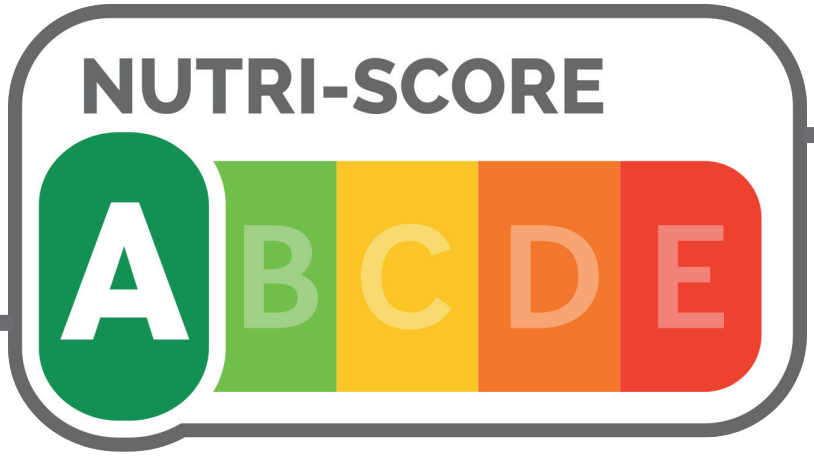

THE NUTRI-SCORE food labelling system

a closer examination of the NUTRI-SCORE system

The document was created by the Nutri-Score Expert Group within the Czech Technology Platform for Foodstuffs.

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INTRODUCTION

Nutrition labelling on the front of food packaging has been mandatory in the EU since 2016. The relevant requirements are harmonized. The Czech government considers the current regulatory requirements pertaining to the labelling of nutritional data laid down in the EU's harmonized legislation to be satisfactory, as does the Federation of the Food and Drink Industries of the Czech Republic.

The Czech Republic will support the introduction of a new labelling system only if it is implemented on a non-compulsory basis at the discretion of the individual Member States. The future new system should be optional, should provide factual information on nutrient and energy content as opposed to assessing the nutritional value of foods in a simplified and generalized manner, should not be discriminatory, and should not differentiate foods into healthy and less healthy. The European Commission should submit a legislative proposal in the second half of 2022.

The Federation of the Food and Drink Industries of the Czech Republic is only in favor of either a non-compulsory system or a harmonized, single system applicable throughout the EU.

Considering the growing pressure from the Member States and multinational food corporations for the adoption of the Nutri-Score system at EU level, attention should at this point concentrate on this system as one of the possible options.

A CLOSER EXAMINATION OF THE NUTRI-SCORE SYSTEM

Nutri-Score is a system for labelling the nutritional parameters of foods. The system places foods into five classes—Class A to Class E. The result is a logo shown on the front of the food packaging.

These systems are usually known through their abbreviation FOPL (front-of-package-labelling).

The placement into individual classes is based on a calculation that considers positive and negative factors using a predefined formula.

Positive points are awarded based on the content of fruit, including nuts, vegetables, dietary fiber, and protein in the given food (higher levels are considered to promote health). Zero to five points can be awarded in each of the three groups, which translates into a possible total of 15 positive points.

Negative points are awarded based on the energy value and the content of saturated fatty acids, sugar, and sodium (higher levels are considered detrimental to health). Zero to 10 points can be awarded in each of the four groups, which translates into a possible total of 40 negative points.

The system is similar (including the graphics) to labels used for rating the energy efficiency of buildings and appliances. The main difference is that energy efficiency labels rate specific

energy parameters, while Nutri-Score relies on a calculation consisting of multiple criteria, which in many cases yields results that are contrary to nutritional recommendations.

Example of calculation:

Points	Energy (kJ)	Sugar (g)	Saturated fatty acids (g)	Sodium (mg)
0	≤ 335	≤ 4.5	≤ 1	≤ 90
1	> 335	> 4.5	> 1	> 90
2	> 670	> 9	> 2	> 180
3	> 1005	> 13.5	> 3	> 270
4	> 1340	> 18	> 4	> 360
5	> 1675	> 22.5	> 5	> 450
6	> 2010	> 27	> 6	> 540
7	> 2345	> 31	> 7	> 630
8	> 2680	> 36	> 8	> 720
9	> 3015	> 40	> 9	> 810
10	> 3350	> 45	> 10	> 900
TOTAL	1 point	0 points	0 points	7 points

Points	Fruit, vegetables (%)	Fibers (g)	Proteins (g)
0	≤ 40	≤ 0.9	≤ 1.6
1	> 40	> 0.9	> 1.6
2	> 60	> 1.9	> 3.2
3	-	> 2.8	> 4.8
4	-	> 3.7	> 6.4
5	> 80	> 4.7	> 8.0
TOTAL	0 points	5 points	5 points

8 − 10 = -2 = A

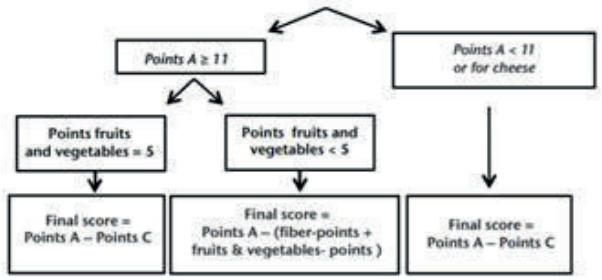
Fats have a different scale for saturated fatty acids, while the calculation method also differs for beverages:

Points	Energy (kJ)	Sugars (g)	Specific cut-offs: beverages Energy (kJ)	Specific cut-offs: beverages Sugars (g)	Saturated fat (g)	Specific cut-offs: fats Saturated fat/ Lipids (%)	Sodium (mg)
0	≤ 335	≤ 4.5	≤ 0	0	≤ 1	< 10	< 90
1	> 335	> 4.5	≤ 30	≤ 1.5	> 1	< 16	> 90
2	> 670	> 9	≤ 60	≤ 3	> 2	< 22	> 180
3	> 1,005	> 13.5	≤ 90	≤ 4.5	> 3	< 28	> 270
4	> 1,340	> 18	≤ 120	≤ 6	> 4	< 34	> 360
5	> 1,675	> 22.5	≤ 150	≤ 7.5	> 5	< 40	> 450
6	> 2,010	> 27	≤ 180	≤ 9	> 6	< 46	> 540
7	> 2,345	> 31	≤ 210	≤ 10.5	> 7	< 52	> 630
8	> 2,680	> 36	≤ 240	≤ 12	> 8	< 58	> 720
9	> 3,015	> 40	≤ 270	≤ 13.5	> 9	< 64	> 810
10	> 3,350	> 45	≤ 270	> 13.5	> 10	≥ 64	> 900
	0–10 (a)	0–10 (b)	0–10 (a)	0–10 (b)	0–10 (c)	0–10 (c)	0–10 (d)
Total	Points A = (a) + (b) + (c) + (d) [0 – 40]						

