

NEVO-online 2019: background information

Dutch Food Composition Database 2019
Bilthoven, 2019

Colophon

Editors

S. Westenbrink
M. Jansen-van der Vliet
E.M. Niekerk
A.M. Roos
C.H.M. Van den Bogaard-van Oosterhout

Editorial board

C.T.F. Grit
P.J.J. Verheijen
W. Van der Vossen

Address

RIVM, P.O. Box 1, 3720 BA Bilthoven,
The Netherlands
Tel. +31 (0)30 2743111
E-mail: nevo@rivm.nl
Internet: <https://www.rivm.nl/en/dutch-food-composition-database>

© Copyright RIVM 2019

Data contained in NEVO are subject to the copyright of the National Institute for Public Health and the Environment (RIVM), Kingdom of the Netherlands.

Use of the information from NEVO online only is allowed if unchanged and when the source and version number are clearly stated. For this, please use the following reference:

NEVO online version 2019/6.0, RIVM, Bilthoven.

Links to this website are permitted.

NEVO online is published by the RIVM, by order and for the account of the Ministry of Health, Welfare and Sports, within the framework of project 5.4.1E 'Netherlands Food Information Resource'.

Liability

The RIVM uses and relies on information from third parties to maintain the NEVO database. Great care is given to the compilation of the NEVO dataset. However, RIVM accepts no claims for any direct or indirect damage, including financial loss, caused by any errors in the dataset or by misuse or misinterpretation of NEVO data. Reporting brand names by no means intends to be a recommendation for these specific foods.

Table of contents

Introduction	3
1 The 2019 edition of NEVO online.....	3
2 NEVO	4
2.1 Organisation.....	4
2.2 International developments	5
3 Use of NEVO online.....	5
4 Explanation to NEVO online data.....	6
4.1 Data sources for the NEVO food composition database	6
4.2 Food industry	6
4.3 Procedures and quality assurance	7
4.4 Bioavailability and biological activity	7
4.5 Variability of data.....	8
4.6 Potential pitfalls in the use of food composition tables.....	8
5 Foods.....	9
5.1 Description of foods.....	9
5.2 Units	10
5.3 Recipes and average foods	10
5.4 Fortified foods.....	10
5.5 Margarine and other edible fats	11
5.6 Sweeteners	11
6 Energy and nutrients.....	11
6.1 Introduction	12
6.2 Energy	12
6.3 Protein.....	13
6.4 Carbohydrates.....	13
6.5 Dietary fibre	14
6.6 Fat and fatty acids.....	14
6.7 Sterols	15
6.8 Alcohol	15
6.9 Polyols.....	15
6.10 Organic acids.....	16
6.11 Water	16
6.12 Minerals and trace elements	16
6.13 Vitamins	18
7 Additional information/metadata	20
8 Other publications of NEVO data.....	20
9 Acknowledgements and members of the NEVO/NES Advisory board.....	21
10 References	22

Introduction

The Dutch Food Composition Database (NEVO) contains data on the composition of foods consumed frequently by a large part of the Dutch population. These foods contribute significantly to the intake of energy and nutrients. Foods of importance for specific groups of the Dutch population are also included.

NEVO is owned by the Dutch Ministry of Health, Welfare and Sports, and maintained at the Netherlands Institute for Public Health and the Environment (RIVM). RIVM collaborates with the Netherlands Nutrition Centre in collecting nutritional data. Data in NEVO originate from chemical food analyses, food manufacturers, international food composition tables or (recipe)calculations.

Data published in NEVO online are freely accessible and can be used to engage in scientific research (nutrition research in particular), the food industry, dietetics and nutrition counselling and/or public health education.

1 The 2019 edition of NEVO online

Data for NEVO online are derived from the Dutch Food Composition Database (NEVO).

NEVO online 2019 contains data of 2152 food items. Since the previous version of NEVO online (2016), information in the database on a large number of foods is added and/or revised. The changes and additions mostly appertain to the addition or removal of foods and the update of nutrient data:

- Individual fatty acids are no longer published as a percentage of the total fatty acid content, but in grams per 100 grams of food.
- The fatty acid composition of 20 types of oils and fats is updated with new analytical values. Analyses were conducted by an accredited laboratory commissioned by the statutory body for the oil and fats industry MVO.
- The sodium content in bread is updated using monitoring data from the 10th national sample of sodium in bread 2018, executed by the Dutch Bakery Centre by order of the Dutch Baking Association.
- The food group 'Legumes' is updated. From nineteen kinds of legumes a large number of nutrients were chemically analysed on behalf of NEVO. The composition of the remainder of the legumes is, as far as possible, supplemented by using foreign food composition tables.
- Special attention is given to the food group 'Nuts and seeds'. Using foreign nutritional analysis, multiple types of nuts are updated and some types of nuts are added.
- The food group 'Clinical formulas' is completely revised. Due to fast changes on the market, including changes in nutrient content, it proved impossible to keep the information for foods for medical purposes up to date in NEVO.

The food group now consists of an extensive list of infant and toddler formulae, as well as some sports nutrition products and meal substitutes. The food group has been renamed to 'Foods for special nutritional use'.

- The food group classification is changed from 23 into 27 groups. Four existing food groups are split into two separate groups. For instance the group 'Alcoholic beverages and non-alcoholic beverages' is split into food group 'Alcoholic beverages' and food group 'Non-alcoholic beverages'.
- Based on food intake data from the most recent Dutch National Food Consumption Survey (2012-2016), 141 frequently eaten foods have been added to NEVO online.
- In total 181 foods were added and 418 foods were removed since the 2016 edition of NEVO online. The majority of removed foods were foods for medical purposes. The remainder of the removed foods consist of products that are no longer available on the market.

