National Institute for Public Health
and the Environment
Ministry of Health, Welfare and Sport

A closer look at *front-of-pack nutrition labels*

Summary

The National Institute for Public Health and the Environment (RIVM) and the Netherlands Nutrition Centre (Voedingscentrum) have compared three existing European front-of-pack nutrition labels to the Dutch Wheel of Five guidelines. These labels are the Scandinavian Keyhole, the British Multiple Traffic Light and the French Nutri-Score.

Each of these labels is set up differently and assesses different foods. In addition, they do not include the same nutrients and the criteria for what constitutes healthy foods vary. As a result, the number and types of foods indicated as a healthy choice vary per label.

With regard to design and the assessment method used, Keyhole is the closest to the Dutch Wheel of Five. In both cases, certain healthy foods are eligible for Keyhole or are part of the Wheel of Five, whereas other, less healthy, foods are not. There are however differences with regards to foods that cannot comply. For example, sauces and processed meat are not part of the Wheel of Five, but are eligible for Keyhole. One similarity is that both have set up criteria per individual food group, but the strictness of these criteria does vary.

In Multiple Traffic Light and Nutri-Score, all packaged food products are eligible for a label. In addition, both the method and the criteria for evaluating foods differ, between the labels and compared to the Wheel of Five. For these two labels, this creates a greater difference in the number and types of food that are indicated as a healthier choice when compared to the Wheel of Five, than the latter compared to Keyhole.

All the front-of-pack nutrition labels examined here can help consumers to rank foods by how healthy they are. In a direct comparison, Nutri-Score is slightly better for ranking foods than Multiple Traffic Light. Based on scientific literature, there is no convincing and consistent evidence that the three labels affect consumers' food choices in practice.

Policy makers can use the results of the comparison when selecting a front-of-pack nutrition label for the Netherlands. The National Prevention Agreement stipulates the introduction of a new, widely acknowledged front-of-pack nutrition label by 2020 at the latest. With a label, the Dutch government wants to help consumers to make conscious healthy choices, in addition to providing measures to improve food composition and the food environment.

Background

The Dutch government is committed to healthier nutrition and a healthier living environment in order to reduce obesity. Eating foods according to the Wheel of Five is the foundation of a healthier diet. In addition to improving nutrition and the food environment, the Dutch government wishes to help consumers make conscious healthy choices. The National Prevention Agreement therefore stipulates the introduction of a new, widely acknowledged front-of-pack nutrition label, by 2020 at the latest [1].

The basic principles of the front-of-pack nutrition label are that it is tailored to how people make their choices: consumer comprehension is a key principle. Moreover, the criteria of the Wheel of Five are explicitly applied and European developments with regards to front-of-pack nutrition labels are taken into account.

The purpose of this fact sheet is to compare three existing front-of-pack nutrition labels with the Dutch Wheel of Five guidelines. The fact sheet determines how the basic principles of the Scandinavian Keyhole, the British Multiple Traffic Light and the French Nutri-Score compare to those of the Wheel of Five. In addition, for several food groups, the number of foods complying to the criteria for the front-of-pack nutrition labels and the Wheel of Five were compared.

The current fact sheet is a translation of the Dutch fact sheet which was published in November 2019. Textual changes were made for clarification. Since the publication of the Dutch fact sheet, Nutri-Score has been adapted (e.g. olive oil criteria were added). These changes were not included in the current fact sheet.

The Wheel of Five

The Wheel of Five is based on the Dutch dietary guidelines 2015 [2]. The Wheel of Five distinguishes between healthy and less healthy food groups (see Figure 1). The healthy food groups are recommended for daily consumption. Certain food groups are considered to be less healthy, such as processed meat and sugary drinks. Less healthy foods are not included in the Wheel of Five. Instead, such foods are divided in "once a day"- or "once a week"-choices. Small snacks, like a biscuit, can be enjoyed once a day, whereas bigger options such as a slice of cake or a frozen pizza can best be had no more than once a week. This is determined by criteria for the amount of calories, salt and saturated fat.

