The Role of the Food Industry in Developing and Communicating Better Nutrition

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Health is one of those matters that deeply interests people; it is also a topic made to measure for the popular press. Food is another subject of surpassing interest, and what has become increasingly obvious is that the combination of food and health provides many people with an overwhelming desire to comment, and in some cases, create alarm and panic in consumers, government, and industry. Many people are now thoroughly worried about being poisoned and are often unable to judge whether food is safe and nutritious. Once food scares start they take a long time to subside. Exaggeration can seriously damage our health.

Nevertheless, satisfying customers and meeting their demands is what keeps us all in business. Customers are increasingly discerning and demanding about what they eat. Safety, quality, and nutritional value will be the order of the day in the 21st century. Diets are already energy-saturated, and as northern Europeans have grown richer the proportion of their income spent on food has fallen. Obviously, there is a limit to how much we can eat, but we can expect that consumers will continue to demand higher-quality foods, which are more complex, fresher, more natural, and better tasting (1). Foods of the future are those which are a pleasure to cook, serve, and eat. Consumers are more aware of how life-style and eating habits influence health and well-being. Different foods will reflect the “convenience continuum,” ranging from fast and functional products to those which require a much greater sense of involvement in their preparation.

For the food manufacturing industry, innovation, productivity, profitability, competitiveness, and quality are the key words. In the future, strong branding will not only reflect the intrinsic properties of quality products, but the marketing techniques needed to position foods in the minds of consumers will have to communicate the fact that the foods are products of people who care.

The “healthier” products of the 1980s and 1990s will continue to reinforce the concerns for more sensible eating. Achieving and retaining public confidence in the food supply and new product developments will require a thorough identification of
consumer needs, continual assessments of the impact of food regulations and technical advances on product development, the absence of quality trade-offs, and appropriate communication, advertising, and pricing of the food products to encourage trial, stimulate consumption, and ensure repeat purchases.

FOOD MANUFACTURING AND QUALITY ASSURANCE THROUGHOUT THE FOOD CHAIN

The food manufacturing industry in Europe plays the major role in keeping a very large and mostly urban population supplied with food and drink. Few foods can be eaten raw; most need to be processed and prepared in some way. Each of industry’s natural raw materials is subject to considerable variation in composition, properties, and quality. Yet consumers look for uniformly high quality in manufactured foods, so requiring manufacturers to find ways of offsetting natural variations and accommodating shortages. Success depends, among other things, on the judicious application of food science and technology at all stages in the food chain, on a flair for formulation, and on sensitivity to the changing needs of the consumer (2). Food manufacturers are always concerned to gain a better understanding of their processes because this knowledge leads to more efficient procedures and improvements in food quality. Development pressures are not just felt by food manufacturers; suppliers of food machinery, new materials, ingredients, control and testing equipment, packaging, and so on are all affected. Farmers and suppliers throughout the food chain are clearly recognizing and responding to the needs of the food industry (3). In turn, the food industry is dependent on the scientific outputs of food research organizations to underpin the applied nature of the food product development and to plug the gaps in our scientific and technical knowledge.

NEW PRODUCT DEVELOPMENT

Public concern about food safety and nutrition has propelled food science and technology out of the laboratory and very firmly onto the nation’s dinner table. Similarly, the trend toward environmentally friendly products has resulted in the focusing of attention of the key role of food scientists and technologists in the food industry. Food manufacturers and retailers have responded positively to reflect the changing needs of consumers. Surveys in the United Kingdom continue to indicate that far more people are concerned about food and their health than in the past. The National Health Survey (4) of 1,200 people provides a continuous assessment of consumers’ spontaneous responses to what they consider to be the attributes of “unhealthy” and “healthy” foods. These consumer perceptions and attitudes toward food components are shown in rank order in Figs. 1 and 2 and they have provided many opportunities for product innovation and new product developments. Manufacturers have developed and segmented markets to offer a wide choice of foods, resulting in the emergence of increasing numbers of brands, more recipe
ROLE OF FOOD INDUSTRY IN BETTER NUTRITION

FIG. 1. Spontaneous consumer perceptions and attitudes toward food components that were considered to be the attributes of an unhealthy food. Data refer to the percent of 1,200 people participating in the National Health Survey in the UK in 1990. From Jones Rhodes Associates Market Research (4).

dishes, and new food sectors. There have been considerable market opportunities for "low" and "light" products (5), and analysis of low-fat product launches and the dynamism of these products versus standard lines is supported by rapid market growth data shown in Tables 1 and 2. There has also been a huge increase in new food ingredients and novel foods produced from raw materials that have not hitherto been used for human consumption or that were consumed only in small amounts. Some of these materials are produced by new or extensively modified processes not previously used in food production and manufacture. Low-energy and energy-reduced

FIG. 2. Spontaneous consumer perceptions and attributes toward food components that were considered to be the attributes of a healthy food. Data refer to the percent of 1,200 people participating in the National Health Survey in the UK in 1990. From Jones Rhodes Associates Market Research (4).
foods containing intense sweeteners, low-energy bulk sweeteners and fat replacements (6), "alternatives," novel proteins, chilled foods, recipe dishes, irradiated products, high-fiber containing foods, and nutrient-fortified foods have all required special attention to safety, taste, flavor quality, nutrient density, product stability, process control, and subsequent use in the home and catering establishments (7).