2 NEVO

2.1 Organisation

The Dutch Food Composition Database (NEVO) is part of the Netherlands Food Information Resource (NethFIR), owned by the Ministry of Health, Welfare and Sports and is maintained by RIVM.

NethFIR is a database for food composition data in both generic and branded foods (nutrients, allergens and characteristics such as sustainability and portion sizes). NethFIR is a shared activity of the Netherlands Nutrition Centre and RIVM. RIVM focuses on professional users and use of the data in nutrition and/or research whilst the Netherlands Nutrition Centre targets the public and use of the data for educational purposes.

In parallel with NEVO, the National Supplement Database (NES) is also maintained at RIVM as part of NethFIR.

RIVM took responsibility for the maintenance of the NEVO database in 2007. Previously, between 1985 and 2007, Stichting Nederlands Voedingsstoffenbestand (NEVO Foundation) was responsible for the database. This Foundation arose from the committee Uniforme Codering van Voedingsenquêtes (Uniform Coding of Food Consumption Surveys, UCV), which started in 1972 to build a computerized databank containing food composition data. In 1988, a merger with the Dutch Food Composition Table resulted in one central database. The NEVO foundation was disbanded on December 31st 2010.

An advisory board with scientific experts, data providers and users of NEVO data advises RIVM. The aim of the management and maintenance of NEVO is to have up to date food composition data. Another important objective is promoting the use of the food

composition data.

2.2 International developments

In the past decades, several European projects (e.g., INFOODS, COST99 and EuroFIR) have been instigated to improve the quality and exchange of data from national food composition databases. Standardisation of European food databases affects not only these databases, but also impacts usage. As a result, increased comparability of food composition data between countries is expected.

In 2009, the non-profit association EuroFIR AISBL was founded in Brussels. RIVM is a member of this association, as are other organisations responsible for national food composition data globally. The vision of EuroFIR AISBL is the delivery of high quality, validated food composition information, which might be used to address food quality, nutrition and public health challenges in Europe, and increased awareness and understanding of the value of food composition data and its importance for consumers to make healthier dietary choices. Its mission is to be the best and only independent broker of validated food composition information in Europe, to facilitate improved data quality, storage and access, and encourage better application of food composition data/information through harmonisation and training.

Thus, EuroFIR AISBL is an important source of knowledge for individual food database compilers. Issues of primary importance include definition and classification of food components and food items, analytical methods, recipe calculations, exchange of data with the food industry, quality assurance, education, and delivery of data to users (www.eurofir.org). Data from NEVO are provided to EuroFIR AISBL for FoodEXplorer, a tool that allows users to search information from most EU Member States as well as Australia, Canada and USA, simultaneously. RIVM uses the tool to complete food composition information for which Dutch data is not available.

3 Use of NEVO online

In NEVO online the composition of foods can be found. It is possible to search on NEVO food code, name of the food item (both Dutch and English) or food group. Synonyms are added to the food names (in Dutch only), to improve search results. Results can be retained to compare them with new search results.

Results are shown per component group (e.g., macronutrients, minerals or fat-soluble vitamins).

By clicking on the button 'productdetails', (*the button with 'i'*) data on all available components per food are given. For each value, a detailed reference is available. This selection of data can be exported to Excel. More information on [how to search](#) on NEVO online can be found at the website.

Background information such as [food group classification](#), [recipes](#), foods [removed](#) or [added](#), [explanation of the references](#) as well as the '[List of abbreviations and symbols](#)' and a '[List of table headings](#)' can be found at the website.

4 Explanation to NEVO online data

4.1 Data sources for the NEVO food composition database

NEVO food composition data are collected from several sources. All data are evaluated following a standard procedure to check if the data are fit-for-purpose (1). Preferably, food composition data should come from chemical analyses by accredited laboratories. This can be commissioned by research institutes, the Dutch government or the food industry. Quality criteria apply for food identification, sampling, and methods of analysis. Supplementary information is collected from foreign food composition tables, scientific literature and food labels.

Information on missing nutrients can, in some instances, be obtained from similar foods, calculated from the ingredients (recipe calculation) or by (logical) deduction, for instance

- vitamin D in plant foods is always zero
- if total carbohydrates is zero, the mono-, di- and polysaccharide content must also be zero.

The source of every value in NEVO online is known. More information about the references used can be found in Chapter 7.

4.2 Food industry

Because of the large, and rapidly changing, number of industrial foods on offer it's important for NEVO online to be as up to date as possible. Whenever relevant RIVM makes use of a branded foods database (LEDA) which is managed and maintained by the Dutch Nutrition Centre to examine as accurately as possible whether foods are still on the market or if their name or composition has changed, necessitating a revision of the data. Once it is known that a food is no longer available on the market it is excluded from NEVO online.

Because of the generic character of most foods in NEVO, the aim is to aggregate comparable foods. For foods for which this is not possible (e.g., fortified foods and foods with no alternatives), data are published under the brand name.

The measurement or calculation method of food composition data provided by manufacturers or taken from food labels, is generally unknown. Usually, the number of components on food labels is limited to a maximum of eight. In NEVO online, missing components (vitamins and minerals) are added as much as possible, using additional data from manufacturers or other sources e.g., calculations from ingredients or expert

estimations. Because the source of each component is available at NEVO online, it is possible to see if the value derives from the manufacturer or from another source.

4.3 Procedures and quality assurance

Food composition data are scrutinised for relevance (foods and nutrients) and quality (analytical method, sampling procedure et cetera). After careful consideration, decisions are taken with respect to food names, allocation of food code numbers including the merging of several tastes and brands et cetera. Selected data are entered into the NEVO database.

Information on missing nutrients is added from similar foods, recipe calculations and logical estimations. If needed, scientific experts are consulted. If multiple values of a component are available for a food, including results of several analytical protocols, a mean value or one of the single values is selected for publication. Foods that do not differ substantially from one another are combined within one food code.