Within the group of healthy foods, there are healthier and less healthy choices, based on group-specific criteria for the amount of saturated fat, trans fat, sugar, salt and fibre. These criteria result in one final conclusion: the food product is only admitted to the Wheel of Five if it meets all the criteria. If a food product is not admitted to the Wheel of Five, it is determined whether it can be consumed on a daily, or only on a weekly basis to stay compatible with a healthy diet.
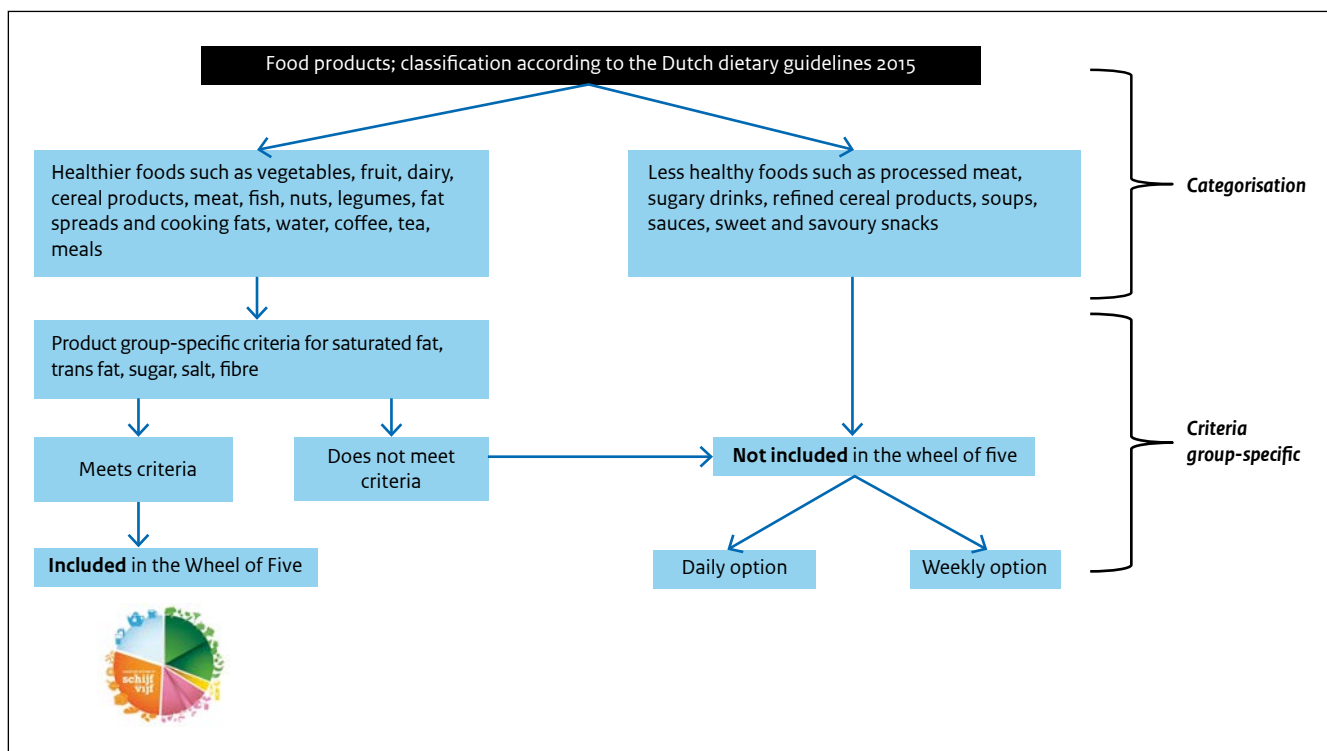

Figure 1. Wheel of Five decision tree

Three European front-of-pack nutrition labels

Keyhole

The Scandinavian Keyhole label has existed since 1989. The recent version is based on the 2012 Nordic Nutrition recommendations [3]. The Keyhole label is used in Sweden, Norway, Denmark, Iceland, Lithuania and Macedonia, among other countries. The label distinguishes between healthy and less healthy food groups

(see Figure 2). Healthy foods such as vegetables and fruit are recommended for daily consumption. The less healthy food groups, such as beverages, sweet and savoury snacks, are not eligible for a Keyhole label.