Points	Fruits, veg (%)	Specific cut-offs: beverages Fruits, veg (%)	Fiber (g)	Protein (g)
0	≤ 40	≤ 40	≤ 0.7	≤ 1.6
1	< 40		> 0.7	> 1.6
2	> 60	> 40	> 1.4	> 3.2
3	–		> 2.1	> 4.8
4	–	> 60	> 2.8	> 6.4
5	> 80		> 3.5	> 8.0
6				
7				
8				
9				
10		> 80		
	0–5 (a)	0–10 (a)	0–5 (b)	0–5 (c)
Total	Points C = (a) + (b) + (c) [0 – 15]			

The positive and negative points are summed, and the given food is placed into Class A to E based on the following criteria and a conversion table, while the criteria for beverages and other foods are differentiated:

2. Final score: -15 to 40 points



3. Attribution of colors

Foods (points)	Beverages (points)	Color
min to -1	water	green
0 to 2	min to 1	light green
3 to 10	2–5	yellow
11 to 18	6–9	orange
19 to max	10 to max	dark orange

Green: highest quality

Red: lowest quality

A HISTORICAL OVERVIEW

The Nutri-Score calculation is based on a proposal made by the British Food Standards Agency, which has compiled nutritional profiles for foods and beverages based on nutritional content in 100 grams of the applicable product.

The introduction of nutritional profiles was foreshadowed in Regulation (EC) No 1924/2006 on nutrition and health claims made on foods. According to the regulation, the objective of using nutritional profiles was to combine the possibility of using the relevant approved claims in conjunction with certain defined nutritional characteristics of foods to avoid a situation where nutritional or health claims obscure the overall nutritional value of a given food. This could mislead consumers wishing to select foods with favorable nutritional values in an effort to achieve balanced nutrition. The sole purpose of the nutritional profiles under the above regulation was to determine circumstances under which claims may be made. They were to be based on generally accepted scientific data pertaining to the correlation between health and nutrition. The regulation also stated that the purpose of profiles included facilitating product innovation and the taking into account of the diversity of dietary habits, traditions, and the fact that specific products can play an important role in the overall diet.

According to the regulation, nutritional profiles were to be set taking into account the content of various nutrients and substances with a nutritional or physiological effect, particularly fats, saturated fats, trans-fatty acids, salt, sodium, and sugars (the excessive intake of which is not recommended), and polyunsaturated and monounsaturated fats, available carbohydrates other than sugars, vitamins, minerals, proteins, and dietary fiber. Nutritional profiles were to be set considering the different types of foods, and the place and role of these foods in the overall diet. For some foods or categories of foods, it might be necessary to establish exemptions from the requirement to conform to predefined nutritional profiles depending on their role and importance in the diet of certain population groups. The plan to define nutritional profiles within the framework of the above regulation was unsuccessful. Reality has shown that defining nutritional profiles in a way conforming to the above requirements is a complicated task.

The concept proposed by the British Food Standard Agency has been elaborated by the French Conseil supérieur d'hygiène publique, which calculated the nutritional profiles of foods using

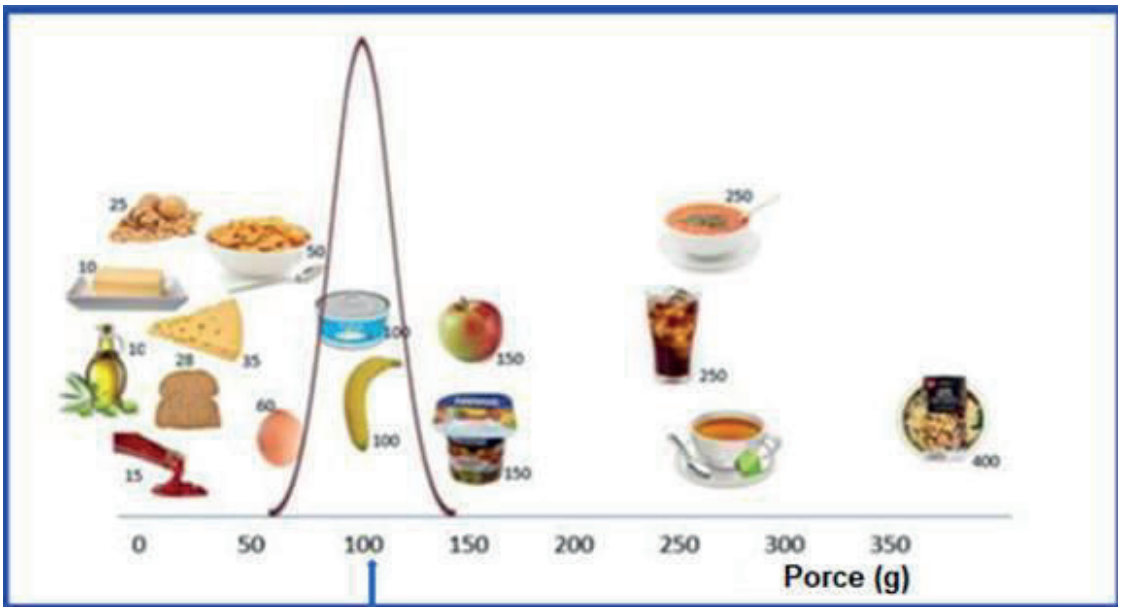
a specifically devised algorithm and made them available in a local database. However, this attempt yielded highly deceptive results for some types of foods. For this reason, specific profiles had to be created for beverages, fats, and cheese in addition to the basic profile.

