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**DANONE
RESEARCH**

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Summary

Consumers are increasingly conscious of what they eat and how it affects their health. The food industry has reacted by providing more detailed nutritional labelling together with information concerning the nutritional value of their products. In order to ensure a higher degree of consumer protection, a European regulation has been drafted and all claims concerning health or nutritional values must now be based upon validated scientific evidence and may only be carried by products having a profile compliant with the definition given by the European Community. This new European regulation will provide consumers with greater assurances and will allow manufacturers whose products offer veritable health advantages to compete fairly on the internal market of the EU.

In addition, national authorities, researchers and manufacturers have proposed nutrient profiling systems. These schemes are based upon a selection and combination of five parameters: approach by food category or transversal approach, approach based on thresholds or scores, choice of selected nutritional criteria, choice of reference units, definition of thresholds of eligibility.

To date, more than 20 systems have been developed based on scientific criteria, but in different contexts and with different aims. This issue of Nutritopics examines seven of these systems and describes the difference between existing systems. This topic is at the heart of current regulatory debate since nutrient profile systems are of great importance to public authorities, consumers and food manufacturers alike.

TOPICS

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Introduction

Introduction

Food and eating patterns constitute central factors in many diseases. It is estimated that 90% of coronary diseases and 30% of certain types of cancer could be prevented by improvement of lifestyle, in which nutrition plays an essential role (1).

Despite nutritional education campaigns and the introduction of numerous measures designed to guide consumers towards improved eating habits, the prevalence of chronic diseases, including type II diabetes, cardiovascular disease and obesity, is continually on the increase in the European countries. Forecasts indicate that worsening is likely, and will probably lead to reduction in human life expectancy for the first time in centuries (2).

In order to combat this tendency, among other measures the European authorities are seeking to introduce the notion of nutrient profiles to allow evaluation of the eligibility of individual foods to carry nutritional or health claims on the basis of their nutritional composition (1).

The concept of nutritional quality of food products is difficult to grasp in its entirety: all foods contain a number of nutrients that are more or less useful. This intrinsic complexity means that while each food may have a legitimate place in a balanced diet, defining this place is a delicate operation making food choices difficult (3).

“Nutrition claim: any claim which states, suggests or implies that a food has particular beneficial nutritional properties due to the energy it provides and/or does not provide, the nutrients or other substances it contains or does not contain. (4) For example, a food may contain calcium naturally and be described as “naturally rich in calcium.”

“Health claim: any claim that states, suggests or implies that a relationship exists between a food category, a food or one of its constituents and health.” (4) A food rich in calcium may bear the health claim “calcium helps promote bone growth.”



“Increasing numbers of foods labelled and advertised in the Community bear nutrition and health claims”. In order to provide consumers with relevant information, food products must comply with an initial requirement concerning their composition, namely nutrient profiles. “[Thus] the application of nutrient profiles as a criterion [eligibility to bear health or nutrition claims] would aim to avoid a situation where nutrition or health claims mask the overall nutritional status of a food product.” (4).

Context

Nutrition and health claims: The new european regulation

Within the European Community, **nutrition and health claims** are increasingly being used on food packaging and in different forms of advertising. These claims consist of **information most readily identified and clearly understood by consumers** who associate them with **the best products in nutritional and health terms**. Some nutrition claims can in fact mask the overall nutritional status of a food product, and this could mislead consu-



Nutrient profiles will be established by the Commission and the Member States based on the opinion of the European Food Safety Authority (EFSA) after consultation with manufacturers and consumer associations. These profiles will be updated regularly in accordance with scientific progress. Nutrition claims may thus only be authorised for products complying with the established nutrition profile: food products for which nutrition and health claims are sought must henceforth meet this new requirement.

mers trying to make healthy choices in the context of a balanced diet. This is the case for instance with claims such as "0% fat" in a product containing 100% sugar, e.g. ice lollies.

In order to combat such deviations in nutrition and health claims, and in the interests of harmonisation of EU law, the European Union has created a **new regulation governing the use of such claims** (4). This regulation complements the general principles set out in directive 2000/13/EC (6) and establishes specific measures concerning the use of nutrition and health claims for foods intended to be supplied as such to consumers. Thus, the new regulation stipulates that *"The application of nutrient profiles as a criterion would aim to avoid a situation where nutrition or health claims mask the overall nutritional status of a food product, which could mislead consumers when trying to make healthy choices in the context of a balanced diet."* In addition, article 4 of regulation (4) states that **foods must comply with nutrient profiles** (to be defined by the Commission by 19 January 2009) **in order to bear nutrition or health claims**. Furthermore, all health claims used on food packaging or for advertising must also be based on *"generally accepted scientific evidence relative to the relationship between diet and health."*

The new regulation also states that nutrient profiles must be created taking into account the following in particular:

- *"The quantities of certain nutrients and other substances contained in the food, such as fat, saturated fatty acids (SFA), trans-fatty acids (TFA), sugars and salt/sodium;*
- *The role and importance of the food (or of categories of food) and the contribution to the diet of the population in general or, as appropriate, of certain risk groups including children;*
- *The overall nutritional composition of the food and the presence of nutrients that have been scientifically recognised as having an effect on health."*

"However, profiles should also allow for product innovation and should take into account the variability of dietary habits and traditions, and the fact that individual products may have an important role in the context of an overall diet." (4)

Through this new regulation, the nutritional composition of foods takes on considerable importance since it helps **determine whether or not a food is eligible to bear a nutrition or health claim**. This measure may be considered a reinforcement of the principle of not misleading consumers.

Many parties (national authorities, researchers, manufacturers, consumer associations, etc.) have focused on a definition of tools allowing the measurement of the nutritional quality of foods based on nutritional composition as well as their eligibility to bear claims. As a result, various systems of nutrient profiles have been developed.

**[The European Union
has defined a new regulation
in order to restrict
the use of nutrition
and health claims]**

Parameters Creation of a nutrient profiling system

All nutrient profile systems are the outcome of choices concerning the following parameters; these choices are largely dependent on the objective in question.

1. Have the profiles been established for foods as a whole (transversal system) and/or for individual food categories?
2. Which nutritional criteria need to be taken into account?
3. Which calculation method has been used (threshold vs. score)?
4. What are the thresholds of eligibility and how are they defined?
5. What is the reference unit?

Methodological approach: by food category or transversal

"When setting the nutrient profiles, the different categories of foods and the place and role of these foods in the overall diet should be taken into account and due regard should be given to the various dietary habits and consumption patterns existing in the Member States." (4). Thus, the notion of food categories is one of the main questions in the development of a nutrient profile system. There are three possible approaches: an **approach by food category**, a **transversal approach**, or a combination of the two.