Within the healthy food groups, a distinction is made between healthier and less healthy choices. The group-specific criteria for amounts of (added) fat, saturated fat, (added) sugar, salt, fibre (see Figure 2) determine whether a food is eligible for a Keyhole label. The label gives one final conclusion: if a product does not meet one of the nutrient criteria, it is not given a label.
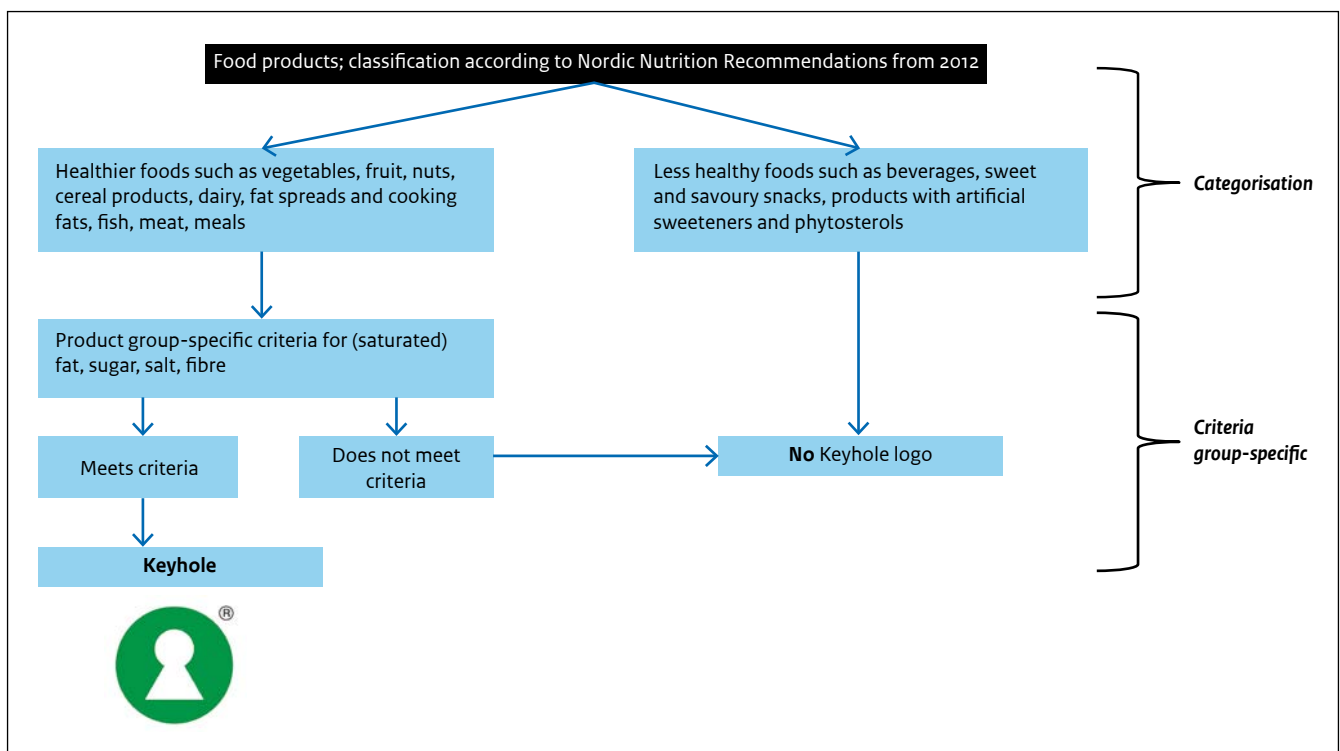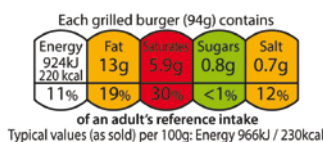

Figure 2. Keyhole decision tree

Multiple traffic light

The Multiple Traffic Light label is used in the UK and has existed since 2013 [4]. Packaged food products are assessed on the basis of the 2009 Food Standards Agency nutrient profiling system. The label gives information about the amount of nutrients and energy per serving, and about the energy per 100 grams. This is compared to the amount of energy, fat, sugar or salt that people need per day (reference intake). The label gives a colour code per nutrient (fat, saturated fatty acids, sugar and salt) based on generic criteria. Fibre content is not assessed (see Figure 3). All food groups are eligible for the label.