THE PROS AND CONS OF THE SYSTEM

Advantages of this system are its transparency and that it is applicable to multiple foods in a consistent manner based on a single calculation formula. The calculation relies on no more than seven parameters, most of which are specified on the packaging, while those that are not can be found in the product and ingredient specifications. As a result, foods can be unambiguously placed into one of the relevant categories. Another advantage is that this system does not incorporate an excessive number of exceptions that would have to be taken into consideration when placing products in the applicable classes, despite the fact that during the development of the system certain variations pertaining to general criteria like the criteria for fats and cheese were incorporated into the calculation.

One disadvantage is that the character of a food significantly predetermines the class (A to E) into which that food can be placed. To a certain extent, this differentiates foods into healthy and unhealthy, without considering the health impact of the consumed quantity of the food. The system's creators attempt to refute this by claiming that the system is not intended to serve that purpose. Some foods, however, cannot attain parameters for placement into a higher class due to inherent reasons, despite being an indispensable part of a healthy diet and the fact that any potentially adverse effects depend on the consumed quantity.

The Nutri-Score system does not consider the content of minority nutrients (vitamins and minerals) and their usability at all. Micronutrients are to some extent indirectly included in positive ratings based on fruit or vegetable content. However, the calcium in dairy products, for example, is not considered at all despite the fact that foods like cheese are an important source of calcium. Foods containing fruit and vegetables receive positive ratings twice: for their fruit and vegetable content on the one hand, and for their dietary fiber content on the other. The Nutri-Score system is suitable for comparing products within the same category or products that have similar consumption patterns. The system favors plant-based nutrition. Generally, plant-based foods contain less high-risk nutrients, but emphasizing this form of diet disregards the presence of certain natural toxic and anti-nutritional substances and incomplete proteins. Likewise, the Nutri-Score system disregards industrial processing. Epidemiological studies show that the consumption of highly processed foods increases the risk of outbreaks of non-communicable diseases. The question is whether a provable causal link exists with industrial processing or whether the cause is the nutritional value of the food itself. The system does not take into consideration serving size despite the fact that a typical serving size exists for every group of foods. Instead, it is arbitrarily based on nutritional content in 100 grams of the applicable product.

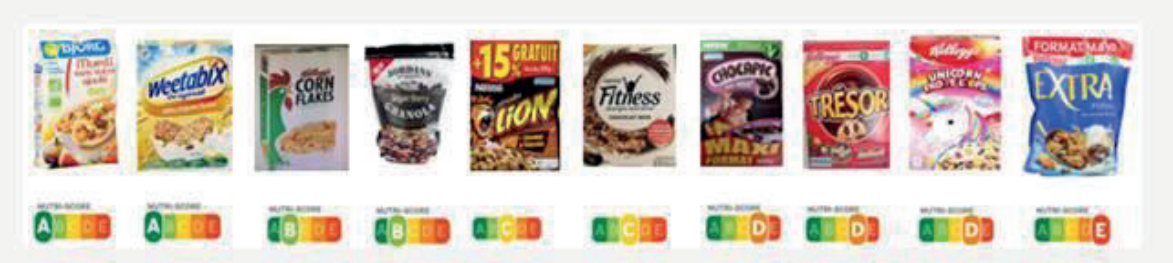


The profiles are defined as if all foods were consumed in the same manner. Some Nutri-Score system advocates claim that determining the serving size is difficult. Nonetheless, the serving size can be taken into consideration indirectly through arranging nutritional profiles for specific groups of foods. The same approach is employed by other FOPL systems. The Nutri-Score creators have failed to incorporate experience gained through the use of other already existing systems.

Products placed in different categories cannot be compared with one another in any way. People who consume only products from Class A or B (green categories) might not achieve balanced nutrition, and might experience a deficit of certain nutrients. The importance of the category in which a product is placed cannot be regarded as an absolute parameter. The consumer should not be under the impression that consuming products in the green Classes A and B constitutes a proper diet. This is the main disadvantage of the system. Placement into Classes A to E as such does not provide clear information in relation to healthiness—the placement must always be correlated with the level of consumption, which is something the system does not offer.

Examples of the pros and cons of the Nutri-Score system

1. In the breakfast cereals group, products with better nutritional values can be clearly distinguished. Products can be placed into any of the categories. A consumer can choose a product from Class A.



2. It would also be useful to be able to compare products not classified in the same category yet consumed on the same occasions. Whole-wheat bread and certain types of muesli are more suitable for breakfast than other products from the fine bakery products category. As above, the products can be placed into any of the categories. A consumer can choose a product from Class A.

3. Comparing different snacks is also useful

4. The labelling of beverages makes sense to some extent. Non-alcoholic beverages are an important source of added sugar intake. Once again, the consumer can choose from any of the product categories.

5. In contrast, the German Association of Sugar Producers advocates a logo depicting energy content as the most effective tool in the fight against obesity. The figure below shows an example of a comparison between two beverages with different energy content, where the beverage with lower energy content is in Class E yet the beverage with higher energy content is in Class B. The Nutri-Score system is referred to as a consumer trap.
https://www.foodnavigator.com/Article/2019/08/16/NutriScore-is-a-consumer-trap-Industry-group-calls-for-front-of-pack-calorie-logo

6. Coca-Cola Zero, Red Bull, and Pepsi Max Zero are in Class B. Because of the calculation methodology, beverages containing sweeteners are classified in the preferred green categories. Opinions about the use of low-calorie sweeteners in foods, and non-alcoholic beverages in particular, differ. The International Association of Sweetener Producers has produced a position document supporting the importance of sweeteners:

https://www.sweeteners.org/latest-science-post/sugar-reduction-and-low-no-calorie-sweeteners-policies-evidence-and-dietary-practice/

There are opposite opinions as well. Recently completed reviews have concluded that further research in this area is necessary. Effects of Sweeteners on the Gut Microbiota: A Review of Experimental Studies and Clinical Trials (nih.gov).
Energy drinks should not be placed in the green categories, as this creates the impression that their consumption is good for health. These beverages should not be consumed by children, adolescents, pregnant or lactating women, before or after vigorous physical activity, before sleep, or in combination with alcohol.

7. On the other hand, Nutri-Score labelling for hams can be described as no less than problematic. Hams have the highest nutritional value among meat products. Despite this, they are found in Classes C to E, mainly on account of their salt content. Meat products contain iron, of which there is a deficiency in the Czech population, particularly in women, according to a recent iron saturation monitoring study conducted by the National Institute of Public Health (NIPH).

