Factsheet Consumption of protein in the Netherlands

Intake of plant and animal protein based on the sixth Dutch National Food Consumption Survey 2019-2021.

Cosun
Nutrition Center

Key messages

- Protein is an essential part of our diet. Amino acids are the building blocks of proteins. 9 out of the 22 different amino acids are essential, which means that the body cannot produce them itself.
- Average protein intake in 2019-2021 exceeds the recommended dietary allowance, especially among (young) children.
- In 2019-2021, the average contribution of plant protein to total protein intake was 43%. This is 3.5% higher compared to 2007-2010.
- Average protein intake (both animal and plant) is higher among boys/males than girls/women; the average animal protein intake is lower among people with high education than among groups with lower education; the average plant protein intake is higher among 18-50-year-olds than among the other age groups.
- The protein transitiond escribes the shift to a diet with less animal protein and more plant protein. The Health Council of the Netherlands concludes that eating more plant proteins and less animal proteins would benefit both the environment as well as public health in the Netherlands.

Proteins consist of chains of amino acids, which are required for building body proteins. Proteins serve as building materials for the body, including muscles, and are essential for many bodily functions, such as transporting substances, enzyme function and immune system functioning. There are nine so-called essential amino acids that the body cannot produce itself. Therefore, it is important for people to consume sufficient good-quality protein. Both plant and animal foods contain proteins. An increasing number of plant-based products containing all nine essential amino acids are being developed and brought to the market[1].

The Health Council of the Netherlands believes that moving towards a diet with more plant and less animal protein is better for the environment and healthier for most Dutch people[2]. Therefore, government policy focuses on the transition to a diet with more plant and less animal protein. There is growing interest in what is known as the 'protein transition'. Research related to nutrition with a plant-based focus has tripled over the past three years[1].

The Health Council of the Netherlands believes that a more plant-based diet aligns better with the 2015 Dutch dietary guidelines[3] than the current diet and estimates that a more plant-based diet can reduce the environmental impact of food consumption by 25%. For most Dutch people, it is feasible to eat more plant-based without causing nutrient deficiencies.

Gaining insight into the protein intake of the Dutch population and its developments is important for a successful protein transition. This factsheet presents information on protein intake by different Dutch population groups (including an assessment), the main protein sources, the protein content of a number of foods and the changes over time in protein intake. This provides a better understanding of the current protein intake of the Dutch population and the direction in which animal/plant protein intake is heading.

Protein consumption (DNFCS 2019-2021)

The average protein intake in the Netherlands in 2019-2021 is 76 g/day which corresponds to 15.5% of total energy intake. **Table 1** and **Figure 1** (page 4) show the average protein intake of different gender-age groups. Boys/men, except for 1-3-year-olds, have a higher average protein intake than girls/women. However, the en% (percentage contribution to total energy intake) is similar for both men and women and is higher in older age groups. The average daily protein intake per kilogram of body weight is lower in older age groups. Particularly young children have a high daily protein intake per kilogram of body weight. For 1-3-year-olds, intake per kilogram of body weight exceeds that of adults by more than threefold.

On behalf of the Ministry of Health, Welfare and Sport, the National Institute for Public Health and the Environment (RIVM) collects data on food consumption and nutritional status of the Dutch population in the Dutch National Food Consumption Survey (DNFCS). Food consumption data were collected through two 24-hour dietary recalls, administered on non-consecutive, independent days by trained dietitians, among 3570 individuals aged 1-79 years old.

The calculation of protein intake is based on protein from food (i.e. not from supplements).

The results of the DNFCSs can be found at www.wateetnederland.nl[13].

Table 1. Protein intake (g/day, g/kg body weight; en%) in 2019-2021 by gender and age.

