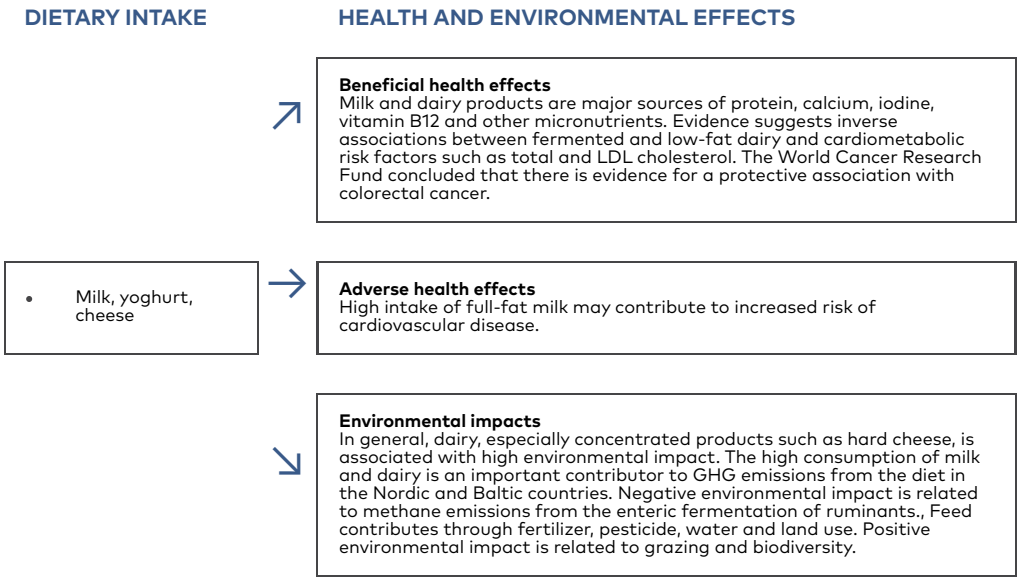
Milk and dairy products



Science advice: **Intake of between 350 ml to 500 ml low fat milk and dairy products per day is sufficient to meet dietary requirements of calcium, iodine and vitamin B12 if combined with adequate intake of legumes, dark green vegetables and fish (varies among different species). The range depends on national fortifications programs and diets across the Nordic and Baltic countries. If consumption of milk and dairy is lower than 350 gram/day, products may be replaced with fortified plant-based alternatives or other foods.**

For more information about the health effects, please refer to the background paper by Kirsten Holven and Emily Sonestedt (Holven & Sonestedt, 2023). For more information about the environmental impacts, please refer to the following background papers (Benton et al., 2024; Harwatt et al., 2024; Meltzer et al., 2024; Trolle et al., 2024).

Dietary sources and intake: Milk and dairy products are a source of high-quality protein calcium, riboflavin, vitamin B_{12}, vitamin D (if fortified), and other nutrients. Milk and yoghurt products are rich in iodine. The average intake of milk and dairy products ranges from approximately 120 to 500 g/d (Lemming & Pitsi, 2022).

Health effects: Several qSRs are available on the role of milk and dairy products and health outcomes (Lamberg-Allardt et al., 2023b; WCRF/AICR, 2018e; Åkesson et al., 2013). A *de novo* qSR for NNR2012 found moderate evidence for no association between dairy consumption and risk of cardiovascular disease (Åkesson et al., 2013). The WCRF/AICR concluded that there is strong evidence for a probable protective association with colorectal cancer, e.g., a 13 % decreased risk per 400 g/d intake of total dairy in adults (WCRF/AICR, 2018e). The associations may be attributed mainly to calcium, e.g., through binding secondary bile acids in the intestine that promote colon cancer progression, although other nutrients or bioactive components may contribute (Holven & Sonestedt, 2023; WCRF/AICR, 2018e).

qSRs of dietary patterns have found strong evidence for an association between dietary patterns that include a higher intake of low-fat dairy and lower risk of CVD and colorectal cancer (2020 Dietary Guidelines Advisory Committee, 2020; Boushey et al., 2020c), while a lower intake of full-fat dairy is a component of dietary patterns associated with lower risk of all-cause mortality and risk of type 2 diabetes (Boushey et al., 2020f, g). A moderate consumption of dairy products, particularly low and fat-free, is also part of dietary patterns associated with lower risks of obesity and other body weight-related outcomes (Boushey et al., 2020a). Regular consumption of predominately low-fat dairy products within an overall healthy dietary pattern is thus compatible with favourable health outcomes.

