

# 7 Dairy and dairy products

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This chapter describes market developments and medium-term projections for world dairy markets for the period 2023-32. 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.

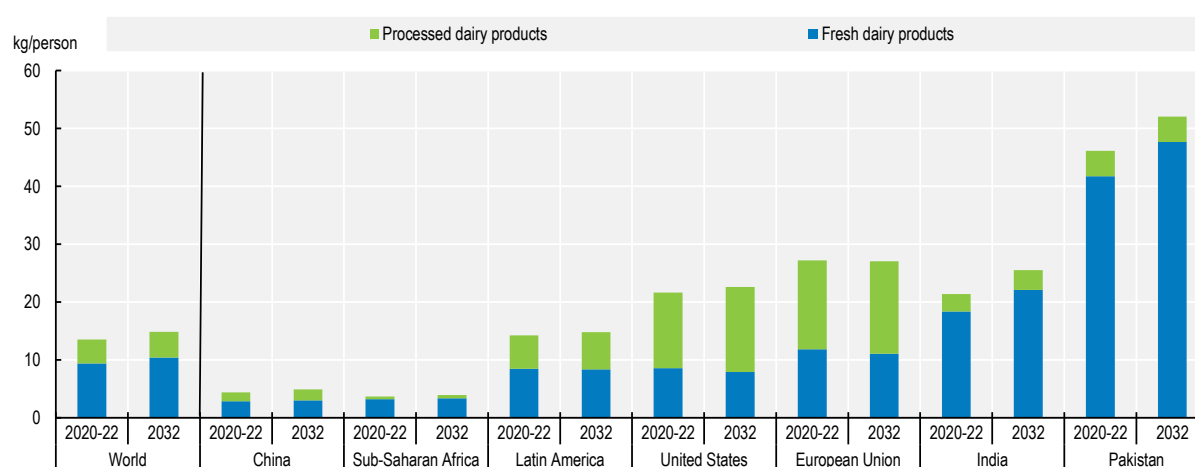
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## 7.1. Projection highlights

### *Buoyant dairy sectors in South Asia and Africa*

Milk and dairy products are vital sources of nutrition and provide livelihoods for millions of people in dairy value chains across the world. As income and population increase, more dairy products are expected to be consumed over the medium term. The key locations of this strong demand growth are India, Pakistan, and several African countries. Overall, per capita consumption is projected to increase 0.8% p.a. to 15.7 kg (milk solids equivalent, excluding the water content of milk or dairy products) by 2032. Most dairy production is consumed in the form of fresh dairy products, which are unprocessed or only slightly processed (i.e. pasteurised or fermented) and their share in world consumption is expected to increase over the next decade. In low- and middle-income countries, fresh dairy products comprise over two-thirds of the average per capita dairy consumption (milk solids), while consumers in high-income countries tend to consume more processed products (Figure 7.1).

**Figure 7.1. 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 (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

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Cheese is the most important processed dairy product consumed in terms of milk solids, which primarily occurs in Europe and North America and is increasing in both regions. In Asia, 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. In Africa, cheese and whole milk powder (WMP) account for the majority of processed dairy consumption. Over the coming decade, however, skim milk powder (SMP) is expected to record the highest growth, although from a lower base.

World milk production (roughly 81% cow, 15% buffalo, and 4% for goat, sheep and camels combined) is projected to grow at 1.5% p.a. over the next decade (to 1 039 Mt in 2032), faster than most other main agricultural commodities. Over half of the increase in total milk production is anticipated to come from India and Pakistan, which will jointly account for over 32% of world production in 2032. Production in the second largest global milk producer, the European Union, is expected to decline slightly in response to stagnating domestic demand due to low population growth and declining per capita consumption of fresh dairy products, policies targeted to a transition to sustainable production, the expansion of organic production,

and pasture-based production systems. Globally, the projected growth in the number of milk-producing animals is expected to be strong, especially in regions with low yields such as Sub-Saharan Africa and in major milk-producing countries such as India and Pakistan. Over the projection period, yields across the world are expected to grow steadily with the strongest growth expected in Southeast Asian countries.

Milk is traded internationally mainly in the form of processed dairy products. The People's Republic of China (hereafter "China") is expected to remain the most important importer of milk products despite a stronger increase in domestic milk production relative to the past decade. The projected increase in import demand for dairy products in Southeast Asian countries will be driven by population as well as income growth, which favours more livestock products in diets. However, their per capita consumption is projected to remain low relative to traditional dairy consumer markets. The Russian Federation (hereafter "Russia"), Mexico and countries in the Near East and North Africa (NENA), especially Saudi Arabia, will also continue to be important net importers of dairy products. Over the medium term, the European Union, New Zealand, and the United States will remain the key exporters of processed dairy product and are projected to jointly account for around 65% of cheese, 70% of WMP, 70% of butter, and 80% of SMP exports in 2032.