In the first approach, a nutrient profile is defined for each food category, e.g. milk and dairy products; bread, starch and cereals; meat, fish and eggs. Using this method of definition, the specific

Table 1: Overview of existing types of classification (Source: Report of stages of IFN studies on nutrient profiles)

Types de classification	For educational purposes	For statistical / epidemiological purposes	For regulatory purposes	For commercial / marketing purposes	For consumers
Existing examples	Food Pyramids and Guides	INCA, CIQUAL, EFG, Eurocode 2, Dafne, EuroFIR, EPIC, OCA	National and community legislations, Codex, FDA	Eurostat Ramon, Secodip, Nielsen	Nutrichoice, on-line supermarkets
Number of categories	5 to 9	13 to 44	3 to 21	8 to 9	3 to 4
Existence of sub-categories?	Possible	Yes if the number of categories is low (13 to 15)	Very high number of sub-categories (several levels possibles)	Very high number of sub-categories (several levels)	Some 30 sub-categories

features of food categories are taken into account, making them more realistic. The chief limitation of such an approach lies in the definition of food categories; there is little agreement on this subject because of the number of categories and the foods that should be classed in different categories. The definition of the latter is based upon elements as varied as nutritional characteristics, consumer perceptions and regulatory requirements. Consequently, several approaches exist, and there may thus be several answers (Table 1). Furthermore, it should be noted that foods may also be classified according to their place in the diet, which may vary from one country to another.

In contrast, under the transversal approach, a single profile exists irrespective of food categories: all foods come under a single profile whether dairy products, oil or fruit. The definition of nutrient profiles is simpler in this case, but the individual characteristics of food families are not taken into account. Hence a clear limitation emerges in this second approach: some entire food categories (such as fats in most cases) clearly suffer and may be erroneously associated with absence of a varied and balanced diet.



Given the respective limitations of each of these two approaches, a number of systems have attempted to combine them

Choice of nutritional criteria to be taken into account

The main nutritional criteria studied in the various systems are nutrients (or ingredients) known for their impact on public health. A distinction is made between **positive nutritional criteria** (nutrients often lacking in the diet and/or associated with beneficial health effects, e.g. dietary fibre, omega-3 fatty acids (ω 3FA), vitamins and minerals, etc) and **negative nutritional criteria** (nutrients generally eaten to excess and and/or implicated in chronic diseases such as type II diabetes, e.g. fats, SFA, cholesterol, sugars, salt/sodium, etc). Although quantitative analysis of these nutrients is most frequently used, some systems also take account of the quality of the nutrients: SFA, TFA, ω 3FA, etc. In addition, although in existing profile systems negative nutritional criteria are generally similar; there is a wide variety in the choice of positive nutritional criteria.

The main objectives of the systems and of national public health policy affect the choice of nutritional criteria used in profiles. Ingredients (fruit and vegetables, oleaginous plants, for example) may also be taken into account.

Two methods of measuring nutritional quality

Two methods of measuring nutritional quality exist: **scoring systems** and **threshold systems**.

In the first, the **scoring system** assigns an overall score to the food obtained by **combining its nutritional weaknesses** (negative nutrient score) and its **nutritional benefits** (positive nutritional score) (Fig. 1).

In some scoring systems, the overall negative nutrient score is kept separate from the overall positive nutrient score, allowing finer distinction to be made between individual foods.

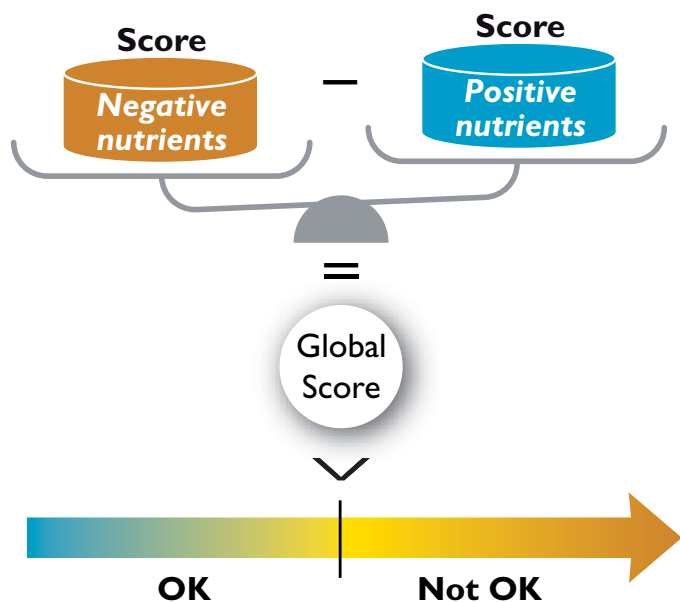


Figure 1: Scoring system (Source: Danone Research) In the above example, the positive score is subtracted from the negative score, and thus the lower the score the better the product.

Where this measurement method is used, weighting factors may also be assigned to nutrients according to the importance of an individual nutrient in public health terms or to the importance of the category in relation to the nutrient in question. In this way, the system may be fine tuned by considering that all foods do not have the same importance. In contrast, rejection of weighting factors is equivalent to implicitly assigning a weight factor of one to each nutritional factor; regardless of food category. All nutrients thus have the same importance, which is scientifically inaccurate but simpler to use from an operational standpoint.

The second calculation method is based solely on the **notion of thresholds**. For each nutrient considered, a threshold (and in some cases two) is defined, resulting in two or three classes of nutrient content (good / intermediate / bad). Depending on the system and nutritional criteria considered, the combination of criteria is designated by 'OR' or by 'AND' (Fig. 2). In the latter case, a food must meet all criteria simultaneously; deficiency in a single criterion results in rejection of eligibility for nutrition and

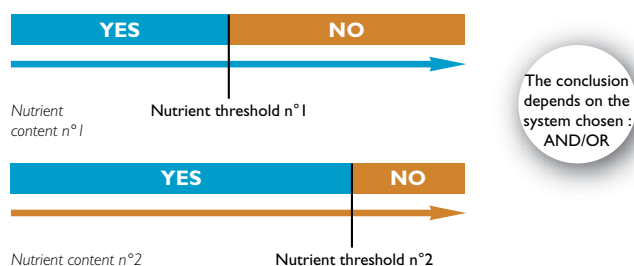


Figure 2: Threshold system (Source: Danone Research)

health claims. This system is extremely restrictive since foods are reduced to a sum of criteria considered as restrictive. All foods in fact provide 'some good' and 'some bad'; it is in fact all the foods in our diet that determine the nutritional quality and balance of our food intake. For an 'OR', the food in question must meet at least one of the different criteria in order to be eligible to bear a claim. Within existing systems, this is often the case for nutritional criteria with positive connotations.