In the NEVO quality manual, all procedures to maintain and compile data are documented (1). The food data compilation process adheres to internationally accepted standards, as described in the EuroFIR Quality Management System, and the EuroFIR generic flow chart for food data compilation (2-4) is followed. This way, the work is standardised as far as possible and data are quality assured.

During compilation, a number of controls are performed. All data are checked for accuracy, completeness and consistency, for instance:

- does total macronutrients per 100 g of food add up to 100 g?
- does the amount of mono- di- and polysaccharides not exceed the total amount of carbohydrates?

Composition of similar types of food is compared to identify errors. Members of the NEVO/NES Advisory Board perform an audit shortly before the release of a new version of NEVO online.

Besides assuring the compilation process as a whole, attention is given to the quality of individual values. Therefore, additional information (meta-data) such as origin of foods or numbers of samples, sample description, status of the laboratory (NEN-ISO 17025 accreditation) and analytical methods (validated/accredited), date of analysis, calculation method, reference et cetera are documented. Using the EuroFIR criteria, documentation of values are further standardized leading to better comparability and easier exchange of data between countries, and easier quality evaluation of data (5,6).

4.4 Bioavailability and biological activity

Biological availability (bioavailability), which is the proportion of a component that is absorbed in the gastrointestinal tract and can be utilised by the body, is influenced by many factors including the chemical form of the nutrient, other substances present

affecting the nutrient and endogenous factors (e.g., nutritional status) associated with the individual factors. Biological activity is the effect the component has in the body and is related to bioavailability.

Data for nutrients given in NEVO not corrected for bioavailability. For some nutrients, however, biological activity of the individual nutrients is considered when calculating retinol activity equivalents (RAE), retinol equivalents (RE), total vitamin E and folate equivalents.

4.5 Variability of data

Information in NEVO should be seen as the closest approximation of actual values. Foods are subject to variation in composition for various reasons. Natural variation amongst comparable foods may arise from differences in breed or variety, cultivation or breeding method, soil conditions, season, harvest time, and storage conditions.

Differences in composition may also arise in production although these processes are subject to stringent quality requirements. The use of different ingredients by the industry or at home is another potential source of variation.

For dishes based on recipes, NEVO uses standard recipes described in Nieuwe Kookboek 38th edition (7) as a starting point. In daily practice, however, deviations will be the rule rather than the exception.

4.6 Potential pitfalls in the use of food composition tables

Data in food composition tables are intended to reflect reality as closely as possible. These data are frequently used in software for nutritional calculation, and for retrieving and comparing the composition of food items. However, whilst compilers must demonstrate adequate quality control and timely revision of data, users should be aware of the limitations of these tables (8).

Missing values

NEVO online does not include all foods on the Dutch market. Equally, not all components are available for every food item included. Macronutrients (i.e. protein, carbohydrates, fat and water) are complete for the majority, but some individual fatty acids, dietary fibre, mineral and vitamin values are missing.

In case there is no available data on a nutrient, this nutrient is not shown in NEVO online. The missing nutrient is represented with a '-' (dash), in case of comparing food items with one another. An overview of the [coverage rate](#) of each food component is available on the website.

Users of NEVO online are advised to determine individually how to deal with missing data (e.g. are missing values considered to be zero?) and to take this into account when interpreting the results of any nutritional calculation.

Comparison with other food composition tables

When working with food composition data it is sometimes necessary to consult several food composition tables. These can be former editions of the national food composition table, foreign food composition tables or food composition tables with a specific scope (e.g., branded data). An important aspect of these comparisons is the identification of the food. Detailed descriptions are needed to be sure the food composition data refer to the same food. Difficulties in translating the name and the fact some foods are country-specific make comparisons between countries difficult. For example in some countries iodized salt is used in bread, but not in other countries. And sometimes foods that look alike, can in different countries be produced by using varying recipes, resulting in different food composition even within one brand.

Another important issue is the definition used for components that can easily vary between data sources. For example in some databases, vitamin A is expressed as retinol equivalents (RE) and as retinol activity equivalents (RAE) in other databases. Another example is carbohydrates which might be presented including or excluding dietary fibre. Furthermore, several analytical methods may have been used, making a direct comparison difficult; see for example Chapter 6.2 on energy calculation.

Differences between NEVO and food labels

Packaged foods declare their nutritional values on the labels. Such information can also be found on the manufacturers' or retailers' websites. Comparison of label information with information in NEVO online might reveal differences. These may be attributable to the values in NEVO being average values based on data from several references and therefore not exactly representing a specific brand food item. In addition, changes in the recipes used, can be introduced by the producer between publication of NEVO online and at the point of sale.

5 Foods

5.1 Description of foods

Names of foods are chosen to describe the food items as appropriately as possible. Sometimes, long descriptions are needed to identify a food and abbreviations may be used in the name. A [list with abbreviations and symbols](#) used (English and Dutch) is available. In NEVO online 2019 synonyms are added to the search options, to get better search results (in Dutch only). Proprietary brands are mentioned only when needed to identify the food item and if the information appertains exclusively to that specific brand.

Via the button 'Productdetails' (*this is the button with 'i'*) additional information about the food item will be supplied. This information may appertain to the brands on which the average value is based, the use of specific cooking fats/oils used for preparing the food, a recipe or whether a food is fortified. In case of a fortified food, the information about the nutrients added by the manufacturer is included here.

Brands included in the calculated mean value are mentioned by name if it concerns a limited number of brands. In case of a large number of brands in the calculated mean this is described as 'Gem van diverse merken', meaning 'average of multiple brands'. It is possible that a food brand which is no longer on the market is mentioned when an update on the mean value has not yet taken place since the withdrawal of this particular brand.

