

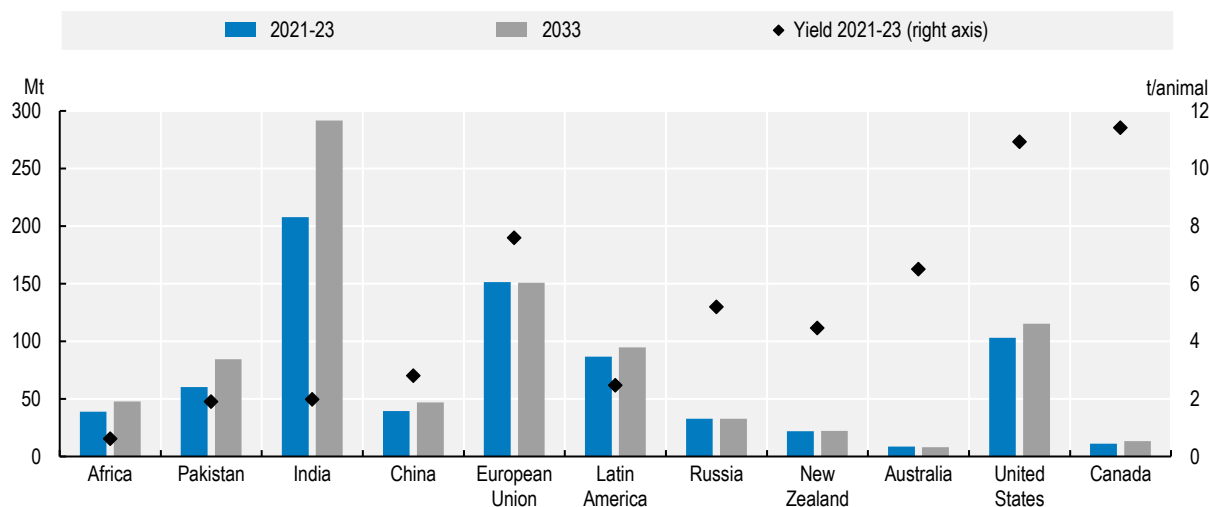
7 Dairy and dairy products

This chapter describes market developments and medium-term projections for world dairy markets for the period 2024-33. Projections cover consumption, production, trade and prices for milk, fresh dairy products, butter, cheese, skim milk powder and whole milk powder. The chapter concludes with a discussion of key risks and uncertainties which could have implications for world dairy markets over the next decade.

7.1. Projection highlights

Milk and dairy products are nutrient-rich foods, providing energy and high-quality protein with a range of essential micronutrients. The dairy sector supports the livelihoods for millions of people in its value chains across the world. World milk production (roughly 81% cow milk, 15% buffalo milk, and 4% for goat, sheep and camel milk combined) is projected to grow at 1.6% p.a. over the next decade (to 1085 Mt in 2033) supported by yield per animal. This rate of growth is faster than other main agricultural commodities. More than half of the growth in production is anticipated to come from India and Pakistan which will jointly account for over 30% of world production in 2033 (Figure 7.1). In the People's Republic of China (hereafter "China") and many African countries noticeable production growth is also projected. Production in the second largest milk producing region, the European Union (EU), is forecast to decline slightly due to the stagnating demand, production constraints due to environmental policies, and the expansion of alternative production systems (e.g. organic, pasture-based), which together cause a decline in cow numbers. In Oceania, the production is expected to continue a moderate growth, more slowly than in North America, due to policies on sustainable production and the expansion of organic production and pasture-based production systems. Globally, the projected growth in the number of cows is expected to be moderate. Over the projection period, yields across the world are expected to grow steadily with the strongest growth expected in Southeast Asian and some African countries, albeit from low base.

Figure 7.1. Milk production and yield in selected countries and regions



Note: The yield is calculated per cow/buffaloes.

Source: OECD/FAO (2024), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

Although milk production in the three major dairy exporters, New Zealand, the European Union, and the United States increased modestly, their exports of dairy products remained strong due to stable domestic consumption. The largest milk producer, India, is expected to maintain relatively fast growth with almost all production being consumed domestically. The United States is forecast to remain the country with the fastest growing production of skim milk powder (SMP), while the European Union, the biggest producer of cheese is expected to continue its long-term growth of cheese production. With lower international demand and declining milk production, EU whole milk powder production (WMP) is expected to continue its downward trend over the next decade.

Dairy products continue to be highly valued by consumers as a key component to an overall healthy, balanced and nutritious diet. As income and population increase, more dairy products are expected to be consumed globally over the medium term. Asia, particularly India and Pakistan, will continue to have the strongest growth in demand for fresh dairy products. Further increases in cheese consumption are expected in Europe and North America. After several years of growth, EU per capita consumption of butter is projected to remain flat over the next decade as consumers shift to diets with a lower fat content.