From a mechanistic viewpoint, the threshold system appears simpler than the score method, although from a nutritional standpoint it is less coherent. The threshold method does not in fact allow for compensation of the nutritional defects of a food by its nutritional qualities.

Determination of eligibility threshold values

Threshold values, irrespective of the type of system used (threshold or score, transversal or by categories), are very often obtained using **nutritional recommendations published by public health authorities** (WHO recommendations 2003 (1), national recommendations, regulatory thresholds, etc).

A nutritional recommendation developed for the overall diet is occasionally applied directly to individual foods. With fat for instance, which has a recommended consumption level of 33% of the daily energy intake, transposing this nutritional recommendation to a specific food is equivalent to setting the total threshold at 33% of the total energy intake for the food. Nevertheless, with transversal systems, transposition of nutritional recommendations in identical fashion for all foods occasionally yields absurd results: with this approach, the threshold set for SFA would in fact be 8% of the energy provided by the food (based on the WHO recommendations), despite the fact that no dairy products could reach this threshold in SFA since 65% of dairy fats are in the saturated form.

Similarly, the threshold value used for a given nutrient may correspond to a nutritional recommendation based upon reduction of the nutrient. For example, if the goal is to ensure a 2.5% reduction in fat consumption, applying a 2.5% reduction to the mean content of standard foods within the category sets the threshold.

It should nevertheless be noted that these nutritional recommendations were developed for diets in their entirety and not for individual foodstuffs taken separately. Direct application of recommendations to an individual food is thus not necessarily meaningful. In the majority of systems, there is generally no scientific rationale supporting the threshold values selected or indeed the fact that certain classes are considered as 'healthy' while others are viewed as 'less healthy'. Similarly, few systems take into consideration the realities of the market and of consumption patterns: there is nevertheless a divergence between recommendations and actual consumption.

Choice of reference unit

The existing systems use different reference units; some in fact combine several such units.

The **“100g” unit** is the most widely used. It is especially simple and is consistent with European nutrition labelling systems. However, it penalises foods consumed in small quantities such as oils for instance while favouring those consumed in larger quantities.

The **portion unit** is used less frequently in Europe. This approach nevertheless appears more logical because foods are in fact consumed in portions rather than in 100g units, but some agreement is required on what constitutes the size of a portion as well as on the frequency of intake.

Finally, **analysis per 100kcal of product**, the most scientifically accurate approach since recommendations are expressed in these terms, is in fact the most difficult to use and is consequently

rarely adopted. It nevertheless provides an accurate reflection of the content or lack of nutrients in a given food, thereby allowing comparison of different foods, irrespective of water content. However, this unit is detrimental to single-nutrient foods or foods having a high water content.

[All nutrient profiling systems are based on combinations of different parameters.]

Table 2: Strengths and weaknesses of the parameters used in the creation of a nutrient profile (Source: Danone Research)

Parameters	Advantages	Disadvantages
Definition	<p>Transversal approach: single profile irrespective of food</p> <p>Simple system in which transcription of nutritional references is easy.</p> <p>Approach by food category</p> <p>Intrinsic characteristics of foods taken into consideration: greater facility for product evolution.</p>	<ul style="list-style-type: none"> • Results in comparisons between foods that are of little practical value. • Penalises entire categories (fats), which is inconsistent with the notion of a balanced and varied diet. • Problem of consensual definition of food categories. • This approach is incompatible with a high number of categories: risk of complication of the system making it inoperative.
Nutritional criteria		Choice of negative nutrients only gives an incomplete idea of a product's nutritional quality.
Method of calculation	<p>Score</p> <p>Only a scoring system may take into account and combine nutritional defects (negative food scores) and nutritional qualities (positive food scores) for food products.</p> <p>Threshold</p> <p>Definition of a threshold is apparently simpler and more objective in transversal systems.</p>	<p>Presence of side-effects with discreet scoring systems.</p> <p>The different criteria represent additional constraints: no compensation possible between criteria.</p>
Determination of threshold values	<p>Application of international dietary recommendations to foods</p> <p>Nutritional recommendations developed for overall diets and not for individual foods.</p> <p>Application of nutritional policy aims to food</p> <p>Nutritional recommendations developed for overall diets and not for individual foods.</p>	
Weighting	Weighting factors may be selected based on the importance of an individual nutrient or nutrient category in public health terms.	Failure to use weighting results in assigning equal importance to all foods (weight = 1 by default).
Reference units	<p>Per 100g of food</p> <p>Simple and consistent with European food labelling systems.</p> <p>Per portion</p> <p>More logical since foods are consumed in portions (and not in quantities of 100g or 100kcal).</p> <p>Per 100 kcal of food</p> <p>Provides a very accurate reflection of the intrinsic richness or deficiency in nutrients of a given food.</p>	<p>Penalises foods consumed in small quantities while favouring those consumed in larger quantities.</p> <ul style="list-style-type: none"> • Rarely used in Europe. • Requires consensual definition of portion size as well as frequency of intake. <p>Very rarely used and highly complex.</p>

PRINCIPAL NUTRIENT PROFILING SYSTEMS

To date, more than 20 nutrient profile systems have been developed using scientific bases, but in different contexts and with different aims. The construction of such a system involves combination of the five parameters defined above, but the consequences in terms of product classification vary widely. Below in this issue of *Nutritopics*, we give a detailed account of 7 of the 20 systems currently being discussed by the scientific community, regulatory authorities and food manufacturers. The seven systems discussed illustrate the variety of approaches within existing systems.

FSA Scheme

FSA scoring system for children

The latest version (2005) (8;9;10) of the nutrient profiling system of the Food Standards Agency (FSA, United Kingdom) is aimed principally at providing a **scientific basis for the creation of rules to restrict television advertising targeted at children and adolescents** (7). However, this system also applies to all persons over the age of five years where particular attention is to be paid to salt intake.

The nutrients analysed as well as the food categories adopted are consistent with public health priorities in the United Kingdom that encourage consumption of proteins, fibre as well as fruit and vegetables and nuts. At the same time, the regulations seek to restrict consumption of foods rich in calories, sugars, salt and SFA. This system therefore recommends three positive nutritional criteria and four negative criteria.