Food and beverages are subject to different generic criteria. For a portion size smaller than 100 grams (food) or 150 millilitres (beverages), nutrient contents are assessed by means of generic criteria (per 100 grams), resulting in a colour code that shows whether the product is 'low in' (green), 'medium in' (orange), 'high in' (red) a particular nutrient. For portion sizes larger than 100 grams (food) or 150 millilitres (beverages), the system also takes into account nutrient contents per portion and compares these with the daily reference intake. In the Multiple Traffic Light label, a food can have both red, orange and green scores, but the system does not provide a total score of the food product.
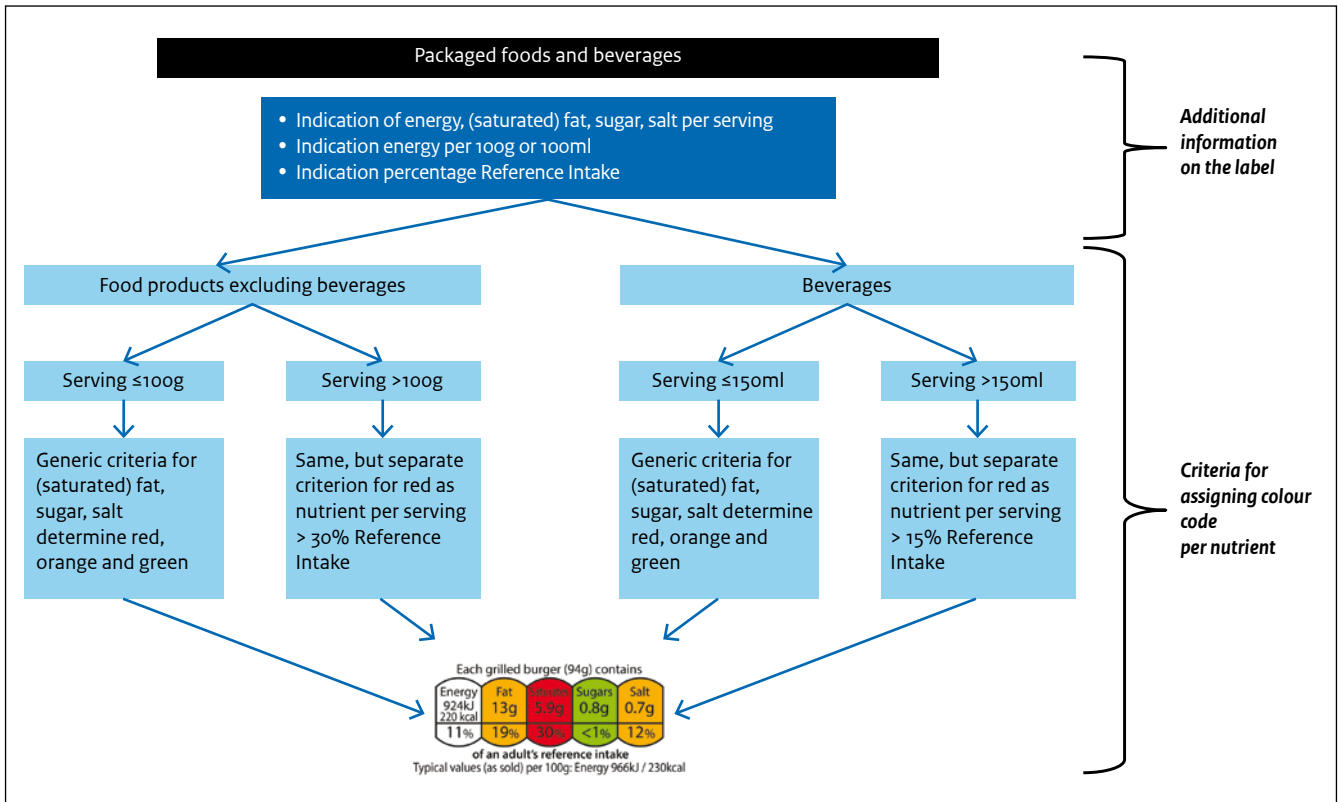
Figure 3. Multiple Traffic Light decision tree

Nutri-Score

The French Nutri-Score has been in existence since 2016 and, like the Multiple Traffic Light label, uses nutritional profiles (2009 Food Standards Agency nutrient profiling system)[5, 6]. In addition to France, the Nutri-Score label has also been adopted by Belgium, Spain and Germany. Nutri-Score covers food products with a mandatory nutritional declaration on their package. Products such as unpackaged fresh-fruit, water with flavouring, coffee and tea are not covered by Nutri-Score. Nutri-Score provides an overall score for packaged food products on the basis of the difference between 'negative' and 'positive' components (see Figure 4).

Negative components are the amounts of energy, sugar, saturated fat and salt, while positive components are the amounts/presence of vegetables, fruit, nuts, legumes, fibre and protein. The scores for the positive components are subtracted from the scores for the negative components, resulting in a single overall score. Products with a lower overall score are a healthier choice. Positive components can compensate, to a certain extent, for the presence of negative components.