Milk is traded internationally mainly in the form of processed dairy products. The EU, New Zealand, and the United States are expected to remain the top exporters of processed dairy products and are projected to jointly account for nearly 70% of total exports. New Zealand is the leading exporter of butter and WMP, while the European Union is the main exporter of cheese. Since 2021, the United States has surpassed the EU as the world's dominant exporter of skim milk powder (SMP) and this trend is expected to continue over the medium term.

China is projected to remain the world's largest importer of milk products including cheese, butter and SMP. China is also the world's largest WMP importer but is anticipated to import less in response to the buildup of stocks, government subsidies to stabilise the domestic processing sector and developing consumer preferences for raw milk products over reconstituted products. The projected increase in import demand for dairy products in Southeast Asian countries and in African countries will be driven by population growth as well as an expanding middle class which consumes more livestock products in its diet. The Russian Federation (hereafter "Russia"), Mexico and countries in the Near East and North Africa (NENA) region will also continue to be important net importers of dairy products.

In 2023, prices dropped significantly from their high 2022 levels for all dairy products, mainly driven by a decrease in input costs and lower global consumption due to 2022's high prices. Overall, prices for dairy products are projected to develop in line with other major agricultural commodities and to resume a gradual nominal increase following a downward adjustment in the first projection years. Since 2015, the price of butter has been considerably higher than for the SMP and the gap is expected to persist throughout the projection period. This development is attributed to a relatively stronger demand for milk fat compared to non-fat milk solids on the international market.

The dairy sector in major exporting countries is facing several economic and environmental challenges which are expected to continue over the next decade. Although the growth rate of plant-based replacements is strong in certain regions, especially in East Asia, Europe, Oceania and North America, there are conflicting views regarding their environmental impact and health benefits which lead to uncertainties about their long-term impact on dairy demand. Nevertheless, per-capita consumption of fresh dairy products is expected to decline in Europe, Oceania and North America, partly displaced by an increasing consumption of plant-based alternatives. The introduction of a wide range of sustainable production policies and growing consumer concerns about the health implication of consumption of dairy products would impact the projections for the dairy sector. In some countries, dairy production accounts for a substantial share of overall greenhouse gas emissions (GHG), resulting in discussions on how adjustments to dairy production scale and technology could contribute to reducing such emissions. The risk of animal disease outbreaks in some countries could threaten production and trade and limit the development of dairy sector growth, especially in Western Europe. Despite its position as the world's largest milk producer, India has, so far, played only a minor role in the global dairy market. As such, any further integration of India into the international market could have a strong impact. This seems more and more plausible as some Indian dairy companies are actively exploring the prospects of exporting to neighboring countries.

7.2. Current market trends

Dairy prices in 2023 fell significantly from historical high levels

In 2023 the FAO Dairy Price Index value fell sharply by 21% from its high 2022 levels for all dairy products. International dairy prices declined slowly between mid-2022 and the end of 2023. The drivers of this sharp decline were mainly the decrease in input costs and lower global consumption due to the high prices.

World milk production grew 1.5% in 2023 to about 927 Mt. In India and Pakistan, production increased by 3% to reach 220 Mt and 63 Mt respectively, but with little impact on the world dairy market as they trade only marginal quantities of milk and dairy products. Among the three major exporters, the production in 2023 increased in the United States and the European Union but declined in New Zealand. The decrease in milk production in New Zealand is partly explained by dry weather, lower farmgate milk prices, higher production costs and a shrinking dairy herd.

World dairy trade fell in 2023 for a second consecutive year by around 0.2% due to the considerably smaller import demand from China, especially for whole milk powder (WMP). However, other major importers of dairy products-Saudi Arabia and Mexico- increased their imports. Of the major exporters, the United States would be a strong beneficiary of any additional export demand due to production constraints in the European Union and New Zealand.

7.3. Market projections

7.3.1. Consumption

Strong demand in India and Pakistan is leading increased global dairy consumption

Although milk is a highly perishable product which must be processed shortly after collection, most milk is consumed in the form of fresh dairy products,¹ including those fermented and pasteurised. The share of fresh dairy products in global consumption is expected to increase over the next decade due to stronger demand growth in India and Pakistan, which in turn is driven by income and population growth. World per capita consumption of fresh dairy products is anticipated to grow by 1.0% p.a. over the coming decade, primarily driven by higher per-capita income growth.