The situation is similar with regard to cheese, which is mostly in Class D. Some kinds of cheese with an elevated salt and saturated fatty acid content are placed in Class E. Certain kinds of fresh cheese may be classified in Class C. Cheese, however, is a source of calcium, a fact disregarded in the calculation methodology. Cheese accounts for the most important part—approximately 21%—of total calcium intake. It is followed by milk and other dairy products, which account for 20% and 15% respectively. The share of calcium obtained from milk and dairy products in the total intake amounts to approximately 56%. Hams contain full-value animal proteins, similar to cheese. The fact that cheese is not represented in the green Classes A and B can be interpreted as suggesting that they are not among the foods recommended for consumption. Red classification is liable to deter the consumption of products that, if consumed in moderate quantities, provide nutrients that people often lack, like calcium and iron in the case of hard cheese and meat products, respectively.
Suffice to say, the calculation method had to be modified to ensure that cheese is not classified even worse.

Italy has objected that the Nutri-Score system is aimed against traditional quality products like Parma ham, prosciutto, PARMESAN AND GORGONZOLA. These traditional products have a high salt and/or saturated fatty acid content. The impact on health depends on the quantity consumed and the frequency of consumption. Classification in the worst category from the viewpoint of nutrition is discriminatory against such products because occasional consumption of low quantities as part of a balanced diet has no adverse impact on health. https://theconversation.com/front-of-pack-nutrition-labels-the-parmesan-and-prosciutto-war-116962

8. Italy has provided an example that testifies to the completely misleading nature of the information provided to the consumer as regards consumption of the traditional pasta with olive oil and traditional cheese. The accuracy of the calculation has been verified using nutritional data in the NutriPro database.

	Energy	Fats	SAFA	Carbohydrates	Sugars	Dietary fiber	Proteins	Salt	Nutri-Score
	KJ/100 g	g/100 g	g/100 g	g/100 g	g/100 g	g/100 g	g/100 g	g/100 g	
100% semolina pasta	1,583	2.0	0.3	67.2	1.7	6.0	12.5	0.02	A
Parmigiano Reggiano natural half-fat cheese	1,639	28.4	18.7	0.0	0.0	0.0	33.0	1.67	D
Olive oil	3,713	100.0	13.8	0.0	0.0	0.0	9.0	0.01	D
Uncooked pasta with oil and cheese	1,948	22.7	5.6	44.8	1.1	4.0	15.3	0.29	C
Cooked pasta (YF2.1) with oil and cheese	1,124	13.1	3.2	25.8	0.7	2.3	8.8	0.17	A

The first three rows show the nutritional value of the raw ingredients in grams per 100 grams. The fourth row shows the converted value of the raw ingredients (80 g of pasta, 20 g of cheese, 20 g of oil) in the recipe per 100 grams. The fifth row refers to the cooked meal using Bognar yield factor tables. Olive oil is primarily classified in Class D, as is traditional Parmigiano Reggiano cheese. Based on this classification, the consumer should avoid this food. Nonetheless, the calculation shows that a meal prepared using these ingredients is placed in Class A. This example also illustrates that the meal preparation process plays a significant role in the resulting classification. While a hypothetical mixture of the raw ingredients before preparation is placed in Class C, the addition of water, which has zero nutrient content but is

needed to hydrate the pasta, places the resulting meal in Class A. This example indicates that food labelling has zero benefit as regards information provided to the consumer.

	Energie	Tuky	SAFA	Sacharidy	Cukry	Vláknina	Bílkoviny	Sůl	Nutri-Score
	KJ/100 g	g/100 g	g/100 g	g/100 g	g/100 g	g/100 g	g/100 g	g/100 g	zákl.profil
Sleď tichomořský syrový, průměr	819	13,9	3,3	0,0	0,0	0,0	16,4	0,19	B
Sleď atlantský syrový, průměr	664	9,04	2,04	0	0	0	17,96	0,23	A
Makrela atlantská syrová, průměr	864	13,89	3,26	0	0	0	18,6	0,23	B
sardinky v oleji	1300	25,1	2,8	0	0	0	19,6	1,28	C

9. Fish is usually among the preferred foods in nutritional recommendations. It is recommended to consume fish twice a week, and to eat fatty fish on at least one of these occasions. A simulation using data from the NutriPro database and the Nutri-Score calculator shows that fresh fatty fish is classified in Class B, which contradicts nutritional recommendations. Sardines in oil are classified in Class C, despite the fact that the fatty acids they contain are favorable and the salt content is not excessive.

Real-world examples show even worse classification of fish products in individual categories.

Clearly, the nutritional profiles of fish and fish products are not properly defined, and they cannot be classified using the basic profile.

10. Categories in respect of which Nutri-Score does not provide the consumer with easily understandable information on nutritional value include fats. Fats have a high energy content, for which they are assigned the maximum number of 10 negative points. Due to inherent reasons regarding how the criteria are presently defined, fats cannot receive any positive points, which is wrong. The classification of fats meant a specific table has had to be introduced for saturated fatty acids, which uses percentages. Otherwise, all of them would be placed in Class E. Paradoxically, the nutritional value of fats (rating) can be improved by the presence of water in spreadable fats. The higher the water content, the lower the energy value and the less negative points the product is assigned for energy content. The system in no way takes into account whether a thinner layer of a product containing more fat is served or vice versa. In this regard, Nutri-Score does not heed nutritional recommendations, according to which the target consumption of fats is higher, as low fat intake is no longer recommended. The system classifies animal fats and tropical fats in Class E, while oils and spreadable fats fall into Classes C and D, including fats whose composition means they are recommended as prevention against cardiovascular diseases.

