

Dutch dietary guidelines: dietary protein sources and dietary patterns 2025

To: the State Secretary for Youth, Prevention and Sport (VWS) and
the Minister for Agriculture, Fisheries, Food Security and Nature
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Health Council of the Netherlands



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summary

The *Dutch dietary guidelines* (DDG) provide advice on foods, drinks and dietary patterns for the general population in the Netherlands. The last version of the guidelines was published in 2015 (DDG2015). The present advisory report (DDG2025) – which was drawn up by the Health Council's Standing committee on Nutrition – focusses on protein sources (legumes, nuts, dairy products, fish, meat, eggs, and meat and dairy substitutes) and more plant-based dietary patterns. Guidelines on other topics, such as vegetables, fruit and cereals, will follow in a later advisory report. Until then, the DDG2015 will remain in force for those topics. An overview of the guidelines can be found at the bottom of this summary.

The DDG are tailored to the general population. The Netherlands Nutrition Centre translates the guidelines into information about healthy, sustainable and safe eating patterns for specific target groups.

Preventing chronic diseases and reducing environmental impact

The prevention of chronic diseases in the Dutch population is the main goal for the DDG2025, as before. In the last 10 years, an increasing number of studies have been published on the health effects of nutrition. Based on this, the committee evaluated the effects of food groups and dietary patterns on common chronic diseases, such as coronary heart

disease, type 2 diabetes, and various types of cancer. New is that the committee has additionally looked at the intake of harmful substances through food. These guidelines also pay more attention to the environmental impact of food. The current food system – from production to consumption, including food waste – causes about 30% of greenhouse gas emissions and 60% of biodiversity loss worldwide. The continuation of this food system will make it increasingly difficult to produce enough healthy food for everyone in the future. The revised DDG are therefore important for the health of future generations.



Healthy and sustainable dietary pattern

Based on the evaluation of the scientific literature, the committee recommends a more plant-based and less animal-based dietary pattern. Compared to the current Dutch dietary pattern, this mainly involves a reduction in the consumption of red meat (such as beef and pork) and processed meat (such as meat products) and an increase in the consumption of legumes (such as brown beans, soybeans, lentils, chickpeas) and unsalted nuts (including peanuts). This is beneficial for public health, as it lowers the risk of chronic disease. In addition, it leads to a lower environmental impact. Regarding fish, the committee



recommends sustainably caught or sustainably farmed varieties to limit overfishing and damage to ecosystems.

The guidelines revised in the current advice are in line with the Health Council advice *A healthy protein transition* published in 2023. It concluded that the shift to a dietary pattern with a protein ratio of 60% plant-based and 40% animal-based (compared to an average of 60% animal protein in the current dietary pattern) is good for the health of most Dutch people and is beneficial for the environment. The committee emphasizes the urgency of this shift, and in its current advisory report it provides recommendations for the composition of such a dietary pattern.

Variety in the dietary pattern

The biggest step towards a healthier and more sustainable dietary pattern is a lower consumption of red and processed meat and a higher consumption of legumes. The committee recommends varying between food groups that are consumed instead of red and processed meat. It is important for both health and the environment to choose mainly plant-based products, such as legumes, whole grains and nuts. Eggs and (unprocessed) white meat can also serve as alternatives to a limited extent.

In addition to variation between food groups, the committee also advises varying within a food group, for example between different types of

legumes. This promotes a more varied intake of nutrients and helps to keep the intake of potentially harmful substances low.

Considerable shift requiring a broad approach

The advised shift to a more plant-based dietary pattern represents a considerable change from the current situation. The committee emphasizes that every (further) step towards the guidelines contributes to better health and lower environmental impact. Robust government policies that work towards sustainable production of healthy food and a physical, social and economic environment in which healthy and sustainable food becomes the norm is important to support consumers.



Dutch dietary guidelines 2025

To optimally promote the health of present generations and to contribute to the health of future generations, the Health Council's Standing committee on Nutrition advises:



The 2015 overarching guideline remains in force
A more plant-based and less animal-based dietary pattern in accordance with the guidelines for specific food groups.

Revised and new guidelines 2025 protein sources		Guidelines 2015 that remain in force until they are revised	
	250 grams of legumes per week		At least 200 grams of vegetables and at least 200 grams of fruit per day
	15 to 30 grams of unsalted nuts per day		At least 90 grams of brown bread, wholemeal bread or other whole grain products per day. Whole-grain products instead of refined cereal products
	A few portions of dairy products per day, with variation between types		Soft margarines, liquid cooking fats, and vegetable oils instead of butter, hard margarines, and cooking fats
	100 grams of sustainable fish per week, preferably an oily fish		Filtered instead of unfiltered coffee
	No more than 200 grams of red meat per week. As little processed (red and white) meat as possible		3 cups of tea per day
Remaining protein sources evaluated in 2025			As little sugar-containing beverages as possible
	White meat		No more than 6 grams of salt per day
	Eggs		Nutrient supplements are not needed, except for specific groups for which supplementation applies
	Plant-based substitutes for meat and dairy		
No guideline. These products can be part of a healthy and sustainable diet, but the extent to which they do so depends on the rest of the diet			



01 introduction



The *Dutch dietary guidelines* (DDG) provide advice on foods, beverages and dietary patterns. They describe the optimal dietary pattern in the context of the health of current and future generations. Advising on the DDG is a permanent task of the Health Council. The last version of the guidelines was published in 2015.¹ The present advice – which was drawn up by the Health Council's Standing committee on Nutrition – contains revised and new advice on protein sources: legumes, nuts, dairy products, fish, meat, eggs, meat and dairy substitutes and advice on a more plant-based dietary pattern. The other topics from the 2015 DDG will follow in a later advisory report.

1.1 Purpose and function of the DDG

In 1998, the Ministries of Health, Welfare and Sport (VWS) and Agriculture, Fisheries, Food Security and Nature (LVVN; before: Agriculture, Nature and Fisheries) asked the Health Council to periodically revise the DDG. The advisory request states that the DDG form the basis for nutrition policy and are of great importance for activities in the field of nutrition education and the production of food, among other things.

Food consumption patterns are determined by a combination of many different factors, such as the knowledge and motivation of consumers, but also by social or cultural values and norms concerning food, and by food prices and the food supply in the environment. Therefore, all parties involved in the food system have an impact on food choices.^{2,3}

The advisory report is therefore relevant for various organisations such as the Netherlands Nutrition Centre, the National Institute for Public Health and the Environment (RIVM), food producers (agricultural sector, fisheries, food industry), supermarkets, catering, education and healthcare institutions.

Prevention of chronic diseases

As in the past, the DDG are mainly intended to prevent chronic diseases through healthy nutrition, such as cardiovascular diseases, type 2 diabetes and various types of cancer. Primary prevention of chronic diseases is important for public health: at present, about half of the population in the Netherlands has at least 1 chronic disease.⁴

Also, various lifestyle-related chronic diseases, such as type 2 diabetes, obesity and colorectal cancer, are becoming more common at a relatively younger age.⁵⁻⁷ Unhealthy diet contributes significantly to the development of chronic diseases and burden of disease in the population.^{4,8,9}

Food safety

People can also ingest substances that are harmful to health through food. Such substances can end up in the diet via various routes.

The potential health risks of harmful substances are diverse and depend on the substances and the quantities.¹⁰ The committee has evaluated the chemical food safety of the various food groups in broad terms and describes the most important points for attention.



Environmental impact

For the health of future generations, it is important that sufficient healthy and safe food is available in the longer term, which is highly dependent on the environment. Therefore, the present DDG are, more than before,^{11,12} also aimed at reducing the environmental impact of food.

The current food system – i.e. all actors involved in the production, processing, distribution, preparation and consumption of food and the outcomes of those activities – burdens the environment and contributes to climate change. Globally, the food system causes about 30% of greenhouse gas emissions, 60% of biodiversity loss, and more than 50% of nitrogen emissions.³ Because of this environmental impact, the food system contributes to risks that affect and threaten food production and food safety. Examples of these risks include extreme weather conditions, water scarcity, pests and diseases, foodborne infections, fungi that form mycotoxins and a decline in fish stocks.^{3,13}

1.2 Scope

Aimed at the general population

The dietary guidelines are aimed at the general population in the Netherlands, including the Caribbean Netherlands. The committee does note, however, that the information used on environmental impact and harmful substances relates to products consumed in the European

Netherlands, because this information was not available for products on the various islands of the Caribbean Netherlands.

The scientific research on which the guidelines are based has mainly been carried out in adults. The guidelines apply from the age of 2, but for children adjustments are still needed about the amounts of recommended foods, because they eat (and need) less than adults. The Netherlands Nutrition Centre translates the DDG to children and takes into account, among other things, differences in energy and nutrient needs.

Protein sources first, other guidelines later

The revision of the guidelines is being carried out in parts. In the present advisory report, the committee advises on the following dietary sources of protein: legumes, nuts, dairy products, fish, meat, eggs and meat and dairy substitutes, and on a more plant-based dietary pattern. Other guidelines from 2015 will remain in force until a future revision, which will be worked on from 2026. Table 1 provides an overview of the food groups and dietary patterns covered in the various advisory reports.

The revision of the aforementioned protein sources is given priority because international developments in the field of research into both health aspects and environmental impact are greatest here. In addition, revisions of international dietary guidelines show that these guidelines probably need the most adjustments. Finally, this prioritization turned out



to be in line with the Netherlands Nutrition Centre thoughts on priority topics.

Cereals are not covered in this advisory report. The committee emphasizes that cereals are a valuable source of protein. However, she does not expect any major changes for that food group because the international guidelines on cereals, including the Dutch guideline on cereals from 2015, are relatively consistent.^{14,15}

Animal welfare outside the scope of advice

Animal welfare was not included in the evaluation. The committee does recognize the importance of animal welfare and refers to the Netherlands Nutrition Centre for additional information about food choices, and to top quality labels such as the Better Life label.

1.3 Committee, working groups and consultations

This advice was drawn up by the committee on Nutrition, consisting of experts in fields such as nutritional sciences, behavioural sciences and (para)medical disciplines. The background documents have been prepared by working groups, consisting of a number of committee members and sometimes supplemented by external experts. Furthermore, additional experts were consulted on specific topics on an occasional basis, partly through a workshop on food safety and environmental impact of food. The committee determined the working

method and drew up the advice. The committee bears full responsibility for the content of both the advisory report and the background documents. The composition of the committee, the additional experts in working groups and the incidentally consulted experts are listed at the end of this advisory report. The composition of the working groups is specified in the background documents.

In a public consultation round, there was an opportunity to comment on draft versions of background documents accompanying this advisory report. The comments received and the committee's response to them have been published on the website of the Health Council.

1.4 Translation into nutrition education

The role of the Health Council is to provide advice based on the current level of scientific evidence. The Health Council's regular tasks include not only advising on food groups in the context of the DDG but also advising on nutrient intake requirements in the context of the dietary reference values.¹⁶ The dietary reference values are not part of this DDG advisory report.

The Health Council thus provides recommendations on nutrition in several advisory reports. In the Netherlands, the integration of these recommendations is not done by the Health Council but by the Netherlands Nutrition Centre. The Netherlands Nutrition Centre is responsible for developing



and disseminating information about healthy, sustainable and safe dietary patterns tailored to age and gender. The Netherlands Nutrition Centre’s Wheel of Five provides the framework for this. For the substantiation of the Wheel of Five, the Nutrition Centre works together with the RIVM. Healthy, sustainable and safe dietary patterns can be composed in various ways. The Netherlands Nutrition Centre therefore also takes account of different eating preferences in its information, such as with meat and without meat.

The Netherlands Nutrition Centre helps people to gain insight into their own diet and to make healthy, sustainable and safe choices, using various information methods, such as apps, websites and brochures.

1.5 Reading guide

Chapter 2 describes the methodology used by the committee to prepare the present advisory report. It also contains the assessment framework that the committee used to weigh the impact of food safety and environmental impact in addition to the risk of chronic diseases. Chapters 3 to 11 contain the guidelines (or recommendations) and points of attention drawn up by the committee, including an explanation. In Chapter 12, the committee gives concluding considerations regarding the guidelines.

This advisory report is accompanied by 11 English-language background documents in which the scientific substantiation for this advisory report is

further specified. These are listed in Chapter 2 and can be found on the website of the Health Council.

Table 1 Topics in advisory reports on Dutch dietary guidelines (DDG)

Subject	DDG 2015	Present DDG advisory report	DDG after 2025
Fruit and vegetables	√		√
Cereals and cereal products	√		√
Legumes	√	√	
Nuts	√	√	
Dairy products	√	√	
Fish	√	√	
Tea	√		√
Fats and oils	√		√
Coffee	√		√
Red and processed meat	√	√	
White meat		√	
Eggs	√	√	
Sugary drinks, incl. fruit juice	√		√
Alcohol ^a	√		
Table salt	√		√
Nutrient supplements	√		
Dietary patterns	√	√	
Meat and dairy substitutes		√	
Low-calorie sweeteners			√

^a The guideline on alcohol is not revised within the Dutch dietary guidelines. Instead, there will be a separate advice *Alcohol consumption in the broad sense*, that is drawn up by the temporary committee on Alcohol.¹⁶ Until the publication of this advisory report, the 2015 guideline will remain in force.



02 methodology



Health is the starting point for this revised DDG. The main goal is, as in the past, primary prevention of chronic diseases. In addition, the committee has now examined in general terms whether there are any points of attention with regard to chemical food safety (risks of harmful substances in food for health). The committee has also looked – even more than before – at the extent to which the recommended consumption levels in relation to health (e.g. a reduction or an increase in the current average consumption) are associated with a lower environmental impact, or how the environmental impact can be limited as much as possible when following the guidelines. The committee has considered the separate conclusions on the risk of chronic diseases, food safety and the environmental impact – as described in the 11 background documents – in conjunction and translated them into guidelines.

2.1 Evaluation of chronic disease risk

As a first step in the assessment of the risks of chronic diseases, the committee performed *quick scans* on the state of the science. This means that the committee, based on a number of leading and recent international reports,^{3,14,15,17-19} prioritised nutrition topics with relevant outcome measures.