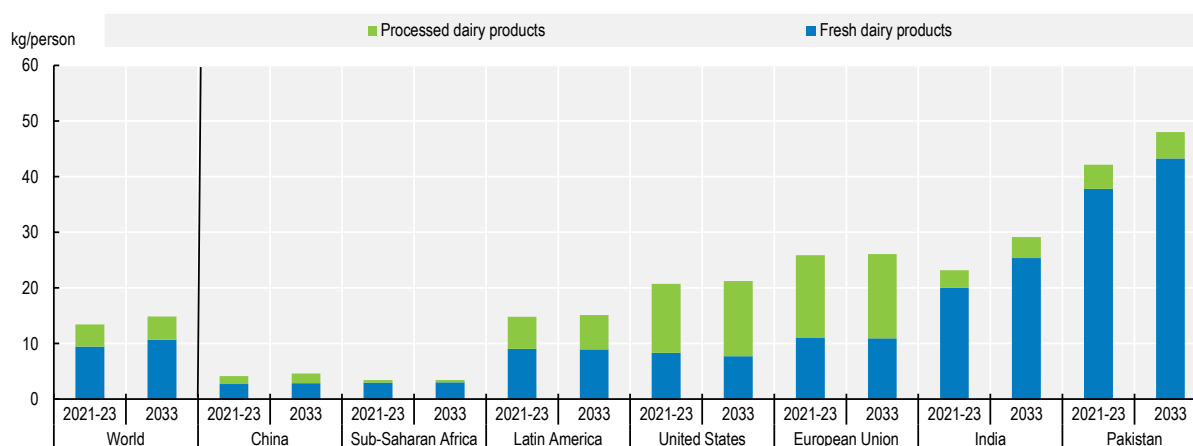
Milk consumption per capita (in terms of milk solids) varies widely across countries (Figure 7.2), driven by varying growth in incomes and regional preferences. The most significant growth is expected in India and Pakistan, where consumption is expected to increase to 25 and 45 kg per capita, respectively. The average fresh dairy consumption per capita in China is significantly lower than in the European Union and North America. In low- and lower middle-income countries most of the production is consumed in the form of fresh dairy products.

In Europe and North America, overall per capita demand for fresh dairy products is stable or declining but the composition of demand has been shifting over recent years against dairy fat such as full-fat drinking milk and cream. Plant-based dairy replacements are increasingly established and competing more with fresh dairy products than with processed dairy products.

The share of processed dairy products, especially cheese, in overall consumption of milk solids is expected to be closely related to incomes, with variations due to local preferences, dietary constraints, and urbanisation. The largest share of total cheese consumption, the second most consumed dairy product, occurs in Europe and North America, where per capita consumption is expected to continue to increase over the projection period. Butter consumption has seen a recovery in North America and Southeast Asia due to shifting preferences. Consumers may be influenced by recent studies that have shed a more positive light on the health impact from butter consumption, contrary to earlier messaging. In Southeast Asian

countries, butter is not only the most consumed processed dairy product, accounting for almost half of all processed dairy consumption in terms of milk solids, but it also has the strongest projected growth (Figure 7.3). Most of it will be used as an ingredient in a wide range of products including cookies, cakes, pies and other baked goods.

Figure 7.2. Per capita consumption of processed and fresh dairy products in milk solids

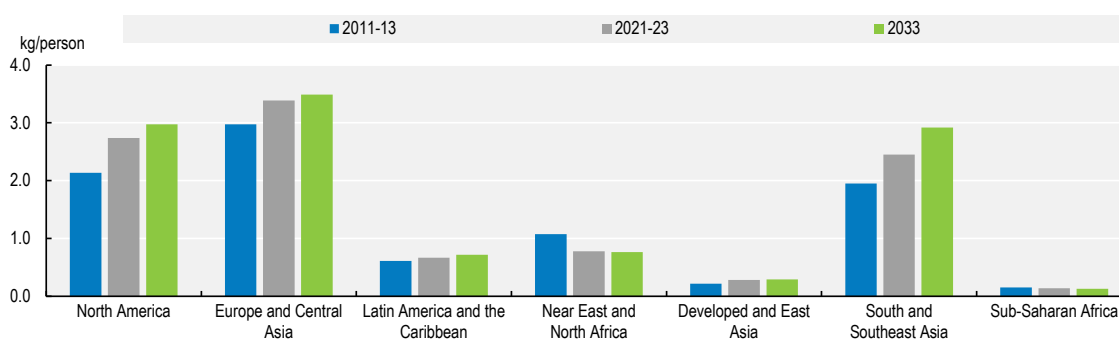


Note: Milk solids are calculated by adding the amount of fat and non-fat solids for each product; Processed dairy products include butter, cheese, skim milk powder and whole milk powder.