Since 2015, the unit price of butter has been considerably higher than for SMP. This development is attributed to stronger demand for milk fat compared to other milk solids on the international market. It is expected that this gap will persist throughout the projection period. Overall, prices are expected to develop in line with other major agricultural commodities experiencing a slight nominal increase following a downward adjustment in the first years of the *Outlook*.

Although the growth rate of plant-based replacements is strong in many regions, including East Asia, Europe, Oceania and North America, contested views regarding their environmental impact and health benefits lead to uncertainties about their long-term impact on dairy demand. Over the projection period the per capita consumption of fresh dairy products is expected to decline in Europe, Oceania and North America, partly at the expense of an increasing consumption of plant-based replacements.

The introduction of new sustainable production policies or consumer acceptance issues of dairy products will 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 considerations of how adjustments to dairy production scale and technology could contribute to reducing such emissions.

Only a relatively small share of global milk production is traded internationally in the form of processed products, mainly powders and cheese. In addition, trade in dairy products is often covered specifically in regional trade agreements. Consequently, new or changed trade agreements tend to alter the global dairy trade. Any entry of India, the world's largest dairy producer and consumer, into the international market could have a strong impact. Currently, some Indian dairy companies are showing interest in exporting to neighbouring countries.

## 7.2. Current market trends

### *Dairy prices reached record highs in 2022 but then started to decline*

In 2022 the FAO Dairy Price Index value increased by 20% across all dairy products, reaching a new record high. International dairy prices reached their peak around mid-2022 and have started to decline slowly since. Nevertheless, domestic milk prices peaked later and only started to decline towards the end of 2022. The main drivers of prices were energy and feed costs, both showing a similar pattern, but with larger swings compared to those for dairy and milk.

World milk production grew by 0.7% in 2022 to about 897 Mt. In India, production increased by 2.2% to 194 Mt., but with little impact on the world dairy market as they trade only marginal quantities of milk and

dairy products. Focusing on the three major exporters, the production of the European Union remained unchanged during 2022 but declined in New Zealand and increased in the United States.

The world dairy trade in 2022 declined due to considerably smaller import demand from China, especially for whole milk powder (WMP). On the other hand, other major importers of dairy products – Saudi Arabia, Indonesia and Mexico - increased their imports. Of the large exporters, the United States would be a strong beneficiary of any additional exports.

## 7.3. Market projections

### 7.3.1. Consumption

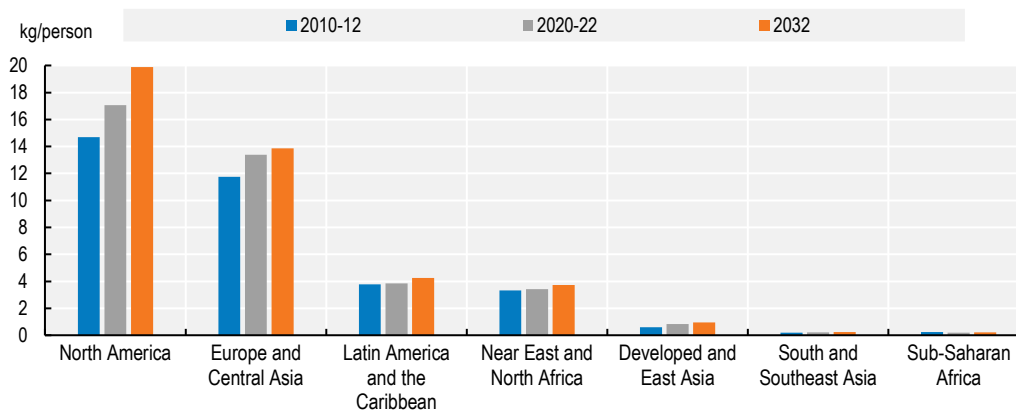
*Strong demand in India and Pakistan is leading increased global dairy consumption*

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,<sup>1</sup> including those fermented and pasteurised. The share of fresh dairy products in global consumption is expected to increase over the coming 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 projected to increase by 1.0% p.a. over the coming decade, slightly faster than over the past ten years, primarily driven by higher per-capita income growth.

Milk consumption per capita (in terms of milk solids) will vary largely worldwide (Figure 7.1), driven by varying growth in incomes and regional preferences. In low- and lower middle-income countries most of the production is consumed in the form of fresh dairy products. The consumption of fresh dairy products per capita is expected to be high in India and Pakistan, but low in China.

