eda Fact sheet

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January 2020

Milk Fat

Milk fat is complex and nutritionally unique

Dairy fat is the most complex fat source of human diet – it contains nearly 400 different fatty acids, many of them unique to dairy.

Nutrient richness of dairy includes its fatty acids as well as other nutrients

Dairy contains not only different fatty acids but is also a major source of high-quality proteins (whey and casein), many vitamins, minerals and much more!

Low and full-fat dairy is essential in a healthy and balanced diet

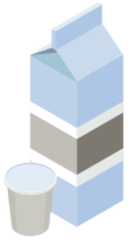
Dairy products, including regular-fat milk, cheese and yoghurt are part of a healthy and balanced diet.

Health effects of fatty acids depend on the food source

There is considerable evidence that the health effects of saturated fat vary depending on the specific fatty acid and on the specific food source.

I. Fat content of dairy products

Dairy is a diverse group of products with (according to the type of dairy product) a broad variation in nutritional composition as well as a huge diversity in habitual intake patterns across European countries. Dairy products with different fat level have been available for a long time in all countries.

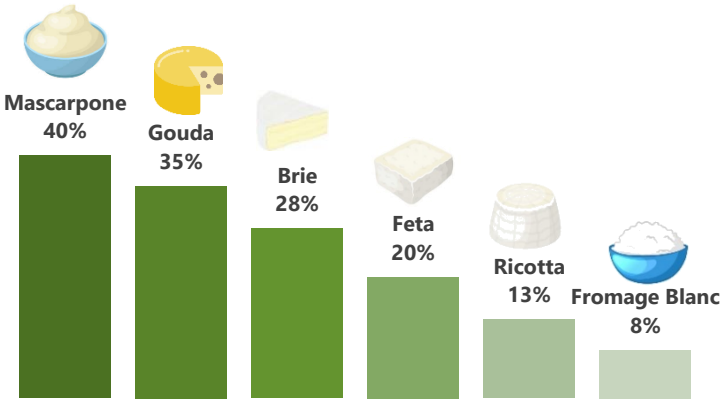


Milk and Yoghurt

Raw milk fat content varies around 4%. Milk sold in stores is usually available as skimmed (0.3%), semi-skimmed (1.5%) and whole (3.5%). However, other fat levels are also available. Yoghurt and yoghurt drinks can be made from all types of milk and are therefore also available in different fat levels.

Cheese

Cheeses are available in many different forms - e.g. hard and soft cheeses, as spreads or slices - and with very different fat levels. In the EU, this level can amount up to around 45% depending on the type of cheese. See average fat content of different types of cheeses ► ► ►



Average Fat content in cheeses

Cream

Cream is available in different fat levels (from 10% to around 35%). It is usually used for cooking and eaten together with other foods.

Butter

It is used as spread or cooking ingredient and consumed together with other foods such as bread and vegetables. The EU legislation recognises the fat content of milk and butter as a quality criterium; the current CMO Regulation (n° 1308/2008) defines "butter" as containing "not less than 80% but less than 90%" of milk fat.