The overall score is displayed by means of a letter (A to E) and a matching colour (dark green, light green, light orange, orange, dark orange). Nutri-Score uses a separate calculation for beverages, cheeses, fat spreads and cooking fats.
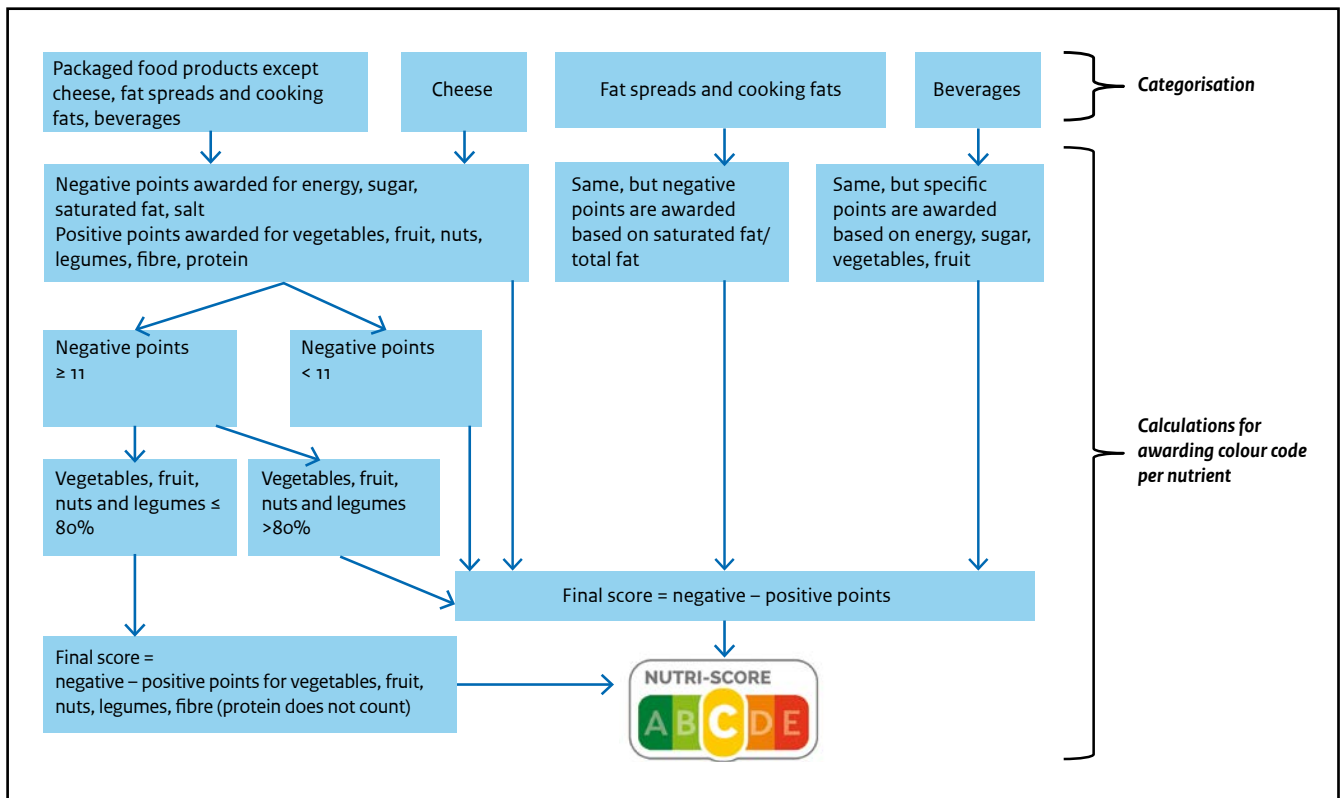
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Categorisation

| Packaged food products except cheese, fat spreads and cooking fats, beverages | Cheese | Fat spreads and cooking fats | Beverages |

Calculations for awarding colour code per nutrient

Negative points awarded for energy, sugar, saturated fat, salt
Positive points awarded for vegetables, fruit, nuts, legumes, fibre, protein

Same, but negative points are awarded based on saturated fat/total fat

Same, but specific points are awarded based on energy, sugar, vegetables, fruit

Negative points ≥ 11

Negative points < 11

Vegetables, fruit, nuts and legumes ≤ 80%

Vegetables, fruit, nuts and legumes >80%

Final score = negative – positive points

Final score = negative – positive points for vegetables, fruit, nuts, legumes, fibre (protein does not count)

NUTRI-SCORE A B C D E

Figure 4. Nutri-Score decision tree

Differences between the three front-of-pack nutrition labels and the guidelines of the Wheel of Five

The front-of-pack nutrition labels differ from the guidelines of the Wheel of Five, both in terms of their framework and the nutrient criteria they use. Figure 5 shows an estimate of the percentage of food products in the Netherlands that meet the criteria of the labels and the guidelines of the Wheel of Five.

The Keyhole label is assigned in the same way as the Wheel of Five: only healthier foods get the Keyhole label or are included into the Wheel of Five. The categories 'crisps, salty snacks, appetisers', 'cake and pastries' and 'squashes, soft drinks, juices' are not included. None of these foods can get a Keyhole label or be part of the Wheel of Five (see Figure 5). Some food groups, such as 'processed meat', are not eligible for the Wheel of Five, but may be eligible for a Keyhole label. Processed meat can therefore be an unhealthier choice according to the Wheel of Five, and a healthy choice according to the Keyhole label. The product-specific criteria also differ. Cheese, bread and dairy products meet the Keyhole criteria less often (1%, 13%, 6%) than the criteria used by the Wheel of Five (11%, 25%, 27%). Fat spreads and processed vegetables more frequently meet

Keyhole criteria (32%, 33%) and less frequently meet the criteria of the Wheel of Five (24%, 12%). The percentages for cooking fats and breakfast cereals are comparable.