5.2 Units

The composition of foods is expressed per 100 g of the edible part (i.e. meat without bones, vegetables without waste). For foods like fish, vegetables and fruit canned or in glass the value refers to the product after it's drained out. Foods such as oil and ice cream, which have a density different from water, are often presented per 100 ml on the label. Users should be aware of this difference when comparing label information with NEVO online data. Values used from the label are recalculated to 100 g by use of a density factor before entering the data in NEVO. In certain cases, the composition of liquid foods for specific dietary uses may be displayed per 100 ml, if the manufacturer has provided such data. When the food composition is not per 100 g of food, this is indicated in the description of the food.

5.3 Recipes and average foods

For several foods, information on a number of components is missing. When possible these foods are included in the database as a 'recipe'. The composition is calculated based on the known composition of the ingredients. However, recipes vary widely between regions and may change over time. Standard recipes from a general cook book are used (7). Several recipes are derived from ingredients on the label, because the label in general only provides macronutrients and salt.

In the '[List of recipes NEVO online 2019](#)' the makeup of the recipes is listed to allow the user to assess the nutritional value in relation to the ingredients.

Averaged foods are included in the same document. Such foods include, for example, 'boiled vegetables averaged', 'sausages without liver products averaged', 'raw beef with <5 g fat averaged', et cetera. If possible, the selection of ingredients for these averaged foods was derived from the Dutch National Food Consumption Surveys (DNFCS) to account for the number of users and quantities consumed. For some averaged foods data on market shares (based on marketing research data or data from manufactures and trade organisations) is used.

Organic and halal foods

Organic and halal foods are not included separately in NEVO online. Users need to use the equivalent values for established commercial varieties. Only very limited information about organic or halal foods is available.

5.4 Fortified foods

Many fortified varieties of food items are available on the market. Fortified and non-

fortified foods cannot be merged in averaged foods, because of the differing amounts of micronutrients. Furthermore, several brands of the same type of fortified foods cannot be averaged due to fortification with different nutrients and/or with different amounts. This results into more foods published under specific brand names.

The quantities given in NEVO online are total amounts including both naturally occurring and added micronutrients. In some foods, the micronutrients are higher due to the addition of additives, e.g. β -carotene as colouring agent. The content of some nutrients, for instance vitamins, decreases over time. Manufacturers take this into account by adding a larger amount and indicating on the label the amount that will remain at the expiration date.

For fortified foods a * behind the value indicates the food is fortified with this component. Under the 'productdetails' button (*this is the button with 'i'*), the fortified components are reported per food item. This does not apply to the food group 'Foods for special nutritional use', as all vitamins and minerals have been added to these foods.

Fortified foods are also marked with * for derived components (e.g., RAE, RE and folate equivalents) if any of the contributing components is fortified; e.g., when folic acid is added, * occurs for folic acid and folate equivalents.

5.5 Margarine and other edible fats

The average composition of several of types of margarine, low fat margarine, cooking and frying fat is included in NEVO online. The average composition is calculated from data of multiple individual brands. The '[List of margarines, low-fat margarines and cooking fats NEVO online 2019](#)' includes NEVO codes of the specific brands. The names 'margarine product', 'low-fat margarine product' and 'butter product' are used for foods that strongly resemble margarine, low-fat margarine or butter, but do not meet the requirements of the Netherlands Food and Commodities Act.

Detailed fatty acid composition of margarines, low fat margarines, cooking and frying fats is not published in NEVO online 2019, due to lack of reliable and up to date information. This also accounts for recipes containing these fat products as ingredient.

5.6 Sweeteners

The amount of high-intensity sweeteners (e.g., aspartame, acesulfam, cyclamate et cetera) in foods is not included in NEVO, as they do not contribute to the energy intake. The content of energy providing sweeteners sugar alcohols (polyols), e.g., sorbitol, xylitol et cetera, is included; see Chapter 6.9.

6 Energy and nutrients

6.1 Introduction

Definitions of nutrients in NEVO are, whenever relevant, described in short. The ['List of components'](#) shows components (nutrients) published in NEVO online 2019.

Units

Nutrient content is expressed in units used by the Dutch Health Council's Committee on Dietary Reference Values for recommended daily intake (9-10). For macronutrients, the unit is gram (g) whilst for vitamins and minerals it is milligram (mg) or microgram (μg).

Missing nutrient values

If no information is available about a nutrient, the space for the value remains empty. In cases where the level is too low to be adequately quantified, the indication 'sp' ('spoor' = trace) is used. Zero is assigned only if the nutrient is not present at all. When nutrient values are missing for one or more ingredients of a calculated recipe, this results in an underestimation of the content of that component in the recipe. Due to this sometimes values do not seem accurate, e.g., the sum of the individual tocoferols is lower than the total amount of vitamin E. As far as possible, missing data have been imputed based on values derived from comparable foods (using NEVO data or other food composition tables), or estimated by recipe calculation based on the ingredients.

6.2 Energy

Energy available to the body for metabolism, heat production and labour (metabolisable energy) is expressed both in kilojoules (kJ) and in kilocalories (kcal).