Source: OECD/FAO (2024), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

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Figure 7.3. Per capita consumption of butter in selected regions



Source: OECD/FAO (2024), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

The dominant use of SMP and WMP will continue to be in the manufacturing sector, notably in confectionery, infant formula, and bakery products. A small share of dairy products, especially SMP and whey powder, are used in animal feed. Whey powders are gaining prominence globally because of their use in the processing of nutritional products, especially of clinical, infant, and elderly preparations and as an import alternative for reconstituted fresh dairy products, such as milk and yogurt especially in Africa and other regions with limited milk production.

In contrast to non-perishable commodities, dairy products experience relatively higher levels of food loss and waste, especially for fresh milk due to its highly perishable nature. Approximately 4.5% is lost during processing. At retail level, distribution waste reduces global food availability by an additional 2.5%, while household waste estimates reach 12%. Over the next decade, food waste volumes in the dairy sector are projected to rise by 17% by 2033, while loss volumes are expected to increase by 13% and 24%, at distribution and at household level respectively compared to current levels.

7.3.2. Production

Greater efficiency in milk production from yield growth

World milk production is projected to grow at 1.6% p.a. (to 1 085 Mt by 2033) over the next decade, faster than most other important agricultural commodities. Growth in the number of cows is expected to be moderate in North America and China but strong in Sub-Saharan Africa and in major milk-producing countries such as India and Pakistan – where yields are low. Yields across the world are expected to grow steadily over the next decade. Nevertheless, in most regions, yield growth is expected to contribute more to production increases than herd growth (Figure 7.4). This yield growth will be achieved through optimising milk production systems, improved animal health and feed efficiencies and improved genetics.

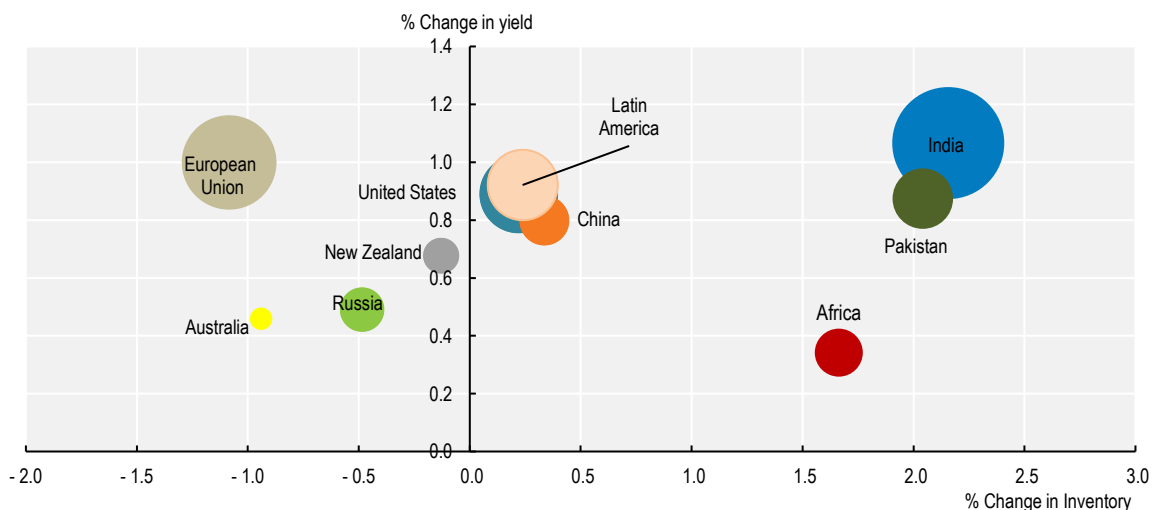
India is the largest producer of milk and is expected to experience a continued strong production growth. Production is based on small households connected to cooperatives for processing and distribution. This integration into the wider supply chains is also important for the value added to dairying in India. The growth is expected to come from more milking cows and buffaloes as well as from yield increases.

Production in the European Union is projected to decline with fewer dairy cows and slower yield growth. Production originates from a mix of grass- and feed-based production systems. A growing share of milk is expected to be organic or from other non-conventional production systems. At present, more than 10% of dairy cows are within, but not limited to, organic systems located in Austria, Denmark, Greece, Latvia, and Sweden. Germany, France and Italy have also seen an increase in organic dairy production. However, as organic yields are about a quarter lower than in conventional production systems and organic systems incur higher production costs, they need to command a substantial price premium to compensate.

The average yields per cow in North America is four times higher than the global average, as their share of grass-based production is low, and feeding is focused on high yields from specialised dairy herds (Figure 7.4). Dairy herds in the United States and Canada are expected to remain largely unchanged and production growth to originate from further yield increases. As domestic demand is projected to remain stronger for milk fats, the United States will continue to expand SMP production.