In Europe and North America, overall per capita demand for fresh dairy products is stable to declining but the composition of demand has been shifting over recent years towards 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 (Figure 7.2). Consumption of cheese will also increase in regions where it has not been traditionally part of the national diet. In Southeast Asian countries, urbanisation and income increases have resulted in more away-from-home eating, including fast food such as burgers and pizzas.

**Figure 7.2. Per capita consumption of cheese in selected regions**

Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

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Butter consumption has seen a recovery in Europe and North America 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.

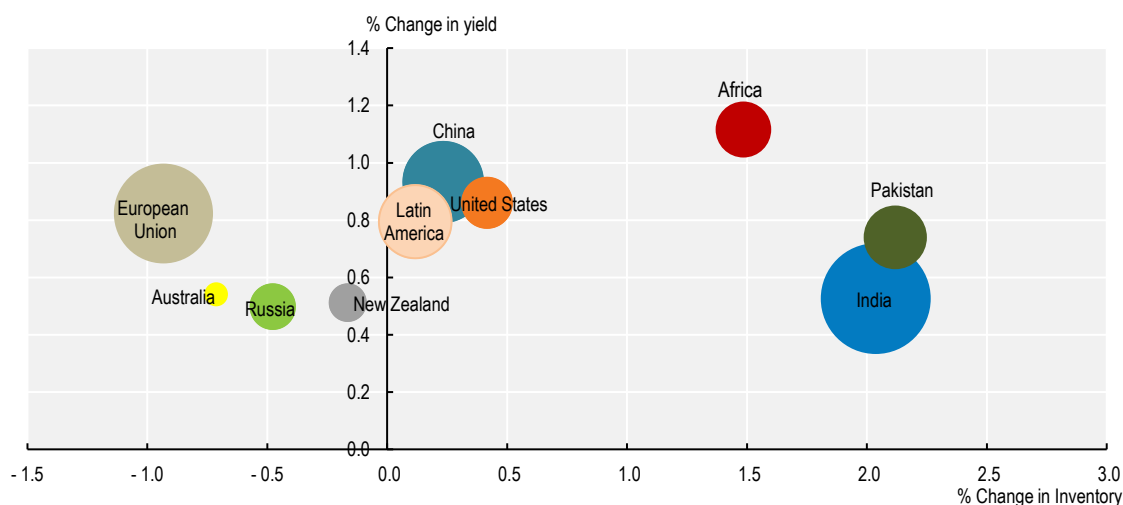
The dominant use of SMP and WMP will continue to be in the manufacturing sector, notably in confectionery, infant formula, and bakery products. A small share of dairy products, especially SMP and whey powder, are used in animal feed. Whey powders are gaining prominence globally because of their use in the processing of nutritional products, especially of clinical, infant, and elderly preparations.

### 7.3.2. Production

#### *Greater efficiency in milk production from yield growth*

World milk production is projected to grow at 1.5% p.a. (to 1 039 Mt by 2032) over the next decade, faster than most other main agricultural commodities. Growth in the number of milk-producing animals is expected to be strong (1.3% p.a.), especially 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 of the world, yield growth is expected to contribute more to production increases than herd growth (Figure 7.3), the drivers of which include optimising milk production systems, improved animal health and feed efficiencies, and improved genetics.

**Figure 7.3. Annual changes in inventories of dairy herd and yields between 2022 and 2032**



Note: The size of the bubbles refers to the total milk production in the base period 2020-22.

Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

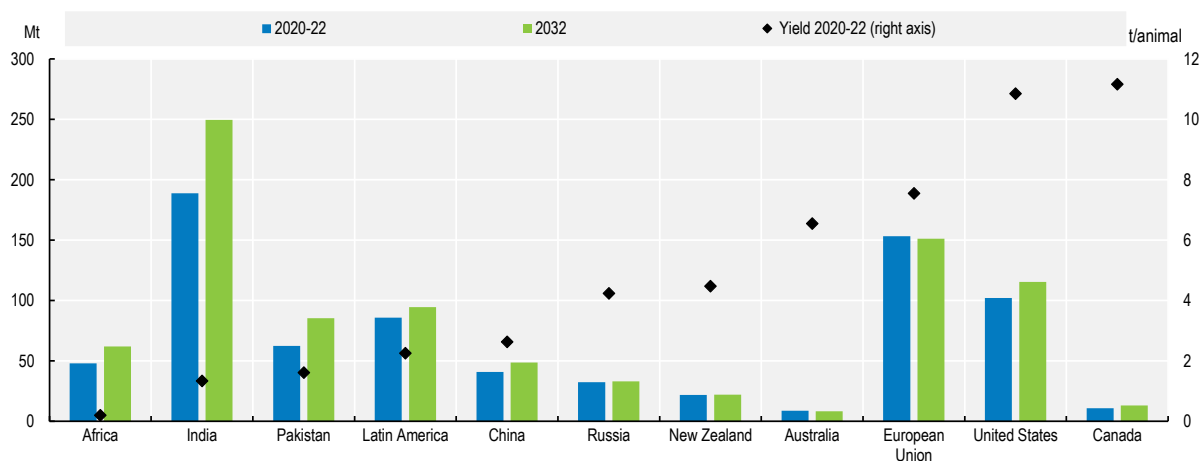
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India is the largest producer of milk and is expected to experience a continued strong production growth. Production is based on small households connected to cooperatives for processing and distribution. This integration into the wider supply chains is also important for the value attached 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 herds and slower yield growth. Production originates from a mix of grass- and feed-based production systems. In addition, 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 and France have also seen an increase in organic dairy production. However, as organic yields are about a quarter lower than in conventional production systems, and higher production costs, they need to command a substantial price premium.