The committee then elaborated on these topics in the following background documents:

- Legumes and chronic diseases²⁰
- Nuts and seeds and chronic diseases²¹
- Dairy products and chronic diseases²²
- Fish and chronic diseases²³
- Meat and meat products and chronic diseases²⁴
- Eggs and chronic diseases²⁵
- Meat substitutes and dairy substitutes and chronic diseases²⁶
- More plant-based dietary patterns and chronic diseases²⁷
- Substitution between dietary protein sources and chronic diseases²⁸

The working method used by the committee is described below and – in more detail and further focused on the subject – in the aforementioned background documents.

2.1.1 Health outcomes

The DDG focus on the influence of nutrition on the development of a disease in people who do not yet have the disease (primary prevention). The committee has sought evidence on common chronic diseases in the Netherlands that may be diet-related: cardiovascular disease and its subtypes coronary heart disease, stroke and heart failure, type 2 diabetes, colorectal cancer, breast cancer, depression, COPD, dementia, and obesity. As in 2015,^{1,29} most guidelines are based on findings on coronary heart disease, type 2 diabetes and/or colorectal cancer, because the vast



majority of conclusions with strong evidence relate to these health outcomes.

As with the DDG2015, the committee not only looked at the chronic diseases mentioned above, but also at the biological factors that play a crucial role in the development of those diseases.^{29,30} These are the following so-called causal risk factors: blood pressure, LDL cholesterol and body weight.

In addition, the following important precursors of chronic diseases were included: glycated haemoglobin (HbA1c) and the glomerular filtration rate. These outcomes are new compared to 2015.

Another new feature compared to 2015 is that the committee not only searched the literature for evidence on chronic diseases, but also for data on all-cause mortality, quality of life, perceived health and fertility. Only for all-cause mortality there was sufficient research available that fitted within the committee's working method (see Section 2.1.2).

2.1.2 Type of research

As in 2015, the committee focused on randomised and controlled intervention research (*randomised controlled trials* – RCTs) and prospective cohort studies. Both types of research have advantages and disadvantages and complement each other.²⁹ The combination provides the most qualitatively reliable picture of the effect of nutrition on the risk of chronic diseases.

RCTs

In RCTs, participants are divided into groups based on chance, with one group receiving the intervention whose effect the researchers want to measure (e.g., consumption of a specific product), and the other group serving as a control (and e.g., receiving another specific product or continuing the usual diet). Well-conducted RCTs have little bias in results and provide strong evidence of causality and therefore of effects rather than associations. RCTs on effects on causal risk factors are relatively widely available. However, RCTs on effects on chronic diseases are scarce. This is because it usually takes a relatively short time to visualize effects on causal risk factors, while this takes years for chronic diseases.

Cohort studies

In prospective cohort research, the relationship between diet and the development of chronic diseases is investigated by following a group of people for a longer period of time, without the researcher intervening in the existing situation. Because large groups participate and the research can cover a long period of time, cohorts are suitable for investigating associations with chronic diseases. However, cohort research provides less strong evidence for causality, because bias can never be ruled out. Therefore, based on cohort research, the committee draws conclusions about associations with the risk of chronic diseases.



Substitution analyses in cohort studies

Cohort research compares the disease risks of people with a higher versus a lower consumption of a certain food group. In practice, however, foods are also exchanged against each other: if someone with a stable body weight eats more of one food, that person usually eats less of another food. Because the health effects of food groups differ from each other, the consumption of the substitute food also affects the health effect. In the classic analysis based on cohort research, this is taken into account by correcting for confounding factors. Nowadays, so-called substitution analyses are also used. The associations with chronic diseases are estimated for specific substitutions between food groups based on a statistical model. For the DDG2015, there were not enough substitution analyses based on cohort research available, but more substitution analyses have now been published, so that the committee was able to use them for the advisory report.

Mendelian randomisation studies

The committee also considered Mendelian randomisation studies, which use genetic variants to investigate causal relationships between dietary intake and chronic disease risk. This turned out to be relevant only for the evaluation of the subject of dairy products. The analysis technique and substantiation are further explained in that specific background document.²²

Publications that combine findings from studies

Because the committee considers it important to describe the total state of the science and not to draw conclusions on the basis of individual studies, it has based itself – as in 2015 – on systematic reviews and publications in which findings from different RCTs or cohorts are combined. She makes an exception for RCTs with chronic disease as an outcome. These are (as explained earlier in this section) scarce, but in some cases an individual RCT was available that showed an effect on a chronic disease. In view of the great evidential value of this type of research, the committee has nevertheless included it.

2.1.3 Convincing or plausible effects*Evidential value of individual conclusions*

In the background documents, the committee formulates conclusions for each specific combination of nutritional factor (food group or dietary pattern) and health outcome. The committee distinguishes the following conclusions:

- strong evidence for an effect or association;
- limited evidence for an effect or association;
- effect or association unlikely (requires strong evidence);
- findings on effect or association are inconclusive or contradictory;
- insufficient (good) research available.

The decision tree used by the committee is included as an appendix in the background documents. The factors that are covered are: the amount of



research (numbers of studies and participants); the quality of the research (the risk that methodological limitations have led to a different picture) and the unambiguity of the research (with regard to both the direction and the magnitude of the associations and effects).

Conclusions in conjunction: convincing or plausible effect

In order to derive a guideline, the committee considers the individual conclusions in conjunction, taking into account only those conclusions with strong evidential value. The committee considers an effect on a chronic disease to be convincingly demonstrated if there is strong evidence from both cohort research and RCTs that support each other or if there is strong evidence from RCTs.

If there is only strong evidence for an association based on cohort research, but there is no evidence from RCTs to substantiate the causality of this association, the committee considers the effect plausible.

The committee prefers to base the guidelines on convincingly demonstrated effects. If there are none, the guideline is based on plausible effects. The difference is usually reflected in the wording of the guideline. If an effect on the disease has been convincingly demonstrated, the guideline is usually quantified; in the case of a plausible effect, this is usually not the case. Where there are both convincing and plausibly demonstrated effects, the plausible effects served as further support for the guideline.

The individual conclusions on which the guideline is based are presented in explanatory tables accompanying the guidelines and are referred to as the conclusions that were leading for drawing up the guideline.

2.2 Evaluation of chemical food safety

Substances that can be potentially harmful to health can end up in the diet via various routes. There are far-reaching regulations in the field of food safety: food producers are obliged to prevent the presence of pathogens and harmful substances in their products or to keep them as low as possible, based on national and European regulations. The control and enforcement of these regulations in the Netherlands is done by the Netherlands Food and Consumer Product Safety Authority (NVWA).

Food safety is ultimately determined by the intake of harmful substances with the overall diet, while the regulations relate to levels in specific food products. For some substances, the general population or certain population groups are known to have higher intakes than are considered desirable in relation to the potential risks, despite the regulations.

The committee focused on these substances when evaluating food safety. For the food groups that make a relevant contribution to the total intake of these substances, the committee has indicated the implications of the new guidelines for that intake. The aim is to visualize the most important aspects of chemical food safety in relation to the dietary guidelines.



The committee based the evaluation of chemical food safety mainly on a RIVM publication (2017) on food safety aspects of a healthy diet based on the 2016 Wheel of Five and on reports on risks in various food chains, published by the NVWA's BuRO.¹⁰ The so called 'critical effects' of the harmful substances described by the committee in this advisory report mainly concern cancer (related to aflatoxins, arsenic, acrylamide, polycyclic aromatic hydrocarbons or PAHs), kidney damage (related to cadmium), fertility (related to dioxins and dioxin-like substances), neural development (related to lead and mercury) and effects on the immune system (related to poly- and perfluoroalkyl substances or PFAS).

Further specification of the working method can be found in the accompanying background document: *Chemical food safety: dietary protein sources and dietary patterns*.¹⁰

2.3 Evaluation of environmental impact

The committee has evaluated the impact of the various food groups and of the current diet on the following environmental aspects:

- greenhouse gas emissions;
- land use;
- water consumption;
- soil acidification;
- eutrophication of salt and fresh water;
- biodiversity (the diversity of species and numbers of organisms of flora,

fauna (vertebrate and invertebrate) and micro-organisms).

The selection of these aspects is based on the FAO/WHO report *Guiding principles for sustainable healthy diets* from 2019.³¹ To evaluate these environmental aspects, the committee used RIVM's Life Cycle Analysis (LCA) database from 2024, as well as international publications.¹³

Quantitative data are available for most aspects, but not for biodiversity. The impact of food on biodiversity and ecosystems cannot be expressed in 1 single number because of the complexity and diversity of these effects. Specific risks have therefore been described for each food group. This concerns, for example, the reduction of biodiversity due to the acidification of the soil, eutrophication of surface water, or other harmful substances in the environment, which promotes the survival of a limited part of the flora and fauna at the expense of the rest. There may also be direct effects on biodiversity and ecosystems, such as deforestation, overfishing, physical damage to ecosystems and the use of plant protection products and veterinary medicines including antibiotics.

Further specification of the working method can be found in the accompanying background document *Environmental impact of food: Dietary protein sources and dietary patterns*.¹³



2.4 Deriving the guidelines and recommendations

The assessment framework in Table 2 summarises the questions the committee has gone through to derive guidelines (or recommendations) and points of attention for each food group. This is explained below.

2.4.1 Starting point: preventing chronic diseases

All guidelines are mainly aimed at the prevention of chronic diseases in the Dutch population. The state of science determined whether a guideline could be derived, whether that guideline could be quantified, and if so, which quantity reduces the risk of chronic disease as much as possible. Where necessary, the committee has formulated points for attention in addition to the guidelines, for example on subtypes and replacement of the food group. For some food groups, it was not possible to formulate a guideline based on the state of science. In those cases, the committee has formulated recommendations.

2.4.2 Food safety and environmental aspects taken into account

The committee then examined whether adjustments to the guideline are desirable on the basis of chemical food safety and environmental aspects, and whether points for attention need to be formulated. The conclusions on food safety and environmental aspects usually only relate to the direction of the desired shift in consumption (i.e. no concrete recommended consumption levels, as is often the case with the risk of chronic diseases) and therefore usually resulted in points of attention in addition to the guidelines.

If there was reason to take food safety or environmental impact into account in the formulation of a guideline, the committee ensured that the principle of the prevention of chronic diseases was guaranteed.

The potential risks of the harmful substances that the committee has evaluated in general terms, sometimes relate to the same chronic diseases that have been selected as outcome measures for the risk of chronic diseases (especially specific cancers). In such cases, the committee considered the findings on harmful substances in conjunction with the leading conclusions on chronic diseases.¹⁰

2.4.3 Points of attention

For each guideline, the committee specifies, if necessary, points of attention related to the functioning and development of the body, points of attention in the context of consumer aspects and possibly other points of attention. The nature of these points of attention may differ between the food groups.

Physical functioning and development

This point refers to nutrients, such as vitamins, minerals, table salt (sodium), saturated fatty acids and sugars. A good supply of nutrients is important for the body to function properly and – if applicable – for growth and development. If necessary, the committee has formulated points for attention in order to meet the need for nutrients (e.g. calcium or vitamin



B12) or to prevent excessive intake (e.g. table salt or selenium) when following the guidelines. In doing so, it mainly relied on the Health Council’s advisory report *A healthy protein transition*.³

Consumer aspects

If the derived guideline turned out to deviate significantly from the current level of consumption in the Netherlands, this was specified as a point of attention. The committee based this on the current average or median consumption in the Netherlands, as reported in the most recent Dutch National Food Consumption Survey (VCP).³²

The committee prefers to use the average consumption, but if the difference between the average and the median is large, the committee also mentions the median, which is usually lower (see box).

Average and median

The average is the sum of the numbers divided by the number of numbers.

The median is the middle value in an ascending series of numbers. For example, when the median is 50 grams, it means that half of the people eat 50 grams or less, while the other half eat more than 50 grams.

For some food groups, at least half of the adults do not consume any of it (e.g. legumes, fish and meat or dairy substitutes). If the average consumption would be mentioned, this would not be visible, whereas it would be visible for the median consumption: in that case it would be 0 grams per day.

Sometimes the committee mentions that it considers it desirable or even

necessary for the government and/or parties in the food chain to take steps to give consumers sufficient opportunities to take the guidelines (or recommendations) and points of attention into account when making food choices.

The elaboration of how the guidelines can be applied in practice falls outside the scope of this advisory report. The Netherlands Nutrition Centre provides information and practical information for various eating preferences and situations (such as a tight budget, little time, few cooking skills). However, at the beginning of each chapter, the committee presents which products fall under the guideline. In doing so, it has also tried to identify relatively affordable and/or easy-to-prepare variants, in order to promote broad accessibility.

2.4.4 Draft guidelines applied in the dietary pattern

During the advisory process, the committee made its provisional guidelines (or recommendations) and points of attention available to the Netherlands Nutrition Centre and RIVM, for the further development of the Wheel of Five. The committee was then given access to the preliminary results of test calculations by these organisations, in order to be able to assess whether further specifications in the advisory report were necessary for the proper implementation of the advice. That turned out not to be the case. The committee emphasises that the Netherlands Nutrition Centre is responsible for providing nutrition information to the Dutch population, which incorporates the various Health Council advisory reports (see Section 1.4).



Table 2 Assessment framework for deriving the guidelines (or recommendations^a) and points of attention per food group

Aspect	Questions
Prevention of chronic diseases Conclusions about the risks of major chronic diseases in the Netherlands are leading for determining the guidelines (or recommendations ^a) and can give rise to the formulation of points of attention.	• Based on the risk of chronic diseases, what are the conclusions regarding: • a higher compared to a lower consumption of the food group? • the consumption levels of the food group? • specific product choices within the food group? • the consumption of the food group instead of specific other food groups? • What has changed in the evidence compared to the DDG2015? • Are there any additional considerations?
Chemical food safety Conclusions about harmful substances are taken into account when determining the guidelines (or recommendations ^a) if necessary and may give rise to the formulation of points of attention.	• Based on chemical food safety, what are the conclusions regarding: • the food group as a whole? • specific product choices within the food group? • Are there any additional considerations?
Environmental impact Conclusions on environmental impact (based on greenhouse gas emissions, water use, land use, eutrophication, acidification, bio-diversity) are taken into account when determining the guidelines (or recommendations ^a) if necessary and may give rise to the formulation of points of attention.	• Based on environmental impact, what are the conclusions regarding: • the food group as a whole? • specific product choices within the food group? • the consumption of the food group instead of specific other food groups? • Are there any additional considerations?
Physical functioning and development Nutrient-based considerations, such as vitamins, minerals, table salt (sodium), saturated fatty acids and sugars, can give rise to the formulation of points of attention.	• Based on physical functioning, what are considerations regarding: • the risk that, (partly) due to the guideline or recommendation, the intake of certain nutrients becomes insufficient? This was mainly estimated on the basis of the advisory report <i>A healthy protein transition</i>.³ • the risk that, (partly) due to the guideline or recommendation, the tolerable upper intake level for one or more nutrients or another guideline will be exceeded? • Are there any additional considerations?
Consumer aspects Considerations based on current food consumption can give rise to the formulation of points of attention.	• Based on consumer aspects, what are considerations regarding: • the extent to which the guideline or recommendation requires an increase or decrease in the consumption of the food group in question compared to the current average consumption in the Netherlands? • Are there any additional considerations?