Although the share of New Zealand in world milk production is only 2.5%, it is the most export-orientated country. After expanding milk production strongly over the last twenty years, milk output growth has stalled in recent years, and is projected to grow at 0.5% p.a. over the next decade. Milk production is mainly grass-based, and yields are considerably lower than in North America and Europe. However, the cost efficiency of grass management allows New Zealand to be competitive. The main constraining factors for growth are land availability, increasing environmental restrictions and the pricing of enteric methane from 2025 (Zero Carbon Amendment Act of 2019 to the Climate Change Response Act of 2002). Nevertheless a shift to more feed-based production systems is not likely.

Figure 7.4. Annual changes in inventories of dairy herd and yields between 2024 and 2033



Note: The size of the bubbles refers to the total cow milk production in the base period 2021-23.

Source: OECD/FAO (2024), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

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Strong production growth is expected in Africa, mostly due to larger herds. These will usually have low yields, and a considerable share of milk production will come from goats and sheep. Most cows, goats and sheep graze, and are used for other purposes including meat production, traction, and as capital assets (savings). Additional grazing occurs on the same pasture, leading to a more intensive use which may lead to local over-grazing. Over the projection period, about a third of the global dairy animal population is projected to be in Africa and to account for around 6% of world milk production.

Globally, around 30% of milk will be further processed into products such as butter, cheese, SMP, WMP, or whey powder in the coming decade. However, there are notable regional differences. In high-income countries, most of the milk production is transformed into dairy products. Butter and cheese currently account for a large share of consumption of milk solids in Europe and North America due to the significant direct food demand for these products. SMP and WMP are largely produced for trade, for use in the food processing sector, notably in confectionery, infant formulae, and bakery products. In low- and lower middle-income countries most of the milk production goes into fresh dairy products.

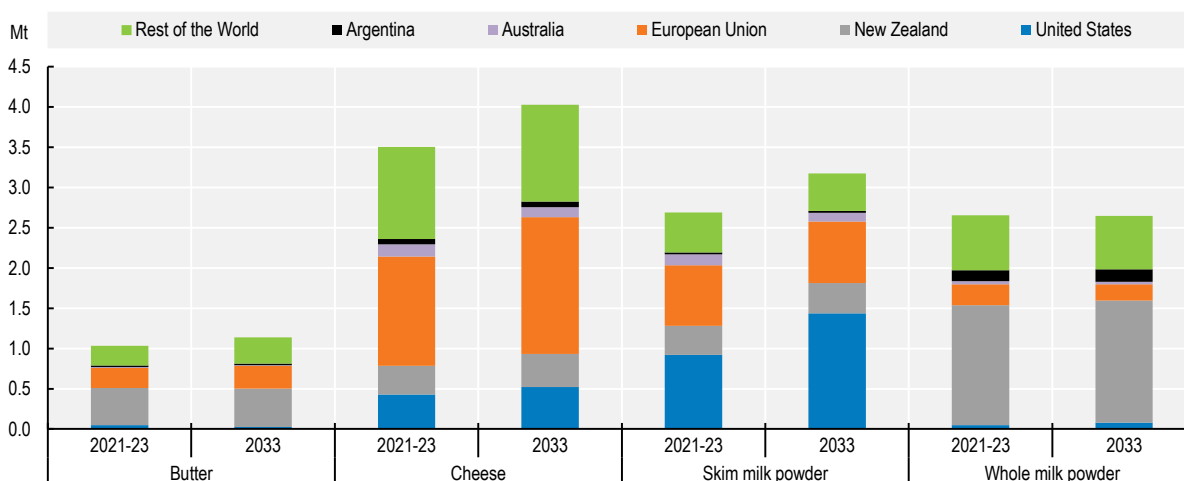
7.3.3. Trade

Trade growth will be driven by an increasing import demand from diversified destination countries


Most dairy products are domestically consumed. Only a small share (around 7%) of world milk production, is traded internationally, primarily due to its perishability and high-water content (more than 85%). Over 50% of world production of WMP and SMP is traded since these products are often produced only to store and trade milk over a longer time period or distance. Fresh dairy products such as fermented milk products are traded in small amounts between neighbouring countries Canada and the United States, or the European Union and Switzerland, for example. An exception is imports of liquid milk by China from the European Union and New Zealand, due to Ultra-High Temperature milk and cream products capable of being shipped long distances, but also favourable Chinese freight rates in some cases. China's net imports of fresh dairy products over the base period reached 1.2 Mt, and this is not projected to increase much over the next decade.