11. Nutri-Score classifies HAK Apple Sauce under Class A despite containing 1.5 times more sugar than Coca-Cola. According to nutritional recommendations, products made from processed fruits do not receive the same rating as actual fruits. Processed fruits have higher

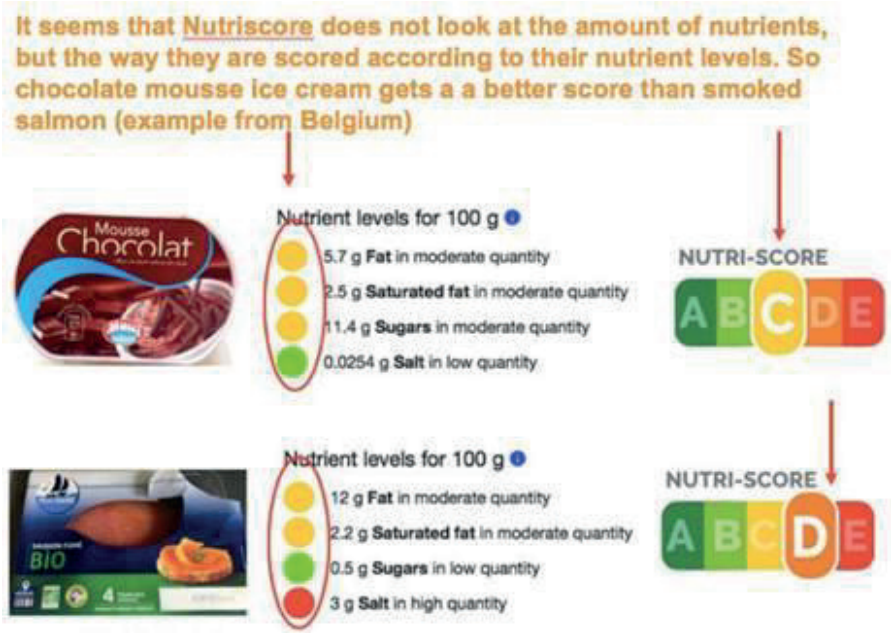
sugar content, leading to higher sugar consumption. Nutri-Score does not take this into account.
https://twitter.com/davidvanbodegom/status/1169641090414186496

12. Comparing foods from completely different categories also appears paradoxical. Advocates of the Nutri-Score system insist that different categories of foods cannot be compared, but normal consumers do so nevertheless. They will always consider the green and red colors as indicative of positive and negative connotations, regardless of the category.

Consumers will find it difficult to understand why Coca-Cola Zero has a better overall rating than olive oil.

https://www.elespanol.com/ciencia/nutricion/20181113/coca-cola-zero-aceite-semaforo-sanidad-empieza-polemica/352965029_0.html

Chocolate mousse ice cream is rated better than salmon.



https://twitter.com/julianmellentin/status/1068792412988858368
Honey Balls are rated better than salmon.

https://twitter.com/fleroy1974/status/1097842403506089984

French fries are among the healthiest foods in Class A. Frying significantly changes the nutritional value of foods.

Potato crisps are classified under the promoted Class B.

https://twitter.com/fleroy1974/status/984344635958054912

13. In April 2019, Hamburg Regional Court issued a preliminary injunction against Iglo, a producer of frozen foods, prohibiting its use of the Nutri-Score system. According to the ruling, Nutri-Score statements are health claims as opposed to mere nutritional value labelling. All health claims must be approved and published in the EU Official Journal. Iglo has released a statement that it will file an appeal.
https://www.spiegel.de/wirtschaft/service/nutri-score-bei-iglo-gericht-stoppt-naehrwertkennzeichnung-a-1263159.html

14. Simulations show that labelling is misleading if the ingredients are then used in the preparation of meals at home. According to the Nutri-Score system, Flora Original and LE&CO turkey breast ham are classified in Class C, which implies that consumers should avoid these products. If the following recipe is used to prepare breakfast or a snack, the sandwich is placed in Class A. From this viewpoint, Nutri-Score is more suitable for calculating the value of prepared meals than for labelling foods not consumed separately. This applies to foods like cheese, meat products, and fats. When shopping, the information that consumers receive is that such foods are unsuitable, yet they can then use them to prepare a tasty and nutritionally valuable meal at home.15. In contrast, the information for raw ingredients intended to be

avokádový sendvič					1,0 porce		pokrmy určené k přesnídávce, k lehkému obědu			
Surovina	množství	Energie (kcal)	bílkoviny (g)	sacharidy (g)	cukry (g)	tuky (g)	SAFA (g)	TFA (g)	vláknina (g)	sodík (mg)
chléb pšenično žitný, celozrnný prů	120	248,7	8,7	49,1	1,1	1,6	0,7		9,1	506,4
Flora originál	10	39,9	0,0	0,0	0,0	4,5	1,1	0,0	0,0	20,6
Šunka krůtí prsní LE&CO	60	52,2	10,3	0,8	0,1	0,8	0,2	0,0	0,0	420,0
Avokádo syrové, jedlý podíl	40	64,1	0,8	3,4	0,3	5,9	0,9	0,0	2,7	2,8
Rajče červené, zralé, syrové	50	9,0	0,4	2,0	1,3	0,1	0,0	0,0	0,6	2,5
Celkem	**280**	**414**	**20,3**	**55,3**	**2,8**	**12,8**	**2,9**	**0,0**	**12,4**	**952,3**
100 g	**100**	**148**	**7,2**	**19,8**	**1,0**	**4,6**	1,0	0,0	4,4	**340,1**
1 porce	**280**	413,9	**20,3**	**55,3**	**2,8**	**12,8**	**2,9**	**0,0**	**12,4**	**952,3**
podíl ovoce	32,14286									
Flora originál	100	399,0	0,2	0,2	0,2	45,0	11,0	0,0	0,0	206,0
Šunka krůtí prsní LE&CO	100	87,0	17,2	1,4	0,1	1,3	0,3	0,0	0,0	700,0

Product	Brand	Kilocalories (Kcal/100g or 100mL)	Kilojoules (KJ/100g or 100mL)	Sugars (g/100g or 100mL)	Saturated fatty acids (g/100g or 100mL)	Sodium (mg/100g or 100mL)	Salt (g/100g or 100mL)	Proteins (g/100g or 100mL)	Fibres AOAC (g/100g or 100mL)	Fruits, vegetables, pulses, nuts (%/100g or 100mL)	score	Nutri-Score	color
Prsní krůtí šunka	Le-CO	87	364	0,1	0,3	700		17,2	0	0	3	Nutriscore_C	Yellow
sendvič: chléb, Flora, šunka, rajče, avokádo		153	640	1	1,1	352		7,5	4,6	33,33	-3	Nutriscore_A	Dark green

Brand	Kilocalories (Kcal/100g)	Kilojoules (KJ/100g)	Sugars (g/100g)	Lipids (g/100g)	Saturated fatty acids (g/100g)	Sodium (mg/100g)	Salt (g/100g)	Proteins (g/100g)	Fibres AOAC (g/100g)	Fruits, vegetables, pulses, and nuts (%/100g)	score	Nutri-Score	color
Flora	399	1660	0,2	45	11	206	0	0,2	0	0	9	Nutriscore_C	Yellow