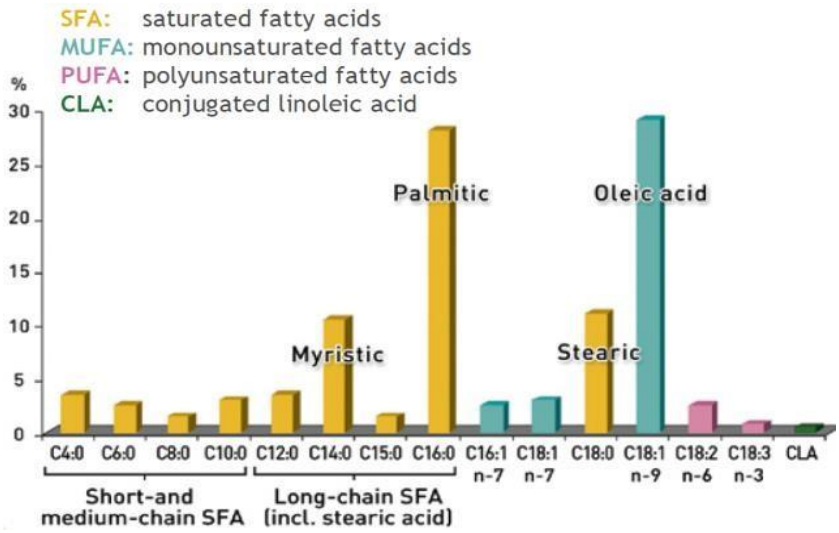
II. Composition of milk fat

The main characteristic of milk fat is the variety of fatty acids it contains: more than 400 different fatty acids![26]

Dairy products are defined by the raw material milk and their final nutrient content depends on the natural composition of the milk. The composition of milk fat varies slightly according to the breed of the cow, the stage of lactation, the season, the geographical location and the feed composition.

General fatty acid composition of milk fat

Data from Legrand P. Sciences des Aliments [2018]. 28:34-43 [23]



Milk fat fatty acids are divided into four main categories:

- Saturated Fatty Acids
- Mono-Unsaturated Fatty Acids
- Poly-Unsaturated Fatty Acids
- Conjugated Linoleic (fatty) acids

Milk fat contains on average 65-70% saturated fatty acids and 30-35% unsaturated fatty acids. [17]

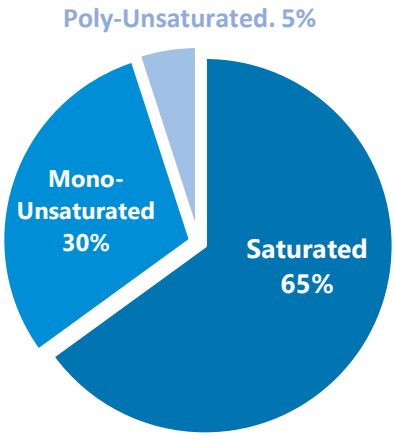
The concentration of saturated fatty acids in milk is typically around 65% [17], with the remainder being composed of mono- and poly-unsaturated fatty acids.

Saturated Fatty Acids (SFA)

Amongst saturated fatty acids (SFA) in milk fat, there are around 10-13% short- and medium-chain SFA and 50-55% long-chain SFA, including palmitic (27%), myristic (10-12%) and stearic acid (9%).

There is considerable evidence that SFA health effects vary depending on the specific fatty acid and on the specific food source. For example, dairy products are a major source of SFA, protein, calcium, and other nutrients.

