

Chapter 2: Food category

1. Meat, fish and eggs

1.1. Meat

- **Protein content**

Meat is a significant source of protein, averaging around 20% of its composition. Its protein profile is dominated by myosin, myoalbumin, and collagen. The first two—myosin and myoalbumin—are considered high-quality proteins as they contain all essential amino acids, resulting in a high Protein Efficiency Ratio (PER). In contrast, collagen is an incomplete protein, deficient in tryptophan and sulfur-containing amino acids, which lowers the overall biological value of cuts or products with high collagen content.

- **Lipid content**

The fat content of meat varies depending on the species, the fatness of the animal and the cut in question. Taking these factors into account, meat can contain between 2 and 30% fat. The leanest meats (<10%) are rabbit, horse, veal, chicken and turkey (without skin). The fattest meats (10 to 30%) include certain cuts of beef and pork, as well as lamb, goose and duck. Offal (liver, heart, kidneys) and game are lean meats (~5%). Poultry is generally a good source of mono- and polyunsaturated fatty acids. All meats, even lean meats, are sources of cholesterol, especially offal.

- **Carbohydrate content**

This is negligible as there is virtually no glycogen left in meat by the time it reaches the market.

- **Mineral intake**

Meat is rich in phosphorus and is the best dietary source of haem iron. This is ferrous iron (++) , which is better absorbed than ferric iron (+++) found in plants. This food category is low in calcium and has a very poor calcium/phosphorus ratio. Offal, particularly liver, is very rich in iron and phosphorus.

- **Vitamin content**

Meat contains no fat-soluble vitamins. It is rich in B vitamins. Offal (mainly liver) is the richest source of these vitamins and also provides a significant amount of vitamins A and D.

1.2. Cured meats

Charcuterie was originally a method of preserving meat. All charcuterie is cured with a mixture of salt and potassium nitrate, or salt and sodium nitrite. Charcuterie contains 10 to 20% protein.

1.3. Fish

- **Protein content**

Fish provides protein of the same high quality as meat. It also contains a higher amount of non- protein nitrogenous substances (ammonia, urea, etc.), which give it its characteristic smell. Fish contains an average of 20% protein.

- **Lipid content**

The vast majority of fish are less fatty than meat. The fat content of fish varies (0.5% to 15%). They are generally classified into three groups: lean fish (0.5% to 5%): whiting, sole, sea bream, cod, trout, hake; medium-fat fish (5% to 10%): mackerel, sardines, salmon; and fatty fish (%): mackerel, sardines, salmon, etc., and fatty fish (> 10%), which are less common: eel, herring. The lipids in fish are composed of a significant proportion of monounsaturated and polyunsaturated fatty acids. The cholesterol content of fish is 50 mg to 70 mg per 100 g.

- **Carbohydrate content**

Shellfish contain a small amount of glycogen.

- **Mineral content**

Fish provides little calcium. It is an important source of phosphorus and, in the case of sea fish, iodine. It is also lower in iron than meat. Shellfish and crustaceans are richer in various minerals (calcium, zinc, iron, sodium, etc.).

- **Vitamin content**

Fish is a good source of B vitamins (especially B12) and vitamin E. Vitamins A and D are also abundant in oily fish, especially fish liver.

1.4. Eggs

- **Protein content**

Egg proteins (ovalbumin in the white and ovovitelin in the yolk) have excellent biological value.

The protein content of a whole egg is 14%.

- **Lipid content**

Lipids account for 12% of the whole egg. They are found only in the yolk and contain a high proportion of phospholipids. Egg yolk is also an important source of cholesterol.

- **Mineral content**

Egg yolk is rich in phosphorus and iron.

- **Vitamin content**

Eggs are a good source of B vitamins, and egg yolks are a good source of vitamins A and D.

2. Dairy products

2.1. Milk

- **Protein content**

One litre of cow's milk, whether whole or skimmed, provides 35 g of protein. This is mainly casein, lactalbumin and lactoglobulin. All essential amino acids are present.

- **Fat content**

The fat content of regular milk is standardised at a minimum of 36 g per litre of whole milk. Semi- skimmed and skimmed milk provide 15 to 18 g and 1 g of fat per litre, respectively. Milk triglycerides consist mainly of saturated fatty acids (60 to 65%) and monounsaturated fatty acids (32%). Milk is low in essential fatty acids (around 3%) and contains 11 to 15% % short- or medium-chain fatty acids. Milk also contains cholesterol.

- **Carbohydrate intake**

Lactose, the essential carbohydrate in milk, promotes the absorption of calcium contained in this food.