World dairy trade is projected to expand over the next decade to reach 13.9 Mt in 2033, 12% higher than during the base period. Most of this growth will be met by increased exports from the United States, the European Union and New Zealand. These three countries are projected to jointly account for around 65% of cheese, 70% of WMP, 75% of butter, and 80% of SMP exports in 2033 (Figure 7.5). Australia has lost market shares although it remains a notable exporter of cheese and SMP. Argentina is also an important exporter of WMP and is projected to account for 6% of world exports by 2033. In recent years, Belarus has become an important exporter, orienting its exports primarily to the Russian market due to the Russian embargo as of 2015 on several major dairy exporting countries.

Figure 7.5. Exports of dairy products by region



Source: OECD/FAO (2024), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

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The European Union will continue to be the main world cheese exporter, followed by the United States and New Zealand. The United Kingdom, Russia, Japan, Saudi Arabia and China are projected to be the top five cheese importers in 2033. Since consumers value variety, these countries are often also exporters of cheese and international trade is expected to offer wider choices of cheeses in the domestic markets.

New Zealand remains the primary source for butter and WMP on the international market, and its market shares are projected to be around 45% and 60%, respectively, by 2033. China is the principal importer of WMP from New Zealand, but trade between the two countries is projected to be less dynamic over the projection period. The expected growth in domestic milk production in China will limit the growth in WMP imports. However, as China removed imports tariffs on milk powder from New Zealand this year, some exporters may start taking advantage. It is also expected that New Zealand will diversify and slightly increase its production of cheese over the *Outlook* period. Russia, the second largest importer of butter, together with China are expected to account for 25% of world imports.

The United States is expected to be the most dynamic large exporter over the next decade and to expand SMP exports especially. This would require growth in drying capacity beyond current investments. SMP imports are disperse globally as it is often the easiest dairy product to trade for use in food processing.

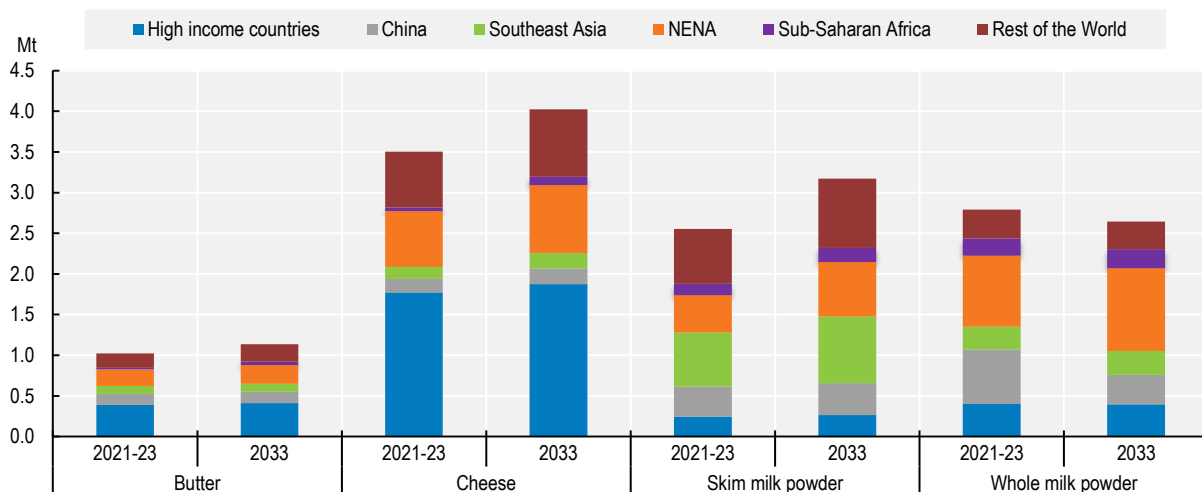
Imports are spread more widely across countries, with the dominant destinations for all dairy products being the NENA, high-income countries, Southeast Asia, and China (Figure 7.6). China is expected to continue to be the world's major dairy importer. WMP imports from China are projected to represent 14% of global imports in 2033, a 10% drop from the base period. Africa is expected to surpass China as a main

destination of WMP in 2033. Per capita consumption of dairy products in China is relatively low compared to traditional markets, but there have been significant increases in demand over the past decade, with growth projected to continue. Most of its dairy imports are sourced from Oceania, although in recent years the European Union has increased its exports of butter and SMP to China.

The global whey powder market is growing driven by rising demand for diets high in protein and animal feeding. Trade of whey powder is expected to increase over the medium with China the top import market mainly for animal feed additives. The European Union is projected to remain the dominant exporter of whey powder, which together with the United States account for more than 40% of the world exports.