Typical fatty acid profile of cow's milk

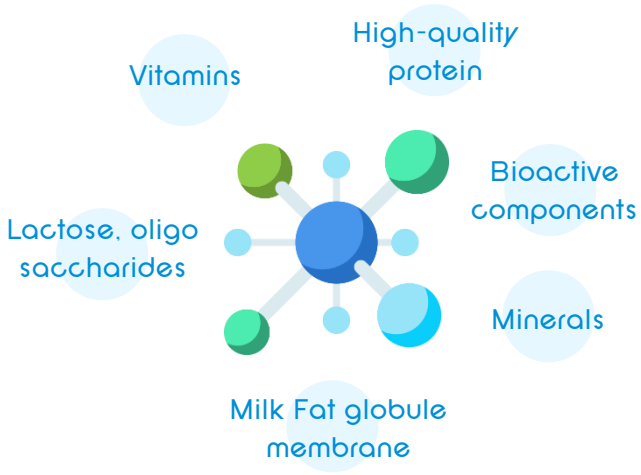


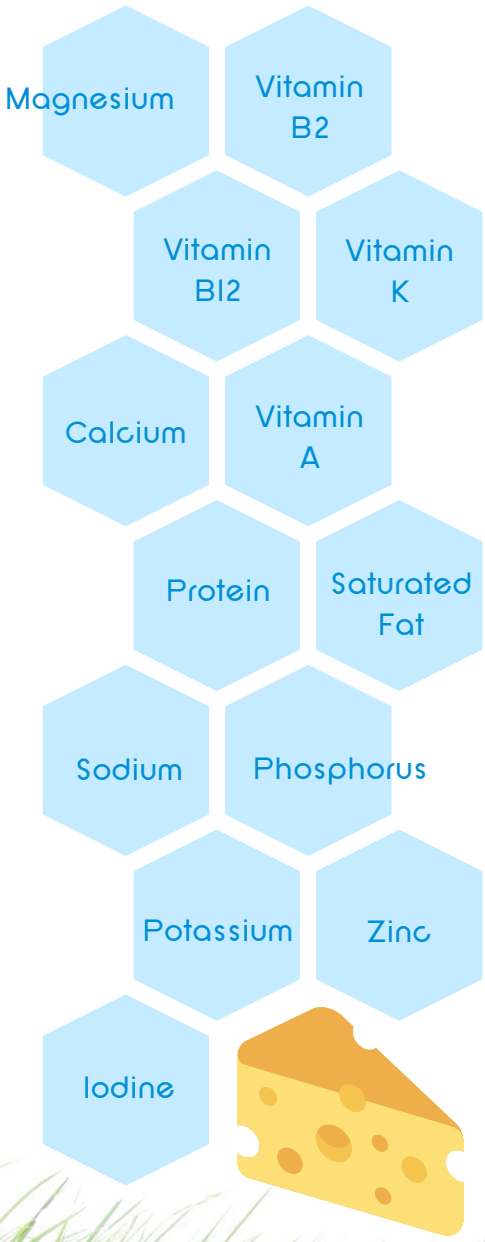
Food-based meta-analyses constantly find no association between dairy foods and increased risk of cardiovascular disease (CVD). [27]

A recent large-scale study reported dairy consumption to be associated with lower risk of mortality and of major CVD events. [8]

Other studies even found that whole-fat fermented dairy, e.g. cheese and yogurts, may actually reduce CVD and diabetes risk. [8, 19, 1, 9]

These results might be explained by the specificity of the interactions between dairy nutrients, i.e. different fatty acids, proteins (whey and casein), minerals (calcium, magnesium, phosphate), sodium, and phospholipid components of milk fat globule membrane (MFGM). This phenomenon is best known as the **dairy matrix**, meaning that the interactions between the structure of a food and the nutrient content of a product influences the whole digestion process. Indeed, nutrients are not eaten individually but as part of a whole food.





"Cheese paradox" explained by dairy matrix

Despite the high content of fat and salt content of cheese, it has been shown to be more similar in composition to yogurt and milk than to butter, due to protein, mineral and MFGM contents. Yogurt and cheese also contain bacteria and bioactive peptides produced by the bacteria, short chain fatty acids, and vitamins such as menaquinones (vitamin K2), which are all important for health [2].

Unsaturated Fatty Acids

Amongst unsaturated fatty acids in milk fat, there is around 25-30% MUFA among which oleic acid is the most important, and 2-6% PUFA, including in healthy proportions both omega 3 (that helps improving heart health, reducing weight in obese and overweight subjects, decreasing liver fat, and are anti-inflammatory) and omega 6 (that are precursor to other substances in human body, and are pro-inflammatory) fatty acids. Even if omega 6 are about five times more present in milk than omega 3 [5], they are both essential fatty acids, meaning that they are not produced by the human body and needs to be obtained from the diet.

Trans Fatty Acids

Trans fatty acids (TFAs) are also unsaturated fatty acids. They can be industrially produced (e.g. frying oils, margarines, spreads) or occurring naturally in small quantities meat and dairy. As of 2021, EU Regulation 2019/649 (coming into force in 2021) will limit the maximum allowed content of industrial TFAs in food at 2 g/100g of fat. This Regulation excludes trans-fat naturally occurring in fat of animal origin.

