit – although this may not have been proven. The health claims connected to secondary functional foods are either type A health claims that they enhance body functions or type B claims that they reduce the risk of disease.

A generally and widely accepted definition of functional foods does not exist. The term is a new concept in nutrition science, rather than a particular type of new food. Functional foods can be seen as foods with an added nutritional value that is communicated to the consumer using nutrition or health claims. As yet, such claims are rarely made for ice cream, but it may be that things are about to change.

The ice cream dilemma

Our knowledge about the relationship between nutrition and health is expanding at the same time as society is witnessing an increased incidence of chronic nutrition-related diseases, mainly because of the ageing of the population in the developed world. The increased purchasing power of consumers and the development of food processing and food technology

capabilities (not least the availability of new bioactive food ingredients – the nutraceuticals) are the business drivers in the search for new value-added products.

In this context, ice cream is something of an oddity. Traditionally, it has been considered a luxury product, a product that is essentially eaten for enjoyment. Such foods have not yet received a lot of attention from the nutritional point of view. However, because ice cream consumption is rising, its nutritional properties are set to become more important, not least to consumers themselves. The question must be asked: what kind of opportunities are there to improve the nutritional characteristics of ice cream without affecting its ability to provide enjoyment?

The dairy basis of ice cream provides an excellent starting point for the production of a nutrient-dense food. Ways of enhancing the nutritional characteristics of ice cream might include:

- Nutrient fortification
- The removal or replacement of negative constituents
- Its enrichment with bioactive substances
- The application of 'intelligent recipes' to give ice cream a well-balanced nutritional composition

Health and safety issues

The success of the next (third) generation of functional foods will depend on resolving a major problem. The future development of the functional food market will require the validation of biomarkers to substantiate health benefits. Only a limited number of validated biomarkers are currently available to test the efficacy and safety of bioactive ingredients.

Compounds with strong bioactivity, such as drugs, almost always have side effects. However, such side effects are not acceptable for foods. The biological effects of functional foods are generally relatively small and difficult to detect using traditional methods. But since small effects can, nevertheless, have a significant health impact over the long term, new techniques need to be developed to measure these biological effects over the short term. Transcriptomics, proteomics and metabolomics can all be used in experiments with cells, animals and humans to develop biomarkers that can be used to assess the effects of bioactive food ingredients.

Nutrigenomics can help expand our knowledge of the mechanisms of bioactivity and speed up the process of assessing the bio-efficacy and bio-safety of a large variety of components. The expansion of our knowledge on the effects (positive or negative) of compounds that occur naturally in our foods may lead to new food fortification strategies or to the elimination of negative components from existing foods. We may also expect the increase in our knowledge on the influence of individual genetic backgrounds on disease risk and well-being to provide new opportunities to market

functional foods that are tailor-made for sub-groups of the population.

Defining functionality

The popularity of the concept of functional foods has increased sharply during the last decade. The concept offers the food industry an opportunity — and a challenge — to improve the nutritional quality of existing foods and design new foods that can promote health. In general, from a marketing point of view, functional foods are considered to be foods that have been designed to provide added nutritional value, using our knowledge of the nutrition-health relationship.

A food is defined as functional if it can be satisfactorily demonstrated that it has a function in the body beyond the provision of adequate nutrition that is relevant to either an improved state of health and well-being and/or the reduction of a health risk. In this context, to communicate to the consumer the health benefit of a food, two types of claims are being used: nutritional claims and health claims. Nutritional claims refer to the composition of the food, and do not inform the consumer directly about the effect the food may have on the body. Health claims, on the other hand, inform the consumer about the beneficial effect that the food has on the body. This beneficial effect can be either an enhancement of a bodily function or a reduction in the risk of a certain disease.

Marketing considerations

Successful marketing of functional foods can only occur when important conditions related to consumer acceptance are satisfied: there must be a rational and emotional consumer affinity with the product, any claim about the product must be true and the food must taste good. It is also evident from existing research in the marketplace that the food product type must have a rational and emotional link with a health benefit. It seems unlikely that a product such as ice cream, which is essentially considered as a food for enjoyment, will be a successful matrix for food fortifications unless there are substantial changes in both business and consumer attitudes.

Since milk is generally the basis for the preparation of ice cream, it is useful to compare the nutritional composition of milk with that of ice cream. Milk is an excellent source of a large variety of essential nutrients, including high-quality proteins, vitamins, minerals and trace elements. Consumption of milk can balance a diet that is otherwise deficient in a particular nutrient. Milk is an excellent source of most vitamins, and particularly vitamins B2 and B12. Milk is also an excellent source of a large number of minerals and trace elements, particularly calcium, phosphorus and potassium.

Weight for weight, the energy content of dairy ice cream is about four times higher than that of full-fat (3.5 per cent) milk, and the nutrient content is about the same. However, the addition of fat and sugar to ice cream causes a substantial reduction in the nutrient density of ice cream compared with milk. Of course, the nutritional significance of ice cream depends on the amount of ice cream consumed. The 22.5l consumed per head, per year in the USA corresponds to an average daily ice cream intake of 41g, which makes only a modest contribution to the recommended dietary allowances of nutrients. If the 41g of ice cream were replaced by milk, the intake of essential nutrients would not change, but energy intake would be reduced from 104kcal/day to 26kcal/day. This, apparently small, reduction in energy would result in a body weight loss of more than 3kg a year.

In the USA, where more than 55 per cent of the population is overweight and about 20 per cent obese, ice cream, as a high-energy food, is contributing to the problem of weight gain. The main challenge for the ice cream business is to make low-energy ice cream available — by removing the fat and sugar — while maintaining the excellent sensory properties of ice cream. Advances in food technology has already resulted in successful low-calorie ice creams coming to market.

Adding value, cutting calories

Soon, we may see other opportunities for the ice cream business to add nutritional value to ice cream, by nutrient fortification or by using bioactive ingredients such as prebiotics, probiotics and cholesterol-lowering phytosterols or phytostanols.

Since ice cream is considered a food for enjoyment, rather than a basic food, a question remains as to whether the consumer will appreciate such fortifications. In the current health climate, consumers are likely to respond positively to the replacement of fat, and priority should be given to the reduction of saturated fats and trans-fatty acids. It should be stressed, however, that the fortification of ice cream with nutrients or other bioactive substances should not be supported without first lowering the energy content of the product. ❖