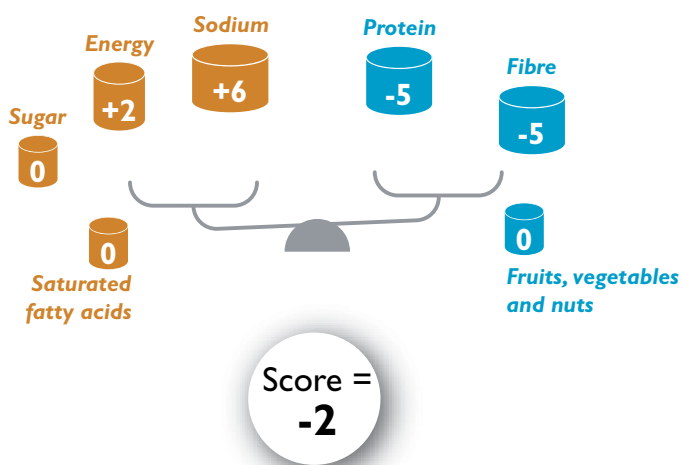


Figure 3: Example: nutritional analysis of whole bread using the FSA scheme (Source: 9) The overall score for whole bread is -2: the nutrient profile of whole bread is therefore compatible with advertising aimed at children

Table 3: FSA Scheme: Scoring system (9)

Overall Score	≤ 0	1	2	3	≥ 4
	More healthy	Intermediate			Less healthy

The FSA scheme is a scoring system; one point is equivalent to 3.75% of the UK GDA (Guideline Daily Amount). A score is assigned to each nutritional criterion: the latter is higher for nutrients present to a larger degree in food products. The scales used for each nutrient are discontinuous. The total positive nutrient score is subtracted from the total negative nutrient score and the overall total obtained allows foods to be classified into three categories: 'more healthy', 'intermediate' and 'less healthy'. Only foods with an overall score of ≤ 3 present a nutrient profile compatible with advertising aimed at children (Tab.3).

The FSA scheme allows good discrimination between food products; in addition, its classification of food presents a high degree of correlation with that of the UK experts. It should nevertheless be noted that the percentages used for nutritional recommendations (3.75%) have been chosen arbitrarily and analysis of food in terms of 100g units tends to penalise foods having high calorie contents. Finally, the use of a stepped scoring system presents side effects: a minimum amount of variation around the threshold can easily result in the gain or loss of a point, pushing the food in question from one zone to another; such side effects may be avoided by the use of continuous scales.

USA Health Claim Scheme

Food and Drug Administration scheme

The nutrient profiling system used by the Food & Drug Administration (FDA, United States) (11) was devised in 2002 in order to **identify food products eligible for nutrition and health claims in the United States**; this aim is shared with the future European nutrient profiling system.

Only those products satisfying negative nutritional criteria and having at least one positive criterion are allowed to bear claims: the content of negative nutrients (fats, SFA, cholesterol and sodium) and positive nutrients (vitamins A and C, iron, calcium, protein and fibre) must be respectively lower than and higher than the stipulated thresholds. The latter have been set at 10% of the DRV (Daily Reference Values) for positive nutrients and at 20% of the DRV for negative nutrients; no explanation is provided regarding the rationale supporting these values. Thus, according to the USA Health Claim Scheme, products must have no

nutritional weaknesses and must present at least one recognised quality in order to qualify for a claim.

Finally, the reference unit used in this scheme is the portion (portion size, with a minimum of 50g); where clearly defined, this unit is consistent with consumption in practice. In the United States, portions are clearly defined for the purposes of nutritional labelling, which is not yet the case in Europe. It should also be noted that despite a transversal approach, some claims have specific features: a product presenting a claim based on hypertension must have a lower salt /sodium than other foods.

4 negative criteria (disqualification thresholds)		+	At least 1 positive criterion (qualification thresholds)	
		Product	Reference threshold	Results
Chocolate biscuit		Product A	Reference threshold	Product A
Fat	g	20.2	13	false
SFA	g	11.3	4	false
Cholesterol	mg	50	60	true
Na	mg	208	480	true
Vitamin A	µg	0	80	false
Vitamin C	mg	0	6	false
Ca	mg	22.6	80	false
Fe	mg	2	1.4	true
Protein	g	5.5	6	false
Fibre	g	4.3	2.5	true
Negative criteria		Disqualified		
Positive criteria		Qualified		
Overall results		INELIGIBLE		

ced in order to achieve a balanced diet (fats, SFA, sugars, sodium) as well as nutrients presenting health benefits and consumption of which should be increased (fibre, calcium and other minerals, vitamins). Each nutritional criterion is associated with a score between (-1) and (+1); the score assigned to each nutrient depends on the quantity present in 100 kcal of a particular food.

For nutrients with a negative score, a score of (+1) is assigned where the quantity of the nutrient in a given food, in relation to the energy content, is below the nutritional recommendation for that food. In contrast, a score of (-1) signifies that the quantity of nutrient in relation to energy content leads to further imbalance through consumption, which already exceeds the recommendations. A linear relation is plotted between these two values and the score (between -1 and +1) is proportional to the distance between the recommendation and actual consumption (Fig. 4). In the case of a positive nutrient the same reasoning applies, but in the opposite direction (Fig. 4).

It is interesting to note that a negative nutrient may contribute to either a negative or positive score depending on the food in question, which differs widely from the other existing systems, and is more in line with nutritional principles (i.e. what is good in one food is not necessarily good in another).

A food is characterised by two scores corresponding to its nutritional qualities (sum of positive scores) and to its nutritional weaknesses (sum of negative scores). A product may thus be placed on a graph and compared with other products in the same category; the x-axis represents nutritional qualities while the y-



Nutrimap

Nutrimap® is a nutrient profiling system designed and developed by the BIO Intelligence Service agency (22), the purpose of which is to **evaluate the overall nutritional quality of a food or meal** based upon its potential rebalancing or unbalancing the diet. It highlights the **most pertinent choices required to rebalance the diet** (3;12). The system is based upon national and international (WHO) nutritional recommendations (1) and on actual consumption trends, thereby minimising the effects of intuition and random results.

Nutrimap® analyses 15 nutritional criteria (Table 8) selected on account of the lack of coherence observed between intake and the recommendations, and likely to result in health risks (1). This scheme thus considers nutrients whose intake should be redu-