While some regions, such as India and Pakistan, are self-sufficient, total dairy consumption in Africa, Southeast Asian countries, and the NENA is projected to grow faster than production, leading to an increase in dairy imports. As liquid milk is expensive to trade (high volume/value ratio), this additional demand growth is expected to be met with milk powders, where water is added for final consumption or further processing. Imports by NENA are expected to originate primarily from the European Union, while the United States and Oceania are expected to be the main suppliers of powders to Southeast Asia.

Figure 7.6. Imports of dairy products by region



Note: NENA stands for Near East and North Africa, and is defined as in Chapter 2. Southeast Asia contains Indonesia, Malaysia, Philippines, Thailand and Viet Nam.

Source: OECD/FAO (2024), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

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7.3.4. Prices

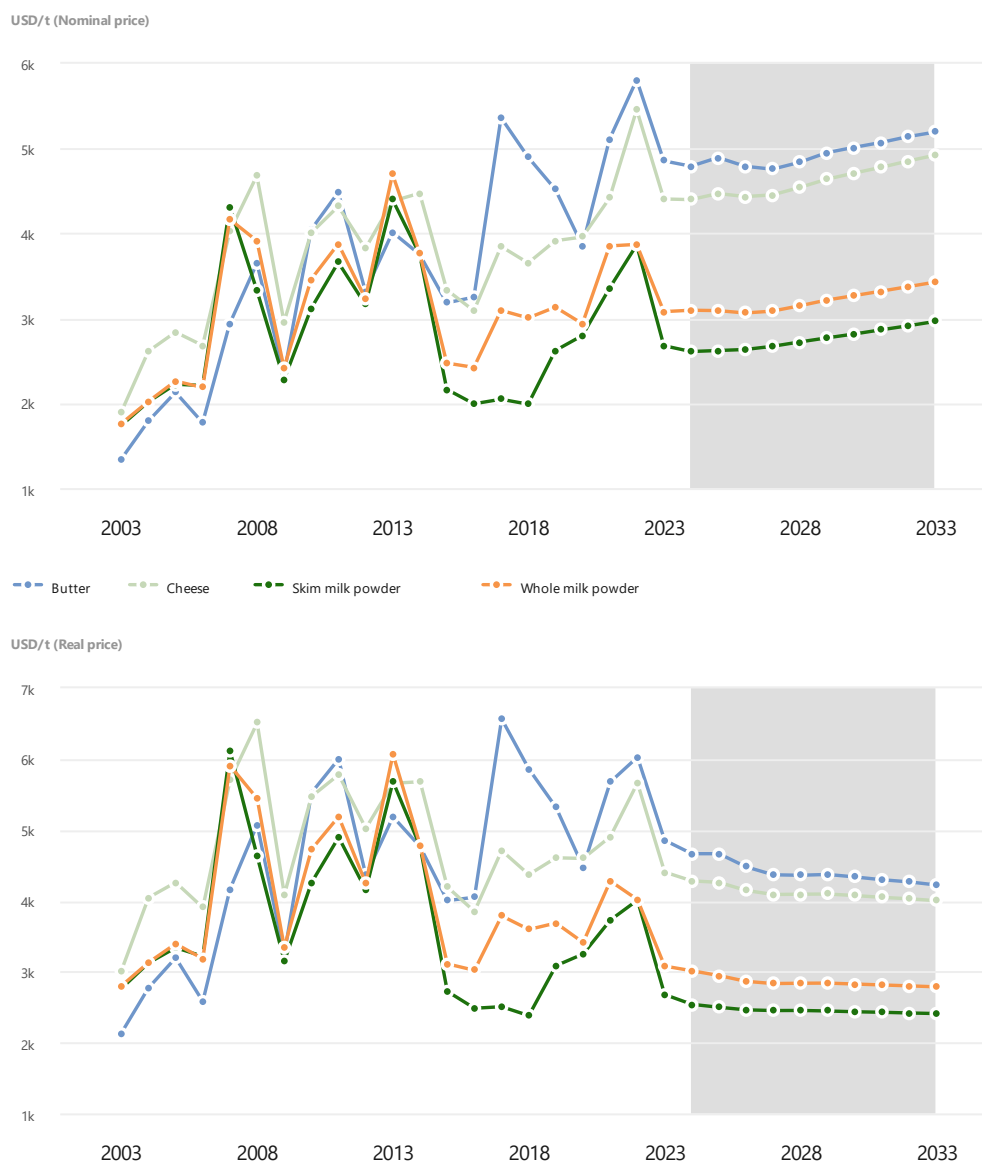
Nominal international dairy prices will gradually and slightly increase