The amount of energy for each food in NEVO is calculated on the base of energy providing nutrients, using the following factors:

17 kJ (4 kcal)	/gram for protein
17 kJ (4 kcal)	/gram for carbohydrates (excluding dietary fibre and polyols)
8 kJ (2 kcal)	/gram for dietary fibre
37 kJ (9 kcal)	/gram for fat
29 kJ (7 kcal)	/gram for alcohol
10 kJ (2,4 kcal)	/gram for polyols
13 kJ (3 kcal)	/gram for organic acid

This energy calculation complies with EU regulation 1169/2011 on the provision of food information to consumers, for nutritional value labelling of food items (11) . In this way, a standardised algorithm for energy calculation is used to yield comparable data. For NEVO online, energy derived from dietary fibre and organic acids is taken into account during the calculation since 2011. Previously, it was assumed that no energy was derived from dietary fibre, as it is not digested. However, research has shown that approximately 70% of dietary fibre is fermented in the colon, yielding some energy. The EU regulation indicates that the amount of energy derived from dietary fibre is, on

average, 8 kJ (2 kcal) per gram of fibre. Similarly, according to EU guidelines, an average of 13 kJ (3 kcal) is provided per gram of organic acid, regardless of the type (11).

The adapted energy calculation has resulted in higher energy content for foods containing dietary fibre and organic acids in NEVO online 2011 and subsequent versions compared with earlier versions.

6.3 Protein

For analytical values, the protein content is calculated from the amount of nitrogen (gram) * 6.25. For dairy foods, a factor of 6.38 is used.

In addition to total protein, the amount of vegetable and animal protein is published. For composite foods, the distribution of animal and vegetable protein is estimated based on the ingredients. If known, the nitrogen content is also published.

6.4 Carbohydrates

The meaning of 'carbohydrate' and 'dietary fibre' in food composition tables depends on the definitions used. Sometimes total carbohydrate content (including dietary fibre and polyols) is given whilst, in other cases, carbohydrate contents excludes dietary fibre. In NEVO online, total carbohydrate content represents carbohydrates excluding dietary fibre and polyols, which are both specified separately.

Carbohydrates consist of:

Monosaccharides:	glucose, fructose and galactose
Disaccharides (2 monosaccharide molecules):	sucrose, lactose and maltose
Oligosaccharides (>2 - <10 monosaccharide molecules):	e.g., malto oligosaccharides, raffinose, fructo oligosaccharides
Polysaccharides (> 10 monosaccharide molecules):	starch, dextrin, glycogen

Oligosaccharides are found in minute quantities in foods and, hence, are not included in NEVO. Available oligosaccharides should be taken into account in total available carbohydrates, although from the data provided it is not always clear if this was done correctly.

NEVO online lists the total amount of available carbohydrates, and the total amounts of mono-, di- and polysaccharides. When analytical values on individual mono-, di- and polysaccharides are available, the total amount of available carbohydrates is calculated from these values. Available carbohydrates can also be calculated by subtracting the content of water, protein, fat, dietary fibre, polyols, alcohol, organic acids and ash from 100 gram using the 'by difference' method.

Since the publication of NEVO online 2016 individual mono- and disaccharides are no

longer published due to lack of value data for many foods and hardly any recently received up to date information.

6.5 Dietary fibre

Dietary fibre consists of those constituents of plant cells that cannot be decomposed by enzymes in the human stomach and small intestine, e.g., lignin, cellulose, hemi cellulose and pectin. Dietary fibre content depends strongly on the method of analysis used. As far as possible, NEVO contains values for dietary fibre that have been analysed using AOAC985.29 or AOAC991.43 methods, which are currently common in food composition databases. These methods, however, do not take into account the presence of low molecular dietary fibre (e.g., inulin and oligosaccharides) or resistant starch, which are included in the latest definition of dietary fibre (11,12). The newer AOAC2009.01 method (or modifications) measures a large part of the low molecular dietary fibre and resistant starch present. In the recent analyses of legumes this method is used for the analysis of dietary fibre. Dietary fibre values derived from AOAC2009.01 for foods other than legumes are not yet available in NEVO, this is also the case in most foreign food composition datasets, as far as is known.

6.6 Fat and fatty acids

In NEVO online the total fat content is given as well as the following fatty acid clusters: saturated (SFA), trans (TFA), monounsaturated (cis) (MUFA), polyunsaturated (PUFA) and n-3 and n-6 fatty acids. All clusters are published in g/100g of food. The n-3 and n-6 fatty acid clusters are also included within the polyunsaturated fatty acids cluster, and hence should not be added onto the other fatty acid clusters to calculate total fatty acid content.

The polyunsaturated fatty acid cluster might contain minute quantities of trans fatty acids, as some cis-trans configurations are included, whilst the trans fatty acid cluster contains only trans-trans configurations. The individual fatty acids used to calculate the fatty acid clusters can be found in '[Composition of fatty acid clusters in NEVO online 2019](#)'.

Sum of fatty acid clusters does not equal total fat

A conversion factor is used to calculate fatty acid content from total fat content, because fat contains compounds other than fatty acids, such as glycerol, sterols and phospholipids (13). For most foods, this conversion factor (FACF) is between 0.80 and 0.96. Foods with a high content of phospholipids and sterols (e.g., egg and offal) have a lower FACF and contain less fatty acids. For this reason, and because foods may contain unidentified fatty acids, the sum of the fatty acid clusters (SFA, MUFA, PUFA and TFA) often does not add up to total fat content.

In addition to the fatty acid clusters mentioned above, NEVO online also includes individual fatty acids. From NEVO online 2019 onwards the individual fatty acids will be

shown in g/100 g food and no longer as a percentage (%) of total fatty acids. This makes it easier to calculate the total value of individual fatty acids in a diet.

Because analytical data from several research projects and different periods may have been used, the fatty acids reported may vary. New and more advanced analytical methods allow for the quantification of more individual fatty acids. For some foods, older and more recent data are combined to calculate mean values, which is why the sum of calculated fatty acid clusters is not always equal to the sum of the individual fatty acids.

Not all foods' individual fatty acid data are analysed. As the fatty acids component pattern from comparable products are similar, the component pattern can be used to complete missing fatty acid data, e.g. the fatty acid component pattern of full fat milk is used for several dairy products.