One of the most important changes that has taken place in the United Kingdom regarding food consumption is that of changing food preparation methods arising from the desire for convenience, time-saving, and speed of preparation—many of which are conducive to healthy eating. The Taylor Nelson Family Food Panel (8) provides a continuous monitor of all food and drink usage by 5,500 individuals in a sample of 2,100 homes representative of all 21 million private households in the United Kingdom. Meals featuring current food preparation methods in 1989–90 and the year-on-year changes in meal occasions are shown in Table 3, and these data highlight the rapid growth in the use of the microwave oven. In a Special Report

### Table 1. The number of launches of new low-fat products in the United Kingdom in 1986, 1987, and 1988. Data from Leatherhead Food Research Association FLAIRS Data bank

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Dairy</th>
<th>Meat</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>1986</td>
<td>28</td>
<td>16</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>1987</td>
<td>46</td>
<td>30</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>1988</td>
<td>62</td>
<td>38</td>
<td>15</td>
<td>9</td>
</tr>
</tbody>
</table>

### Table 2. Dynamic changes in per capita volume consumption of low-fat products compared with standard lines during 1980s in the UK

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Milk</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low-fat milk</td>
<td>+550%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All milk</td>
<td>−12%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yogurt</td>
<td></td>
<td>+262%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very-low-fat</td>
<td></td>
<td></td>
<td>+71%</td>
<td></td>
</tr>
<tr>
<td>All yogurts</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spreads</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low-fat</td>
<td></td>
<td></td>
<td>+216%</td>
<td></td>
</tr>
<tr>
<td>Butter</td>
<td></td>
<td></td>
<td>−32%</td>
<td></td>
</tr>
<tr>
<td>Margarine</td>
<td></td>
<td></td>
<td>−3%</td>
<td></td>
</tr>
<tr>
<td>Cheese</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low-fat hard</td>
<td></td>
<td></td>
<td></td>
<td>+21%</td>
</tr>
<tr>
<td>Low-fat soft</td>
<td></td>
<td></td>
<td></td>
<td>+7%</td>
</tr>
<tr>
<td>All cheese</td>
<td></td>
<td></td>
<td></td>
<td>+1%</td>
</tr>
</tbody>
</table>
TABLE 3. Food preparation trends showing meals featuring current food preparation methods and the year-on-year changes in 1989–1990

<table>
<thead>
<tr>
<th>Meals featuring food</th>
<th>%</th>
<th>Year-on-year changes in occasions</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uncooked/cold</td>
<td>87.0</td>
<td></td>
<td>+1</td>
</tr>
<tr>
<td>Grilled/toasted</td>
<td>29.5</td>
<td></td>
<td>+1</td>
</tr>
<tr>
<td>Boiled/steamed</td>
<td>22.8</td>
<td></td>
<td>-1</td>
</tr>
<tr>
<td>Heated</td>
<td>17.3</td>
<td></td>
<td>-12</td>
</tr>
<tr>
<td>Roasted/baked</td>
<td>13.4</td>
<td></td>
<td>+5</td>
</tr>
<tr>
<td>Fried</td>
<td>11.1</td>
<td></td>
<td>-4</td>
</tr>
<tr>
<td>Microwaved</td>
<td>6.8</td>
<td></td>
<td>+31</td>
</tr>
<tr>
<td>Stewed</td>
<td>2.3</td>
<td></td>
<td>N/C</td>
</tr>
<tr>
<td>Other</td>
<td>1.8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(9), Taylor Nelson explored further the forces shaping the consumption of various foods. The most important foods prepared with microwave ovens are shown in Fig. 3.