The Multiple Traffic Light label focuses on the nutrients (saturated) fat, sugar and salt through generic product criteria. The fibre content is not evaluated and the label assigns a colour code to each single nutrient. All foods can receive a Multiple Traffic Light label. To be able to estimate which food groups are scored healthier under the Multiple Traffic Light label, we have calculated an overall score (see methodology) which was classified into healthier (total score 4 to 6) and less healthy (total score of 7 to 12) foods. While the product categories 'crisps, salty snacks and appetisers', 'cake and pastry', 'processed meat' and 'squashes, soft drinks and juices' are not included in the Wheel of Five, part of these do receive a healthy Multiple Traffic Light overall score.
Squashes, soft drinks and juices are almost all given a healthy Multiple Traffic Light rating because they have a low salt and fat content. Most processed vegetables also receive a healthy score under this system, while only 12% are included in the Wheel of Five. None of the cheeses, fat spreads and cooking fats would, however, receive a favourable Multiple Traffic Light overall score, while 11% of cheeses, 24% of fat spreads and 74% of cooking fats are included in the Wheel of Five. Bread gets a healthy assess-

ment in 76% of cases, while only 25% of the bread group is included in the Wheel of Five. For breakfast cereals this is 49% compared to 26%. The Multiple Traffic Light does not assess fibre content, so the fibre content of 'healthier' foods does not necessarily differ from that of 'less healthy' foods. An example of this is bread: both breads with a low or a high fibre content can have a 'healthy' overall score or an 'unhealthy' overall score (see Figure 6).

The Nutri-Score system focuses on nutrients and ingredients. Positive (vegetables, fruit, nuts, legumes, fibre and protein) and negative (energy, sugar, saturated fat and salt) nutrients and ingredients are given a certain amount of points. All food groups are eligible for a Nutri-Score. Cheese, fats and beverages are assessed separately. A calculated final score (negative – positive points) is used to assess the composition of the food product as a whole. While the product categories 'crisps, salty snacks and appetisers', 'cake and pastry', 'processed meat' and 'squashes, soft drinks and juices' are not included in the Wheel of Five, some of these do receive a healthy Nutri-Score. In the bread, dairy products, breakfast cereals, processed vegetables and processed meat categories, some

products are given a Nutri-Score A or B, many of which do not meet the guidelines for the Wheel of Five (see Figure 5). About 80% of bread products get a Nutri-Score A or B, while only 25% meet the Wheel of Five criteria. For breakfast cereals, 62% gets a Nutri-Score A or B and 26% is included in the Wheel of Five. Moreover, 95% of processed vegetables get a Nutri-Score A or B, while 12% are included in the Wheel of Five. None of the cheeses, fat spreads and cooking fats would, however, receive a Nutri-Score A or B, while 11% of cheeses, 24% of fat spreads and 74% of cooking fats are included in the Wheel of Five.

These differences between the Nutri-Score and the Wheel of Five are caused by the fact that the Nutri-Score system is based on a final score, in which the total positive score is subtracted from the total negative score. As a result, foods with a higher salt content (negative component) in combination with a higher fibre content or protein content (positive component) may still be given a Nutri-Score A and B. Bread with a lower fibre content could still get a Nutri-Score A or B, if the food scores well on other aspects, such as protein or energy (see Figure 6).
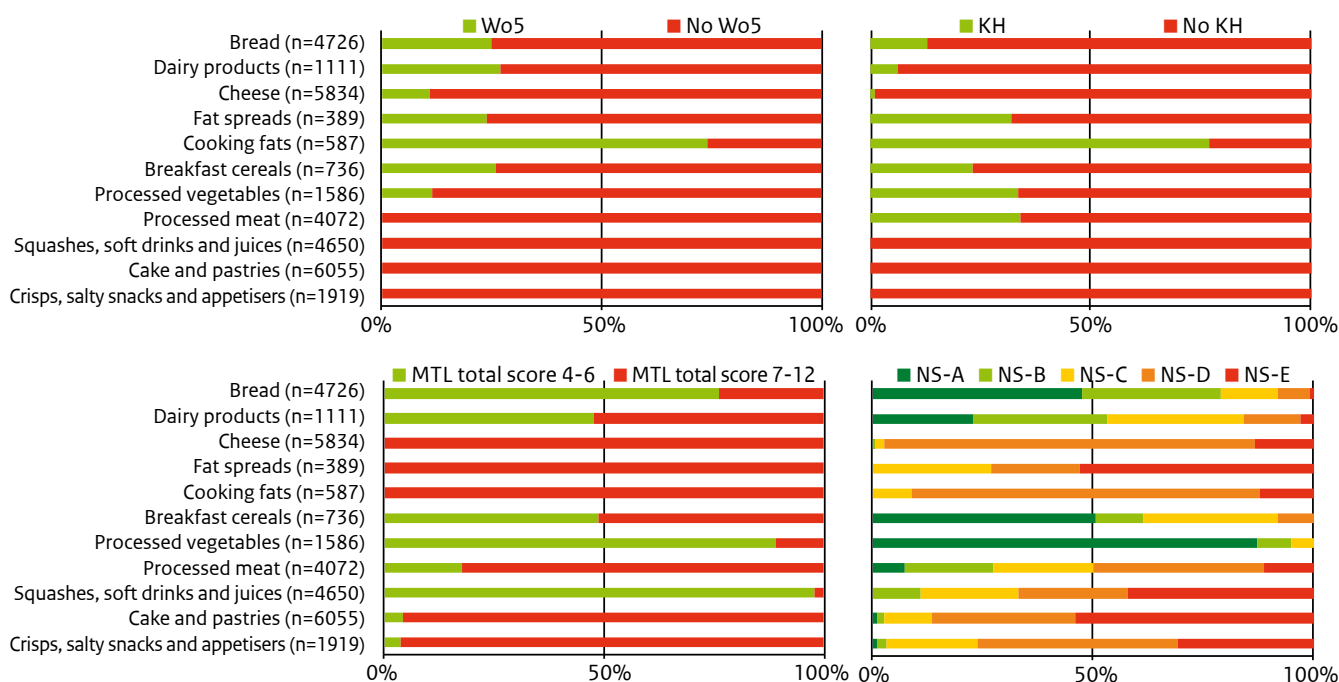