The *de novo* qSR by Lamberg-Allardt et al. (2023b) demonstrated that replacement of animal proteins (most often dairy protein) with plant protein (e.g., soy protein) was shown to lower total and LDL cholesterol in RCTs while there were no effects on HDL cholesterol or triglycerides.

As discussed in the background review by Holven and Sonestedt, higher intake of dairy products may also be associated with modestly lower blood pressure. On the other hand, the associations between dairy products as a group and cardiovascular disease or risk factors are not clear. The associations may however be different between subgroups of dairy products, as favourable associations with low-fat and fermented dairy products (such as yoghurt and cheese) have been reported (Holven & Sonestedt, 2023). Dairy protein has been used as a reference for high quality protein because of its content and composition of essential amino acids (Holven & Sonestedt, 2023).

Intake of between 350 ml to 500 ml milk and dairy product per day is sufficient to meet dietary requirements of calcium, iodine and vitamin B_{12} if combined with adequate intake of legumes, dark green vegetables and fish (varies among different species) (Lassen et al., 2020; Meltzer et al., 2016).

Lower amounts of cheese can substitute milk and milk products (depending on product and nutrient content). Since calcium and iodine content of cheese varies in national food tables and between products, national authorities may define a national conversion factor. Typically, about 10-20 grams cheese corresponds to 100 g milk. If the intake of dark green vegetables and legumes is lower than recommended, the intake of milk and dairy products in the higher range is needed to meet requirements for calcium. If intake of white fish is lower than recommended, the intake of milk and dairy products in the higher range is needed to meet requirements for iodine. Various fortification policies will also affect the role of dairy products for nutrients such as calcium, iodine and vitamin B_{12}. For nutritional reasons, milk and dairy products with high content of calcium and iodine should preferentially be used.

Environmental impacts: As for all foods derived from ruminants, the GHG emissions of dairy products, particularly hard cheese and butter, are relatively high. The risk of eutrophication from animal husbandry is significant, especially in the case of concentrated and intensive animal husbandry in sensitive areas. The environmental impact from dairy production in the Nordic countries varies. Feed ingredients contribute to the environmental impacts through fertilizer, pesticide, water and land use (Meltzer et al., 2024).

Main data gaps: Different dairy products may possess different effects dependent on fermentation, matrix and composition, therefore more studies on the effect of the different dairy products are needed (Holven & Sonestedt, 2023). Moreover, little focus has been on systematically comparing the effect of low- versus full-fat dairy because most studies compare different dairy products to other foods. Studies using objective biomarkers of dairy consumption are lacking. Because of an increasing focus on plant-based diets, more studies focusing on alternatives to dairy to meet dietary requirements for calcium, iodine and other nutrients are needed (Holven & Sonestedt, 2023). There is also a lack of studies covering environmental impacts other than climate impact, such as biodiversity aspects.

Risk groups: People with milk protein allergy. Low- or no-consumers have an increased risk of vitamin B_{12}, iodine and calcium inadequacy if fortified plant-based alternatives or other foods are not consumed.

Science advice:

- **Based on health outcomes:** It is recommended to consume 350-500 grams milk and dairy products/day with reference to fulfilling recommended intakes for calcium, iodine and vitamin B_{12} in combination with a varied diet. Milk and dairy products are also major dietary sources of saturated fatty acids. Therefore, replacing full-fat dairy products with low-fat products is considered more beneficial for health. Since calcium and iodine content of cheese varies in national food tables and between products, national authorities may define a national conversion factor. Typically, about 10-20 grams cheese corresponds to 100 g milk.
- **Based on environmental impacts**: In general, dairy, especially concentrated products such as hard cheese, is associated with high environmental impact. The high consumption of milk and dairy is an important contributor to GHG emissions from the diet in the Nordic and Baltic countries. Negative environmental impact is related to methane emissions from the enteric fermentation of ruminants. Feed contributes through fertilizer, pesticide, water and land use. Positive environmental impact may be related to grazing and biodiversity.
- **Overall science advice:** Intake of between 350 ml to 500 ml low fat milk and dairy products per day is sufficient to meet dietary requirements of calcium, iodine and vitamin B12 if combined with adequate intake of legumes, dark green vegetables and fish (varies among different species). The range depends on national fortifications programs and diets across the Nordic and Baltic countries. If consumption of milk and dairy is lower than 350 gram/day, products may be replaced with fortified plant-based alternatives or other foods.