The composition of fatty acids in foods consisting of multiple fat containing ingredients is calculated from these ingredients and their relative fat contribution. Due to insufficient available data on the type and amount of fat in margarine, low fat margarine, cooking and frying fats, it is not possible to use this method for these foods. In this case, individual fatty acids are not published (see chapter 5.5).

6.7 Sterols

Cholesterol

The fatty substance cholesterol is found in foods of animal origin. By definition, vegetable foods have a cholesterol content of zero mg per 100 g of food.

Plant sterols

In some foods plant sterols are added for their cholesterol-lowering effect. Their presence and, if known, the amount added is mentioned under 'Opmerkingen' (meaning 'Remarks'), which can be found after clicking on 'Productdetails' (this is the button with 'i').

6.8 Alcohol

Values for alcohol are expressed in grams per 100 g of the food. On labels, alcohol content is often described as alcohol by volume (e.g. 15% abv), which can cause discrepancies.

6.9 Polyols

Polyols include sugar alcohols such as sorbitol, xylitol, mannitol, maltitol, isomalt and lactitol. These compounds are added to sweeten a limited number of foods. Since NEVO online 2016 individual polyols are no longer published. Only the total amount of polyols is given, due to lack of up to date information on individual polyols in foods. Total polyols are shown in the tab 'Carbohydrates'.

6.10 Organic acids

Organic acids include compounds such as lactic, oxalic, citric, malic and tartaric acids. These compounds are naturally occurring in a limited number of foods and are sometimes added to foods for their technological function. The total amount of organic acids is shown in the tab 'Energy and macronutrients'.

6.11 Water

Water is an important compound to establish the nature of a food item and to compare foods. However, many analytical data and most label information do not include water. Where the water content is not known it is calculated by subtracting carbohydrate, protein, fat, dietary fibre, polyols, alcohol, organic acids and ash from 100 gram ('by difference method').

6.12 Minerals and trace elements

Sodium

All home cooked foods such as boiled vegetables, potatoes, legumes, cereals (rice, pasta, et cetera), prepared meat and fish are reported without added salt unless otherwise stated. The indication 'prepared without salt' is not used in the food names. The abbreviation 'Na-' in the name of a food is used to indicate it is a low-sodium or sodium-restricted food. For a limited number of foods, both the variety with and without added salt is included when both types are available (e.g., salted and unsalted nuts).

Recipes are calculated without added salt where possible. If salt is indispensable for the dish (such as soup) or a food is usually bought ready-to-eat, salt is taken into account. Recipes for cookies and pastries are calculated with iodine-fortified salt (not bakers' salt).

To estimate the sodium content of foods prepared with salt, reference is made to Dutch Nutrition Council advice 'reduce the use of table salt' (14). To include sodium intake from added salt (during cooking or eating), the following quantities of salt per 100 g can be applied. These figures exclude the sodium naturally present as indicated in NEVO online.

Per 100 g of food prepared with salt	estimated amount of added salt in g/100g food *
potatoes, rice and pasta	0.375
mashed potatoes	0.625
Vegetables	0.625
meat, fish, game, poultry, egg, tofu	1.250
composite dishes	1.000
Gravy	0.750

*1 gram of salt contains 0.4 g of sodium

Updating sodium from industrial foods received special attention for NEVO online 2019. Up to date values were included whenever possible.

Foods contain naturally occurring sodium, sodium from added salt, and sodium bound to other compounds (several additives). Analytical values in NEVO are determined by measuring total sodium. For label data it is not always clear if sodium values are produced by chemical analyses or recipe calculation and if sources other than salt (NaCl) are included (such as food additives). Sodium content of foods can also be calculated based on the analysis of chloride, assuming all chloride occurs as sodium chloride. However, in NEVO, values derived in this way are only used if there are no values based on the analyses of total sodium content available.

Potassium, calcium, phosphorus and magnesium

The food industry uses additives that may contain potassium, calcium, phosphorus and magnesium. Using additives will vary per brand and type of food. It is likely that the amount of minerals from these additives is not included in the total amount as presented in NEVO online, due to missing information from the manufacturers. This may result in some underestimation of this mineral content in NEVO online.

Iron

The iron in foods is present as haem [Fe^{2+}] and non-haem iron [Fe^{3+}]. Plant foods contain exclusively non-haem iron whilst animal foods contain both haem and non-haem iron. In NEVO, the percentage of haem iron is estimated from available literature for all raw and cooked meat species. These percentages are used to calculate haem and non-haem iron contents for foods in NEVO (15). For composite foods with animal and plant ingredients, the ratio between haem and non-haem iron is estimated as accurately as possible or calculated by using a recipe. In case iron is added to a food ('Fortified' or added as additive) it is assumed this is done with non-haem iron.

Iodine

In the Netherlands, bread is supplemented with iodine by using bakers' salt. Iodine content of a limited number of frequently eaten types of bread is analysed. For most types of bread in NEVO online, the iodine content is calculated based on the sodium content.

Dutch legislation states that the maximum iodine content allowed is 65 mg/kg bakers' salt. In daily practice, this varies between 50 and 65 mg/kg. For modelling studies and for recipe calculations in NEVO, RIVM applies the iodine content of bakers' salt as defined at 58 mg/kg of salt (previously, it was 55 mg/kg salt) (16). This iodine level was defined in collaboration with salt producing industry and the Nederlands Bakkerij Centrum (Dutch Bakery Centre) (17).

Where food composition of cookies and pastry is calculated as a NEVO recipe, the iodine content was calculated from retail salt with iodine (21 mg iodine/kg). The iodine content of this salt is in between the content of non-iodised salt (0.44 mg iodine/kg) and baker's

salt. For other industrial foods, it is assumed non-iodised salt was used, unless otherwise specified by the manufacturer.