Prepared and frozen vegetables, fresh potatoes, and root vegetables dominate the number of meal occasions when the microwave oven is used. These washed, peeled, and prepared vegetable products ready for the microwave are likely to generate significant markets in the future, and foods such as these fit precisely the recommendations for the greater consumption of vegetables in the diet. Likewise, fish, pastas, baked beans, and soups (mostly low-fat foods) are ideally placed to exploit the forces shaping eating habits. In the future, the kitchen will continue to be the focal point of the household and the rapid penetration of the microwave oven into

![Bar chart showing percentage of meals prepared with various foods](chart.png)

**FIG. 3.** Results of Taylor Nelson Family and Panel survey illustrating the most important foods prepared using microwave ovens. Data refer to estimates of millions of food occasions grossed up for all private households in the UK in 1989 (8).
homes of young and old alike will provide the stimulus for new products that combine convenience and wholesomeness.

For nutritional criteria and specific nutrient claims to be considered in product development, manufacturers must not only know the technology of combining ingredients to produce attractive, safe, and nutritious foods, but in the current regulatory and consumerist climate, pay serious attention to formulations, labeling, and cost implications of existing and proposed food regulations and guidelines (10). The introduction of new products requires specialist advice from concept research right through to product launch. If nutrition claims are desired or intended, additional questions need to be answered: Do the ingredients support the claims? Will a nutrition claim trigger any other labeling requirement? How much processing and storage data are necessary to support on-the-shelf nutrition claims? What extra quality control will the product need to support claims? Will the product contribute significantly to the diet? Is the product designed to be a replacement or alternative to a natural food and should it be nutritionally equivalent to the natural food it would replace? Questions such as these will require considerable care and attention as the food industry prepares for the third millennium.

Market trends toward minimally processed foods and those containing reduced levels of antimicrobial agents such as salt, sugar, and preservatives mean that the manufacturer must pay special attention to the hygienic and microbiological aspects of food manufacture (7,11). For example, changing to high-fiber options, as in pasta and rice, may present problems owing to uneven uptake of water, acid, etc.; the absence of emulsifiers could cause phase separation leading to microbial growth; fresh, frozen, and freeze-dried herbs and spices may be microbiologically contaminated; e.g., the use of organic fertilizers on fresh herbs and spices may result in Salmonella, Listeria and Enterobacteriaceae being present in addition to molds, Bacillus, and Clostridium species from the soil. Freezing may prevent growth of organisms but will not necessarily kill them; the freeze-drying of herbs and spices does not ensure freedom from spores such as Bacillus and Clostridium species, and they could retain viability during storage. The removal of one preservative factor may disrupt a whole system of preservation. Hence, preservatives should not be removed or reduced in concentration unless comprehensive challenge tests have been carried out to ensure the microbiological stability of the product. The impact of shorter shelf life products and the stability of a product in packages after opening also need to be carefully assessed.

Many of the products in the 21st century will continue to be based on the staple products that the food industry has been selling for decades. It is essential that the methods by which these are manufactured are constantly updated. It is also essential that the new improved process leads to exactly the same product, which is perceived by the consumer to be unchanged. Some of these demands will present very significant scientific and technical problems, which will make life extremely challenging for all food scientists and technologists, and at the same time present immense opportunities for all technically and scientifically oriented food companies. Forecasting the future is always a gamble. However, it is highly likely that process automation,
biotechnology in the agricultural sector, process design, microelectronics, new packaging utensils, use of microwave radio frequency heating, new sensors, and mathematical modeling for microbiological control will have a major impact. Already there is a substantial trend toward the consumption of fresh and chilled foods and a lesser but significant increase in the frozen food market. In contrast, canned foods are expected to decline further. These trends are entirely consistent with the perceived need for minimally processed, natural, fresh foods (12).

CONSUMER EDUCATION

For the food industry the task of educating consumers about food is approached through labeling, the provision of nutrition information, and clear instructions for safe cooking and preparation of the product. Food retailers were quick to recognize that their interests were directly aligned with the interests of the consumer because of their close daily contact with the consumer. To date, it has been the retailers rather than the manufacturers of food who have retained public confidence. While it is often said that the role of government is to set the rules and parameters for food legislation and the role of the manufacturer is in the development and launching of new products, these bodies have not been convincing in their efforts to educate the public.

In the wider sense, educating consumers about food embraces nutritional values and healthy eating; which foods make for a balanced diet; what products contain key nutrients and food components; food additives and preservatives—what they do and to whom they might be harmful; the basics of food hygiene, storage, and cooking procedures; the use of date and shelf life codes, and the risks of microbiological deterioration and of food-borne disease and to whom the risks might apply; new processes such as irradiation and the environmental and ecological impact of food production.

How Is Nutrition Information to be Communicated?

At a recent conference on “the human food chain” (13) three main themes were identified: (a) the medium—how do people acquire their nutrition information? (b) the message—what sort of information is being, or will be, relayed and to whom? (c) the motivation—how can we encourage people to want to become better educated about nutrition and about the food chain in general? More importantly, how can we encourage scientists, teachers, and the media to interact better to convey that information?