^a For some food groups, it was not possible to formulate a guideline based on the state of science. In those cases, the committee has formulated recommendations.



03 guideline on legumes



Guideline

250 grams of legumes per week



3.1 Definition of food group and consumption in the Netherlands

Legumes in this advisory report include beans, lentils, chickpeas, split peas and soybeans. They are also referred to as pulses. These are dry legumes and legumes from cans, jars or packs. Products made mainly from legumes, such as tempeh, tofu and hummus also fall under legumes in this advisory report, but the legume content differs between these products.

Fresh peas, snow peas, broad beans and green beans are covered by the guideline on vegetables in the DDG, because these foods are more similar to vegetables than legumes in terms of nutrient composition. For the same reason, peanuts are classified under nuts and not legumes. Soy products that are included in the guideline for legumes in this advisory report include tofu and tempeh. The committee does not include soy drink and other soy-based dairy alternatives in this guideline, because these products contain much more water and less protein, among other things. These products are discussed separately in Chapter 11, which covers meat and dairy substitutes.

Legumes provide various nutrients, including protein, dietary fibre, iron and vitamin B1.^{33,34}

Adults in the Netherlands consume legumes on average once every 2 weeks. On days when legumes are eaten, the median consumption is about 100 grams. This amounts to an average of 8 grams per day. Kidney beans, split peas and white beans contribute the most to total legume intake. Soybeans are generally consumed little (0.1 grams per day on average). At least half of the people in the Netherlands do not eat legumes at all.^{32,35}

3.2 Substantiation and explanation of the guideline

The committee recommends eating 250 grams of prepared legumes per week. This is derived from the amount at which beneficial effects on the risk of chronic diseases are seen in scientific research, namely 250 to 300 grams per week. There are no clear indications that a higher intake would yield more health benefits, but there seems to be no objection to the consumption of more than 250 grams of legumes per week from a health (including food safety risks) or from an environmental point of view, provided that there is sufficient variation between types of legumes (see points of attention in Section 3.3).

Below is a summary of the findings that the committee has taken into account in deriving the guideline and formulating points for attention.



A detailed description can be found in the background documents on legumes, substitution of protein sources, chemical food safety and environmental impact.^{10,13,20,28}

Chronic diseases

The committee considers it convincingly demonstrated that consumption of legumes including soy from about 40 grams per day, or 250 to 300 grams per week, lowers the risk of coronary heart disease. This is because the findings from RCTs and from cohort studies on legumes and soy support each other. RCTs show that consumption of at least 80 grams of legumes per day results in a reduction in LDL cholesterol.²⁰ Substitution analyses in cohorts, in which the maximum legume consumption was 40 grams per day, show that consuming legumes instead of red and processed meat is associated with a lower risk of coronary heart disease.²⁸ Prospective cohort research also shows that consumption of soy (products) is associated with a lower risk of coronary heart disease. No evidence of adverse associations or effects on chronic disease risk with intakes higher than 40 grams per day was found in the included studies.²⁰ These research findings on the risk of chronic diseases leading to the derivation of the guideline are summarised in Table 3.

In addition to the above conclusions that have been leading for the guideline, there are also conclusions that support the guideline. This concerns the committee’s conclusion that it has been convincingly

demonstrated on the basis of RCTs that consumption of legumes reduces body weight in people who are overweight or obese.²⁰ However, the committee considers the effect found on body weight to be very small and has therefore considered this conclusion to be supportive to the guideline, not leading. In addition, the committee notes that soy drink has an LDL-lowering effect compared to cow’s milk (see Chapter 11).²⁸ Although soy drink does not formally fall under the definition of legumes, the committee nevertheless sees this as support for the guideline.

Table 3 Conclusions that were leading for the formulation of the guideline for legumes, as described in two background documents.^{20,28}

Food group	Amount at which the association/effect was seen	Chronic disease or risk factor with which an association/effect was seen
Legumes including soy	From 80 grams per day	Lowering effect on LDL cholesterol ²⁰
Legumes instead of red and processed meat	Specification of the quantity was not possible. The maximum legume consumption in the studies was 40 grams per day.	Association with lower risk of coronary heart disease ²⁸
Soy (products)	Specification of the quantity was not possible. The maximum soy consumption in the studies was 200 grams per day.	Association with lower risk of coronary heart disease ²⁰

Food safety

When consuming 250 grams of legumes per week with variation between different types of legumes, the committee does not expect any risks with



regard to food safety. However, it is important to eat dried and fresh beans only after cooking them to neutralise the lectins in these products.¹⁰

There is no evidence of safety risks from specific types of beans, peas, and lentils. For soy, additional research is needed on the 2 points below to properly weigh the benefits and harms for health:

- The NVWA sometimes finds mycotoxins in whole soybeans. However, NVWA does not find these harmful substances in tofu, tempeh and soy protein. It is unclear to what extent mycotoxins occur in soybeans for human consumption (a lot of soy is used as animal feed).¹⁰
- Soybeans and soy products contain isoflavones. In rats, isoflavones affect fertility. There are no known indications that this is also the case in humans.¹⁰

As a precaution, the committee considers it wise not to fill in the guideline for legumes solely with soy (products).

Environmental impact

Legumes have the lowest environmental impact of all the food groups evaluated in this advisory report, on all environmental aspects evaluated. Characteristic of legumes is that they can extract nitrogen from the air and convert it into building blocks for the plant in the soil. As a result, the need for fertilization is relatively low, even for the crop that is subsequently grown in the field. This favourable picture of the environmental impact of legumes concerns all types of legumes. Although soy cultivation for animal

feed has a substantial impact on biodiversity, this is hardly the case for cultivation for soy products that are for sale to humans in the Netherlands: that soy almost always comes from countries that are not associated with deforestation for soy cultivation.¹³

3.3 Points of attention

3.3.1 Consumer aspects

Substantial change compared to current diet

The recommended amount of legumes is far away from the current average consumption level in the Netherlands and therefore implies a substantial change.

However, certain population groups, such as Dutch people of Mediterranean descent, consume a relatively large amount of legumes.^{36,37}

A favourable side effect is that legumes have a relatively low purchase price (compared to meat). Increasing legume consumption can be done in several ways. For example, legumes can be used as a substitute for meat in a hot meal, but can also be eaten in frequent smaller portions, for example as hummus on bread or as an ingredient in a soup or salad. The Netherlands Nutrition Centre can help consumers to eat more legumes through practical advice.



3.3.2 Physcial functioning and development

Variation between types of legumes

The nutrient levels differ between the different types of legumes.

The results of the scientific research into the effects on chronic diseases also relate to a mix of legumes. Therefore, the committee recommends varying between types of legumes, such as various beans (including soybeans), lentils and peas. Variation is also important to limit a high intake of potentially harmful substances.

Legumes with little or no added salt are preferred

The available studies included both salted and unsalted legumes, and the evidence found therefore applies to a combination of salted and unsalted legumes. However, the average Dutch population consumes more salt than the guideline indicates (maximum 6 grams per day).³⁸ Therefore, legumes with little or no added salt are preferred. Certain products made from legumes, such as hummus, can also have a high salt content; the less salty varieties are preferred.



04 guideline on nuts



Guideline

15 to 30 grams of unsalted nuts per day



4.1 Definition of food group and consumption in the Netherlands

This food group includes tree nuts, peanuts and seeds (including spreads from these products, such as peanut butter). In this advisory report, the committee classifies nuts based on products that consumers and nutrition researchers generally consider to be nuts and seeds, and not based on the botanical classification. That is why peanuts (groundnuts) also fall into this food group. The best-known types of tree nuts are walnuts, almonds, hazelnuts, cashews, pistachios, macadamia nuts, Brazil nuts and pecans. Examples of seeds include pine nuts, sesame seeds, sunflower seeds, and pumpkin seeds.

In this advisory report, coconuts, soy nuts (roasted soybeans) and quinoa seeds do not fall under the food group nuts, but under other food groups.

Nuts provide various nutrients, such as protein, dietary fibre, fatty acids of which a significant part is unsaturated, and certain vitamins and minerals, such as vitamin E and iron.^{33,34}

The daily average consumption of nuts (including peanuts, seeds and spreads) among adults in the Netherlands is 15 grams, of which only 5

grams are unsalted. However, half of the people eat no or very little (on average less than 2 grams per day) of nuts. People who do eat nuts consume it on average 2 to 3 days a week. On these days, the median consumption is 30 grams.^{32,35}

4.2 Substantiation and explanation of the guideline

The committee recommends eating 15 to 30 grams of unsalted nuts per day. With this amount, scientific research finds beneficial effects on the risk of chronic diseases. For both food safety and environmental impact, the committee advises not to eat more than 30 grams of nuts per day. The committee recommends that the guideline should mainly be filled in with tree nuts and peanuts. Seeds were – to a limited extent – part of part of the research. That is why seeds can make a small contribution to the Nuts guideline.

Below is a summary of the findings that the committee has taken into account in deriving the guideline and formulating points for attention. A detailed description can be found in the background documents on nuts, substitution of protein sources, chemical food safety and environmental impact.^{10,13,21,28}

Chronic diseases

The committee considers it convincingly demonstrated that consumption of 15 to 30 grams of nuts per day lowers the risk of coronary heart disease



and stroke. This stems from both cohort research and RCTs. Cohort studies show that 15 to 30 grams per day is associated with fewer coronary heart disease. For stroke, this has been found at 10 to 20 grams per day.²¹ The findings are further supported by substitution analyses in cohorts, which show that consumption of nuts instead of (red, processed and white) meat is associated with a lower risk of cardiovascular disease.²⁸ RCTs with doses starting at 15 grams per day show a lowering effect on LDL cholesterol. In both cohort studies and RCTs, the risk reduction was almost the same for all doses between 15 and 30 grams per day.²¹

Based on RCTs on the effects of nuts on LDL cholesterol and body weight, the committee found no indications that nut intakes higher than 30 grams per day are unfavourable, but no added value of higher intakes was found either. Cohort research almost exclusively concerns intakes up to 30 grams per day and therefore does not yield any conclusions about higher intakes.²¹

The research findings on the risks of chronic diseases leading to the derivation of the guideline are summarised in Table 4.

Table 4 Conclusions that were leading for the formulation of the guideline for nuts, as described in two background documents.^{21,28}

Food group	Amount at which the association/ effect was seen	Chronic disease or risk factor with which an effect/association was seen
Nuts, peanuts and seeds	15 to 30 grams per day compared to few or no nuts	Association with lower risk of coronary heart disease ²¹
Nuts, peanuts and seeds	10 to 20 grams per day compared to few or no nuts	Association with lower risk of stroke ²¹
Nuts and peanuts	15 to 85 grams per day compared to no or fewer nuts	Lowering effect on LDL cholesterol ²¹
Nuts, peanuts and seeds instead of unprocessed red meat	Specification of the quantity was not possible. The maximum nut consumption in the studies was 20 grams per day.	Association with lower risk of cardiovascular disease ²⁸
Nuts, peanuts and seeds instead of processed meat	Specification of the quantity was not possible. The maximum nut consumption in the studies was 30 grams per day.	Association with lower risk of cardiovascular disease ²⁸
Nuts, peanuts and seeds instead of white meat	Specification of the quantity was not possible. The maximum nut consumption in the studies was 20 grams per day.	Association with lower risk of cardiovascular disease ²⁸

Food safety

Nuts are randomly checked for the presence of certain mycotoxins. Aflatoxins are found in some of the analyses. This applies to tree nuts (e.g. walnuts, almonds, cashews) as well as peanuts. In principle, food products in which more harmful substances are found than permitted are not placed on the market. The risk of store-bought nuts containing too many aflatoxins is low, although this cannot be ruled out because it is not possible to check all the nuts.



The committee notes that the beneficial effects of nuts outweigh the risks of aflatoxins. The risk of aflatoxins concerns liver cancer, a specific type of cancer that is relatively rare in the Netherlands.¹⁰ The consumption of nuts is associated with a lower risk of cancer (all forms combined) and with a lower risk of other chronic diseases.²¹ Therefore, the committee considers the risk of occasional intake of aflatoxins at a consumption of 15 to 30 grams of nuts per day to be acceptable. Careful control and monitoring to keep these levels as low as possible remains very important.¹⁰

Flaxseed (also called linseed) contains cyanogenic glycosides, which are natural plant toxins. In the EU, there is a maximum permitted level for cyanogenic glycosides in flaxseed. Flaxseed is checked for this. Based on this maximum permitted level, adults could consume up to 28 grams of flaxseed per day.³⁹ Because it is not possible to control all flaxseeds, flaxseed in the store may sporadically contain a higher content than is allowed. EFSA calculated the maximum amount of flaxseed that could be consumed per day, based on the highest levels of cyanogenic glycosides measured, which could occur in a small part of the flaxseed. For adults, EFSA's calculation was between 7 and 15 grams of flaxseed per day. Because the amount depends on body weight, it varies within each age group and the values for children are lower than for adults.¹⁰

This information contributes to the substantiation for a limited proportion seeds within the recommended 15 to 30 grams of nuts.

Roasting nuts can form harmful substances such as acrylamide and PAHs. Unroasted nuts are therefore healthier than roasted ones.