	Men		Women	
Total	g/d	(g/d/kg; en%)	g/d	(g/d/kg; en%)
1-3 years old	45.8	(3.42; 13.9)	49.5	(3.44; 14.0)
4-11 years old	63.4	(2.02; 14.2)	55.3	(1.84; 14.1)
12-17 years old	76.6	(1.45; 14.6)	60.0	(1.27; 14.2)
18-50 years old	91.3	(1.14; 15.5)	66,8	(0.98; 15.2)
51-64 years old	91.1	(1.05; 16.0)	71.7	(0.96; 16.6)
65-79 years old	86.2	(1.02; 16.0)	73.7	(1.02; 16.8)

Figure 1. A visual representation of Table 1. Protein intake (g/day; en%) in 2019-2021 by gender and age (y/o).

The average intake (g/day) of plant and animal protein has a similar pattern for the various sex-age groups as observed for total protein (see **Tables 1** and **2,** page 3 and 5).

On average boys/men consume more protein (plant and animal protein), in g/day as well as g/kg/day. The en% for protein intake does not differ substantially for men and women. The average contribution of protein to energy intake is higher for adults (15.8 en%) than for children (14.2 en%).

Carbohydrates are the primary source of energy (± 43 en%), fat provides ± 37 en% and protein ± 16 en%. Dietary fibre and alcohol together provide the remaining ± 4 en%[13].

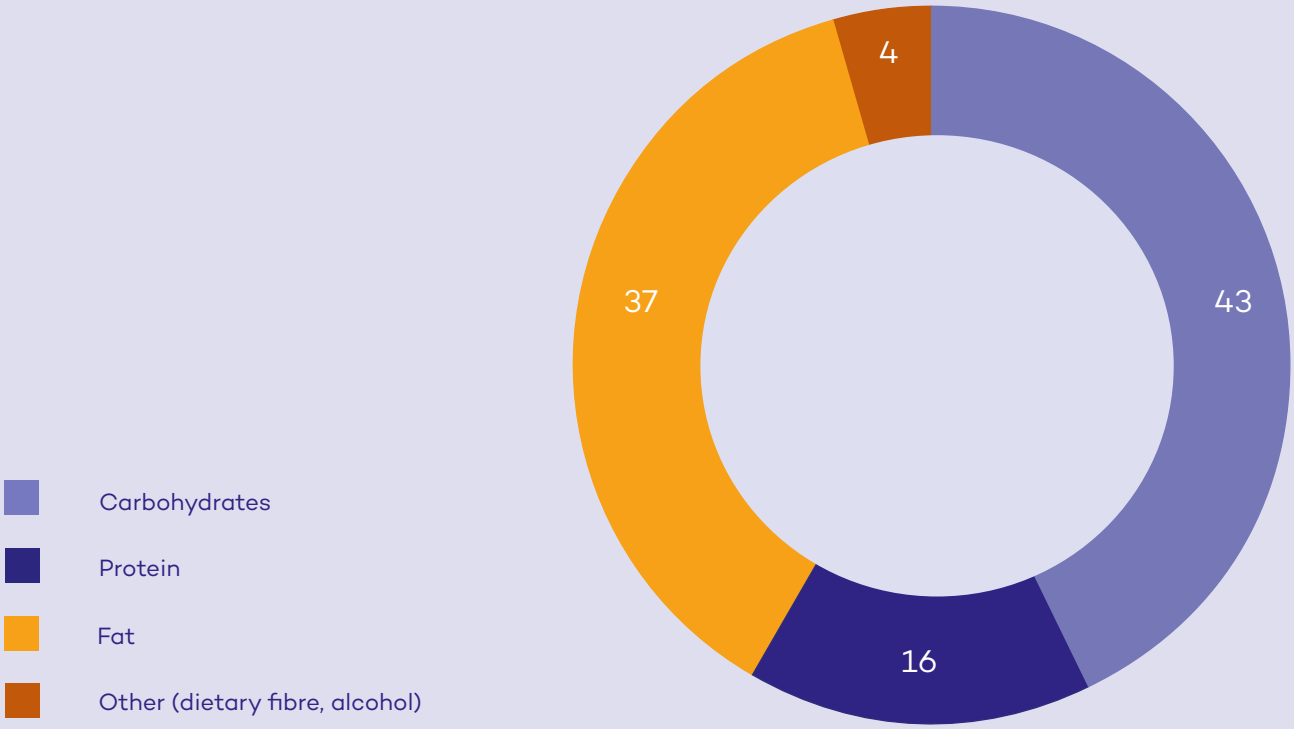


Figure 2. Distribution of energy-yielding nutrients of average Dutch people, 1-79 years old (en%), based on the DNFCS 2019-2021.