The Medium

By far the greatest volume of nutrition information—and misinformation—comes via the popular media: television, radio, newspapers, magazines, and paperbacks,
many of which enjoy large sales. These are often written by people with no formal training in nutrition or food science, and at present there is nothing to prevent any individual from claiming to be a nutrition expert, even though he lacks any recognized qualification. Our problem is to get the public sufficiently educated and sophisticated to recognize nonsense when they see it. Few people receive any instruction in nutrition at primary or secondary schools; physicians are frequently inadequately informed on matters concerning nutrition and health and have little time to advise the general patient. Some people will be advised by a health professional such as dietitian or a general practitioner, but usually this occurs when a degenerative disease is already manifest. Large retailers have begun to give customers nutrition information, some of extremely good quality; belatedly manufacturers have followed, although in both sectors there is still a tendency to stress the "good" points and omit or de-emphasize the "bad" points.

The Message

Health and nutrition issues are often complex and where a vacuum exists misinformation and quackery can prevail in the public domain. Many correspondents confuse—or have never understood—the distinction between dietary goals for the population and their applications to individual adults and growing children; some writers fabricate meaningless lists of "good" and "bad" foods, and equate "natural" with "safe." Vacillation by nutritionists and public perception that they can never agree about anything have always been highlighted, perhaps unfairly, as a major reason why people become disillusioned and confused about nutrition (13). Many of these problems are caused by the difficulties of extrapolating results of epidemiological and nutritional studies from one population group to another where many variables, including differences in age, sex, socioeconomic conditions, etc., can confound the interpretation. One major observation is that initiatives in nutrition education can only be successful in the context of the education system as a whole. Perhaps we should take a longer view for the 21st century and concentrate our resources only on the very young who are the food purchasers of tomorrow. More emphasis on scientific method and on the practical value of science in the community is needed. Only then can the broadening of syllabuses to include nutrition and health as a component of school curricula be effective. Government initiatives are required to promote and perhaps coordinate efforts to increase public perception and understanding of the food chain and nutrition science (13). Sufficient resources from public funds are needed to embark on a major information and education campaign aimed at school children, their teachers, the medical profession—especially medical students—and the public as well, as a means for monitoring the success of these programs. It is increasingly important that there is a systematic and cooperative approach between governments and the different sectors of the food industry.
## TABLE 4. Eight guidelines for a healthy diet

<table>
<thead>
<tr>
<th>Advice for healthy eating from H. M. Government</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Enjoy your food.</td>
</tr>
<tr>
<td>2. Eat a variety of foods</td>
</tr>
<tr>
<td>3. Eat the right amount to be a healthy weight</td>
</tr>
<tr>
<td>4. Eat plenty of foods rich in starch and fiber</td>
</tr>
<tr>
<td>5. Don’t eat too much fat</td>
</tr>
<tr>
<td>6. Don’t eat sugary foods too often</td>
</tr>
<tr>
<td>7. Look after the vitamins and minerals in your food</td>
</tr>
<tr>
<td>8. If you drink, keep within sensible limits</td>
</tr>
</tbody>
</table>


### The Motivation

Nutritionists are in no position to present with absolute confidence a diet and lifestyle that would unfailingly promote a long and healthy life for each individual. A lifestyle that includes moderate exercise, a prudent diet, the avoidance of obesity, a wise ‘choice of parents—the genetic inheritance!—will probably lead to a greater sense of well-being and may delay the onset of degenerative disease. However, if nutrition education is to be successful and if dietary guidelines, such as those published recently in the USA (14) and in the United Kingdom and shown in Table 4 are to be of practical use, they must be based primarily on an understanding of the basic motivations, attitudes, and demands of consumers, together with the prevailing trends in their eating habits. Consumers want a simple formula for health, longevity, prolonged youth, good appearance and increased vigor, not a discussion of the multifaceted influences on the development of a disease. For example, the achievement of weight control and avoidance of being overweight throughout one’s life are the common denominators of all the existing dietary guidelines, and similarly, overall appearance and more recently, the longer term benefits of being slim, are prime motivating factors in the eye of the public.

The growing interest in leisure activities such as cycling is introducing new dimensions for products catering to those concerned about sports nutrition. Vitality and the promotion of athletic performance are prime motivators. Promoting health and overall fitness, building an attractive body, enhancing muscular performance, giving an extra nervous edge, and preventing exercise-induced injuries are all benefits expected from physical activity and an appropriate feeding behavior. Interestingly, the recommendations for diets for athletes are not dissimilar to the dietary guidelines for healthy eating. Brand names alone can convey most of the message to potential consumers, e.g., prefixes such as “plus,” “super,” “fit,” “vit,” “musc,” “dynam,” “activ,” etc., evoke athletic success (15). Surely the physiological benefits of foods for sport and fitness can provide the motivation for children and adults alike to modify their nutritional behavior. Other highly motivated “target groups”
of the population are identifiable, including pregnant and nursing mothers, mothers with young children, and those individuals who are at higher than average risk of degenerative diseases such as coronary heart disease.