Figure 5. Estimated percentage of foods in the Netherlands that meet the criteria of the Wheel of Five (Wo5) or the front-of-pack nutrition labels Keyhole (KH), total score Multiple Traffic Light (MTL) and Nutri-Score (NS). An MTL total score of 4 to 6 indicates a healthier choice, an MTL total score of 7 to 12 an unhealthier choice. n is the number of food products within the food group.
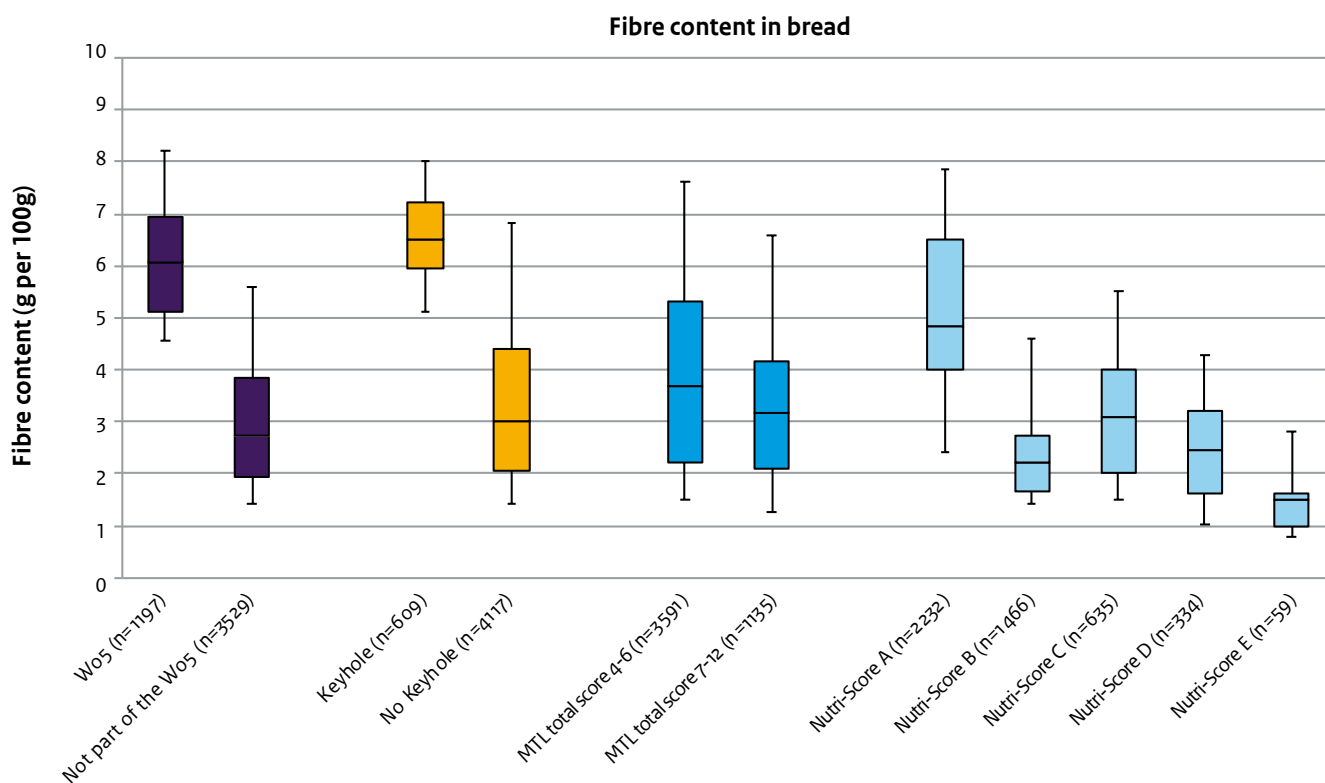
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Figure 6. *Fibre content in bread by category of the front-of-pack nutrition label. W05 = Wheel of Five; MTL = Multiple Traffic Light. An MTL total score of 4 to 6 indicates a healthier choice, an MTL total score of 7 to 12 an unhealthier choice. The figure shows the 5th , 25th , 50th (median), 75th and 95th percentile.*