Table 2. Plant and animal protein intake (in g/day) by gender and age.

	Men		Women	
	Plant	Animal	Plant	Animal
1-3 years old	19.8	26	19.1	30.4
4-11 years old	27.5	35.9	24	31.3
12-17 years old	33	43.6	27	33
18-50 years old	37.6	53.7	28.5	38.3
51-64 years old	35.5	55.6	27.6	44.1
65-79 years old	32.1	54.1	26.3	47.4

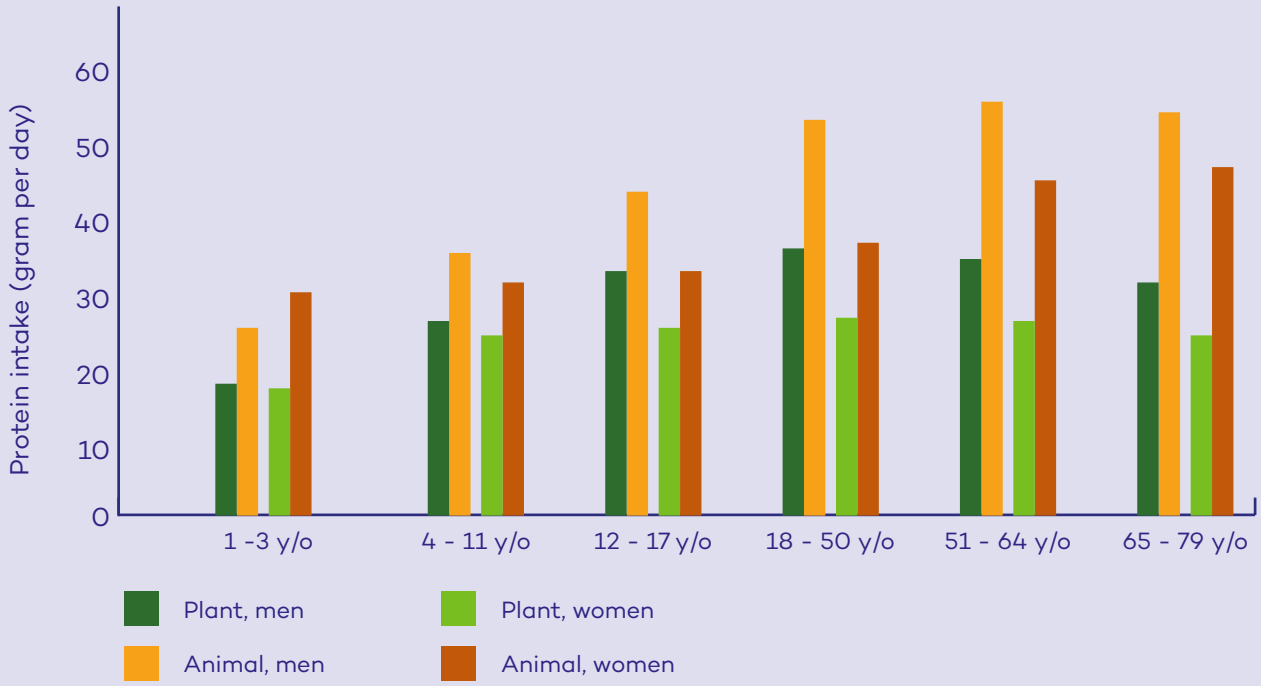


Figure 3. A visual representation of Table 2. Plant and animal protein intake (in g/day) by gender and age (y/o).

Most protein (88%) is consumed at home. The contribution of protein intake at school/work to total intake is 7%. Dinner is the main source (42%) of protein. Lunch provides on average 25%, snacks provide 17% and breakfast 16% of daily protein intake.