**Nutrition Labeling and Claims**

Generally, the policies and action within the food industry on nutrition reflects a genuine desire to scrutinize the composition and nutritional value of prepared foods and to develop marketing and promotional strategies that will permit the consumer to make informed choices and enjoy the benefits that modern food technology can provide (12). Nevertheless, the use of scientific facts, issues, judgments, or implications, to describe, promote, and advertise foods, requires very special care and attention to the basic food laws; namely to avoid false descriptions of a food and to mislead as to its nature, substance, or quality.

Negative claims, "naturalness," comparative claims, claims resulting from the fortification of foods with vitamins and minerals, and more recently the increasing use of health claims have all undergone substantial scrutiny, and various guidelines have attempted to remove inconsistencies, ensure fair trade, and restrict the use of those claims that are either spurious or which emphasize qualities that are only marginal and which may, therefore, give a completely wrong impression of a food and its use (16–18).

Implicit claims for the presence of vitamins, minerals, proteins, fatty acid content, etc., are already controlled by the Food Labelling Regulations 1984 in the United Kingdom (19). Claims as to the suitability of a food for use in the prevention, alleviation, treatment, or cure of a disease, disorder, or particular physiological condition are prohibited unless they follow strict rules for such foods as those for special dietary use. More recently, however, there has been a trend toward more explicit health-related and disease prevention claims on food packs—e.g., calcium for osteoporosis, dietary fiber for cancer prevention, low cholesterol for heart disease, etc. The concept that foods and diet can be selected to have a beneficial effect on the body and mind gives food a new dimension and reflects a trend toward health consciousness which is common across all of the developed world. Japan is leading the world in the development of the so-called "functional" foods (20) and Fig. 4 illustrates those areas where nutrition claims and statements are already being developed either implicitly or explicitly. The Japanese authorities are already wrestling with claims that have a doubtful scientific basis, and they are aiming to establish criteria for the proper description of "functional" foods. For example, the food must be a normal food (not a capsule or pill), which is derived from naturally occurring substances; it can and should be consumed as part of a normal daily diet; it should have a particular function when ingested, serving to regulate a particular body process; and the consumer must neither be misled nor encouraged to consume products that are either unnecessary or may be inappropriate for the individual's needs. The preoccupation in Japan is to establish what ingredients/foods are active components,
what claims are justifiable, what tests should be conducted, and how tests should be conducted to validate claims. In the European Community and in the USA there has been a general tightening of labeling regulations relating to nutrition claims, and we can expect a sharper focus of attention as new products are launched with purported built-in health benefits.

While health claims on food labels can be an important way of conveying nutrition information to the public there is concern that, without sufficient control or guidance, such claims would furnish potentially misleading and/or harmful information. There is a need to develop a case-by-case basis to evaluate any health claim. The basic problems are how to allow valid, appropriate health claims on foods without opening the door to misleading and fraudulent claims, and to ensure that disease prevention claims are founded on and are consistent with widely accepted, well substantiated, peer-reviewed scientific publications (21). Further complexities in implementing health claims on food labels are related to the amount and kind of scientific data necessary to substantiate such claims, the difficulty in simplifying complex health measures to fit the limited space on labels, and the threat of "power races" among food companies to gain a competitive edge. To maximize their effectiveness, validated health claims would need to be used in conjunction with other nutrition education efforts.

Several nutrients have been added to food and drink products around the world, both as public health measures and as cost-effective ways of ensuring the nutritional quality of the food supply. Addition of some nutrients has also formed the basis of marketing strategies in product development. Food fortification requires careful attention to food regulations, labeling, nutritional rationale, cost, acceptability of the product to consumers, and a careful assessment of technical and analytical limitations.
for compliance with label declarations (22). The indiscriminate additions of nutrients to foods, however, should be discouraged and information on food labels should not overemphasize or distort the role of a single food or component in enhancing good health.

Any nutrition or ingredient information on a food label should be backed up with a coordinated educational effort from public funds to ensure that consumers can apply their nutrition knowledge to make informed choices about food (13). There is, however, a real danger in introducing a nutrition labeling program with no educational program to support it. Food labeling, and in particular the use of nutrition and health claims, is potentially the most significant food policy issue. Food labels will understandably become one of the most widely read sources of information; the gradual emergence of new scientific evidence linking diet and health will stimulate further the provision of nutrition information and claims on food labels and their use in marketing and advertising.