Lightly roasted nuts are healthier than dark roasted ones.¹⁰

Environmental impact

The production of nuts has low greenhouse gas emissions and leads to little or moderate eutrophication and acidification. However, the impact on land use varies greatly within the food group. Trees are valuable because they store a lot of CO₂, but they evaporate a relatively large amount of water. For tree nuts, the water consumption is very high compared to peanuts and other protein-rich food groups. The impact of nut consumption on water consumption can be limited by consuming peanuts as part of a variety of nuts and by not eating more nuts than necessary to reduce the risk of chronic diseases.¹³

4.3 Points of attention

4.3.1 Consumer aspects

Change from current diet

Half of the people in the Netherlands eat (almost) no nuts. In addition, people who do eat nuts, often do not eat them daily.^{32,35} The recommended amount of nuts therefore implies an increase in nut consumption for many people. The committee points out that nuts are regularly consumed as a snack, but can also be eaten instead of meat by incorporating them into meals. If this contributes to achieving the guideline, it will benefit the



risk of chronic diseases. By consuming nuts instead of meat, the environmental impact is also lower, although water consumption is a point of attention for nuts (see Section 4.2).

4.3.2 Physical functioning and development

Variation between nuts

The levels of nutrients differ between the different types of nuts.

The cohort studies typically examined a variety of nuts, including peanuts and peanut butter. The health benefits found, therefore do not apply specifically to 1 type of nut. The committee therefore recommends varying the type of nuts that are consumed. This is also beneficial in terms of food safety and the environment. The relatively low purchase price of peanuts (compared to tree nuts) is a favourable side effect.

Specifically for Brazil nuts, the committee points to the tolerable upper intake level for selenium.⁴⁰ The consumption of 1 or a few Brazil nuts per day can be valuable as a source of selenium. However, with a higher daily intake (3 to 4 Brazil nuts in adults and lower amounts in children, depending on age), selenium intake can already exceed the tolerable upper intake level. Long-term excessive intake of selenium can cause various complaints, such as hair loss, changes to nails and skin, fatigue and neurological complaints.⁴¹

Unsalted and unsweetened nuts are preferred

The available studies included both salted and unsalted nuts and the evidence found therefore applies to a combination of salted and unsalted nuts. Because of the guideline on table salt, it was advised in 2015 to eat unsalted nuts.¹ The committee maintains this because the salt content of nuts may be considerable and because the new guideline gives a further incentive to the consumption of nuts.

Based on the cohort studies, no distinction could be made between nuts with and without added sugar. However, high sugar consumption is unfavourable for health.⁴² Therefore, nuts and nut spreads without added sugar are preferred; products such as chocolate or sugar peanuts and peanut butter with added sugar are therefore not recommended.

4.3.3 Food safety and environment

Making sustainable choices visible to consumers

Due to the environmental impact, it is recommended not to eat tree nuts from areas with water scarcity. At the moment, however, it is not possible for consumers to determine whether tree nuts have been grown in a water-scarce area. The committee argues that this should be improved, for example by means of a specification on the packaging, and that this information should be widely available at all points of sale.



05 guideline on dairy products



Guideline

A few portions of dairy products per day,
with variation between types



5.1 Definition of food group and consumption in the Netherlands

In this advisory report, dairy products include milk and products made from milk, such as yogurt and cheese. In this advisory report, the food group only includes dairy products from animal sources. Dairy substitutes, such as plant-based drinks, are discussed separately in Chapter 11.

Butter is excluded from the definition of dairy products and will be included in the revision of the guideline on oils and fats (see Table 1 in Chapter 1).

Dairy products provide various nutrients, such as protein, calcium, vitamins B2 and B12. At the same time, depending on its fat content, dairy products can also be an important source of saturated fatty acids, which can have an adverse impact on health.^{32,33}

Adults in the Netherlands consume dairy products on average almost every day and an average of about 330 grams per day. The most commonly consumed dairy products are milk and milk based drinks, yogurt and cheese (53%, 21% and 10% of dairy consumption, respectively).^{32,35}

5.2 Substantiation and explanation of the guideline

The committee recommends using a few portions of dairy products per day and varying between types of dairy products. Research shows associations with lower risks of chronic diseases for the total consumption of dairy products and for specific dairy types (milk, yogurt and cheese).

The guideline has not been further quantified because there is no evidence of a causal relationship. There are also more uncertainties about the translation into portions for this food group than for other food groups, because the assumptions about portion sizes differ between studies and especially between different types of dairy products. The committee recommends not consuming more dairy products than is necessary to limit the risk of chronic diseases. After all, current dairy product consumption in the Netherlands has the highest impact on the environment – after meat – and makes an important contribution to the intake of dioxins and PFAS. For further specification of the recommended quantities of dairy products for consumers, the committee refers to the Netherlands Nutrition Centre.

Below is a summary of the findings that the committee has taken into account in deriving the guideline and formulating points for attention.

A detailed description can be found in the background documents on dairy products, substitution of protein sources, chemical food safety and environmental impact.^{10,13,22,28}



Chronic diseases

The committee considers it plausible that the consumption of a few portions of dairy products per day reduces the risk of chronic diseases (see Table 5).²² In the case of dairy products, the committee speaks of portions because the portion size differs between the types of dairy products. In the Netherlands, the following standard portion sizes are used: 200 grams of milk, 150 grams of yogurt and 20 to 30 grams of cheese.⁴³

Prospective cohort research shows that dairy product consumption in general is associated with a lower risk of colorectal cancer. The consumption of 3 specific types of dairy products is also associated with lower risks of various chronic diseases. This concerns milk (including buttermilk), yoghurt and cheese (including curd and soft cheeses). The different types of dairy products were associated with different chronic diseases. Milk was associated with a lower risk of colorectal cancer and stroke, yogurt with a lower risk of colorectal cancer and type 2 diabetes, and cheese with a lower risk of coronary heart disease.²² Therefore, according to the committee, it is important to vary between these 3 types of dairy products. Whether it is necessary to consume all 3 types of dairy products on a daily basis cannot be substantiated on the basis of the state of science. Findings from research based on so-called Mendelian randomisation support the finding that milk consumption is associated with a lower risk of colorectal cancer.²²

The recommendation to consume a few servings of dairy products is further supported by substitution analyses in cohorts that showed that consumption of milk, yogurt or cheese instead of the consumption of red and/or processed meat is associated with a lower risk of coronary heart disease and type 2 diabetes.²⁸

Findings from RCTs on the effects of dairy products (total, high-fat, semi-skimmed and low-fat) on causal risk factors, such as LDL cholesterol and body weight, did not provide conclusions with strong evidential value and were therefore not suitable for the guideline.²² Due to this, there was also lack of evidence for causality that the committee considers necessary for a quantification that is more specific than a few portions of dairy products.

The research findings of the study on the risks of chronic diseases leading to the derivation of the guideline are summarised in Table 5.



Table 5 Conclusions that were leading for the formulation of the guideline for dairy products, as described in two background documents.^{22,28}

Food group	Amount at which the association was seen	Chronic disease with which an association was seen
Total dairy products	Every 400 grams increase in consumption per day	Association with lower risk of colorectal cancer ²²
Milk	Every 200 grams increase in consumption per day	Association with lower risk of colorectal cancer ²²
Milk	115 to 600 grams per day compared to 0 grams per day	Association with lower risk of stroke ²²
Yogurt	75 to 150 grams per day compared to 0 to 22 grams per day	Association with lower risk of colorectal cancer ²²
Yogurt	80 to 125 grams per day compared to 0 grams per day	Association with lower risk of type 2 diabetes ²²
Cheese	Every 20 grams increase in consumption per day	Association with lower risk of coronary heart disease ²²
Milk instead of processed meat	Specification of the quantity was not possible. The maximum milk consumption in the studies was 300 grams per day.	Association with lower risk of type 2 diabetes ²⁸
Yogurt instead of red and processed meat	Specification of the quantity was not possible. The maximum yogurt consumption in the studies was 95 to 100 grams per day.	Association with lower risks of coronary heart disease and type 2 diabetes ²⁸
Cheese instead of red and processed meat	Specification of the quantity was not possible. The maximum cheese consumption in the studies was 50 to 55 grams per day.	Association with lower risks of coronary heart disease and type 2 diabetes ²⁸

Food safety

Dairy product consumption (especially full-fat variants) contributes considerably to the intake of dioxins and related compounds (dairy products contribute an average of 30% to the total intake). Dairy also contributes to the intake of PFAS (on average 13 to 17% of the total

intake). To limit this intake, it is important not to consume more dairy products than recommended for limiting the risk of chronic diseases.¹⁰

Environmental impact

It is important for the environment to limit the consumption of dairy products. Current dairy product consumption in the Netherlands has the highest impact on the environment – after meat. This concerns greenhouse gas emissions, land use, water consumption, acidification and eutrophication. The impact on biodiversity is also significant, due to the use of crop protection products on grassland and forage crops, veterinary medicines including antibiotics, the generally high frequency of mowing of grassland and the deforestation of important nature reserves to grow soy for animal feed, among other things.¹³ To limit the environmental impact, it is important not to consume more dairy products than recommended based on the risk of chronic diseases.

5.3 Points of attention

The points of attention for dairy products relate to nutrients (physical functioning and development).

Customization

In the Netherlands, dairy products make a relatively large contribution to the intake of calcium (56%) and vitamin B2 (38%) through food. On an individual level, the importance of dairy products for the intake of



(especially) these nutrients depends on the daily requirement (which differs with age) and the composition of the rest of the diet.

Low-fat and semi-skimmed dairy products are preferred

Full-fat dairy products provide more saturated fatty acids and calories than semi-skimmed/low-fat dairy products; The same applies to cheese with a high compared to a relatively low-fat content. Based on the available research on the consumption of full-fat, semi-skimmed and low-fat dairy products in relation to the risk of chronic diseases, further specification of the guideline on the basis of the fat content of dairy products was not possible. Although there are now more studies on this topic compared to 2015, they did not result in conclusions with strong evidential value and it remains unclear whether there is a difference between full-fat, semi-skimmed and low-fat dairy products in relation to the risk of chronic diseases. However, based on the dietary reference values, the intake of saturated fatty acids should be limited.⁴² On average, the Dutch consume 14% of their energy intake from saturated fatty acids, about a third of which from dairy products.³² Therefore, it may be wise to limit the consumption of full-fat dairy products, and is low-fat or semi-skimmed yogurt or milk or less fatty cheese (such as 30+ cheese) preferred. The importance of choosing low-fat or semi-skimmed dairy products for health is partly determined by the intake of saturated fatty acids through other foods. From an environmental perspective, it may be worth

considering choosing full-fat dairy products from time to time. This is because it is more sustainable to consume all fractions of the milk.¹³

Cheese low in salt and dairy products without sugar are preferred

Based on cohort research, no distinction could be made between dairy products with and without added sugar. However, high sugar consumption is unfavourable for health. In addition, there exists a guideline for sugar containing beverages (minimise consumption of these beverages).^{1,42} Therefore, the committee recommends not to choose dairy products with added sugar.

The guideline for salt (maximum of 6 grams per day¹) is particularly relevant for cheese, in the context of dairy products. Most (hard) cheeses have a high salt content, while salt is usually not added to other types of dairy products. It is wise to limit the consumption of relatively salty cheese.

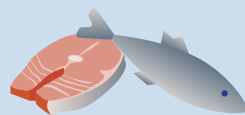


06 guideline on fish



Guideline

100 grams of sustainable fish per week, preferably an oily fish



6.1 Definition of food group and consumption in the Netherlands

This advisory report distinguishes between oily (or fatty) fish and non-oily (or lean) fish. Oily fish include trout, herring and salmon. Non-oily fish include cod, pangasius and plaice. Oily fish naturally have a high fat content (according to the NEVO table, oily fish contains ≥ 5 grams of fat per 100 grams of fish³²); It does not refer to fish that contains a lot of fat due to preparation (for example, from breading and frying, such as fried cod bites). Crustaceans and shellfish, such as shrimps, mussels and oysters, are also covered by the fish guideline in this advisory report, even though they are not officially fish. These are non-oily species.

The advisory report discusses the importance of sustainable fish. This is based on the environmental impact of fish. Sustainable fish is best recognisable by the MSC label (for wild fish) or ASC label (for farmed fish) and/or on the basis of the classification in the VISwijzer.

Both fresh and frozen fish and canned fish are classified as fish in this advisory report.

Oily fish are an important source of eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). These are polyunsaturated fatty acids with a long chain of carbon atoms. The levels of EPA and DHA are low in most non-oily fish (including crustaceans and shellfish). Other beneficial nutrients in fish and crustaceans and shellfish include protein, iodine, selenium, vitamin B12 and vitamin D. Crustaceans and shellfish also contain dietary cholesterol, which is less beneficial to health.^{32,33}

Approximately 48% of the Dutch adult population eats fish at least once a week, of which 30% once a week and 18% at least 2 times a week.

On the days that fish is eaten, the average fish consumption is 110 grams per day. The share of oily fish is about 38% of the total fish consumption. Crustaceans and shellfish are not commonly consumed in the Netherlands.^{32,35}

6.2 Substantiation and explanation of the guideline

Based on the health effects of fish, the committee recommends eating 100 grams of fish per week, preferably an oily type of fish. To prevent harmful environmental impact, it is very important that the fish consumed comes from a sustainable source and that the consumption does not exceed the recommended levels to limit the risk of chronic diseases. Because fish consumption can make an important contribution to the intake of certain harmful substances, species with relatively low levels of these substances are preferred.



With 100 grams of fish per week, a reduction in the risk of fatal coronary heart disease can be achieved. In the selected studies, reduced risks of coronary heart disease were found both for fish in general and specifically for oily fish, but not for non-oily fish. That is why the committee advises to preferably choose oily fish. A higher fish intake (up to 3 portions per week) may lead to a slightly further reduction in the risk of fatal coronary heart disease, but the committee considers the health risks due to a potentially very high intake of harmful substances to be too high, as well as the harmful impact on the environment.