Protein intake varies by level of education (see **Figure 4,** page 7). The average plant protein intake is higher among adults with a higher education. The average intake of animal protein is lower among higher educated families (both among children, parents/carers, and adults). Among low educated adults, the average is 36%. Highly educated consumers

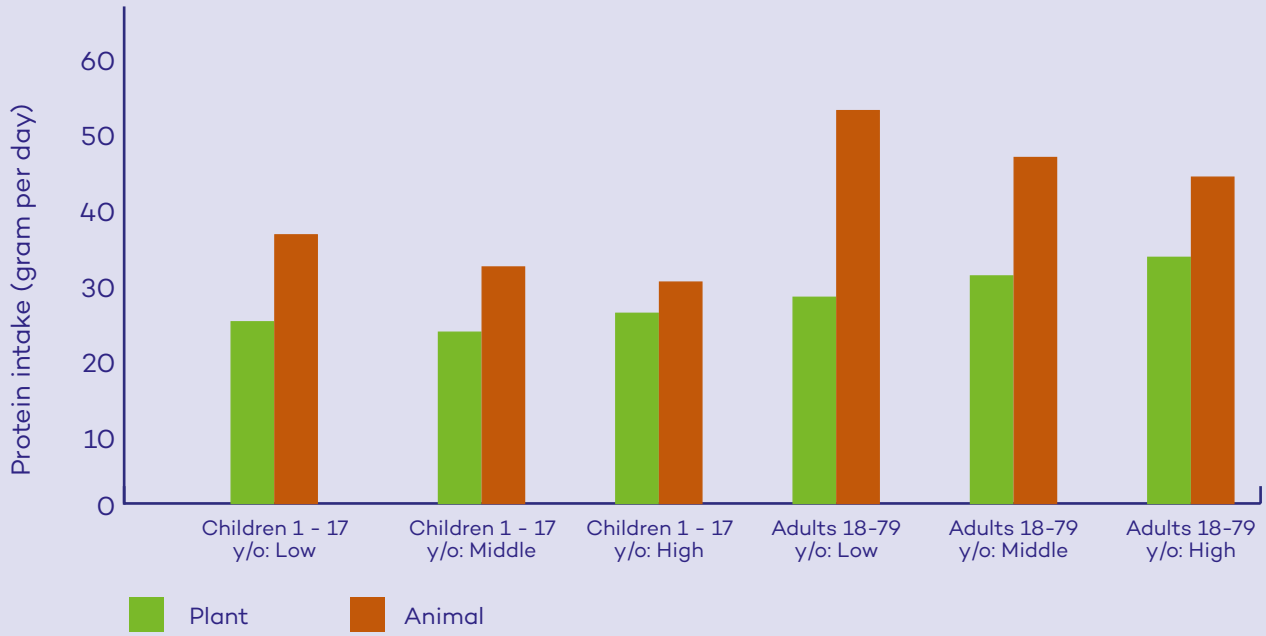


Figure 4. Average protein intake (g/day) by age and education in 2019-2021.

may be the trendsetters and appear more receptive to alternative sources of protein[4]. Young highly educated consumers appear to be more willing to accept alternative proteins (such as pulses, meat alternatives and cultured meat)[5].

Sources of protein

The amount consumed and the protein content determine the extent to which a food group is a major source of protein. Three groups, one of which is plant-based, provide 73% of the average daily protein intake (see **Table 3**, page 8). These are meat, meat products and substitutes, dairy and dairy