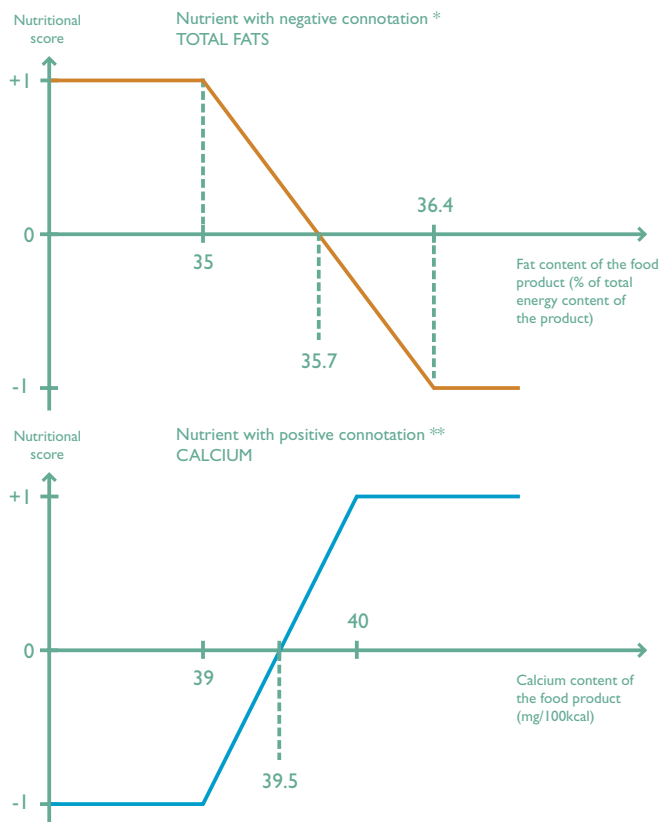


Figure 4: Nutrimap®: scoring system (Source: 12;22)

* A food product with a fat content representing more than 36.4% of the energy content (equivalent to the actual consumption value) is given a score of (-1). In contrast, a score of (+1) is assigned where the fat content is below the recommended level. At 35.7% (median value between the recommendation and consumption), the score changes sign.

** In the case of positive nutrients, such as calcium, a score of (+1) indicates a quantity higher than the recommendations (40mg/100kcal).

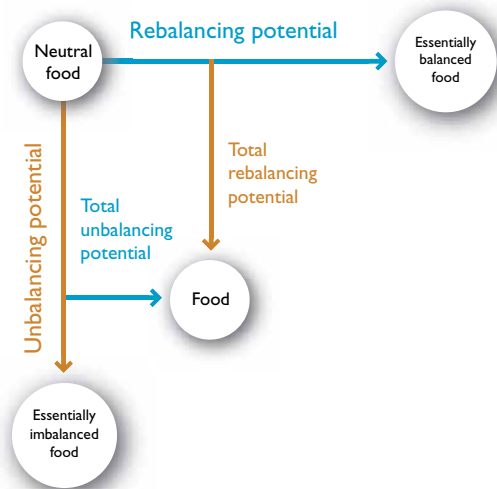


Figure 5: Nutrimap® (Source: 12)

axis represents nutritional weaknesses (Fig. 5). This distinction between a positive and negative score allows finer grading in the distinction between products.

In addition, the Nutrimap® scheme takes into consideration the relative importance of different nutrients in evaluating the overall nutritional quality of food products by assigning a weight based upon the food category to which they belong. For example, calcium is assigned maximum weight in the dairy product category, which is in fact the food category that contributes the most to intake of this nutrient. However, the criteria of fibre is assigned minimum weight in this same category but is assigned maximum weight in the category of cereal products, where it is the most important contributor. In addition, values are standardised in order to ensure that the coefficient of maximum weight is equal to the value of three, with the other coefficients being proportional.

This system is thus highly flexible and extremely elaborate; it may be adapted to different groups within the population (children, women, elderly citizens, etc) by modification of the scores and weights assigned to each nutrient. In addition, analysis per 100 kcal of product provides an extremely accurate reflection of the distribution of energy between macronutrients; nevertheless, this criterion penalises mononutrient products, most of whose energy derives from a macronutrient. In addition, this method of representation does not take into account the energy density of products: a given product and the same product in dilution occupy the same place on the map.



Food Profiler

Nevertheless, the high number of criteria is not suited to regulatory requirements with special insistence on ease of use. A new and simpler tool, the **Food Profiler** has thus been developed using the scientific bases of the Nutrimap® scheme, but with vast simplification.

Only four negative criteria (fats, SFA + TFA, added sodium, added sugars) are considered for each food (irrespective of all consideration of food categories). An exception has nevertheless been made for the category of oils and fats, in which products are composed chiefly of fats and for which it is of no interest to measure total fat content (not discriminating), nor added sugars (normally absent). As regards positive nutrients, these are characteristic of the food family studied. Calcium for instance constitutes the specific nutritional criterion for dairy products, while fibre content is only analysed for fruit and vegetables and cereals (Table 4).

Table 4: Nutritional criteria of the Bio Intelligence Service Food Profiler (Source: 23)

Negative nutrients	Food categories and associated positive nutrients	
Total Fat SSA + TSA Added Sugars Added Sodium	Meat, Eggs	Iron
	Fish	Polyunsaturated
	Oils & Oleaginous	Fatty
	Plants	Acids
	Dairy Products	Calcium
	Cereals	Dietary
	Fruits & Vegetables	Fibre
	Sugars Products and Others	None

With this system, in order to be eligible, a food must exhibit less than 50% nutritional weaknesses (i.e. a negative nutrient score < 2.5) AND it must exhibit more than 50% nutritional qualities (i.e. a positive nutrient score > 2.5). A food that qualifies under the “Food Profiler” scheme thus has more nutritional strengths than weaknesses (Fig. 6).

In addition, it is interesting to note the existence of an “**added sugar**” filter. Only foods containing no more than 12.5g of added sugars per portion can be analysed using the “Food Profiler”. This value is based upon the Eurodiet nutritional recommendations (18): intake of added sugars must not exceed 10% of the daily energy intake (i.e. around 50g of added sugars per day – based on an intake for adults of 2000 kcal / day; furthermore, it is recommended that this intake (18) should be distributed between 4 daily meals, i.e. 12.5g/meal).

Nutritional qualities

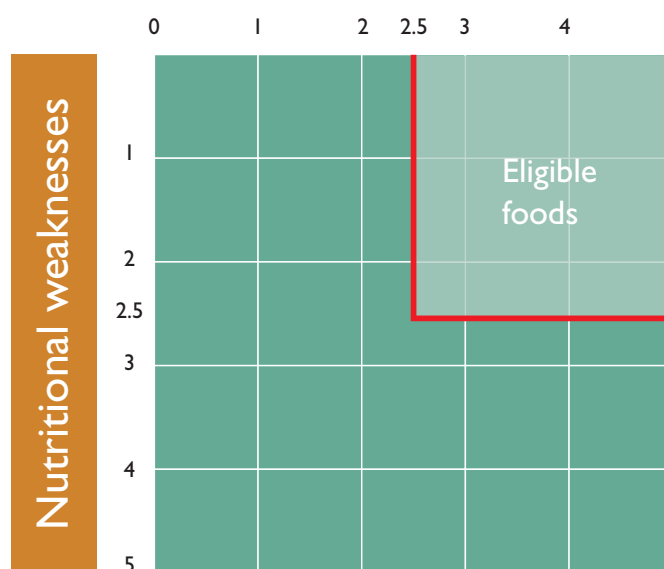


Figure 6: Bio Intelligence Service Food Profiler (Source: 23)
Only foods within the red zone are eligible to bear claims.