Food choice

An advisory report by the Independent Front-of-pack Logo Committee in 2016 showed that front-of-pack nutrition labels can inform consumers, but that they have not been shown to contribute to an improvement in food choice [7]. There are few scientific publications available on the effect of the Keyhole label on food choice; more scientific data are available on Multiple Traffic Light and Nutri-Score. Multiple Traffic Light and Nutri-Score have been compared in several studies, but Keyhole was not compared to the other labels. Research has shown that Multiple Traffic Light and Nutri-Score help consumers opt for healthier foods. Various populations, including a Dutch one, showed that when ranking pizzas, cakes and breakfast cereals in a healthy order, the Nutri-Score worked better than Multiple Traffic Light [8]. Swedish and Norwegian studies indicate that the Keyhole label is understood by the majority of respondents [9-11].

However, there is no convincing and consistent evidence that front-of-pack nutrition labels have an impact on the actual choice of food [7, 8, 12, 13]. Such studies often only focus on a limited number of food groups, which are often not included in the Wheel of Five, and the effects and

differences between labels are small. It is also unclear what the effect will be if the 'message' of a label does not match the national nutritional information of the Wheel of Five.

Product improvement

In theory, all nutrient criteria systems can provide direction for improving the composition of foods. The extent to which and the way in which this is possible is different for each front-of-pack nutrition label. We will briefly comment on this.

The criteria for the Wheel of Five and the Keyhole label can only stimulate product improvement of the food groups evaluated by the system. As such, food groups that are not included in these systems, such as cake and pastries, sweets and chocolate and savoury snacks, cannot use these criteria as target.

Because of the generic set of criteria for all foods in Multiple Traffic Light, the system does not focus on product improvement of a specific food group. When the generic criteria for a particular nutrient are outside the reformulation range of many products in a product group, steps for product

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improvement are not likely. Examples are the criteria for the red Multiple Traffic Light scores for saturated fat and salt in the cheese product group, or sugar in the cake and pastry group.

Because Nutri-Score gives an overall score based on negative and positive components, there are several ways to improve the score. A higher score can be achieved, for example, by lowering a product's salt or sugar content, but also by increasing its fibre or protein content. A higher salt content can also be compensated for by a positive component. An example of this is the food group of processed vegetables, in which both vegetables with and without added sugar and salt get a Nutri-Score A.

Methodology

The comparison between the three front-of-pack nutrition labels and the Wheel of Five guidelines is based on the label criteria and the nutritional value data. The nutritional value data were taken from the Dutch Branded Food database (15 April 2019). This database contains a total of 95,000 food products available in Dutch supermarkets. Producers or retailers voluntarily provide these data.

The food groups shown (in Figure 5) have been chosen because they illustrate the differences between the labels. Food products of which relevant nutritional values were missing have not been included. In the case of fibrous foods (processed vegetables, bread, breakfast cereals), any foods with missing fibre data have not been included. In the other groups, the nutritional value for fibre has been set to '0' in foods with missing fibre data (e.g. soft drinks, fat spreads and cooking fats).

The following methodology and assumptions were used to award a Keyhole label. The food products were divided into different types of bread, cheese and dairy products. Keyhole uses different salt criteria per type of processed meat. For the estimation of processed meat, a single criterion of a maximum of 2 grams of salt per 100 grams of product has been applied. For the assessment of breakfast cereals, the Keyhole criteria for 'breakfast cereals and muesli with at least 55% wholegrain cereals' have been adopted. Contents of added sugar and fat could not be included in the Keyhole comparison, because these data are not recorded in the Dutch Branded Food database. For processed vegetables, processed meat, cheese and breakfast cereals, the number of foods with a Keyhole label may be overestimated. As a result, the numbers of processed vegetables and meat could be closer to the numbers in the Wheel of Five.

For the Multiple Traffic Light label, a total score is calculated by summing the scores for the individual nutrients (green=1 point, orange=2 points and red=3 points). To allow comparison with the Wheel of Five guidelines, a distinction was made between a total score of 4 to 6 (a 'healthier' choice) and a total score of 7 to 12 (an 'unhealthier' choice) [14]. This total score is not part of the label, nor is it used to inform the consumer.

The Nutri-Score is based on the Nutri-Score calculation tool results, categorizing products into A (dark green), B (light green), C (light orange), D (orange) and E (dark orange) [15].

A background report (in Dutch) is available on request from the RIVM.

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