- **Mineral and trace element content**

Milk is an important source of calcium. The calcium in milk is better absorbed than that from any other source thanks to the presence of beneficial elements (proteins, fats and a small amount of lactic acid). Milk also provides sodium chloride, potassium chloride and small amounts of sulphur, magnesium and copper.

- **Vitamin content**

Whole milk is a significant source of vitamin A. The vitamin D content varies. Almost all B vitamins are present, particularly vitamin B12. Fat-soluble vitamins (A and D) are absent from skimmed milk.

2.2. Cheese

- **Protein content**

Cheese contains casein, as soluble proteins are removed during draining. The protein content varies: 8 to 10% in fresh cheese, 20 to 24% in soft cheese and 28 to 30% in hard cheese.

- **Fat content**

All of the fat in milk is retained in cheese. Cheese fat is mainly composed of saturated fatty acids (60 to 65%) and monounsaturated fatty acids (around 30%). Mature cheeses contain an average of 90 to 100 mg of cholesterol per 100 g.

- **Carbohydrate content**

Lactose is almost completely eliminated during draining. The remaining amount is converted into lactic acid during ripening.

- **Mineral content**

The calcium and phosphorus content depends on how the cheese is made. Emmental (hard pressed cheese) provides approximately 1,000 to 1,200 mg of calcium per 100 g. A typical soft cheese contains 200 to 400 mg per 100 g and fresh cheeses 100 mg per 100 g. Cheeses vary in their sodium chloride content. Their content depends on the amount of salt added during production.

- **Vitamin content**

The vitamin A content of cheese is proportional to its fat content. Blue cheeses are good sources of B vitamins.

3. Fats

- **Cream and butter**

Cream contains approximately 30 to 35% fat, while butter contains 82 to 84%. Saturated fatty acids account for more than 60% of total fatty acids. Butter also provides short- and medium-chain saturated fatty acids (approximately 13%). These products are low in polyunsaturated fatty acids (2%) and provide cholesterol (250 mg/100 g of butter). These fats are an excellent source of vitamin A (content varies depending on the origin of the butter) and contain a small amount of vitamin D when made from summer milk. They do not provide any calcium.

- **Oils**

These are fluid or solid oils made from oilseeds or oleaginous fruits. Oils are generally liquid at room temperature. Fats that are solid at room temperature (copra oil, etc.) are called solid oils or fats. These fats do not contain cholesterol and all provide 100% lipids. Oils differ from one another in their fatty acid composition. Olive oil is an important source of monounsaturated fatty acids (70 to 75% of the fatty acids present). Its saturated and polyunsaturated fatty acid content is low.

- **Margarines**

Margarines of exclusively vegetable origin are composed of a mixture of various

partially hydrogenated oils. Margarines made exclusively from sunflower or corn oil are increasingly available on the market. They have the nutritional characteristics of the oils from which they are made. However, their polyunsaturated fatty acid content is lower than that of oils of the same name due to the hydrogenation process they undergo during manufacture. They are generally enriched with vitamin A and sometimes vitamin E.

4. Vegetables and fruit

• Vegetables

Fresh vegetables are derived from various plant parts: roots (carrots, turnips), tubers (potatoes), stems (celery), leaves (spinach), flowers (cauliflower), and fruits (tomatoes, courgettes).

- High water content: Approximately 90% on average.
- Carbohydrates: Moderate levels, varying by type: 1–6% in aerial parts (lettuce, spinach, courgettes, tomatoes); ~9% in roots (carrots, celery).
- Mineral content: An important source of potassium, plus:
 - Calcium (notably in cabbage).
 - Magnesium, iron, and copper (especially in leafy vegetables like spinach).
 - Sulphur (found in cabbage, onions, garlic, leeks, turnips, radishes).
- Vitamin content: Rich in water-soluble vitamins:
 - Vitamin C (cabbage, leafy vegetables, tomatoes).
 - Provitamin A/Beta-carotene (in coloured plant parts: green leafy vegetables, carrots).
 - B Vitamins.
- Dietary fibre: Primarily composed of cellulose, hemicellulose, and pectic substances.

• Fruit

Fruit composition is broadly similar to vegetables, but with a notably higher carbohydrate content.