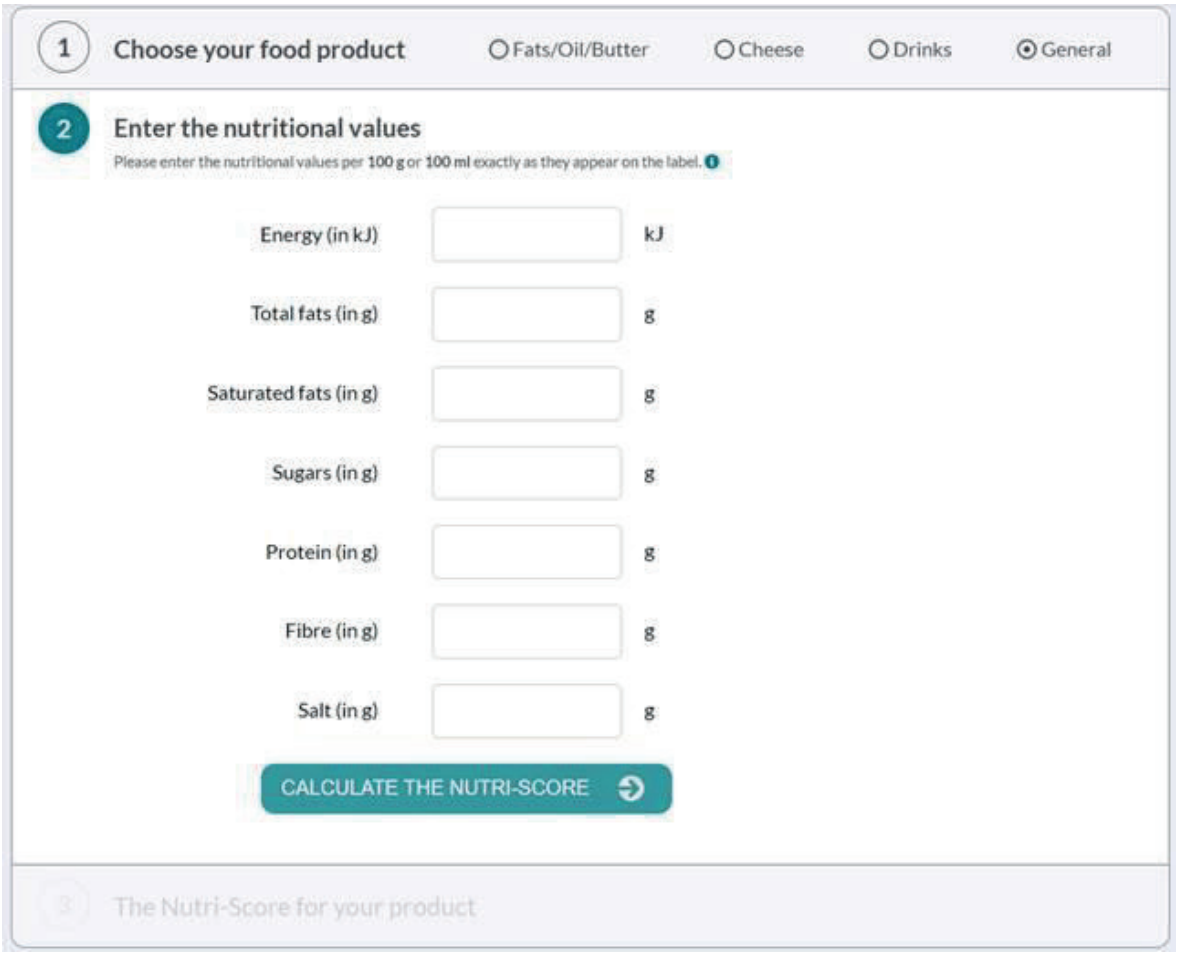
prepared by frying can be misleading in the opposite sense. Ingredients can be classified in Class A (such as French fries as above) or Class B.

Frying significantly increases the energy content of cooked meals, resulting in reclassification into a class with a poorer nutritional profile. The consumer does not receive any information to that effect, however, and is under the impression they will be consuming a nutritionally balanced meal.

Ways to prevent consumers being misled

The fundamental flaw of the Nutri-Score system is that it only uses four profiles and that positive/negative points are inadequately defined. Positive points essentially correspond to foods (fruit, vegetables, nuts), while negative points correspond to nutrients. It is impossible to prevent consumers from comparing foods classified in different categories. The misleading nature of the above examples is not caused by the unsuitable selection of the compared foods, but primarily the poor definition of the calculation method. The use of no more than four categories is defended through the claim that the system needs to be as simple as possible. That is correct, but only in part. The system should be simple. Simplicity, however, needs to be the result of the availability of information sources. The calculation currently relies on nutritional data mandatorily stated on food packaging, complemented with information on dietary fiber, which is stated optionally. There appears to be nothing preventing this concept from being preserved. However, the system will be no more complicated if additional profiles are defined for additional food categories. Another improvement worth considering is assigning positive points for certain vitamins and minerals or assessing the quality of proteins and, as regards negative points, taking into consideration added sweeteners or higher quantities of added substances. The foregoing, however, should not result in an excessive increase in calculation complexity. The calculation is also carried out in the background, which means that regular consumers do not know the details, and adding additional parameters and additional groups of foods will therefore not be detrimental.