Below is a summary of the findings that the committee has taken into account in deriving the guideline and formulating points for attention. A detailed description can be found in the background documents on fish, chemical food safety and environmental impact.^{10,13,23}

Chronic diseases

The committee considers it convincingly demonstrated that consumption of fish in general and of oily fish in particular reduces the risk of (mainly fatal) coronary heart disease. This is because the findings from prospective cohort studies and an RCT support each other. Cohort studies show that higher consumption of fish in general and oily fish in particular are associated with a lower risk of coronary heart disease. Specifically for fatal coronary heart disease, this association was also found for fish consumption in general, but there was only limited evidence regarding the

consumption of oily fish.²³ This evidence is supported by evidence from an RCT (DART trial), that showed that eating oily fish lowers the risk of fatal coronary heart disease.⁴⁴

Based on prospective cohort research, the committee concluded that it is unlikely that consumption of non-oily fish is associated with coronary heart disease. According to the committee, this suggests that at least part of the fish consumed must be oily to lower the risk of (fatal) coronary heart disease. The committee further noted that the amount of oily fish studied in the cohort studies is lower than the total amount of fish associated with the maximum risk reduction. In addition, it is not known what the proportion of oily fish and non-oily fish was in the cohort studies into total fish consumption.

Based on the above findings, the committee advises to preferably choose oily fish, but not exclusively. This is because the committee cannot state with certainty whether the maximum gain in terms of the risk of coronary heart disease can be achieved with solely oily fish.

The research findings on the risks of chronic diseases leading to the derivation of the guideline are summarised in Table 6.

In addition to the above conclusions that have been leading for the guideline, there are also conclusions that support the guideline.



This concerns the committee’s conclusion that it is plausible that fish consumption reduces the risks of stroke, dementia and cognitive decline.²³

Table 6 Conclusions that were leading for the formulation of the guideline for fish, as described in a background document.²³

Food group	Amount at which the association/effect was seen	Chronic disease or risk factor with which an association/effect was seen
Total fish	It was not possible to indicate this. The maximum total fish consumption in the studies was 180 grams per day	Association with a lower risk of total coronary heart disease ²³
Oily fish	It was not possible to indicate this. The maximum oily fish consumption in the studies was 30 grams per day	Association with a lower risk of total coronary heart disease ²³
Non-oily fish	No connection was seen. The maximum non-oily fish consumption in the studies was 45 grams per day	Probably not associated with total coronary heart disease ²³
Total fish	15 to 50 grams per day compared to less than 1 time per month	Association with a lower risk of fatal coronary heart disease ²³
Oily fish	2 servings per week (advised amount) versus virtually nothing (no advice)	Lower risk of fatal coronary heart disease ^{a,23}

^a The committee found one RCT of good quality for this chronic disease. This RCT confirms the conclusion with strong evidential value based on cohort research and is therefore used to derive the guideline for fish (see Section 2.1.2).

Food safety

The fish food group contributes relatively much to the intake of harmful substances. The concentrations of harmful substances in fish, such as heavy metals, dioxins and PFAS, depend, among other things, on the fish

species and the fishing area. Based on the currently available levels of harmful substances, certain species, such as mackerel, wild eel and sea bass, already exceed 1 or more health-based guidance values with a consumption of 100 grams per week. It is therefore better to limit or avoid the consumption of these species, especially since these harmful substances are also found in foods other than fish, which therefore also contribute to the total intake. It is recommended to eat (mainly) fish species in which the average levels of these substances are relatively low, as is (currently) known for the oily fish species salmon, rainbow trout and herring, and for various non-oily fish species.¹⁰

Environmental impact

The committee concludes that from an environmental perspective it is important to choose fish from sustainable sources and to limit the consumption of fish, so that future generations can still eat fish. A considerable part of the fish consumption has a major impact on the environment. This concerns both fishery (wild fish) and aquaculture (farmed fish). In the fishery, it concerns overfishing, discarding bycatch and damaging the ecosystem. The fishing technique and fishing grounds determine the environmental impact. Bottom trawling has by far the most impact. Within aquaculture, it concerns the pollution of surface water (with faeces, pathogens, veterinary medicines and antibiotics), large-scale degradation or even loss of ecosystems, weakening of wild fish populations due to



interbreeding with escaped farmed fish, and the environmental impact of fish feed (such as wild fish and soy). The type of aquaculture system determines the environmental impact.¹³

6.3 Points of attention

6.3.1 Consumer aspects

Change from current diet

Half of the people in the Netherlands eat (almost) no fish. The fish guideline therefore implies a substantial change. The choice of the recommended fish species also requires a change among many consumers.

Choices on food products are determined by many aspects, but the ability to identify oily (and non-oily) fish species that are sustainable requires good tools for consumers and other actors in the food chain, which are currently insufficiently available (see also Section 6.3.3).

6.3.2 Physical functioning and development

Fish with no or little added salt is preferred

The available studies included both salted and unsalted fish, and the evidence found therefore applies to a combination of fish with and without added salt. However, the average Dutch population consumes more salt than the guideline indicates (maximum of 6 grams per day).³⁸ Therefore, fish with little or no added salt is preferred.

6.3.3 Food safety and environment

More information on harmful substance levels needed

Fish is the food group in which (by far) the highest levels of harmful substances occur (see also Section 6.2). The committee advises to preferably consume fish species with relatively low levels of these substances.

Consumers should be able to trust that the food they buy is safe.

A condition for this is that up-to-date and complete information about levels of harmful substances is available and assessed for the fish sold in the Netherlands. For example, there may be more fish species with relatively low concentrations of harmful substances than is currently known.

Further sustainability needed in fisheries and aquaculture

Much of the currently consumed fish comes from non-sustainable sources. The committee concludes that, from an environmental perspective, it is important to choose fish from sustainable sources (see Section 6.2). This implies that further sustainability of fisheries and aquaculture is essential.¹³

Wider application of top quality labels and VISwijzer needed

Whether a fish comes from a sustainable source is a complex consideration, because the nature of this impact is very diverse and variable and depends not only on the fish species, but also on the way in which, and the location where the fish is caught or farmed. Therefore, the availability



of high-quality tools is a precondition for consumers to be able to choose sustainable fish. In principle, tools are available in the form of the MSC (for wild fish) and ASC (for farmed fish) labels and the VISwijzer (for wild fish and farmed fish, also covers fish without a top quality label). However, it is a problem that they are only applied at a limited number of points of sale. Given the importance of opting for sustainable fish, the committee recommends that these tools become widely available to all parties in the fish chain, including the consumer, where necessary through regulations.

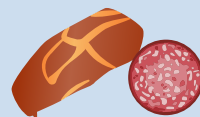


07 guideline on red and processed meat



Guideline

- No more than 200 grams of red meat per week
- As little processed (red and white) meat as possible



7.1 Definition of food group and consumption in the Netherlands

This advisory report, as in most scientific literature, distinguishes between red meat and white meat and between processed meat and unprocessed meat. In this advisory report, red meat refers to meat from cattle, calves, pigs, goats, sheep and horses. White meat is discussed in Chapter 8. Processed meat refers to the meat that has been processed prior to sale to improve its taste or shelf life by smoking, salting, brining, fermenting or by adding preservatives such as nitrate or nitrite. This also includes meat products. Meat is unprocessed if it has only been sliced or minced for domestic food preparation, possibly after having been refrigerated or frozen. The distinction between processed and unprocessed meat concerns the product as it is purchased by the consumer. The way in which the meat is prepared by the consumer at home is not included in this. In the Netherlands, mainly processed *red* meat is eaten and considerably less processed *white* meat.

The committee advises on the amount of prepared meat, i.e. after cooking, baking, frying or preparation in the oven (meat products have already been prepared). These amounts are lower than in unprepared

form, because during the preparation there is 20 to 30 percent weight loss.⁴⁵

Meat substitutes, such as vegetarian burgers or plant-based meatballs, are discussed separately in Chapter 11.

Meat provides beneficial nutrients, including protein, iron, selenium, zinc, and vitamins B1, B2, B3, B6, and B12. Certain meats can also contain nutrients that are unfavourable to health: for example, processed meat generally provides a lot of salt and fatty(er) meats can contain relatively high levels of saturated fatty acids. Certain types of organ meats such as liver are very high in dietary cholesterol and vitamin A.^{32,33}

Dutch adults consume meat on average 5 to 6 days a week. On average, about 92 grams of meat is consumed per day, of which about three-quarters concerns red meat and about one-quarter concerns white meat. About half of the meat consumed is processed and most processed meat is red meat (>90%).^{32,35}

7.2 Substantiation and explanation of the guideline

The committee recommends consuming no more than 200 grams of red meat per week in total; This concerns unprocessed and processed red meat together. However, the committee also advises to eat as little processed meat as possible, which in practice means that as little of this



200 grams as possible should be processed. Research shows that processed meat is less favourable for the risk of chronic diseases than unprocessed meat. The advice to eat as little processed meat as possible applies to both processed red meat and processed white meat.

Lower consumption of red and processed meat will also contribute to a reduction in the intake of harmful substances through meat and to a significantly lower environmental impact.

Below is a summary of the findings that the committee has taken into account in deriving the guideline and formulating points for attention. A detailed description can be found in the background documents on meat, substitution of protein sources, chemical food safety and environmental impact.^{10,13,24,28}

Chronic diseases

The committee considers it convincingly demonstrated that higher consumption of both red meat and processed meat increases the risk of coronary heart disease and stroke and that consumption of red and/or processed meat instead of plant-based dietary sources of protein increases the risk of cardiovascular disease. The results from prospective cohort research and from RCTs support each other.

Prospective cohort research shows that eating total red meat (unprocessed red meat and processed meat combined), as well as unprocessed

red meat, as well as processed meat is associated with a higher risk of coronary heart disease and stroke. The association with coronary heart disease seems stronger than with stroke. In addition, the research shows that the unfavourable relationship is stronger for processed meat than for unprocessed red meat: for processed meat, the associations are already observed at lower amounts (at 17 grams per day instead of 25 grams for unprocessed red meat). This is supported by substitution analyses in cohorts, which show that the consumption of processed meat instead of unprocessed meat is associated with a higher risk of cardiovascular disease. Substitution analyses in cohorts also show that the consumption of unprocessed red meat instead of legumes is associated with a higher risk of cardiovascular disease. This also applies to the consumption of unprocessed red meat and processed meat instead of plant-based protein sources. This finding is further supported by RCTs showing that replacing red meat with plant-based protein sources lowers LDL cholesterol.

The guideline to eat no more than 200 grams of red meat per week is based on the finding that from a consumption level of 25 grams of unprocessed red meat per day, there is a higher risk of coronary heart disease. This is also the case for the combined consumption of unprocessed red meat and processed meat (red and white) from 25 grams per day.²⁴ The committee rounds this up to 200 grams of red meat per week. This concerns the amount of prepared meat. The committee



translates this into 250 grams of unprepared red meat per week, based on a 20% weight reduction during preparation.

The research findings on the risks of chronic diseases leading to the derivation of the guideline are summarised in Table 7.

In addition to the above conclusions that have been leading for the guideline, there are also conclusions that support the guideline. Based on cohort research, it is plausible that consumption of red meat and processed meat increases the risks of type 2 diabetes and colorectal cancer. Also, 2 conclusions based on substitution analyses in cohort studies describe plausible effects that support the guideline:

- 1. The consumption of red and/or processed meat instead of various dairy products (milk, cheese and yogurt) is associated with a higher risk of type 2 diabetes.
- 2. The consumption of red and processed meat instead of various other animal protein sources (yogurt, cheese, eggs, fish) is associated with a higher risk of coronary heart disease.²⁸

If the latter relationship were causal, it would probably not be established via an effect on LDL cholesterol, because on the basis of the available RCTs, the committee considers that effect unlikely.

Table 7 Conclusions that were leading for the formulation of the guidelines for red meat and processed meat, as described in two background documents.^{24,28}

Food group	Amount at which the association/ effect was seen	Chronic disease or risk factor with which an association/effect was seen
Unprocessed red and processed meat combined	From 25 grams per day ^e	Association with higher risk of coronary heart disease ²⁴
Unprocessed red meat	From 25 grams per day ^e	Association with higher risk of coronary heart disease ²⁴
Processed meat ^a	From 17 grams per day ^e	Association with higher risk of coronary heart disease ²⁴
Total Red Meat	From 55 grams per day ^e	Association with higher risk of stroke ²⁴
Unprocessed red meat	From 55 grams per day ^e	Association with higher risk of stroke ²⁴
Processed meat	From 25 grams per day ^e	Association with higher risk of stroke ²⁴
Unprocessed red meat instead of plant-based protein sources ^b	Specification of the quantity was not possible. The maximum unprocessed red meat consumption in the studies was 130 grams per day	Association with higher risk of cardiovascular disease ²⁸
Unprocessed red meat instead of legumes	Specification of the quantity was not possible. The maximum unprocessed red meat consumption in the studies was 130 grams per day	Association with higher risk of cardiovascular disease ²⁸
Processed meat instead of plant-based protein sources ^c	Specification of the quantity was not possible. The maximum processed meat consumption in the studies was 40 grams per day	Association with higher risk of cardiovascular disease ²⁸
Processed meat instead of unprocessed red meat	Specification of the quantity was not possible. The maximum processed meat consumption in the studies was 40 grams per day	Association with higher risk of cardiovascular disease ²⁸
Red meat ^d instead of plant-based protein sources	75 to 500 grams per day	Increasing effect on LDL cholesterol ²⁴

^a Red and white meat.
^b Nuts or whole grains.
^c Nuts, legumes or whole grains.
^d The majority of RCTs involved unprocessed red meat, but some involved processed red meat.
^e See Section 3.9 of the background document.²⁴



Food safety

A reduction of the consumption of beef, in particular, will help to reduce the intake of dioxins and dioxin-like PCBs. In 2014, RIVM estimated that an average of about 15% of the total intake of dioxin came from beef. A more recent estimate is lacking, but due to the decline in beef consumption that has taken place since then, the share may now be a few percent lower.³² The levels in pork (and chicken meat) were considerably lower.¹⁰

Lower consumption of processed meat and red meat (from beef and pork) can also contribute to a reduction in the intake of PFAS. RIVM estimated in 2023 that meat consumption contributes an average of 8% to the intake of PFAS. RIVM reported higher levels for processed meat than for red meat, while the levels in chicken meat were considerably lower than in red and processed meat.¹⁰

Environmental impact

Current meat consumption in the Netherlands has the highest impact on the environment compared to all other foods. Therefore, reducing the average meat consumption would be good for the environment; this also applies to a further reduction below the limit of 200 grams set out in the guideline. The environmental impact differs between types of meat. For example, red meat has significantly more undesirable environmental impact than white meat, while white meat is still more detrimental than plant-based protein sources. And within the red meat category, beef is

less favourable to the environment than pork, and meat from beef cows is less favourable to the environment than meat from dairy cows. Meat is also the food group with the greatest effect on biodiversity loss. Important reasons for this are the impact on the acidification and eutrophication of soil and water, the use of plant protection products, both on grassland and in the cultivation of animal feed crops, the usually high frequency of mowing of grassland, and soy cultivation for animal feed.¹³ Also, the use of antibiotics in livestock farming can contribute to the development of antimicrobial resistance, which poses risks to human health.¹⁰

7.3 Points of attention

7.3.1 Consumer aspects

Substantial change: small portions and not every day

The guideline implies a substantial reduction in the current consumption of red meat, and especially processed meat, in the general Dutch population. It is not desirable for health to eat a lot of meat (including white meat) every day; Preferably, meat is chosen at most a few times a week and/or small(er) portions are taken. The environmental impact of the diet is also lower with lower meat consumption.