S.A.I.N. Score for individual suitability of foods to recommended nutritional intake

The score for individual suitability of foods to recommended nutritional intake (SAIN) is an **indicator of the degree of suitability of foods or diet to nutritional requirements**. It corresponds to the recommended mean percentage nutritional intake for 16 essential nutrients (Table 7) found in 100g of food, corrected by the presence of components of which excessive consumption is not recommended (SFA, cholesterol, sodium, sugars). Interestingly, the SAIN system incorporates the notion of nutritional density, an important item (13).

The suitability score is given by the following formula:

$$\sum ([\text{Nutrient}_i / \text{REI}_i] \times 100) / 16$$

The recommended energy intake for an adult (2000 kcal/day) is taken as the reference point; the denominator of 16 corresponds to the 16 key nutrients used in this system. However, it should be noted that this score does not in itself constitute a nutrient profiling system since it does not propose any eligibility criteria.

The Dutch system

Tripartite Classification Model

The Tripartite Classification Model nutrient profiling system was first proposed in 1993 by the Dutch Food Information Bureau. In 2005, an updated version of this system was introduced, the main aim of which is to **provide information on the nutritional quality of foods in order to help consumers make dietary choices** (14;15).

For each food category (bread, starches and cereals, fruit and vegetables, dairy products, cheese, meat and fish, eggs, added fats), thresholds were devised for negative nutrients (SFA, sugars) and/or for positive nutrients (vitamins C and B9, dietary fibre and ω 3FA); the choice and number of nutritional criteria selected were specifically defined for each food group. In addition, two threshold values were defined for each individual food category, with foods being classed as 'optimal choice', 'intermediate choice' or 'occasional choice'. This classification allows good discrimination between foods in the same category. Taking the example of the cereals family (Table 5), because of its high fibre content (7g/100g) and its low SFA content (16), whole bread represents a dietary choice to be encouraged. In contrast, white bread and children's breakfast cereals, which are low in fibre, (< 5g /100g) (16) must be considered as foods for occasional consumption under this system.

The definition of thresholds is based upon the desire to increase daily intake of certain positive nutrients; this optimal consumption is consistent with Dutch national recommendations and with the results of epidemiological consumption studies.

This system, which takes into account national nutritional policy (Dutch Health Council), market realities and intrinsic differences between foods, is of considerable scientific value.

Table 5: Tripartite Classification Model: Threshold system (Source: 4; 15)

Food categories Ex: Bread, cereal products, breakfast cereals	Optimum choice	Intermediate choice	Occasional choice
	Fibre : min. 6g / 100g Saturated fatty acids: max. 1g / 100g	Fibre : 5-6g / 100g	Fibre : < 5g / 100g



Key Hole

The Swedish nutrient profiling system, the Key Hole system, has been in use since 1989 (17). The packaging of foods meeting the nutritional criteria set out by the National Food Administration carries a **green keyhole symbol**. This symbol allows consumers to identify the healthiest foods, i.e. foods rich in fibre and/or low in fat and/or low in sugars and/or low in salt, both in shops and in restaurants. It is therefore easier for consumers to **make better nutritional choices thanks to this green keyhole sign**. This measure is part of the fight against obesity, cardiovascular disease, type II diabetes and certain types of cancer.

Foods are divided into food families, the characteristics of which are taken into consideration; a margarine bearing the green keyhole symbol must not exceed 41% in fat content, compared with fish and meat, for which the maximum fat content is 10%. The thresholds were established based upon consumption data (Eurodiet) (18;19) and in accordance with nutritional recommendations in the Scandinavian countries.

This system is particularly strict since in the dairy produce category for instance, only low-fat sugar-free products qualify. In addition, the system has limited discriminatory power: Within this category, there is only one total fat threshold at 1.5g/100g. Such a system makes it impossible to distinguish between products containing 1.6g fat and those containing 3g fat and does not allow distinction between unsweetened products, those containing a little sugar and those containing large quantities of sugar.

Nutrition enhancement programme

« Nutrition Enhancement Programme » (NEP) - Unilever

Unilever has been working since 2003 on the NEP nutrient profiling system in order to **evaluate and improve the nutritional composition of its food products** (20).

Only certain nutrients associated with adverse health effects have been selected as nutritional criteria in this system: TFA, SFA, sodium and sugars. The selection of these nutrients was based upon the WHO 2003 report (1). Three classes were defined for each of these four criteria: the border between the first two classes is based upon the WHO nutritional recommendations (1) (Fig. 7) while that between the other two classes is based on a synthesis of national recommendations within European countries. Thus, each food product is classified in one of three classes based on each of these four nutrients; only foods complying with all internationally

recommended thresholds carry the **'My choice'** logo on the front of their packaging. This logo is present on foods and drinks compliant with the reference values of the NEP programme for TFA, SFA, sugar and salt / sodium.

The Unilever system is based upon a transversal analysis of foods; the selected thresholds are consequently the same irrespective of the individual foods. However, in order to avoid penalising certain classes of foods in which the content of one of these four criteria actually characterises the product, Unilever created specific categories and thresholds for such foods.

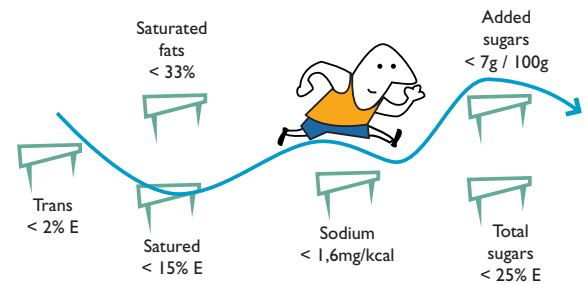


Figure 7: NEP (Unilever) - Transversal thresholds system (Source: 20)

Only food products compliant with these nutritional recommendations (WHO, 2003) carry the 'My Choice' logo.