6.13 Vitamins

Fat soluble vitamins

Vitamin A

In NEVO online, Vitamin A in foods is expressed as retinol activity equivalents (RAE) (18). This value is calculated as follows:

$$\mu\text{g retinol} + \mu\text{g } \beta\text{-carotene}/12 + \mu\text{g } \alpha\text{-carotene}/24 + \mu\text{g } \beta\text{-cryptoxanthin}/24.$$

Lycopene, lutein and zeaxanthin have no vitamin A activity.

Previously vitamin A was only expressed as retinol equivalents (RE). RE values are calculated as follows:

$$\mu\text{g retinol} + \mu\text{g } \beta\text{-carotene}/6 + \mu\text{g } \alpha\text{-carotene}/12 + \mu\text{g } \beta\text{-cryptoxanthin}/12.$$

Both RAE and RE are published in NEVO online.

If available, the contributing components retinol and individual carotenoids are also shown in NEVO online.

Vitamin D

Vitamin D is present in animal foods, mainly as cholecalciferol (vitamin D3) and 25-hydroxy-vitamin D. In NEVO online 2013 cholecalciferol was published as total vitamin D. Since NEVO online 2016 a further distinction is made and cholecalciferol and 25-hydroxy-vitamin D are summed as total vitamin D. This approach is similar to several foreign food composition tables. However, in the United Kingdom and Denmark, 25-hydroxy-vitamin D is multiplied with factor 5, before making the summation with cholecalciferol. From the literature, there is no consensus whether a factor for the activity of 25-hydroxy-vitamin D should be used or not. Therefore, no factor is applied to 25-hydroxy-vitamin D in NEVO online. Cholecalciferol, 25-hydroxy-vitamin D and total vitamin D are published in NEVO online 2019, which allows the users to apply a factor and recalculate total vitamin D if required.

Vitamin E

Vitamin E consists of several tocopherols and tocotrienols, which vary in activity. Vitamin E is available in NEVO online as mg α -tocopherol equivalents based on:

$$\text{mg } \alpha\text{-tocopherol} + \text{mg } \beta\text{-tocopherol} * 0.40 + \text{mg } \gamma\text{-tocopherol} * 0.10 + \text{mg } \delta\text{-tocopherol} * 0.01.$$

Whenever possible the amount of Vitamin E is calculated from contributing tocopherols. In the absence of such data, derivations or estimations of total vitamin E content are used.

In other data sources vitamin E can be presented as mg α -tocopherol. In NEVO online not only total vitamin E but also the individual tocoferols are published. This way NEVO online users can chose to use only α -tocopherol as a measure for vitamin E. Note that

for approximately 42% of the foods in NEVO a α -tocopherol value is not available, therefore calculations with α -tocopherol as vitamin E give a underestimation of the real value. Data on tocotrienols are not available in NEVO.

Vitamin K

Vitamin K is available in NEVO online as vitamin K total, vitamin K1 (phylochinon) and vitamin K2 (menachinon). Vitamin K total is the sum of vitamin K1 and vitamin K2. Vitamin K2 is the sum of several types of menachinon, ranging from menachinon-4 (MK-4) to menachinon-10 (MK-10).

Water soluble vitamins

Vitamin B1

Analytical values for vitamin B1 (thiamin), produced in Dutch laboratories, are determined as thiamin (chloride) hydrochloride (thiaminCl.HCl). This is also the preferred analytical method when using data from other sources.

Niacin

Niacin is expressed in mg. Information on niacin equivalents (niacin + tryptophan/60) is not available in NEVO online.

Folate equivalents

NEVO online contains data on folate (present in food by nature), folic acid (added to food items) and total dietary folate equivalents.

Total dietary folate equivalents are calculated as follows (10,19):

$\mu\text{g naturally present folate} + \mu\text{g synthetic folic acid from fortified foods} * 1.7 + (\mu\text{g folic acid from food supplements} * 2.0)$

NEVO does not include food supplements. Thus, the part of the formula in parenthesis is not applicable to total dietary folate equivalents given in NEVO online.

Folate values for NEVO online are analysed microbiologically, which is the most frequently used analytical method for laboratories in the Netherlands and abroad. When values are used from foreign food composition databases, preferably values measured by microbiological method are used, if available.

Producers usually calculate total folate by summing absolute quantities of naturally present folate and folic acid. In NEVO, calculations of folate activity use * 1.7 for folic acid. Consequently, values for fortified foods may be higher in NEVO online than values given on food labels.

Vitamin B12

Vitamin B12 (cyanocobalamin) is found exclusively in animal foods. Kelp (seaweed) is an exception to this rule, but vitamin B12 in kelp is present in a biologically inactive form and hence is 0 $\mu\text{g}/100\text{ g}$ in NEVO.

Vitamin C

Total vitamin C content is the sum of active forms ascorbic acid and dehydro-ascorbic acid.

7 Additional information/metadata

Source codes

For each nutrient value in NEVO online a reference is available. References can be found using the information button 'Productdetails' (*this is the button with 'i'*). On the NEVO website the [specification of the references](#) can be found.

Reference codes are different from NEVO online 2016, because of a different software system. A [translation table](#) from codes 2019 to 2016 is made.

Next to the reference for each value, the NEVO database contains additional information, in particular for analytical values. This information is used to assess the quality of data and to determine if older values are to be kept or discarded should new values become available. NEVO online does not report this additional information.

More background information

On the NEVO website more information can be found on e.g., [the NEVO food group classification](#), [components published in NEVO](#), foods [added](#) or [removed](#) since 2016, [recipes](#), [composition of fatty acid clusters](#) and the [classification of margarins et cetera](#). An overview of [abbreviations and symbols](#) used is also available.