However, there are several reasons why meat should not be avoided entirely. A limited amount of meat can be valuable in the diet as a source of nutrients such as (heme) iron and vitamin B12.^{32,33} The guideline on dairy products also implies that some meat from dairy cows will be made



available. Finally, from the perspective of optimal use of land and resources for food production, a limited amount of (poultry) livestock is better than the production of plant-based foods alone (see Section 10.3.2).¹³

Favourable alternatives

Replacing red and processed meat with white meat, cheese or eggs is beneficial for health and for some of the environmental aspects. However, the greatest health and environmental gains are achieved by replacing meat (including white meat) with plant-based protein sources, such as legumes, nuts and whole grains. To replace red and processed meat, the committee therefore recommends opting for (a combination of) plant-based protein sources as much as possible. This has the added benefit that fibre intake may increase and the intake of saturated fatty acids and salt may decrease. The plant-based products mentioned above that can replace meat can be used, for example, during the main meal and/or as an alternative bread spread (such as peanut butter and hummus).

7.3.2 Physical functioning and development

Lean meats are preferred

Fatty meats provide more saturated fatty acids and calories than lean meats. There is insufficient research on the specific associations or effects of lean meat consumption compared to fatty meat with chronic diseases or risk factors to further specify the guideline based on the fat content of

meat. However, based on dietary reference values, the intake of saturated fatty acids should be limited.⁴² After dairy products, meat is the most important source of saturated fatty acids in the average diet of the Dutch population.³² By eating less meat, the intake of saturated fatty acids through meat will already be lower, and that intake can be further reduced by choosing lean meats. However, the importance of choosing lean or fatty meat for health is partly determined by the intake of saturated fatty acids through other foods. At the same time, from the point of view of waste, it is not beneficial for the environment if the fatty parts of the animal were not consumed. From this perspective, it may be worth considering eating fattier parts of the meat from time to time.



08 considerations regarding white meat



The committee decided, as in 2015, not to derive any guidelines for white meat. However, in the broader context of the dietary pattern, the committee does make recommendations about this food group.



8.1 Definition of food group and consumption in the Netherlands

White meat comes from poultry such as chickens, turkeys, ducks and geese, as well as domestic rabbits.

Dutch adults consume an average of 92 grams of meat per day, of which about a quarter is white meat and three-quarters is red meat. About half of the meat consumed is processed, of which a small proportion is white meat (<10%).^{32,35}

8.2 Recommendations

The committee's recommendation is that white meat can occasionally be eaten as a substitute for red and processed meat, but that plant-based protein sources are preferred. For both health and the environment, white meat is better than red and processed meat, but plant-based protein sources are even better.

Below is a summary of the findings that the committee has taken into account when formulating the recommendations and points for attention. A detailed description can be found in the background documents on

meat, substitution of protein sources, chemical food safety and environmental impact.^{10,13,24,28}

Chronic diseases

The available cohort studies on the association between white meat consumption and chronic disease risks did not lead to conclusions with strong or limited evidential value.²⁴ However, the findings of substitution analyses in cohorts pointed to the importance of the nature of substitution: white meat as a substitute for processed meat was associated with a lower risk of cardiovascular disease, while white meat as a substitute for plant sources, such as nuts, was associated with a higher risk (see Table 8).²⁸

Based on these findings, and in the context of the whole dietary pattern, the committee indicates that white meat can be eaten occasionally, preferably as a substitute for (processed) red meat. The guideline to eat as little processed meat as possible also applies to processed white meat (in addition to processed red meat).



Table 8 Conclusions with strong evidential value about white meat, as described in a background document.²⁸

Food group	Amount at which the association was seen	Chronic disease with which an association was seen
White meat instead of processed meat	Specification of the quantity was not possible. The maximum white meat consumption in the studies was 75 grams per day	Association with lower risk of cardiovascular disease ²⁸
White meat instead of nuts and whole grains	Specification of the quantity was not possible. The maximum white meat consumption in the studies was 75 grams per day	Association with higher risk of cardiovascular disease ²⁸

Food safety

On average, chicken meat is not a major source of intake of dioxins and dioxin-like PCBs and PFAS at current food consumption. Significantly lower levels of dioxins and dioxin-like PCBs have been reported for fat in chicken meat (as well as for fat in pork) than for fat in beef. The PFAS levels in unprocessed chicken meat are relatively low compared to the levels in red and processed meat.¹⁰

Environmental impact

Chicken meat has a lower environmental impact than red and processed meat in many aspects. However, on average, the production of a kilo of chicken meat requires more feed soy than the production of beef and pork, which is unfavourable for the environment. The cultivation of feed soy is associated with large-scale deforestation of (mainly South American) nature reserves, and also takes place in large monocultures,

which means that it contributes greatly to the loss of biodiversity in the area. Chicken meat has a higher environmental impact than plant-based protein sources on most environmental aspects.¹³ Therefore, it is better for the environment to replace red and processed meat with plant-based products than with white meat.

8.3 Points of attention

Laying hens and broiler chickens

In the current food system, the production of chicken meat (broiler chickens) takes place in a different chain than egg production (laying hens). As a result, egg production is hardly related to the production of chicken meat. Laying hens used to be widely available as soup chicken (unprocessed meat), but are now mainly eaten as processed meat (processed in chicken products), which is unfavourable for health (see Chapter 7). It would be beneficial for both health and the environment if the meat of laying hens were to become more widely available and consumed in unprocessed form.¹³

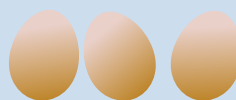


09 considerations regarding eggs



The committee has decided, as in 2015, not to derive a guideline for eggs.^{1,46}

However, in the broader context of the dietary pattern, the committee does make recommendations about this food group.



9.1 Definition of food group and consumption in the Netherlands

This advisory report focuses on the consumption of chicken eggs because this type of eggs is usually eaten in the Netherlands and other Western countries.

Eggs provide various nutrients, such as protein, vitamin B2, vitamin B12 and iron. However, eggs are also an important source of dietary cholesterol, which is less beneficial for health. Eggs contribute about 20% to the consumption of dietary cholesterol in the current Dutch diet. In addition, meat (30%) and dairy products (28%) are the most important sources of dietary cholesterol in the Dutch diet.^{32,33}

Adults in the Netherlands consume an average of 2.5 eggs per week. This concerns eggs that are eaten as such or that people have added to dishes themselves. Eggs incorporated into products such as pastries, biscuits or desserts, were not included.³²

9.2 Recommendations

The committee's recommendation is to limit the consumption of eggs because of the unfavourable effect on LDL cholesterol. This means that egg consumption should preferably not increase compared to the current average consumption level (2 to 3 eggs per week), unless extra eggs are eaten instead of other cholesterol-rich and LDL cholesterol-raising products, especially red and processed meat. Replacing red and processed meat with eggs is also beneficial for the environment.

Below is a summary of the findings that the committee has taken into account when formulating the recommendations and points of attention about eggs. A detailed description can be found in the background documents on eggs, substitution of protein sources, chemical food safety and environmental impact.^{10,13,25,28}

Chronic diseases

Substitution analyses in cohort studies show that consumption of eggs instead of red and processed meat is associated with a lower risk of coronary heart disease.²⁸ In contrast, the classical cohort analyses do not show consistent associations between egg consumption and the risk of coronary heart disease and stroke, although these studies did not indicate that egg consumption is associated with higher risks. The studies were conducted in populations with consumption levels of up to 7 eggs per week. However, the committee notes that eggs are often incorporated into



products, but those invisible eggs are usually not included in the consumption data of the cohort studies.²⁵

RCTs, on the other hand, provide strong evidence that egg consumption increases LDL cholesterol (by an average of 0.1 mmol/L per egg per day). LDL cholesterol is a causal risk factor for coronary heart disease and stroke.²⁵ Because of this LDL-increasing effect of eggs, the committee recommends limiting the consumption of eggs. The current average consumption of 2 to 3 eggs per week does not give rise to concerns, but the committee notes, as did the 2006 and 2015 committees,¹ that above-average use of cholesterol-rich products is not desirable. Therefore, the committee recommends that the consumption of eggs should only be increased if the (extra) eggs are eaten instead of other products that increase LDL cholesterol (rich in cholesterol and/or saturated fat), especially instead of red and processed meat. Such a substitution is preferred because it contributes to the desired reduction in consumption of red and processed meat, as outlined in Chapter 7, and to the reduction of the risk of coronary heart disease.²⁸

How many eggs can be eaten depends on the content of the whole diet. If red meat consumption were reduced to an average of 200 grams per week, there would be room for consumption of a few extra eggs per week. However, the committee emphasizes that replacing red and processed meat with plant-based protein sources for the risk of chronic diseases is

even more beneficial. On the other hand, eggs can be a valuable source of certain nutrients in a more plant-based dietary pattern.

The research findings on chronic disease risks relevant to the recommendations on eggs are summarised in Table 9.

Table 9 Conclusions with strong evidential value about eggs, as described in two background documents.^{25,28}

Food group	Amount at which the association/ effect was seen	Chronic disease or risk factor with which an association/effect was seen
Eggs	1 to 4 eggs per day	Increasing effect on LDL cholesterol ²⁵
Eggs instead of red and processed meat	Specification of the quantity was not possible. The maximum egg consumption in the studies was 30 grams per day. ^a	Association with lower risk of coronary heart disease ²⁸

^a 1 egg weighs about 50 grams.

9.3 Points of attention

Food safety

With regard to harmful substances, commercial eggs (eggs offered in stores) do not give rise to concerns at the current average consumption level. However, privately produced eggs (eggs from hobby chickens) can contain very high levels of PFAS and the RIVM therefore advised in 2025 not to consume them (for the time being).⁴⁷ RIVM is currently investigating whether action perspectives can be indicated for owners of hobby



chickens to find out whether consumption of their privately produced eggs is safe.¹⁰

Environmental impact

Compared to meat (both red and white, processed and unprocessed), eggs have a lower environmental impact. On average, eggs have a greater impact on acidification of agricultural land than plant-based protein sources.¹³



10

guideline on the dietary pattern



Guideline

A more plant-based and less animal-based dietary pattern in accordance with the guidelines for specific food groups.

**10.1 Definition of dietary patterns**

In the DDG, dietary patterns are defined as the amounts, proportions and variation of all foods and beverages consumed. The guidelines advise on what to eat and drink. The distribution over eating moments (meals, snacks), the timing of those eating moments and the combination of the foods and drinks in eating moments fall outside the scope of this advisory report.

In the DDG2015, the Health Council found that the various dietary patterns associated with lower risks of chronic diseases (referred to as recommended dietary patterns) had in common that they consisted of relatively more plant-based and fewer animal-based foods.^{1,48}

These recommended dietary patterns studied at the time were characterized by high quantities of vegetables, fruit, whole grain products, nuts, legumes, oils rich in cis-unsaturated fatty acids, semi-skimmed and low-fat dairy products, poultry and fish; contained little red and processed meat, full-fat dairy products, beverages and other products with added sugar, hard fats and table salt; and were moderate with alcohol.¹ Based on recent reports, the committee concludes that this conclusion still applies based on more recent research.^{14,15,49} Therefore, this advisory report

focuses on dietary patterns that characterise an increase in the consumption of plant-based foods and a decrease in the consumption of animal-based foods, and other dietary patterns have not been evaluated.

These dietary patterns are further referred to as more plant-based dietary patterns. In the evaluated studies, these more plant-based dietary patterns are compared with dietary patterns that contain fewer plant-based and more animal-based foods.

10.2 Substantiation and explanation of the guideline

The committee maintains the 2015 overarching guideline for a more plant-based dietary pattern, because the 2015 conclusions regarding the risks of chronic diseases are confirmed by research published after 2015.

Moreover, more plant-based dietary patterns also appear to be more beneficial for the environment. The environmental impact can be reduced even further through the choice of products within food groups.^{3,13}

The committee sees no reason to increase concerns about the intake of harmful substances through the diet if there is a shift to a more plant-based dietary pattern, in which there is a variation between products. Preventing overconsumption remains an important concern, also in a more plant-based dietary pattern, because of the adverse effects on health and the environment.

As the guidelines for specific food groups also illustrate, the committee does not recommend that the whole population shifts to a completely



plant-based dietary pattern, but rather to a more plant-based dietary pattern.

Below is a summary of the findings that the committee has taken into account when deriving the guideline and formulating points for attention. A detailed description can be found in the background documents on more plant-based dietary patterns, chemical food safety and environmental impact.^{10,13,27}

Chronic diseases

In 2015, the committee concluded that there was convincing evidence that recommended dietary patterns lower the risks of coronary heart disease and stroke. Based on analyses that combined the findings for different recommended dietary patterns, the recommended dietary patterns in cohort studies were associated with lower risks of coronary heart disease and stroke, and RCTs showed that these dietary patterns lowered blood pressure. The beneficial effect on coronary heart disease had also been convincingly demonstrated specifically for a vegetarian dietary pattern. In addition, it was considered plausible that recommended dietary patterns reduced the risk of diabetes, colorectal cancer and all-cause mortality.^{1,48}

Since 2015, additional research has been published on the health effects of more plant-based dietary patterns. This research confirms the picture that such dietary patterns are associated with a lower risk of various

chronic diseases including cardiovascular disease, type 2 diabetes and some types of cancer, and with less mortality.²⁷ This is evident from systematic evaluations of the literature presented in the Health Council advisory report *A healthy protein transition*^{3,49} and from the U.S. Dietary Guidelines 2020 and 2025,^{15,50} and from a literature review performed for this advisory report into findings on the Planetary Health Diet drawn up by the EAT-Lancet Commission in 2019.^{51,52} The findings on the Planetary Health Diet refer to the 1.0 version published in 2019.¹⁹ Version 2.0 was released in October 2025.⁵³ The composition of this diet has hardly changed compared to 2019. Almost all DDG2025 guidelines fall within the recommended ranges of the Planetary Health Diet (see box).