LEGISLATION CONCERNING FOOD AND NUTRITION CLAIMS

The regulations concerning the addition of nutrients to foods and the authority to make claims vary considerably from one country to another, and many problems can arise for food manufacturers and for nutrition education owing to this lack of harmonization. Differences in methods of analysis, the variations in the lists of recommended daily allowances (RDA) of the nutrients, and the varying proportions of the RDA to make a nutrient claim are also problems that are encountered by food manufacturers selling the same products on an international basis (22).

For example, the reference points for addition of nutrients can be per 100 g per kg, per 100 kcal, per food serving (in grams), or per the amounts of a food that can be reasonably consumed in a day (in grams). In addition, the serving sizes of daily portions can, of course, vary considerably from one population to another depending on eating habits.

In view of the wider use of nutrition claims in the labeling and advertising of food products, there is a need to compile an up-to-date compendium of existing laws, with a view toward greater harmonization of approach for the future. Major differences in legislation and guidelines already exist throughout Europe and North America on claims such as low and reduced energy (calories), low and reduced fat, high content of polyunsaturated fatty acids, low content of saturated fatty acids, low cholesterol and cholesterol-free, low salt, reduced salt, and salt-free, increased and rich in fiber, as well as the use of the words “light” and “lean.” In some countries in the European Community there is still absence of any reference to these sorts of nutrition claims on food labels. Hence nutritionists, particularly scientists in industry, and legislators will have to work hard to identify and harmonize the criteria for claims and effective ways to communicate these nutrition messages.
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NUTRITIONAL AND COMPOSITIONAL DATA BASES

Consumers whose interest in nutrition has been awakened will want to be able to assess the nutritional value of the products they consume, and they will look increasingly to the food label to supply this information (23). The food manufacturing industries have responded by a marked revival of interest in the composition of foods, in improved methods of analysis, and in the establishment of nutrition data bases for information about their products.

Food composition and nutrient intake data are essential in order to assess dietary adequacy and its relationship to human health and longevity. In addition, technical accuracy and compliance with specific legal requirements need a comprehensive food composition data system. Today, the maintenance of records of compositional standards and nutrition profiles is an awesome task. The data bases can provide (a) nutrition information for declarations on packs, sales brochures, tenders and contracts, dietary and product information sheets, identification and substantiation of nutrition claims, and private label specifications; (b) product information for claims on packs and in advertising, private label specifications, consumer inquiries, and government and media inquires; (c) data for food intolerance data banks, e.g., the Leatherhead Food RA “free from” and “contains” lists. To ensure that all on-pack statements and claims can be substantiated requires specialist assessment and collation of data on raw materials, semiprocessed materials, and finished products; good control and unique numbering of recipes; careful checking of analytical work; scrutiny of calculations; and specialist input of the information into the data base.

As changes occur in food consumption patterns, agricultural practices, food processing and preservation techniques, food distribution systems, and food preparation inside and outside the home, the means to monitor and assess nutrient availability become vital. Research and quality assurance procedures provide information not only of use to consumers but also to the agricultural and food manufacturing industries. Without the analytical information to measure the amounts and bioavailability of nutrients in the food supply, the assessment of the degree of risk from nutrient excesses or deficiencies cannot be made.

With greater European and global harmonization, it is essential that the amount, quality, and availability of food composition data are properly coordinated, that common methods of analysis are agreed internationally, and that expression of information is compatible. Here lies a real opportunity for government and industry to collaborate in developing new and existing data bases.

PRIORITIES FOR FOOD COMPOSITION RESEARCH AND DISSEMINATION OF NUTRITION INFORMATION

It is essential for those who become interested in nutrition to have a multidisciplinary approach and at the same time it is necessary for them to assimilate quickly
and use tools from the very focused disciplines of basic science and technology. Nutrition science needs to have far greater application of the more basic skills of chemistry, physics, biochemistry, physiology, molecular biology, and genetics. Nutritionists also need an understanding of the psychological and sociological influences on food acceptability. Although a nutrition research philosophy will be needed to allow the discipline to evolve and survive, the commitment to more basic research efforts is fundamental to the development of the science. Examination of existing data for composition and bioavailability of nutrients in foods, as eaten, as well as the methodologies for the analysis of foods, indicates that these areas warrant further study (24). Basic underpinning research is needed to increase the state of knowledge of the mechanisms by which biological macromolecules and food components interact to influence the quality and nutritional value of foods. A greater understanding of complex food matrices depends upon sound basic studies in food chemistry, physics, and process engineering. The research should address (a) interactions between food components and their influence on the physicochemical properties of raw materials and finished products; (b) the effects of processing on the sensory and nutritional value of foods; and (c) new sensing technologies for monitoring food quality. For maximum benefit from food composition research, high priority should be given to those nutrients and food components that are associated with public health problems for which data are inadequate. The application of the basic sciences to nutritional and compositional studies require more focused attention to priority areas. For example:

Which foods? Analysis of foods as eaten yields immediate information on nutrient intakes and provides information for dietary advice. Priority areas can be selected by (a) assessing relationships between nutrient intake and public health problems; (b) manufacturing benefits, e.g., release authorization for product safety and quality; (c) trade benefits including labeling and claims.

Which nutrients? (Protective factors?) Assessment of priorities based on (a) state of methodology—sufficient, substantial; conflicting, fragmentary; little/none; (b) speed of analysis; (c) cost of analysis.

Which methods? (All methods do not work for all foods) On-line measures and sensors to monitor physical, technical, and microbiological properties of raw materials; appraisal of internationally proposed analytical methods and calibration procedures; applications of histochemical and immunological techniques for food components; multiple trace element analysis, etc. The further uses of nutrition and compositional data bases include: (a) the determination of nutrient intakes of target groups from market information on kinds and quantities of food consumed; (b) the development of educational materials that describe types and amounts of foods to use to meet desired (optimal?) nutrient levels, and how to select alternative foods to control costs (e.g., food service, catering, and institutional meals); (c) establishment of "typical" values for labeling all foods with the "Big 8"1 and assessment of appropriate serving sizes.

1 The "Big 8": energy; protein; carbohydrate, sugar; fat, saturated fat; sodium; fiber.
CONCLUSION

In the United Kingdom, the COMA report (25) made a significant impact in changing attitudes toward food and diet. The acceptance by the government and food industry of the COMA report resulted in a commitment to encourage changes in the diet in many ways, including research and development to create new foods to fit a "healthy" diet, the provision of nutrition information, and new controls and guidelines on labeling. A well designed nutrition labeling program is an important component of any educational efforts, but the provision of information is only one part of the behavioral process which is aimed at promoting long-term dietary changes. Public and private sector initiatives could help consumers understand and apply the nutrition information on the label. Only with comprehensive nutrition education programs can consumers plan diets and make appropriate food choices to reduce the risk of diet-related health problems (23).

Recently, a European Community directive on nutrition labeling for foodstuffs was negotiated which will standardize the rules throughout Europe. The directive (26) lays down a statutory format for the provision of nutrition information on food labels in a two stage approach. The first stage provides for energy, protein, carbohydrate, and fat, plus sugar, sodium, saturates, and fiber ("the Big 8") in the second stage. The provision of information remains voluntary, although when given it must be in the agreed format. The exception to this is where a nutrition claim is made when the provision of the information is compulsory. The first stage of this approach comes into final effect in October 1993; the second comes two years later, in 1995. Although the dates of implementation of the directive have disappointed many consumer and health groups in the United Kingdom, the food industry has been actively encouraged to provide comprehensive nutrition information and many manufacturers, including Nestlé UK Ltd, are already implementing a policy to provide the "Big 8" across most of its product ranges.

Today there is a broad consensus about what constitutes a healthy diet and there has been a plethora of both qualitative and quantitative dietary guidelines. The guidelines and recommendations are issued by governments in the belief that modification or management of dietary trends will reduce the prevalence of diet-related degenerative diseases. Many committees are setting specific dietary goals and targets with quantitative lower and upper limits for components of the food supply identified as being most relevant to public health. For example, the World Health Organization report (27) has recommended that total dietary fats should comprise between 15% and 30% of total energy intake; and saturated fatty acids and refined sugars, between 0% and 10% of total energy. It is, however, questionable how realistic these diet goals can be when these lower limits are set at zero (28). All naturally occurring fats contain mixtures of unsaturated and saturated fatty acids, and it is impossible to select a diet adequate in the essential fatty acids that contains no saturated fatty acids.

It should not be assumed that the apparently simple matter of reducing daily fat or sugar intake is really as straightforward as it seems. We eat food, not fat, carbohydrate, proteins, vitamins, and minerals. There may be concomitant adverse
nutritional consequences of reducing fat intake depending on which foods it is chosen to reduce. Hence, recommended nutritional changes must be seen in the context of specific foods as part of the whole diet (29). Changes in fat and carbohydrate cannot be discussed in isolation from the foods that contain them and changes in consumption of one food influence the consumption of another. Expert committees issuing guidelines or goals usually overlook this practical point. Clearly, however, much greater attention must be paid to the targets of our education programs, the language of our communication, and the communication of information in lay terms. Food manufacturers have a responsibility to supply a wide range of safe quality foods labeled in compliance with the law. The provision of clear, consistent nutrition information on the pack, together with a responsible approach to any nutrition and health-related claims will be best achieved by close cooperation between the regulatory authorities and all sectors of the food industry. Much greater attention must be paid to a sound nutrition education policy including inputs from the government, educators, the media, and the food industry.