International dairy prices are prices of processed products from the main exporters in Oceania and Europe. The two main reference prices are butter and SMP, where butter is the reference for milk fat and SMP for other milk solids. Milk fat and other milk solids together account for about 13% of the overall weight of milk, the remainder being water. Since 2015, the price of butter has increased considerably more than SMP. Increased demand for milk fat resulted in a price gap emerging between the two products and the price of butter will continue to be supported by stronger demand for milk fat compared to other milk solids on the international market. Therefore, the gap between the price of butter and SMP is assumed to remain a defining feature over the coming decade (Figure 7.7). Prices of butter and SMP are foreseen to increase

slightly in nominal terms over the projection period after a significant drop in 2023 from historically high levels as input prices are expected to resume with a gradual increase. World prices for WMP and cheese are expected to be affected by butter and SMP price trends, in line with the respective content of fat and non-fat solids.

The strong volatility of international dairy prices stems from its small trade share, the dominance of a few exporters, and a widely restrictive trade policy environment. Most domestic markets are only loosely connected to those international dairy prices as fresh dairy products dominate consumption, and only a small share of milk is processed as compared to that which is fermented or pasteurised.

Figure 7.7. Dairy product prices, 2003-2033



Note: Butter, FOB export price, 82% butterfat, Oceania; Skim Milk Powder, FOB export price, non-fat dry milk, 1.25% butterfat, Oceania; Whole Milk Powder, FOB export price, 26% butterfat, Oceania; Cheese, FOB export price, cheddar cheese, 39% moisture, Oceania. Real prices are nominal world prices deflated by the US GDP deflator (2023=1).

Source: OECD/FAO (2024), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

7.4. Risks and uncertainties

Environmental and health concerns are becoming more significant

Plant-based dairy alternatives (e.g. soya, almond, rice, and oat drinks) have increased in popularity in many regions, especially in North America, Europe and East Asia. Available replacements have continued to expand beyond the more traditional options, branching into various sources from nuts, legumes and other crops. Key drivers of the expansion include health concerns and increasing consumer awareness of the environmental impact of dairy production, and lactose intolerance. The growth rates of plant-based replacements for dairy products are strong, albeit from a low base, although the evidence regarding their environmental impact and relative health benefits is contested. The sustainability of popular replacements such as almond and soya drinks have been questioned as more consumers consider other environmental issues in addition to GHG emissions, such as water usage and deforestation. Similarly, lactose intolerance is a concern for some consumers with a range of lactose-free dairy products becoming available for those who do not prefer plant-based replacements. Overall, there is uncertainty surrounding the long-term impact of plant-based replacements on the dairy sector.

Environmental legislation could have a strong impact on the future development of dairy production. GHG emissions from dairy activities make up a significant share of total emissions in some countries, such as New Zealand and Ireland, and more stringent environmental policies and initiatives such as the Pathways to Dairy Net Zero launched in September 2021 by the dairy sector could affect the level and nature of dairy production to curb such emissions. The growing trend towards sustainable practices such as those related to water access and manure management are associated areas where policy changes could impact on dairy production. Nevertheless, stricter environmental legislation could also lead to innovative solutions that improve the long-term competitiveness of the sector. Overall, the global level of GHG emissions will largely depend on efficiency gains in India and other countries with high cattle populations and extensive production. In addition, climate change and extreme weather events, already experienced in some countries and regions, could aggravate the viability of milk production in the affected countries.

Russia's war against Ukraine has significantly heightened the uncertainty of energy, fertiliser and other agricultural supplies and may slow down economic growth. Market impacts could be felt in related sectors such as dairy through increased input costs for these products. It could also increase the interest in circular agriculture with a focus on using fewer external inputs, an option available and widely used in dairy production.

Changes in domestic policies remain an uncertainty. Under the United States-Mexico-Canada Agreement (USMCA), Canada has reorganised SMP exports, allowing increased market access. In the European Union, intervention buying of SMP and butter at fixed prices remains possible under certain circumstances, and this already had a considerable market impact in recent years.

Dairy trade flows could be substantially altered by changes in the trade environment. Modifications to existing trade agreements or the creation of new ones, could affect dairy demand and trade flows. In addition, India and Pakistan, the big dairy consuming countries, have not integrated into the international dairy market as domestic production is projected to expand fast enough to respond to growing home demand. Future investment in cold chain infrastructure in these regions will contribute to increase their degree of dairy self-sufficiency. Another challenge faced by the sector is the risk of disease outbreak. As the world is increasingly inter-connected through trade, including trans-boundary movement of animals, animal disease could rapidly spread across the borders and disrupt the dairy industry growth.

Note

¹ Fresh dairy products contain all dairy products and milk which are not included in processed products (butter, cheese skim milk powder, whole milk powder, whey powder and, for few cases casein). The quantities are in cow milk equivalent.