Various calculators are currently used to calculate Nutri-Score values. The application is simple and relies on two steps:



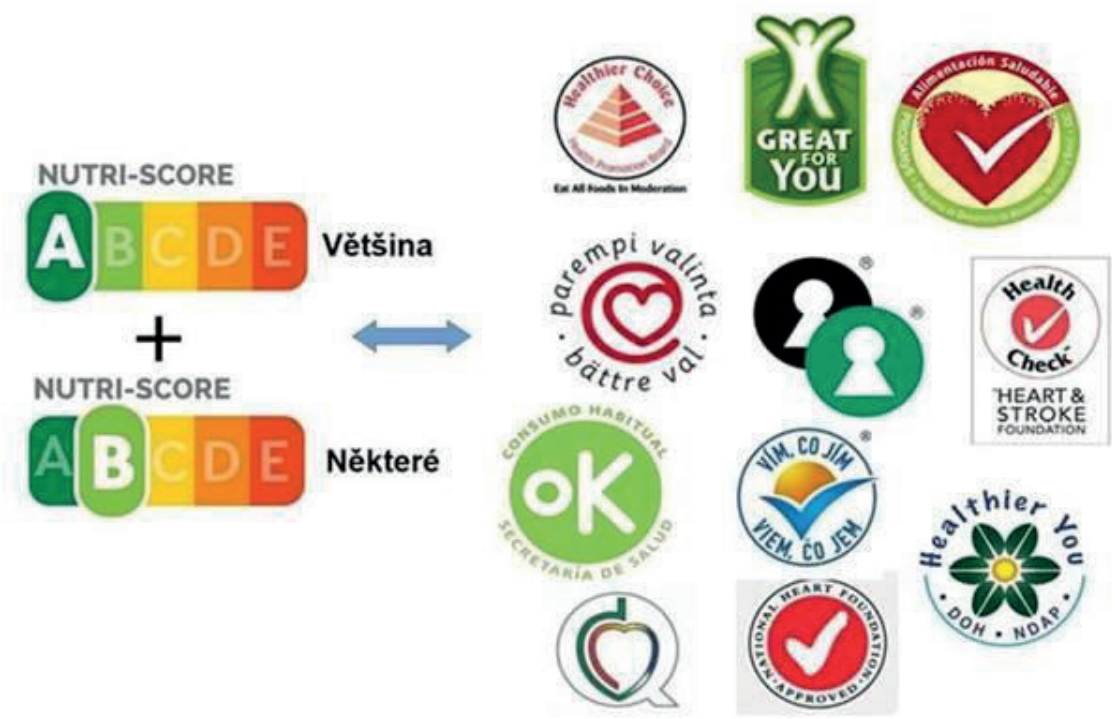
1. Selection of the food product
2. Entry of nutritional values per 100 g/ml. The calculation is carried out automatically.

There appears to be nothing preventing this concept from being preserved. Nonetheless, it is already apparent that having only four profiles is insufficient. Such a classification system does not meet the requirements for formulating a varied and balanced diet. The four profiles have been defined in an arbitrary manner, without a profound analysis of the specific characteristics of the individual food kinds, serving sizes, and preferred dietary customs.

Inspiration can be sought in a comparison of existing systems.

There are numerous systems that use a positive logo. A positive logo indicates that a given food has more favorable nutritional composition than one that does not meet the criteria for the given food type. There are systems on the market introduced a considerable time ago that feature a more refined structure. Most systems incorporate a higher number of food groups. The criteria they employ are defined so as to preserve the concept of a varied, balanced diet. For example, the Choices system is based on a detailed analysis of the composition of foods on the market, and it regulates the criteria so that 30% of foods in a given category meet the logo award requirements.

It has been demonstrated that if foods that meet the parameters for a positive logo are consumed, the overall diet structure corresponds to nutritional recommendations. This is the objective of the Nutri-Score system as well. At present, the problem with Nutri-Score is that its system is incorrectly defined, having been created hastily by French officials without being subjected to in-depth expert analysis. Systems that use a positive logo should roughly correspond to the green classes of the Nutri-Score system. Most products designated with a positive logo should fall into that category, while some might be classified in Class B.



This should be the first step toward the correct definition of the Nutri-Score calculation algorithm. Nutritional profiles are also defined by

WHO: https://www.euro.who.int/__data/assets/pdf_file/0005/270716/Nutrient-children_web-new.pdf

EU Pledge: https://eu-pledge.eu/wp-content/uploads/EU_Pledge_Nutrition_White_Paper.pdf

EFSA: https://efsa.onlinelibrary.wiley.com/doi/epdf/10.2903/j.efsa.2008.644.

In 2006 the EFSA already pointed out (Table 2) that individual groups of foods not only differ in the content of high-risk nutrients, but also contain various nutrients that need to be consumed in sufficient quantities to provide the body with what it needs.

Table 2: Role and dietary contribution of selected food groups including those identified in the Terms of Reference

Food or food group	Nutrients for which intakes might exceed recommendations [1-5]	Overall dietary role [1-5]
Vegetable oils:	SFA	Unsaturated fatty acids acid (MUFA & PUFA) and vitamin E
Spreadable fats:	SFA (fats of animal origin) and TFA (hardened fat).	Unsaturated fatty acids (MUFA, PUFA), vitamins E, and A and D (if added)
Dairy products:	SFA, Na (cheese), sugar (added)	Calcium, Vitamin D (added), protein, and vitamins B_{12}, B_2, iodine, Zn
Cereal and cereal products:	SFA, TFA, Na (added) and sugar (added)	Dietary fibre, Digestible carbohydrates, Minerals, B-vitamins, trace elements
Fruits and vegetables, and their products:	Na (added), Sugar (added)	Related to individual product (vitamins and minerals, folate, potassium and dietary fibre). Low energy density
Meat and meat products:	SFA and Na (added)	High quality protein, Fe, vitamins and minerals, and MUFA..
Fish and fish products	Na (added), SFA	n-3 LC-PUFA (EPA/DHA), vitamins A and D, and iodine
Beverage (non-alcoholic)	Sugar (added)	Hydration

There is no other system that uses only four categories of foods. The low number of food categories results in a situation in which the classification of certain foods is completely different from nutritional recommendations. Some systems have been created with the participation of a large number of nutritional experts, and they should be used for inspiration when defining an appropriate algorithm that is intended to be applicable to all the different food and beverage categories.

A demonstration of the erroneously defined Nutri-Score system using several products

Six products have been selected from the NutriPro database (see the table below). The nutritional values were entered into the Nutri-Score nutritional calculator. Calculations were performed for the applicable group of foods, and the results were compared against the values calculated using the basic profile and the criteria employed by the I Know What I Eat *(Vím, co jím)* system.