- Carbohydrate profile:
 - Primary forms: mostly sugars (fructose, sucrose, glucose) and, more rarely, starch (e.g., bananas, chestnuts).
 - Variable sugar content: ranges significantly:
 - Low (5-10%): citrus fruits, redcurrants, strawberries, raspberries, blackberries, melon, watermelon.
 - Typical serving: a standard piece of fruit generally provides 15 to 20 grams of carbohydrates.
- vitamin content:
 - Vitamin C: highest in acidic fruits (citrus fruits, redcurrants, blackcurrants, strawberries).
 - Carotene (provitamin A): highest in colourful fruits (apricots, peaches, blueberries, blackcurrants).
- mineral content:

- Potassium: all fruits are rich in potassium and low in sodium.
 - Calcium: present only in citrus fruits.
 - Trace elements: generally few in fruit.
- dietary fibre composition: composed of roughly equal parts cellulose, lignin, hemicellulose, and pectin.
- Pectin-rich fruits: some, like apples, quinces, and redcurrants, are particularly high in pectin.

- **Dried fruit**

- Dried fruit (raisins, prunes, bananas, apples, pears) contains an average of 73% digestible carbohydrates. If dried properly (using industrial processes rather than the sun), these fruits are a good source of vitamins A and C. They are high in fibre.

- **Oilseeds** (walnuts, hazelnuts, almonds, peanuts, cashews) are a significant source of lipids (more than 50%) and protein (10 to 15%). Walnuts and hazelnuts are rich in unsaturated fatty acids (polyunsaturated or monounsaturated). Oilseeds are also a good source of minerals (calcium, magnesium, iron) and fibre. They are very energy-dense foods.

5. Cereals and derivatives - legumes

5.1. Cereals and derivatives

- **Carbohydrate content**

This food category is mainly a source of starch: 74% in flour, 72-73% in pasta and rusks, 55% in bread and 80% in rice. Wholemeal cereals and flours also provide fibre. Wheat bran consists mainly of hemicellulose and cellulose.

- **Protein intake**

Flour provides an average of 10% protein, bread 7-8%, and rice and pasta 10%. These proteins are low in lysine. Combining them with dairy products or eggs, which are rich in this amino acid, significantly increases their biological value.

- **Mineral content**

Cereals and cereal products are low in calcium. They provide a lot of phosphorus, three-quarters of which is in the form of phytic acid in wholemeal products. Unfortunately, iron and magnesium in these types of foods are poorly absorbed.

- **Vitamin intake**

These are mainly B vitamins (B1, B2, PP). The levels are higher in whole grains and wholemeal flour. However, the presence of phytic acid and bran can hinder their absorption.

5.2. Legumes

This category includes pulses (lentils, beans, peas, chickpeas, etc.), soya and peanuts.

6. Sugars and sugar-containing products

- **Sugar**

Cane sugar and beet sugar are identical in terms of their composition. Similarly, brown sugar and raw sugar have no particular nutritional characteristics. All these sugars are composed of 100% sucrose, which is quickly absorbed by the body. They are a source of rapidly usable energy, which is useful during periods of intense physical activity.

- **Confectionery**

It's a food preparation in which sugar is the dominant ingredient, excluding jams, jellies and marmalades. Apart from sugar, the raw materials used in their composition are numerous and varied. For example: vegetable fats, starch, gums, gelatines, colourings, natural and synthetic flavourings, almonds, hazelnuts, etc.

- **Honey**

Honey consists of 3 to 6% sucrose, 35% glucose and 35% fructose. Vitamins and minerals are present in trace amounts.

- **Chocolate**

Chocolate is made by mixing sugar and cocoa paste. Except for milk chocolate, cocoa paste accounts for at least **35%** of the final product, including 18% cocoa butter. Chocolate contains on average 50 to 65% sucrose, 20 to 30% lipids (mainly cocoa butter), 6% protein, minerals (phosphorus, calcium, magnesium and a little iron) and a small amount of vitamins.

7. Drinks

7.1. Sweetened beverages:

- Lemonade, soft drinks, cordials, cola, and fruit drinks (which contain only ~12% fruit extract and are distinct from pure juices).
- Contain 90-120g of sugar per liter. "light" versions use synthetic sweeteners instead of sugar.

7.2. Tea and coffee:

- Primarily consumed for their stimulating caffeine/theine content.
- Provide no significant assimilable nutrients.

7.3. Fruit juices:

- Contain the minerals, vitamins, and sugars of the original fruit.
- Sugar content varies (e.g., ~200g/l in grape juice, 90-100g/l in orange juice).
- The designation includes both direct pressed juices and those reconstituted from concentrate.

7.4. Alcoholic beverages:

- Categorized by alcohol content: low-alcohol (cider, beer, wine: 2-25°) and spirits (liqueurs, brandies: 35-60°).
- Provide minimal nutritional value (trace minerals and b vitamins in beer/wine).
- Ethanol has a density of 0.8 g/ml.