Table 6: Different models of nutrient profiles (Source: Danone Research)

System	Developed by	Approach (transversal or by food category)	Nutritional criteria	Nutritional recommendations	Actual consumption	Calculation method	Reference unit
FSA scoring system for children	UK (2005)	Transversal approach	8 + 2 food families	National (Guideline Daily Amount)		Score	100g
FDA scheme	USA (2002)	Transversal approach	10	National (Daily Reference Values)	National	Threshold	Portion
Nutrimap®	BIO Intelligence Service (2006)	Food categories	15 + individual weighting	National, European (Eurodiet), international	European	Score	100kcal
Food Profiler (Simplified Nutrimap®)	BIO Intelligence Service (2006)	Food categories (negative nutrients) + Food categories (positive nutrients)	8	National, European (Eurodiet), international	European	Threshold (« added sugars » filter) + Score	100kcal and portion (added sugars)
S.A.I.N.	France (2005)		16	National (ANC)		Score	100g
Tripartite Classification Model	Netherlands (2005)	Food categories	6	National (Dutch Health Council)	National	Threshold	100g
Key Hole	Sweden (1989)	Food categories	4	National (National Food Administration) & European (Eurodiet)		Threshold	100g & 100kcal
Nutrition Score – NEP	Unilever (2003)	Food categories	4	International & national		Threshold	100g & 100kcal



Table 7: Nutritional criteria adopted in the nutrient profiling systems analysed (Source: Danone Research)

Systems	Nutrimap® BIO IS	Food Profiler BIO IS	FDA Scheme	FSA scoring System for children	S.A.I.N.	Tripartite Class Model	Key Hole	Nutrition Score – NEP Unilver
Number of nutrients	15	8	10	8	16	6	4	4
Energy				✓		✓		
'Negative' nutrients	Fat	✓	✓	✓			✓	
	SFA	✓	✓	✓	✓	✓		✓
	TFA		✓					
			(criteria associated with AGS)					
	Cholesterol			✓		✓		✓
	Total Carbohydrate	✓			✓			
	Sugars	✓	✓			✓	✓	✓
	Sodium	✓	✓	✓	✓	✓	✓	✓
	Protein			✓	✓	✓		
	Omega 3 FA				✓		✓	
PUFA	✓	✓						
MUFA	✓							
Fibre	✓	✓	✓	✓	✓	✓		
Calcium	✓	✓	✓	✓				
Magnesium	✓							
Potassium								
Iron	✓	✓	✓	✓				
Vitamin C	✓		✓			✓		
Vitamin A			✓					
Vitamin B9	✓					✓		
Vitamin D	✓							
Vitamin E	✓							
Thiamine (B1)					✓			
Riboflavin (B2)					✓			
Niacin (B3 or PP)					✓			
Pantothenic Acid (B5)					✓			
Vitamin B6					✓			
Vitamin B12					✓			
Food Families	Fruits and vegetables			✓				
	Oleaginous plants			✓				

The debate concerning the choice of parameters is currently of central importance since the implications of nutrient profiling systems are far-reaching for public health authorities, consumers and food manufacturers.

Public health implications

The major diseases in the industrialised countries in the 21st century are multifactorial diseases. Whether cancer, obesity, diabetes or cardiovascular disease, these diseases emerge following interaction between the genetic make-up of individuals and an environment favourable to their development (sedentary lifestyle, poor dietary habits, tobacco, alcohol, etc). It is estimated that **90% of coronary diseases and 30% of certain forms of cancer could be prevented by improvements in lifestyle, in which nutrition plays a key role** (1).

Nevertheless, despite nutritional education campaigns and the institution of numerous measures designed to guide consumers towards better dietary choices, the prevalence of chronic diseases, including type II diabetes, cardiovascular disease and obesity, is constantly on the increase in Western countries (2). There is thus an important and urgent need to improve dietary patterns among Europeans, particularly through improvement of commercially available foods. **Nutrient profiles must be defined in order to prevent nutritional or health claims from being carried by food products whose nutritional characteristics do not meet certain requirements based upon public health considerations** (4). The essential point is to prevent claims being made for products of which excessive consumption would result in further imbalance of the diet of consumers rather than simply making claims the exclusive preserve of "perfect" products.

However, this regulation will be insufficient in itself to resolve all existing problems. It only covers those products carrying claims, which in fact form a minority of available food products. Thus, in order to act upon the remainder of available foods, new measures are required in terms of nutritional education.

Finally, in order to optimise existing nutrient profiling systems, regular critical analysis is essential.

Consumers Implications for consumers

Questions of nutrition and health are rightfully assuming greater importance in the minds of consumers. In this context, consumers are increasingly seeking food products that carry health claims (5; 21). However, the increasing debate surround-

ing nutrition / health benefits of foodstuffs coupled with lack of clarity in certain claims may result in confusion in the minds of consumers concerned about health.

The European regulation should provide **consumers with greater guarantees**, as well as ensuring the accuracy of the information provided. **When presented with coherent and clear claims on foods for sale, consumers will be able to make objective informed choices about nutrition**; such choices can only contribute to a balanced diet. **This new regulation will thus clarify the debate on nutrition and health as regards foods**. However, it will not be able to educate consumers or change their dietary habits: products with high energy density and/or low nutritional density will not be banned and will continue to be sold. Eating habits can only be changed by other measures such as nutritional education or the presence of labelling on all foods.



Manufacturers

Implications for food manufacturers

Following its implementation, this new regulation will allow food manufacturers whose products offer real health benefits to **compete fairly** on the internal market of the European Community. Similarly, as clearly indicated in the preambles to the texts, the **nutrient profiling system should be a tool that promotes innovation and reformulation of food products** increasingly in line with nutritional recommendations (4). The future nutrient profiles system may be expected to be sufficiently precise and discriminating to encourage such innovation. Consequently, a profiling system based upon thresholds that do not allow any distinction to be made between a product whose nutritional composition is far from the threshold criteria from a product that is very close to the target should not be adopted. Similarly, a nutrient profiling system should be able to distinguish between a standard product and a light version of the same product.

It is also clear that a system based solely upon negative nutrients will not be particularly stimulating for an industry seeking to promote the positive aspects of the nutrients contained in its products. The same applies to an excessively severe system that allows only natural products and light products to bear such claims.

For this reason, the target criteria should be technologically, sensorially and economically attainable and realistic in order to stimulate innovation and renovation in the food product sector, and ultimately to improve the nutritional quality of foods.

The European regulation should provide consumers with greater guarantees and ensure fair competition between food manufacturers whose products offer real health benefits

Conclusion

Nutrient profiles will be established by the European Commission and the Member States based on the recommendations of the European Food Safety Authority following consultation with manufacturers and consumer associations. After this date (January 2009 at the latest), only those foods that comply with the official nutrient profiles may be associated with nutrition and health claims. The new European regulation is thus intended to ensure stricter control of such claims, which for consumers are synonymous with products of nutritional value.

In addition, this regulation will allow manufacturers whose products offer real health advantages to compete fairly on the internal market of the European Community. Similarly, the nutrient profiling system should present manufacturers with a tool to assist with innovation and reformulation of their food products, which must be brought in line with the nutritional recommendations.