Planetary Health Diet

The Planetary Health Diet has been published by the EAT-Lancet Commission, a team of scientists from different countries. The aim of the EAT-Lancet Commission is that healthy food is accessible to everyone, fits within planetary boundaries and is produced, processed, distributed and consumed in a fair way. The Planetary Health Diet is intended as a reference diet for the entire world population and is largely plant-based, with a limited amount of animal products and minimal amounts of added sugar, saturated fatty acids and salt. Ranges for the intake of food groups are presented to allow for adaptation to local aspects (such as culture, customary eating patterns) and personal eating preferences. The recommended amounts per food group in the Planetary Health Diet are based on health effects. The environmental impact of this Planetary Health Diet was then investigated. The EAT-Lancet Commission notes that the shift to this diet already has a positive effect on the environmental impact of food, but that



additional actions, such as reducing food waste and improvements in food production systems, are needed to further reduce the environmental impact.⁵³

Almost all DDG2025 guidelines fall within the advised ranges of the Planetary Health Diet. These ranges in the Planetary Health Diet are very wide for some food groups, such as legumes, nuts and fish, because the EAT-Lancet Commission aims to enable a wide application throughout the world. The DDG2025 advisory report focuses on the Dutch situation, in which the recommended consumption amounts fall within the ranges reported by the cohort studies relevant to the Netherlands.

Food safety

With respect to harmful substances, the possible health risks relate to the intake from the total diet. In 2017, RIVM estimated the intake of harmful substances based on a healthy and varied plant-based dietary pattern in accordance with the DDG2015 and the dietary reference values at the time.⁵⁴ At that time, the intakes of most harmful substances turned out to be within an acceptable range. However, the intake of some substances is higher than desired, both with the healthy dietary pattern described above and with the food consumed on average by people in the Netherlands. With regard to the food groups in this advisory report, this mainly concerns aflatoxins, dioxins and PFAS.¹⁰

The interpretation of a healthy and sustainable diet has many variation possibilities, which can also influence the intake of harmful substances.

Therefore, further elaboration is needed on this point for the purpose of nutrition education; this is done by the Netherlands Nutrition Centre and RIVM in the further development of the Wheel of Five.¹⁰

Environmental impact

It is important that the environmental impact of the average Dutch diet is reduced, see Section 1.1. Diets with a lower environmental impact contain less meat (especially less red meat) and less dairy products than the current diet, and contain fish from sustainable sources. It is also important for biodiversity that fewer crop protection products, chemicals and veterinary medicines are used. This is one of the principles of organic farming, but non-organic farms can also contribute to reducing the use of these products through adjustments in production methods.¹³

It is important to prevent food waste as much as possible. There is considerable room for improvement, especially with respect to meat (products), cheese, bread (products), fruit and vegetables.¹³ It is also important to limit overconsumption. This applies not only to excessive intake of energy (kilocalories), but also, for example, to protein intake that is far above the requirement. Those who eat more usually have more environmental impact, especially if it concerns too many products with a high environmental impact, such as animal protein-rich products.¹³



10.3 Points of attention

10.3.1 Physical functioning and development

Importance of protein quality

Variation and combining plant-based protein sources are important for good protein quality (see box Protein quality). Most plant-based products have a lower protein quality than animal products. The protein quality of a more plant-based and less animal-based dietary pattern improves when protein sources are combined. Good examples of this are the combination of legumes with grains or the combination of plant-based protein sources with (a small amount of) an animal protein source. Soy has a relatively high protein quality of its own.

For the general population in the Netherlands, the protein quality with a varied and healthy diet based on the DDG, i.e. including a limited amount of animal products, is not an important point of attention, according to analyses for the advisory report *A healthy protein transition*.^{3,55} In those analyses, the ratio of animal to plant protein was 40:60; a further shift towards a more plant-based diet was not investigated. Protein quality did appear to be a more important point of attention for certain groups, such as people who consume little energy and/or protein or have an increased requirement, and people with a vegan diet.^{3,55,56}

Protein quality

Proteins are chains of different amino acids. Of the more than twenty different amino acids in body proteins, humans can only produce a part themselves.

The amino acids that the body cannot produce are called essential amino acids. There are nine of them: histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan and valine. It is important that these are available in the diet in sufficient quantities, and preferably in the right proportions.

Protein quality indicates the extent to which the proteins in a food, meal or diet provide the essential amino acids that the body needs. That depends on both the amino acid profile and the digestibility of the protein.^{3,55} A lower protein quality of a (vegetable) protein source can be compensated by combining protein sources and/or by a higher protein intake, provided that all essential amino acids are present.

Importance of variation

It is important to vary within food groups, for example by eating different types of nuts or legumes. Variation helps to better guarantee the intake of different nutrients. In addition, there is recent evidence that the risk of certain chronic diseases decreases the more variety there is in the diet.⁵⁷ Some food groups may contain products with high levels of harmful substances and/or with a high environmental impact. If it concerns a single product, variation helps to limit the intake of harmful substances and/or the environmental impact. But if the high values concern a considerable part of the food group, it is better to limit the consumption of



those products in a targeted manner and (especially) to vary between the other products in the food group.

Antinutrients

With an increase in the consumption of plant-based products, the intake of plant substances such as phytate and oxalate will also increase. Phytate and oxalate are substances that can greatly reduce the absorption of certain nutrients in the body (also called: bioavailability) and are therefore referred to as antinutrients or anti-nutritional factors. In the advisory report *A healthy protein transition*, it is assumed that the changes in bioavailability will be relatively limited in a Western diet with 60% plant-based protein.³ According to the committee, it is desirable to monitor the status of the nutrients with which these antinutrients, interact, such as calcium, iron and zinc, in population groups with different dietary patterns.

10.3.2 Environment

Organic foods

Organic farming is aimed at producing food using natural substances and processes. A responsible use of energy and natural resources is encouraged for the benefit of biodiversity, ecological balance, water quality, soil fertility and animal welfare. Organic food must comply with EU regulations and is recognizable by the EU logo.⁵⁸

The committee concludes that organic foods are more beneficial for biodiversity than non-organic ones. For example, the organic cultivation of crops is more focused on the prevention of crop diseases and pests, which limits the use of (organic) crop protection products. This is beneficial for biodiversity, because crop protection products also unintentionally kill organisms (plants, animals, microorganisms). The above also applies to feed crops, including grass. In addition, the use of veterinary medicines (including antibiotics) is low in organic livestock farming and fish farming, which means that fewer residues end up in the ecosystem. This is also beneficial for biodiversity.¹³ The lower use of antibiotics results in a lower prevalence of antimicrobial resistance.¹⁰

More biodiversity strengthens the ecosystem, making it more resistant to crop failures due to extreme weather conditions, diseases and pests. However, the average yield per hectare for organic production is lower than for non-organic production.¹³

Whether the consumption of organic foods is also better for the risk of chronic diseases cannot be concluded on the basis of the evaluated research on the risk of chronic diseases, because it does not distinguish between consumption of organic and non-organic foods. With regard to the nutrient composition, the Health Council also found no indications of significant differences between organic and non-organic foods in 2009.⁵⁹ Organic foods tend to contain fewer residues of plant protection products and veterinary medicines than conventional agricultural foods, but all



foods, regardless of the production method, are subject to strict regulations aimed at preventing undesirable health effects of these residues in humans.

Optimal use of land and residual flows

The production of 1 kilo of protein in dairy products or meat requires many kilos of protein from (vegetable) animal feed. It would provide more food for humans if the arable land on which forage crops are grown were used for food crops for humans. However, for the highest food production for humans, in addition to predominantly vegetable production, a limited degree of livestock farming is also required. This is firstly because the land is then better used. Unlike arable land, grassland is often unsuitable for growing food crops for humans. If this grassland is converted into high-quality food (dairy products, meat) via cows (or other grazing cattle), more food becomes available than if it remains unused.¹³ Secondly, livestock farming makes it possible to make better use of residual flows.

The production of food leaves residues that are not edible for humans. By using these residual flows as animal feed, they can be converted into high-quality food for humans, namely meat, dairy products and eggs. Especially omnivores such as chickens and pigs can play a role in this.¹³ Another aspect in this context is that the committee advises to consume a few portions of dairy products per day for the prevention of chronic diseases (Chapter 5). The production of that dairy products also produces meat from dairy cows. It has already been indicated that meat from dairy

cows is more beneficial to the environment than meat from beef cows (Section 7.2).



11

considerations regarding meat substitutes and dairy substitutes



The committee has not derived a guideline for meat substitutes and dairy substitutes. However, in the broader context of the dietary pattern, the committee does provide some points of attention about this food group.



11.1 Definition of food group and consumption in the Netherlands

The committee defines meat substitutes and dairy substitutes as products that are (largely) made from plant-based proteins or plant-based protein sources. These products are ready to eat or ready to prepare (for baking, for example). The most common name is meat substitutes and dairy substitutes. These products are often marketed to replace meat or dairy products and are often used as such by consumers.

With regard to fish substitutes, little or no scientific information is available on health and environmental effects, consumption, ingredients and nutrient levels. Therefore, these products will not be further discussed in this chapter. Alternative (new) protein sources that are not yet or hardly consumed in the Netherlands, such as products based on algae, are also not discussed in this chapter. In Chapter 12, the committee describes research needs related to such products.

Meat substitutes and dairy substitutes are eaten by less than half of adults in the Netherlands and (on average) not on a daily basis. On days when these products are consumed, the average consumption of users is about

85 grams of meat substitutes and 240 grams of dairy substitutes.

The average daily consumption is 6 grams for meat substitutes and 14 grams for dairy substitutes.³²

11.2 Recommendations

According to the committee, the use of meat substitutes and dairy substitutes can be a convenient way to make the transition to a more plant-based dietary pattern. After all, when using these products, the type of meal can remain unchanged. Research into the relationship between meat substitutes and dairy substitutes and the risk of chronic diseases is still scarce. The committee therefore does not make any recommendations on the consumption of meat substitutes and dairy substitutes, but based on what is currently known, it does not see any reason to advise against the use of these products.

With regular consumption, a targeted choice based on nutritional composition can be useful, especially with regular use of dairy substitutes instead of dairy products (with respect to the supply of calcium and vitamins B2 and B12). With regard to meat substitutes, the committee emphasizes that consumption of legumes, nuts and whole grains is preferable, because beneficial effects on the risk of chronic diseases have been convincingly demonstrated for these food groups.



The findings that the committee has taken into account are described in detail in the background documents on meat substitutes and dairy substitutes, chemical food safety and environmental impact.^{10,13,26}

Chronic diseases

Not much is known from the scientific literature about the health effects of meat substitutes and dairy substitutes. Only for soy drink, strong evidence was found for a relationship with health endpoints: RCTs show that consumption of soy drink instead of cow’s milk lowers LDL cholesterol (Table 10). A similar trend was visible for the effects of soy drink on blood pressure, but that evidence was limited.

Research is also available with regard to various (other) types of plant-based meat substitutes and dairy substitutes. That research had methodological limitations that prevented the committee from drawing conclusions, but it did not give rise to discourage the use of these products. It mainly showed beneficial or neutral effects on LDL cholesterol and some other health outcomes.²⁶

Table 10 Conclusions with strong evidential value about soy drink, as described in a background document.²⁶

Food group	Amount at which the effect was seen	Risk factor with which an effect was seen
Soy drink instead of cow’s milk	240 to 1000 ml of soy drink per day	Lowering effect on LDL cholesterol ²⁶

Food safety

An evaluation of food safety of meat substitutes and dairy substitutes was not available. In general, it is wise to vary between products that are based on different plant-based ingredients. In this context, the committee refers to the recommendation in Section 3.2 not to exclusively choose soy-based dairy substitutes and soy-based meat substitutes.¹⁰

Environmental impact

The composition of meat substitutes and dairy substitutes is highly variable, and the environmental impact depends, among other things, on the ingredients of the product. However, data on the environmental impact are only available for a limited number of meat substitutes and dairy substitutes. Based on the available data, the committee concludes that meat substitutes and dairy substitutes have a lower environmental impact than the animal-based variant. When meat or dairy substitutes are used as an alternative to meat or dairy products, it is therefore beneficial for the environment.¹³

11.3 Points of attention

The points of attention for meat substitutes and dairy substitutes relate to the dietary reference values and the guideline on table salt (physical functioning and development).



Nutrient levels vary widely

The nutrient content of meat substitutes and dairy substitutes available in the Netherlands vary considerably.^{3,60} In some of these products, the content of salt, sugar and/or saturated fatty acids is high. It is preferable to choose variants in which these levels are relatively low. In addition, the committee notes that certain, but not all, nutrients that are present in the animal-based variant, have been added to some of the meat substitutes and dairy substitutes. In previous advisory reports, the committee recommended that international criteria be established for the nutritional composition of products that are explicitly marketed as meat substitutes and dairy substitutes.^{3,61} This applies to nutrients for which the animal food groups make an important contribution to the intake, and for which the supply may be compromised with a shift to a more plant-based dietary pattern. For dairy products, this may be the case for calcium and vitamins B2 and B12.³⁵ Of course, the composition of the whole diet ultimately determines whether it is necessary to choose variants in which nutrients are supplemented. According to the committee, a targeted choice for supplemented variants is wise for people who regularly use a dairy substitute instead of dairy product, without further changes to the diet. This can help them to consume an adequate diet. The same applies to frequent use of meat substitutes instead of meat, but the committee recommends replacing meat mainly with legumes, whole grains and nuts.