	Energie	Energie	Tuky	SAFA	Sacharidy	Cukry	Vláknina	Bílkoviny	Sůl
	KJ/100 g	kcal/100 g	g/100 g	g/100 g	g/100 g	g/100 g	g/100 g	g/100 g	g/100 g
Eidam 30 % t.v.s průměr	1081	257	16,2	13,2	0,0	0,0	0,0	27,3	1,50
Řepkový olej, průměr	3713	884	100,0	7,4	0,0	0,0	0,0	0,0	0,00
sycené nápoje kolového typu	181	43	0,0	0,0	10,6	10,6	0,0	0,0	0,01
Zrna rýže bílá dlouhozrnná	1533	365	0,7	0,2	80,0	0,1	1,0	7,1	0,01
knedlíky houskové, české průměr	633	151	2,8	0,9	26,9	0,3	1,6	4,2	0,28
Šunka krůtí prsní LE&CO	441	105	4,2	1,2	1,3	1,1	0,0	15,2	2,08

The calculation results are shown in the following table.

	Nutri-Score	Nutri-Score	logo VCJ
	zákl.profil	skupina	
Eidam 30 % t.v.s průměr	E	D	Ano
Řepkový olej, průměr	D	C	Ano
sycené nápoje kolového typu	B	E	Ne
Zrna rýže bílá dlouhozrnná	A		Ne
knedlíky houskové, české průměr	A	-	Ne
Šunka krůtí prsní LE&CO	D		Ano

Several conclusions can be drawn from the results.

1. Calculations involving fats, cheese, and beverages carried out using the basic profile yielded entirely distorted interpretations. Edam cheese with 30% fat content in dry matter would be placed in Class E, rape-seed oil in Class D and, in contrast, a cola-type beverage in Class B. The creation of a specific profile for these categories was therefore substantiated.

2. The definition of the nutritional profile for beverages appears logical, with the cola-type beverage being reclassified from Class B to Class E. The question is whether the use of sweeteners should somehow be incorporated into the algorithm. The relevant information is available on the packaging in the list of ingredients. For example, FOPL criteria in Mexico take the presence of sweeteners as a discriminatory factor against the award of a positive logo.

https://ijbnpa.biomedcentral.com/articles/10.1186/s12966-021-01148-1

3. The current definition of the nutritional profile for fats does not correspond to nutritional recommendations. Rape-seed oil, which has one of the best compositions among oils, has been moved from Class D only to Class C, which does not reflect reality. Rape-seed oil meets the requirements for being granted a positive logo and should be classified in a Nutri-Score green category, most likely Class A.

4. The current classification of Edam cheese with 30% fat content in dry matter, reclassified from Class E to Class D, does not reflect reality either. The salt content corresponds to the minimum technically necessary amount, and the fat and saturated fatty acid content is generally lower than in other kinds of cheese. Edam cheese with 30% fat content in dry matter meets the requirements for a positive logo and should be classified in a Nutri-Score green category, most likely Class B.

5. Nutri-Score does not currently have a specific category for meat products. The following arguments can be made in favor of introducing such a category. Compared to other meat products, LE&CO turkey breast ham has a lower fat and saturated fatty acid content. The salt content corresponds to the minimum technically necessary amount. LE&CO turkey breast ham is in Class D. The product meets the requirements for a positive logo and should be classified in a Nutri-Score green category, most likely Class B.

6. Nutri-Score does not currently have a specific category for fish and fish products. Fresh fatty fish should undoubtedly be placed in Class A. The question is why a high number of fish products are classified in non-preferred categories—whether the salt content is so high as to justify such classification.

7. Nutri-Score does not currently have a specific category for rice and cereal products. According to nutritional recommendations, the critical parameter for these kinds of products is the dietary fiber content. Although dietary fiber content is one of the parameters used in the calculation pertaining to these products, its inclusion is not manifested as might be expected. According to Nutri-Score calculations, traditional white rice and regular bread dumplings are in Class A, even though both products are relatively lacking in nutrients. The products do not meet the requirements for a positive logo and should not be classified in a Nutri-Score green category, either Class A or Class B.

The Nutri-Score system should not be applied to products with exemptions from the requirement to specify nutritional data granted under Regulation (EU) No 1169/2011 of the European Parliament and of the Council (Annex V).

Educating the consumer is what matters

The Institute of Agricultural Economics and Information (IAEI) has teamed up with the STEM/MARK market research agency to conduct a questionnaire survey with a representative sample of more than 1,000 respondents. The survey focused on food labelling, and the results have shown that the majority of consumers do not have a clear idea of what information is mandatory and what is optional. When answering an open question regarding optional information on foods they would like to see, a large number of respondents cited information that is already mandatory, including nutritional data, while half of them provided no response. There continues to be a general lack of knowledge about nutrition and foodstuffs in the Czech population and so it is necessary to continue educating and guiding people. A red symbol on a specific product will likely deter informed consumers, yet the majority will disregard it.

One of the questions asked in the survey concerned the form that should be used to present nutritional data on the front of the packaging. From the answers obtained through the questionnaire, **35% of the respondents selected a table of nutritional values, 28% a simplified graph**, and 6% opted for an electronic code (such as a QR code) for an app. As many as 32% of the respondents expressed no interest in information to that effect. A table containing nutritional values is preferred by young people (in the cohort of respondents aged 18 to 34, 36% opted for such a table and only 19% for a graph), while older people (55 and above) would prefer a simplified graph (29% opted for a table versus 37% a graph).

A survey conducted in the Netherlands established that approximately 40% of consumers consider it misleading if products are designated healthy by the label on the front of the packaging but not so according to nutritional recommendations. Such labelling has an adverse impact on their trust both in labelling and in nutritional recommendations. In other words, any labelling system needs to be understandable and, at the same time, consistent with nutritional recommendations. Criteria applicable to individual categories should consider the role of the products in the diet as well as their nutrient content. The system should unambiguously differentiate between staple foods that meet nutritional recommendations and products that do not. This is the only way FOPL can be of real assistance to consumers when selecting their food.

Summary

The Nutri-Score system is unsatisfactory as currently configured. There are numerous specific examples of the incorrect classification of individual foods into Nutri-Score classes, which are inconsistent with nutritional recommendations and do not reflect scientific knowledge pertaining to the health impact of food consumption. Before its real-world implementation on a broad scale, the system should be subjected to a thorough expert review and wide debate in the scientific community. The arbitrary definition of four nutritional profiles, which constitute the basis for Nutri-Score calculations as it currently stands, leads in many cases to completely misleading conclusions that will make no contribution whatsoever to educating consumers regarding adherence to healthy nutrition principles. It should be mentioned that the objective of this document is not to present detailed proposals to change the specific aspects of the system. Nonetheless, the document suggests directions that should be followed. The relevant measures should be implemented strictly on an expert basis.

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