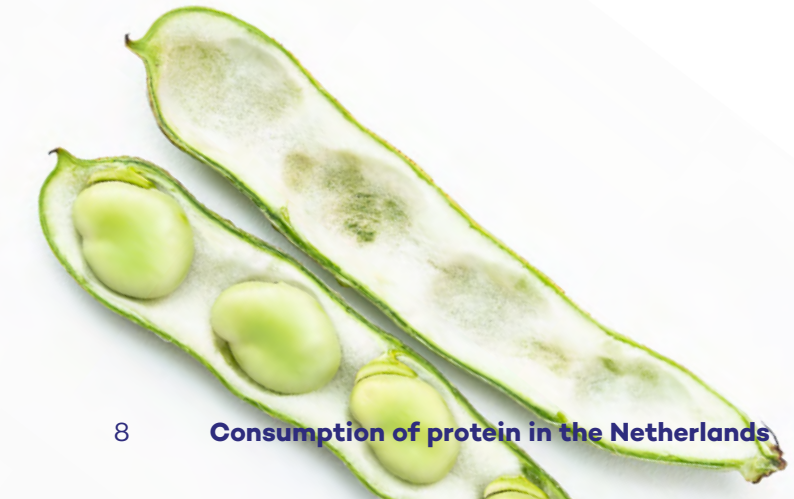
Food group	Contribution (%)
Meat, meat products and substitutes	26
Dairy products and substitutes	24.3
Cereals and cereal products	22.7
Fruits, nuts and seeds, olives	4.8
Fish, shellfish and amphibians	3.8
Vegetables	3.3
Eggs and egg products	2.9
Cakes and sweet biscuits	2.6
Savoury snacks	2.1
Potatoes and other tubers	2

Table 3. Main ten sources (% contribution of total protein intake) of plant and animal protein among 1-79-year-olds in 2019-2021.

substitutes, cereals and cereal products. Other food groups contribute to a limited extent to the protein intake of Dutch people. Meat and meat substitutes contribute on average 41.5% to daily intake of animal protein and 2.0% to the intake of plant protein. For dairy and dairy substitutes, the numbers are 41.7% and 1.2% respectively.

Protein levels of various foods

There are considerable differences between the protein contents of foods. Soft drinks contain no protein, fats and oils contain no or very little protein, and for fruit, the protein content is usually less than 1 g per 100 g.



Animal-based products usually have higher protein contents than plant-based products, but a number of products, such as meat substitutes and nuts, contain similar amounts (see **Table 4,** page 9).

Food processing

Food processing can have both beneficial and adverse effects on the properties of plant and animal protein sources. Denaturation changes the protein structure and causes cell wall degradation, which can enhance digestibility. Conversely, heating foods can reduce protein quality. At high temperatures, amino acids can undergo a chemical reaction that makes them no longer available to the body. The Maillard reaction between the amino acid lysine and sugars, known as browning of foods by frying, is an example of this. Plant-based foods contain anti-nutritional substances that limit protein digestion and amino acid absorption. However, food processing can reduce the content of these anti-nutritional substances and improve the bioavailability of amino acids. Moreover, food preparation can affect protein

content. For example, cooked legumes contain on average 8 g of protein per 100 g, which is significantly lower than the protein content of dry legumes due to water absorption (see **Table 5,** page 10). In contrast, protein content is similar in a cooked and raw egg.

Trends in protein consumption

Animal protein consumption increases with higher purchasing power. There is a clear relationship between gross domestic product and the percentage contribution of animal protein to energy intake[7]. With increasing prosperity, there has been a trend of increasing consumption of animal products for a long time. For instance, global meat production increased by 84% in the years 1961-2021. The most significant increase was observed in middle-income countries[7]. Using data on household purchases and national food balances, Dagevos and Verbeke[8] showed that in the period 2010–2020, meat consumption in the Netherlands was relatively stable. The researchers found that an increasing number of people indicated that they were reducing their meat consumption or switching to a flexitarian diet.

According to the DNFCSs, the average animal protein intake decreased while plant protein intake increased slightly in the period 2007–2021. During that period, the average contribution of plant proteins to total daily protein intake increased from 39.5% to 43.0%. These trends were determined based on the 2007–2010, 2012–2016 and 2019–2021 DNFCSs, for 7–69-year-old Dutch people (see **Table 5,** page 10). Average daily protein consumption (per kg body weight) has slightly declined over more than a decade, due to a decrease in animal protein intake which was not compensated by the slight increase in plant protein intake. The average

Table 4. Protein content (g/100 g) of some non-prepared high-protein products[6].