The committee also notes that the protein content of the meat substitutes and dairy substitutes is usually lower than that of the animal-based product. However, she expects that this will not be a problem for most people in the general population, because they usually consume more protein than they need.³

A beneficial aspect of many meat substitutes and dairy substitutes is that they typically contain dietary fibre from plant sources, while animal-based products do not contain dietary fibre.³



12

concluding remarks and additional recommendations



Based on the evaluation of the scientific literature on different food groups and dietary patterns, the committee recommends a more plant-based and less animal-based diet in accordance with the food group-specific guidelines (or recommendations) (see Table 11). The revised guidelines in this advisory report further elaborate on the Health Council advisory report *A healthy protein transition*, published in 2023.³ In it, the Health Council concludes that a shift in the protein ratio to 60% plant-based and 40% animal-based is in line with a healthy and complete diet (compared to an average of 40% plant-based protein in the current Dutch diet).

The committee emphasizes the urgency of the transition to a more plant-based dietary pattern. A more plant-based dietary pattern lowers the risk of chronic diseases and leads to a lower environmental impact, contributing positively to the health of current and future generations.

For all guidelines, the direction of the recommended change (i.e. more or less compared to consumption at population level) is the same as in the DDG2015. However, the quantities of products recommended in some guidelines have been substantially changed or made more concrete (legumes and red meat). Furthermore, the substantiation of the revised guidelines is broader than in 2015: after all, food safety and environmental impact have also been taken into account this time, and more research is now available on the relationship with chronic diseases for most topics. Although the adjustments to the guidelines for nuts, fish and dairy products are limited, it is precisely for these food groups that findings on

food safety or environmental impact have been taken into account when formulating the guidelines and points for attention. For legumes and meat, the findings on food safety and the environmental impact pointed in the same direction as the findings on the risk of chronic diseases.

12.1 Challenges in the recommended shifts

The advised shift to a more plant-based dietary pattern is accompanied by certain challenges. It represents a significant change from the current situation. The committee emphasizes that every (further) step towards the guidelines contributes to better health and lower environmental impact.⁵³ It is important that consumers are supported in this. As highlighted in the advisory report *A healthy protein transition*,³ this requires a robust policy that strives for a physical, social and economic food environment where healthy and sustainable diets become the norm. It requires, among other things, changes in the production and supply of food and in eating habits and cultural attitudes about nutrition (such as the role of meat in many Western meals). In addition, it is important that consumers are provided with reliable information to be able to apply the guidelines in different ways and in different situations. Such a transition can only take place if all parties that have a role in the food system – such as the agricultural sector, the fisheries sector, food industry, supermarkets, catering, education, healthcare institutions, public information services (such as the Netherlands Nutrition Centre) and the government – take their responsibility.



To reduce the environmental impact of diets, there are major challenges, affecting different aspects of the production system and requiring a systematic approach. Consumers can contribute to this by moving towards a more plant-based dietary pattern, by eating more of certain food groups (such as legumes) and substantially less of others (such as meat). The choice of food within food groups also matters (such as sustainable instead of non-sustainable fish), but in order to be able to take the environmental impact into account, consumers need high-quality information about this. This is often insufficiently available at the moment. For example, there is insufficient information available about sustainable fish at many points of sale and in catering.

In order to offer consumers more action perspectives, it is important that more healthy and sustainable food becomes available. To this end, cooperation between policy and the production chain is important. This cooperation is also important for the parties in the food chain themselves. For example, various organisations have previously signalled that farmers cannot easily realise the necessary transition independently because of the economic impact.⁶²⁻⁶⁴ The committee considers that this remark also applies to fisheries.

12.2 Attention to adequacy and variety

In the transition to a more plant-based dietary pattern, it is important to pay attention to the adequacy of the diet. For most people in the general population, a slightly lower intake of protein will not pose a problem for the

protein supply, because most people consume more protein than they need.³ This also applies to people who exercise recreationally several times a week. In 2023, the Health Council did recommend continuing to monitor the intake of some specific nutrients in the population. These are vitamins A, B2 and B12, calcium, iodine and the omega-3 fatty acids EPA and DHA and in women of childbearing age also iron.³

For groups with relatively high nutrient requirements (such as pregnant or breastfeeding women) or those with low protein and energy intakes, the adequacy of the diet in the transition to a more plant-based dietary pattern may be more challenging. Moreover, there are specific groups for whom – regardless of this transition – a supplementary advice applies.^{1,65,66}

The implementation of the guidelines for certain target groups, such as children, elderly, pregnant women and women who are breastfeeding, is part of the role of the Netherlands Nutrition Centre (see Section 1.4). For specific groups that may have a lower protein or energy intake (such as patients in hospitals, nursing homes or rehabilitation centres, or elderly people with home care) and for people with problems such as nausea, taste changes, obstruction, malabsorption, allergies and intolerances, the committee sees an important role for the dietician, who can guide the consumer at an individual level towards an adequate diet. Attention to good protein quality is important in this respect (see also Section 10.3).³



For an adequate diet, it is important to eat a varied diet. This means: variation between food groups but also within food groups (for example, between different types of legumes, such as brown beans, soybeans, lentils and chickpeas). Variation helps to better guarantee the intake of different nutrients. In addition, variation between protein sources can contribute to good protein quality. Furthermore, variation helps to limit the risk of a high intake of harmful substances. With fish, the risk of a high intake of harmful substances is relatively high, which means that, as well as ensuring variety, it is also important to consume certain species sparingly or not at all. Finally, variation can also contribute to reducing environmental pressure. For example, it is better for the environment if people not only choose tree nuts but also peanuts.

12.3 People who cannot or do not want to follow certain guidelines

There are people in the population with a food allergy, food intolerance or certain diseases and for them following certain guidelines can have undesirable health effects. For example, someone with a nut allergy cannot eat nuts. Other people eat vegan, which means that the dairy product and fish guidelines do not fit into their diet. There are also people who do not like certain recommended foods, such as fish. In such situations, it makes sense to follow the remaining guidelines where possible, in order to minimise the risk of chronic diseases and the environmental impact.

However, the committee notes that not eating certain recommended food groups can be at the expense of the adequateness of the diet.

For example, animal-based products are an important source of vitamins B2, B12, calcium, iron, iodine, zinc, omega-3 fatty acids and proteins^{32,33}

People who do not consume dairy products can consume the nutrients for which dairy products are important by using a dairy substitute in which these nutrients have been added, or by other dietary adjustments.

It depends on the composition of the whole diet whether such a dairy substitute is necessary for sufficient nutrient intake. People who do not want to or cannot eat fish may choose to use an omega-3 fatty acid supplement (possibly based on algae oil), as fish is the main source of these fatty acids.^{32,33} A low dose (200 mg EPA plus DHA) is sufficient to replace the content in oily fish. While such products may be beneficial for the intake of the necessary nutrients and thus the adequateness of the diet, there is insufficient research to support that this approach achieves the same effects on chronic diseases as following the dairy product and fish guidelines respectively.

For people with a vegetarian dietary pattern, who do not eat meat but do eat other animal products (dairy products, fish, eggs), it is possible to meet all guidelines and keep the diet adequate. For people with a vegan dietary pattern, who only eat plant-based products, this is a lot more difficult. In addition to supplements, meat and/or dairy substitutes supplemented with nutrients, as specified in Section 11.3, could contribute



to an adequate diet. Sufficient nutritional knowledge or support is needed to be able to put together an adequate vegan diet. Currently, there is insufficient information available on the consumption patterns, nutrient intake and nutritional status of people in the Netherlands with a vegan diet. As a result, it is insufficiently clear what the adequacy of their diet is.

12.4 Applicability of the guidelines for specific groups

These guidelines are intended for the general population aged 2 years and older (see Section 1.2). Between 2021 and 2023, the Health Council concluded that the DDG2015 also apply to people with type 2 diabetes,⁶⁷ people with cardiovascular diseases due to atherosclerosis⁶⁸ and pregnant women.⁶⁶ However, a higher recommended intake of fish applies to both people with cardiovascular diseases and pregnant women. Additional advices were also given for all 3 of these groups. The committee considers the new guidelines to also apply to the aforementioned groups, whereby the higher recommended intake of fish and additional advices for these groups remain in force. The recommendation to consume sustainable fish also applies to these groups. The intake of harmful substances via fish is a key point of attention due to the higher recommended consumption.⁶⁶ A Health Council advisory report is due to be published, containing dietary recommendations aimed at breastfeeding women and young children.¹⁶

12.5 Follow-up questions

On the basis of its evaluation, the committee has identified that more knowledge on a number of topics would be valuable for a future revision of the guidelines that are covered in this advisory report.

Health effects

There is already a lot of research available on the health effects of the food groups covered in this advisory report (with the exception of meat substitutes and dairy substitutes), but this usually focuses on a select group of health outcomes (especially coronary heart disease, type 2 diabetes, colorectal cancer). The committee points out that for all food groups in this advisory report, more research is needed into health effects for which too little data has been available, such as dementia, perceived health, quality of life and fertility. In addition, the committee notes that on the basis of the evaluated research, it is difficult to distinguish the health effects of different protein sources from one another, particularly red and processed meat compared to products that are often eaten alongside them. Therefore, there is a need for research into the health effects of protein sources in people who do not eat red and processed meat. The advices within the DDG could be further specified on the basis of research in which the health effects of different protein sources are directly compared with each other, in particular via RCTs. This concerns both comparisons of variants within (such as low-fat versus full-fat variants) and between food groups. In addition, research into food consumption



(product choices) and nutritional status is required for people with a vegan diet in the Netherlands, to assess the adequacy of the diet and the bioavailability of nutrients.

Harmful substances and environmental impact

For the purpose of monitoring and assessing chemical food safety, more information is needed about the levels of harmful substances in our food, and regular updates of these levels are required, for example on the levels of harmful substances in fish. With regard to the impact of food on the environment (including biodiversity), more information is needed to assess the importance of product choices within food groups, such as between open field cultivation and greenhouse, and between organic and non-organic. Knowledge is also needed about how information about the sustainability of specific foods can best be brought to the attention of consumers and how this can be combined with health information (e.g. on the pack of a product, via a label, or in some other way).

Specific groups

In order to tailor the guidelines further to specific groups, there is, for example, a need for (more) knowledge about the health effects of food groups and dietary patterns in obese people and in people who use medication that affects their eating behaviour.

Alternative (new) protein sources

In order to be able to evaluate alternative (new) protein sources that are not yet, or are scarcely, consumed in the Netherlands, such as algae, for the purposes of the guidelines, more knowledge is needed about the health effects, (nutrient) composition, safety and the environmental impact of such products.

12.6 Future advice by the Health Council of the Netherlands

In subsequent DDG advisory reports, the committee will revise the guidelines for other food groups, such as cereals, vegetables, fruit and juices. In addition, the Health Council will examine whether there is reason for additional guidelines, such as for (products with) low-calorie sweeteners. The committee also considers it relevant to examine whether knowledge about the health effects of eating behaviour gives rise to advice, such as on the timing of meals, the distribution of meals throughout the day, the eating speed, the texture of foods, the degree of processing of foods, the size of pre-packaged portions and the design of the food environment.

Because the shift to a more plant-based dietary pattern requires a significant change in behaviour, the Health Council considers it valuable that, in addition to the current and future DDG advices, recommendations will also be made on promising measures to make the dietary behaviour of various Dutch population groups healthier and more sustainable. It is important to



consider which interventions deserve priority to reduce health inequalities between groups. In 2026, the Health Council will start an exploration of scientific research on this subject.¹⁶



Table 11 Overview of revised guidelines, additional recommendations and points of attention.

Food group	DDG2025	Additional recommendations and points of attention
Dietary pattern in general 	More plant-based and less animal-based	• Variation between plant-protein sources and combination of protein sources are important for protein quality. • Variation within food groups is important for sufficient intake of nutrients, for limiting the intake of harmful substances and for limiting the environmental impact. • Avoiding overconsumption is important for both health and the environment. • Preventing waste is important for the environment.
Legumes 	250 grams per week	• Variation between various types, such as brown beans, soybeans, lentils and chickpeas. • A consumption of more than 250 grams of legumes per week (with sufficient variation between types) is also fine. • Preferably legumes with little or no added salt. • Dried and fresh beans should always be heated before consumption.
Nuts 	15 to 30 grams per day, unsalted	• Variation between different types of nuts (and nut spreads), including peanuts. A small proportion can optionally be replaced with seeds. • Preferably nuts without added sugar and nuts that are not or only lightly roasted. • Preferably tree nuts from regions where there is no water scarcity.^a
Dairy products 	A few portions per day, with variation between types	• No more dairy products than is necessary to limit the risk of chronic diseases. • Preferably low-fat and semi-skimmed dairy products without added sugar. • Preferably cheese with a low fat content and a low salt content.
Fish 	100 grams sustainable ^b fish per week, preferably an oily fish	• Preferably fish species with relatively low levels of harmful substances. • Preferably fish preparations to which little or no salt has been added.
Red and processed meat 	No more than 200 grams of red meat per week; As little processed (red and white) meat as possible	• Red and processed meat should preferably be replaced by plant-based products such as legumes, nuts and whole grains. • Further reduction of consumption below 200 grams per week can contribute to reducing environmental impact. • Preferably lean meats.
White meat 	No guideline	• White meat can occasionally replace red and processed meat^c (but plant-based protein sources are preferred).
Eggs 	No guideline	• Preferably no increase in consumption compared to the current average (2 to 3 eggs per week), unless the extra eggs are eaten instead of red and processed meat.
Plant-based substitutes for meat and dairy 	No guideline	• These products can be a convenient way to make the transition to a more plant-based dietary pattern (but legumes, nuts and whole grains are preferable to meat substitutes). • Preferably variants with relatively low levels of salt, sugar and saturated fat. • In the case of regular consumption of dairy substitutes instead of dairy products: preference for variants in which levels of certain nutrients have been supplemented to the level in dairy products.

^a It is currently not possible for consumers to determine whether tree nuts have been grown in a water-scarce area. The committee argues to improve this.

^b For the consumption of sustainable fish, further sustainability improvements in fisheries and aquaculture is essential, as well as a good recognisability of sustainable fish in the fish chain and for consumers.

^c For the benefit of health and the environment, it would be beneficial if meat from laying hens were to become more widely available in unprocessed form.



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