However, this regulation in itself is not the solution to obesity, cardiovascular disease and diabetes prevalent in the Western countries. It only concerns products bearing claims, which in fact make up a small part of food products currently on offer. In addition, the available foods will remain the same and there is nothing to prevent consumers choosing foods high in energy and/or low in nutritional density. This regulation is merely a first step, albeit extremely important, towards achieving more balanced dietary habits. For this reason, it is essential that other measures be introduced rapidly in order to encourage Europeans to improve their diet and lifestyle, for example through mandatory nutritional labelling, nutritional education in schools and the promotion of regular physical activity.



References

1. WHO. Diet, Nutrition and prevention of chronic diseases. Report of a joint WHO/FAO expert consultation. *WHO technical report series*. 2003. http://www.who.int/hpr/NPH/docs/who_fao_expert_report.pdf
2. Olshansky S. A potential decline in life expectancy in the United States in the first 21st century. *New England Journal of Medicine*. 2005;352:1138-45.
3. Azais-Braesco V, Goffi C, Labouze E. Nutrient profiling: comparison and critical analysis of existing systems. *Public Health Nutr*. 2006;5:613-22
4. Règlement (CE) N°1924/2006 du Parlement Européen et du Conseil concernant les allégations nutritionnelles et de santé portant sur les denrées alimentaires. http://eurlex.europa.eu/LexUriServ/site/fr/oj/2007/L_012/L_01220070118fr00030018.pdf
5. Direction Générale de l'Alimentation (DGAL) & l'association Consommation, Logement et Cadre de Vie (CLCV). 2004. <http://www.clcv.org/>
6. Directive 2000/13/CE du Parlement européen et du Conseil du 20 mars 2000 relative au rapprochement des législations des Etats Membres concernant l'étiquetage et la présentation des denrées alimentaires ainsi que la publicité faite à leur égard. <http://www.ac-orleans-tours.fr/difor-haccp/ressources/Dir2000.13.pdf>
7. Fischler C. *L'omnivore: le goût, la cuisine et le corps*. Ed Paris: Odile Jacob, 1990.
8. FSA. <http://www.food.gov.uk/healthiereating/advertisingtochildren/nut-lab/>
9. Rayner M, Scarborough P, Boxer A, et al. Nutrient profiles: development of final report model, final report. British Heart Foundation Health Promotion Research Group. Department of Public Health. University of Oxford. 2005
10. FSA - Nutrient profiling, Agenda Item 7. <http://www.food.gov.uk/multi-media/pdfs/fsa051004.pdf>
11. FDA Scheme. <http://www.fda.gov/>
12. Labouze E. Nutrimap: un outil opérationnel pour le profilage nutritionnel des produits alimentaires et des repas. *Cah.Nutr.Diet* 2006;41.
13. Darmon N, Darmon M, Maillot M et al. A. A nutrient density standard for vegetables and fruits: nutrients per calorie and nutrients per unit cost. *J Am Diet Assoc*. 2005;105(12):1881-7.
14. Netherlands Nutrition Center. Criteria for the nutritional evaluation of foods, the Netherlands tripartite classification for foods. www.voedingscentrum.nl
15. Hammink J, VandenBerg H, Breedveld B. Criteria for the nutritional evaluation of foods: the Netherlands tripartite classification model. Netherlands Nutrition Center; poster 18th International Nutrition Congress, Durban. 2005.
16. Favier J, Ireland-Ripert J. Répertoire général des aliments: table de composition. Lavoisier. 1999.
17. National Food Administration (Sweden) - Key Hole. <http://www.slv.se>
18. Eurodiet 2001: European Diet and Public Health: The Continuing Challenge. Working Party 1: final report; 14 June. Eurodiet, population goals for nutrients and features of lifestyle consistent with the prevention of major public health problems in Europe, Table 1 page 23. 2000.
19. Eurodiet - Ferro-Luzzi A, James WPT, the Eurodiet group. Nutrition and diet for healthy life styles in Europe: the EURODIET evidence. *Public Health Nutrition*, 2001, 4, 2 (A) and 2 (B). 2001.
20. Nijman CA, Zijp IM, Sierksma A et al. A method to improve the nutritional quality of foods and beverages based on dietary recommendations. *Eur J Clin Nutr*. 2007; 61 (4):461-71.
21. Volatier J. Enquête individuelle et nationale sur les consommations alimentaires. *Collection Tec et Doc, Editions Lavoisier*. 2000.
22. BIO Intelligence Service - www.biois.com.
23. Food Profiler - BIO Intelligence Service www.thefoodprofiler.com



Food, Nutrition, and Health Charter

the 9 COMMITMENTS of Groupe DANONE

"Health and nutrition are at the core of our business. We have formalised our commitments in the shape of a charter: in an environment that reminds us how exacting we should be regarding our products and communications, it is everyone's responsibility to implement them."

Franck Riboud

1 Propose **products adapted** to needs and tastes

Groupe DANONE will use its competencies in nutrition, technology, and sensory sciences together with its understanding of consumer needs to develop and improve its range of products: selection of the most appropriate raw materials; development of products adapted to a diversity of tastes and nutritional needs; development of products with specific health benefits; continuous improvement to the taste and nutritional properties of existing products. The Groups will also use its expertise in order to develop products across the globe which take into account local needs, with a commitment to making such products available to as many people as possible.

2 Dialogue with **scientists**

Groupe DANONE undertakes to remain in regular contact with the scientific community, interacting with specialists and tracking current and emerging issues in food, nutrition, and health in order to stay at the forefront of progress.

3 Support **research**

Groupe DANONE undertakes to support and promote research in nutrition and health.

4 Promote **knowledge sharing**

Groupe DANONE undertakes to share its knowledge and findings with scientists, health professionals, and the public.

5 Heed **public opinion**

Groupe DANONE undertakes to maintain an ongoing dialogue with public institutions and organizations involved in nutrition and health issues, including consumer associations. This gives the Groups the opportunity to explain its approach, and to better respond to public questions and expectations.

6 Communicate with **clarity and transparency**

Groupe DANONE undertakes to provide clear and transparent information to consumers, namely through the gradual introduction of nutritional labels on all products and development of consumer information services.

7 Guarantee the **scientific validity** of the claimed **benefits**

Groupe DANONE undertakes to make nutrition or health claims only with the backing of sound scientific evidence. No nutrition or health claims, other than nutritional content information, will be made for "purely indulgent" products.

8 Promote **responsible advertising**

Groupe DANONE undertakes to develop a responsible approach concerning health and nutrition advertising.

9 Encourage **physical activity**

Groupe DANONE undertakes to encourage consumers and staff members to take part in regular physical exercise.



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Key words

European regulations, nutrient profiles, nutritional claims, health claims, nutritional criteria, scoring system, threshold values, food categories, transversal approach, reference units

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