Natural TFAs (also called ruminant TFAs) are naturally produced in the rumen (a special stomach that ferments plant-based foods prior to the digestion) of the cow due to a bacterial fermentation. Levels of natural TFAs found in dairy are very low, e.g. 0.09 g/100g in full fat milk, 0.03 g/100g in low fat yoghurt and 0.87 g/100g in cheddar cheese [14].

The literature shows that consumption of ruminant TFAs from natural sources such as dairy, meat and butter is below 2 g/day in the average European diet [14, 6]. Contribution of ruminant TFAs to the overall energy intake in our usual diets is therefore not of any health concern (further reading in our EDA Q&A on TFAs), since it is minimal and below the maximum level for total TFA intake of 1% of energy set by WHO [31]. There is a scientific consensus stating that the intake of TFAs via usually consumed amounts of dairy does not have negative effects on health [28].

Conjugated Linoleic Acid

Conjugated Linoleic Acid (CLA) is one of the ruminant TFAs. Science indicates that consumption of natural TFAs found in milk and dairy, in particular CLA and its predecessor vaccenic acid (VA), may be linked to numerous beneficial health effects such as improved blood lipid profiles and decreased cholesterol absorption [13, 20]. Trans fatty acids, but especially CLA, has been associated to reduction of body fat mass in overweight and obese subjects [21, 22]. Another ruminant-specific TFA, trans-palmitoleic acid, has been found to substantially reduce the risk of type 2 diabetes [10]; this acid is not produced by the human body [26]and can only be introduced to the diet with dairy products. Anti-cancer properties of ruminant CLA have also been shown in in vitro studies [12].

III. Health effects of milk fat

Milk fat is complex and contains several positive ingredients or is consumed together with several nutrients that are beneficial to the health (e.g. proteins, essential fatty acids, CLA).

Reduced risk of cardiovascular disease (CVD)

The latest scientific evidence proves that dairy foods have either beneficial or neutral effects on the risk of cardiometabolic diseases [29]. Studies also show that the consumption of regular fat dairy foods is not associated with an increased risk of cardiovascular disease [16].

Fermented dairy products, such as cheese and yogurt, are associated with a lower risk of cardiovascular diseases [30], and high-fat dairy, non-fermented milk, butter or cream are not associated with stroke risk [29].

The interaction between the numerous nutrients within a food enhance health properties of food dairy products, thanks to the dairy matrix effect. As mentioned earlier, this might explain for example why cheese shows such healthy effects, despite its content in SFAs and salt [6]. Considering the effects on health, there is nowadays a scientific consensus that the metabolic effect of whole dairy may be different than those of single dairy constituents [30].

Reduced risk of overweight and obesity

Several researches have demonstrated an inverse association between milk fat and body fat and the risk of obesity [4], and a non-linear but strong inverse association between yogurt intake and the risk of type 2 diabetes [3, 15].

Prevention of hypertension

High-quality studies also highlight the positive impact of dairy with respect to a lower hypertension risk and a reduced blood pressure, the latest constituting a major risk factor for development of stroke, coronary heart disease, heart failure, and end-stage renal disease [11], especially through the cis-MUFA contained in dairy foods [24].

Dairy is much more than milk fat

In Western diets, dairy products are the **primary source of calcium** providing between 40-70% of the daily needs. They also provide **many other minerals** and contribute to the intake of **important vitamins** such as fat-soluble vitamins A and D, vitamins B2, B6, B12, and provide **high-quality protein.**

All dietary guidelines in every EU country recommend dairy as part of a healthy diet, see JRC overview of Food based dietary guidelines in Europe. They are rich in many nutrients and are key contributors of several minerals, vitamins and high-quality protein. Beyond pure nutritional value, several other health benefits have been demonstrated or suggested for all dairy foods [18].

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