8 Other publications of NEVO data

Since 2013 NEVO data are published online and not as printed tables anymore. A copy of the NEVO online dataset can be requested via the NEVO website. Use of this information is allowed if data are unchanged and with the correct reference, including the version number. The reference to be used is: NEVO online version 2019/6.0, RIVM, Bilthoven. For more information, visit: [Request NEVO online 2019/6.0 dataset](#)

The Netherlands Nutrition Centre produces printed publications and electronic tools incorporating NEVO data. More information can be found at www.voedingscentrum.nl.

9 Acknowledgements and members of the NEVO/NES Advisory board

Acknowledgements

We would like to thank our database managers Ido Toxopeus and Zohreh Ghameshlou for their support in all IT issues. We would also like to thank the Netherlands Nutrition Centre for their cooperation in collecting and exchanging data. In addition, we are grateful for the advice and support of the NEVO/NES Advisory Board during the production of this new NEVO online version.

Members of the NEVO/NES Advisory board as per October 2019

Dhr. Dr. Ir. J.M.A. van Raaij, chairman

Mw. Drs. H. Klerken-Cox, Ministry of Health, welfare and Sport, Den Haag

Mw. S.A.E. ter Borg, Dutch Association of Dietitians, Houten

Mw. Dr. Ir. J. J.M. Castenmiller, Netherlands Food and Consumer Product Safety Authority, Utrecht

Mw. Drs. C.T.F. Grit, Dutch Federation of Food Industry, Den Haag

Dhr. Ir. P.J.M. Hulshof, Wageningen University, Wageningen

Mw. Dr. Ir. C.T.M. van Rossum, National Institute for Public Health and the Environment, Bilthoven

Mw. Drs. S. Tuinier, Nutrimedia, Halfweg

Dhr. P.J.J. Verheijen, Wageningen Food Safety Research, Wageningen

Mw. Ir. W. van der Vossen, The Netherlands Nutrition Centre, Den Haag

Mw. Dr. J. de Vries, Wageningen University, Wageningen

10 References

1. NEVO. NEVO Kwaliteitshandboek 2012 (intern document), RIVM 2012.
2. Westenbrink S, Oseredczuk M, Castanheira I, Roe M. Food composition databases: The EuroFIR approach to develop tools to assure the quality of the data compilation process. *Food Chemistry*. 2009;113(3):759-67.
3. Castanheira I, Roe M, Westenbrink S, Ireland J, Møller A, Salvini S, et al. Establishing quality management systems for European food composition databases. *Food Chemistry*. 2009;113(3):776-80.
4. Greenfield H, Southgate DAT. Food composition data; Production, management and use. Rome: FAO; 2003.
5. Becker W, Møller A, Ireland J, Roe M, Unwin I, Pakkala H. Proposal for structure and detail of a EuroFIR standard on food composition data. II. Technical Annex: D1.8.19. Danish Food Information, Roskilde. Available at http://www.eurofir.org/?page_id=12; 2008.
6. Becker W, Unwin I, Ireland J, Møller A. Proposal for structure and detail of a EuroFIR standard on food composition data I: Description of the standard. Technical Report - 2007-07-13. 2007.
7. Henderson HHF. *Het Nieuwe Kookboek*, 38e druk, Uitg. Kosmos-Z&K, Utrecht/Antwerpen. 2008.
8. Westenbrink S, Jansen-van der Vliet M, Siebelink E, Buurma-Rethans EJM. Voedingsmiddelentabellen. Informatorium voor Voeding en Diëtetiek, Bohn Stafleu van Loghum. 2015.
9. Gezondheidsraad. Voedingsnormen: energie, eiwitten, vetten en verteerbare koolhydraten. Den Haag: Gezondheidsraad, 2001; publicatie nr 2001/19. ISBN 90-5549-384-8
10. Gezondheidsraad. Voedingsnormen: vitamine B6, foliumzuur en vitamine B12. Den Haag: Gezondheidsraad, 2003; publicatie nr 2003/04. ISBN 90-5549-470-4
11. EU. Verordening (EU) nr 1169/2011 van het Europees parlement en de raad betreffende de verstrekking van voedselinformatie aan consumenten. 25 oktober 2011. 2011R1169-NL-19.02.2014-002.002-1.
12. Codex. Report on the 30th session of the Codex Committee on Nutrition and Foods for Special Dietary Uses. ALINORM 09/32/26, Appendix II (pp. 46). Rome: Codex Alimentarius Commission. 2009.
13. Westenbrink S. Herziening conversiefactoren voor vetzuren in het NEVO-bestand 1998. Rapportnummer 98.1, Bureau Stichting NEVO, Zeist. 1998.
14. Voedingsraad. Advies 'Vermindering gebruik keukenzout'. 1986.
15. Balder HF, De Vogel J, Jansen MCJF, Weijenberg MP, Van Den Brandt PA, Westenbrink S, et al. Heme and chlorophyll intake and risk of colorectal cancer in the Netherlands cohort study. *Cancer Epidemiology Biomarkers and Prevention*. 2006;15(4):717-25.
16. Verkaik-Kloosterman J, Veer van 't P, Ocké MC. Reduction of salt: will iodine intake remain adequate in The Netherlands? *British Journal of Nutrition* 2010;104:1712-8.
17. Nederlands Bakkerij Centrum, www.nbc.nl, 21-6-2013.
18. Institute of Medicine. Dietary reference intakes for vitamin A, vitamin K, arsenic, boron, chromium, copper, iodine, iron, manganese, molybdenum, nickel, silicon, vanadium, and zinc, Food and Nutrition Board, National Academy Press. 2001.
19. Institute of Medicine. Dietary Reference Intakes for thiamin, riboflavin, niacin, vitamin B6, folate, vitamin B12, pantothenic acid, biotin and choline, Food and Nutrition Board, National Academy Press. 2000.