Food	Protein content g/100 g
Semi-skimmed milk	3
Semi-skimmed yoghurt	4
Gouda cheese 48+	23
Farmed salmon	20
Chicken egg (raw, on average)	12
Chicken (without skin)	21
Beef steak	23
Hotdog sausage	12
Beef mince	19
Vegetarian minced meat, soy-based	20
Vegetarian bratwurst, pea-based	16
Vegetarian schnitzel, soy/wheat-based	16
Plant-based yoghurt alternative, soy-based	4
Dessert, soy-based	3
Legumes (dried, average)	23
Tofu	12
Unsalted mixed nuts	18
Pizza Quattro formaggi	9

consumption of meat and dairy has declined. Daily consumption of meat substitutes, and unsalted nuts and seeds has increased with the note that values were low in 2007-2010.

There is no data available on changes in cereals and cereal products consumption, which are by far the main source of plant proteins.

Recommended amounts for protein intake and protein requirement

Dietary standards for protein by the Health Council of the Netherlands are based on the protein standards of the European Food Safety Authority (EFSA)[9]. The Dutch standards expressed in grams per day are slightly higher than EFSA's because Dutch people are on average taller and thus heavier than the average European person.

According to the Health Council of the Netherlands[10], the recommended dietary allowance (RDA) of protein is higher for young children (e.g. 1.14 g/kg/day for 1-year-olds) than for older children (e.g. 0.86 g/kg/day for 17-year-old boys and 0.83 g/kg/day for 17-year-old girls). For adults (18+), the RDA is 0.83 g/kg/day.

The Netherlands Nutrition Centre[11] states that RDA can be calculated by adding mean requirement to a doubled standard deviation. The RDA assumes a statistically normal distribution. RDA is the amount of a nutrient which is sufficient to cover the needs of almost the entire population group. By adhering to this RDA, 97.5% of the population group achieves a sufficient intake of the nutrient, in this case protein.

Is protein intake in the Netherlands sufficient?

According to the RIVM, protein intake seems adequate with a side note for 18-64-year-old women. Based on an average healthy weight, RIVM assesses protein intake for those women as sufficient. Calculations of the DNFCS are based on self-reported body weights. This assessment is based on protein intake per

Table 5. Average protein intake and intake of protein-rich foods (g/day) in the Netherlands over the years.

	Dutch National Food Consumption Survey			
	2007-2010	2012-2016	2019-2021	Difference between 2007-10 and 2019-21
Total protein (g/kg/day)	1.19	1.13	1.11	- 0.08 g/kg/day
Animal protein (g/d)	52.4	50.2	46.9	- 5.5 g/d
Plant protein (%)	39.5	41.4	43	+ 3.5 %
Food group (g/day)				
Red and/or processed meat	91.8	83.3	72.6	- 19.2
Meat(s), meat substitutes	109.9	100.8	90.5	- 19.4
Meat substitutes	1.2	1.7	5.4	+ 4.2
Dairy	386	346	333	- 53
Unsalted nuts and seeds	0.2	2.5	5	+ 4.8
Legumes (days/week)	0.2	0.3	0.4	+ 0.2

kilogram of body weight. The reported intake of overweight women reduces the average intake as adipose tissue requires almost no protein.

The average protein intake (g/kg/day) exceeds the RDA for all gender-age groups studied (see **Table 1,** page 3), which means that intake is adequate for almost the entire population. In children (up to 18 years), the average protein intake greatly exceeds the RDA. Therefore, a shift to a more plant-based diet will not pose a problem in protein supply in this group. According to the Health Council of the Netherlands[2], it is possible for most Dutch people to consume less animal-based products without causing nutrient deficiencies.

Protein quality

Three factors determine the protein quality of a food: the amount of protein, the amount of essential amino acids in the protein and bioavailability of the amino acids. The quality of plant protein in products is generally lower than protein quality in animal products, due to less optimal amino acid composition and lower digestibility. Consumption of meat and dairy substitutes and combinations of protein sources can improve the quality of protein intake. More information on protein quality is provided in the Factsheet Plant-based proteins[12].