REFERENCES

DISCUSSION

Dr. Schiffman: In view of the aging population do you think there would be a case for food stores with products orientated toward older people?

Dr. Richardson: I don't think the development of foods specific to an older age group would be particularly appealing unless they are classified as special dietary foods. The variety and choice of foods should always be sufficient for the population as a whole. If I were an elderly person I wouldn't find the idea of obtaining all the foods I would need from a store for geriatrics particularly appealing!

Dr. Georgala: In relation to the educational role of industry and government, some would say that the credibility of both is very low, for all sorts of reasons.

Dr. Richardson: I would be the first to admit that in the United Kingdom at least people at present have little confidence in the government or in the food industry. However, many efforts are being made to ensure the safety of the food supply. For example, the surveillance programs carried out by the government and the large food manufacturers in the UK in relation to heavy metals, pesticides, and other potential contaminants are extremely comprehensive. The food industry rarely tells people about the extent of such work. Industry must provide more information and be more open so that consumers understand where their food comes from.

Dr. Goldberg: There is clear overinterpretation, misinterpretation, and exaggeration of the health value of certain foods such as oat bran. The amount of oat bran you find in cereal boxes is trivial compared to what you need to eat to see a cholesterol lowering effect. These spurious claims invite second- or third-party intervention to supervise the situation. Unless industry is really going to regulate itself it is going to be subjected to organizations such as the AHA, or to legislation, to regulate the claims.
Dr. Richardson: I agree. Human studies carried out on the cholesterol lowering effect of baked beans showed that each of the unfortunate subjects had to consume 400 g, that is a whole tin, every day for about a month before any effect on blood lipids was seen!

Dr. Harper: Has anyone considered treating health claims like the safety claims for food additives? Before you can make a health claim you must submit evidence that the claim has been substantiated and that in tests with consumers there is adequate evidence that the claim is not misleading.

Dr. Richardson: Any claims and statements about the health-giving properties of foods must be capable of substantiation and not be misleading. This approach encapsulates the basic principle of food law. However it is still possible to convey a health message by skillful use of marketing techniques and imagery.

Dr. James: I should like to tackle the problem of labeling. How is the public going to understand what is in a food? The standard story I accepted until two or three years ago was that the only way is to have a completely free market as long as everything is labeled properly and in a way that can be interpreted. But this means you have to have labels about a whole series of different issues—the source of the product, the flavors, the additives, and now the nutritional properties. In fact, few of the implications of this labeling are understood. I think we are guilty of creating a mechanism that allows us to say we have done our job, while in practice we have produced a recipe for total confusion. I have not yet met a nutritionist who is capable of going around a supermarket and giving me a proper explanation of the choice of purchases based on the nutrition labeling. What is the solution to this?

Dr. Richardson: Consumers tend to buy products through habit or by brand. If they recognize the brand they are usually reassured about quality and safety. One observation made in the USA is that when nutrition information is provided on the label the purchasers are generally reassured, and the longer the list of information the more reassured they are. I agree that the elements of food labeling that are understood are probably quite few, but for people suffering from food allergies or other specific food-related disorders the labels can be essential. In the UK our policy is to provide the "Big 8" on the whole range of Nestlé products. We have the information so why not use it?

Dr. James: A solution would be to move to some commonly accepted coherence in labeling so that foods would be displayed in the supermarkets in a systematic way, showing the nature of the product, its source, its nutritional content, and so on. People would then get the idea that there are different ways of looking at, for example, a yogurt. They could see whether it was strawberry flavored, strawberry containing, or flavored with synthetic strawberry taste. The retail trade would thus do the discriminating for the consumer.

Dr. Richardson: I do not like the idea of categorizing foods into good or bad. All foods have a role in a properly balanced diet.

Dr. James: That is a separate issue. To persist on the nutritional point, the dilemma is how to put nutrition information into a simple system. What about some sort of graphic representation?

Dr. Richardson: I support the idea of giving standardized quantitative nutrition information on the label. I think in addition that there could be a place for having a simplified pictorial description on the pack. Several forms of pictorial descriptions have been used by some of the large retailers. Unfortunately they have different formats. A consistent system is needed. A pictorial system might also be used as a basis for making nutrition claims.