Protein transition

A shift towards a more plant-based diet has attracted attention from policymakers, consumers, and various organisations, including the Health Council of the Netherlands, the Netherlands Nutrition Centre and companies. Considering the protein transition, Dutch people should consume more protein from plant sources and less from animal sources. This is beneficial for both public health and the environment. The Netherlands Nutrition Centre[11] advises eating and drinking according to The Dutch Wheel of Five, with a maximum meat consumption of five hundred grams per week. This results in a ratio of animal and plant protein of 50/50. The Health Council of the Netherlands advocates for a diet in which plant proteins constitute 60% of the total protein intake[2]. By consuming little to no meat, but including dairy, eggs, and fish in the diet, 60% of the protein consumed in the diet is derived from plants. In this transition, it is important to keep a close eye on how diets of Dutch people evolve.

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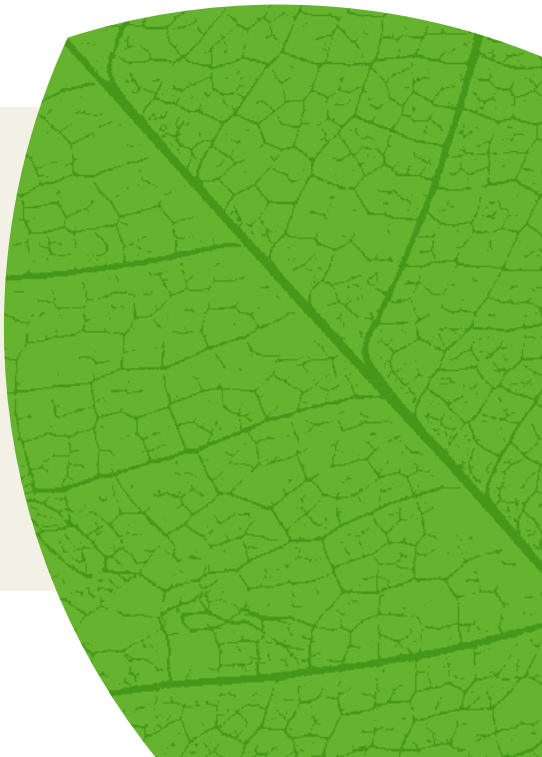

References

1. **Abe-Inge V, et al.** Plant-based dietary shift: Current trends, barriers, and carriers. Trends in Food Science & Technology 2024; doi.org/10.1016/j.tifs.2023.104292.
2. **Gezondheidsraad.** Gezonde eiwittransitie. Den Haag, 2023.
3. **Gezondheidsraad.** Richtlijnen goede voeding. Den Haag, 2015.
4. **Onwezen MC, Dagevos H.** A meta-review of consumer behaviour studies on meat reduction and alternative protein acceptance. Food Quality and Preference, 2024. doi.org/10.1016/j.foodqual.2023.105067
5. **Onwezen MC et al**. A systematic review on consumer acceptance of alternative proteins: Pulses, algae, insects, plant-based meat alternatives, and cultured meat. Appetite 2020. Onwezendoi.org/10.1016/j.appet.2020.105058
6. **Rijksinstituut voor Volksgezondheid en Milieu.** NEVO-tabel. https://nevo-online.rivm.nl/
7. **https://ourworldindata.org**
8. **Dagevos H, Verbeke W.** Vlees eten en vleesminderen in de Lage Landen: een consumptiesociologische bijdrage. Tijdschrift Sociologie. 4:210-235. 2023.
9. **EFSA Panel on Dietetic Products, Nutrition and Allergies (NDA).** Scientific Opinion on Dietary Reference Values for protein. EFSA Journal 2012; 10(2): 2557
10. **Gezondheidsraad. Voedingsnormen voor eiwitten.** Referentiewaarden voor de inname van eiwitten. Den Haag, 2021.
11. **www.voedingscentrum.nl**
12. **Cosun Nutrition Center**, Factsheet Plantaardige eiwitten (2022).
13. **Rijksinstituut voor Volksgezondheid en Milieu.** Wat eet Nederland. https://www.wateetnederland.nl/