North America has some of the highest average yields per cow, as the 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 exports.

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 0.4% p.a. over the next decade. Milk production is mainly grass-based, and yields are considerably lower than in North America and Europe. The cost efficiency of grass management, however, allows New Zealand to be competitive. The main constraining factors for growth are land availability and 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), but a shift to a more feed-based production is not likely.

**Figure 7.4. Milk production and yield in selected countries and regions**

Note: The yield is calculated per milking animal (mainly cows but also buffaloes, camels, sheep and goats).

Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

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 worldwide herd 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 is notable regional dispersion. In high-income countries, most of the milk production is transformed into dairy products. Given the considerable direct food demand for butter and cheese, these presently account for a large share of consumption of milk solids in Europe and North America. 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

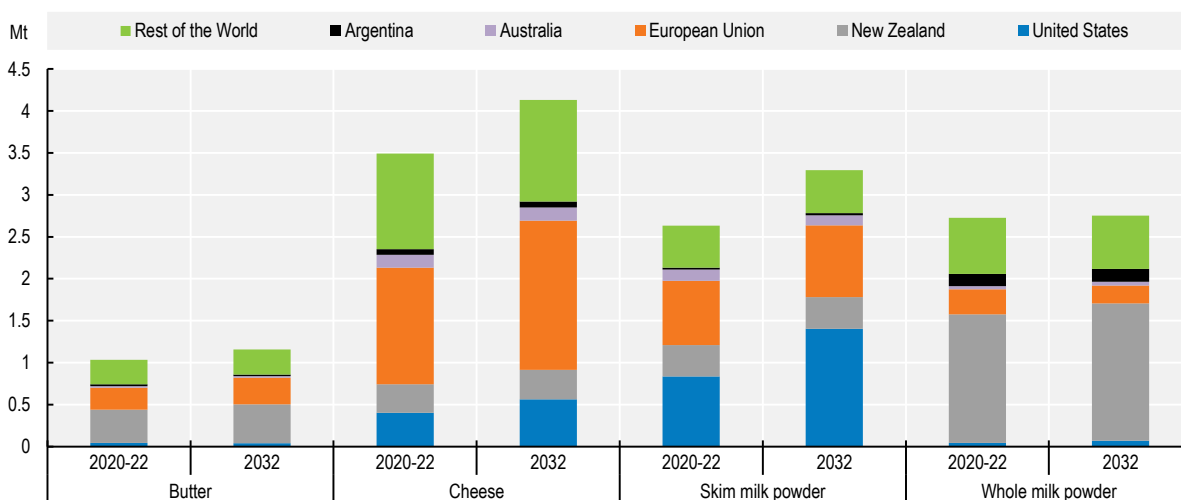
#### *Trade will expand from a few major exporting to many dispersed importing countries*

Only 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 are very lightly traded as small amounts of fermented milk products between neighbouring countries (Canada and the United States, the European Union and Switzerland). 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 able to be 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 14.2 Mt in 2032, 11% 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, 70% of butter, and 80% of SMP exports in 2032 (Figure 7.5). Australia, another exporter, has lost market shares although it remains a notable exporter of cheese and SMP. In the case of WMP, Argentina is also an important exporter and is projected to account for 5% of world exports by 2032. 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 (2023), "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, Japan, Russia, the European Union, and Saudi Arabia are projected to be the top five cheese importers in 2032. These countries are often also exporters of cheese and international trade is expected to increase the choice of cheeses for consumers.

New Zealand remains the primary source for butter and WMP on the international market, and its market shares are projected to be around 40% and 60%, respectively, by 2032. 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. It is expected that New Zealand will diversify and slightly increase its production of cheese over the outlook period.

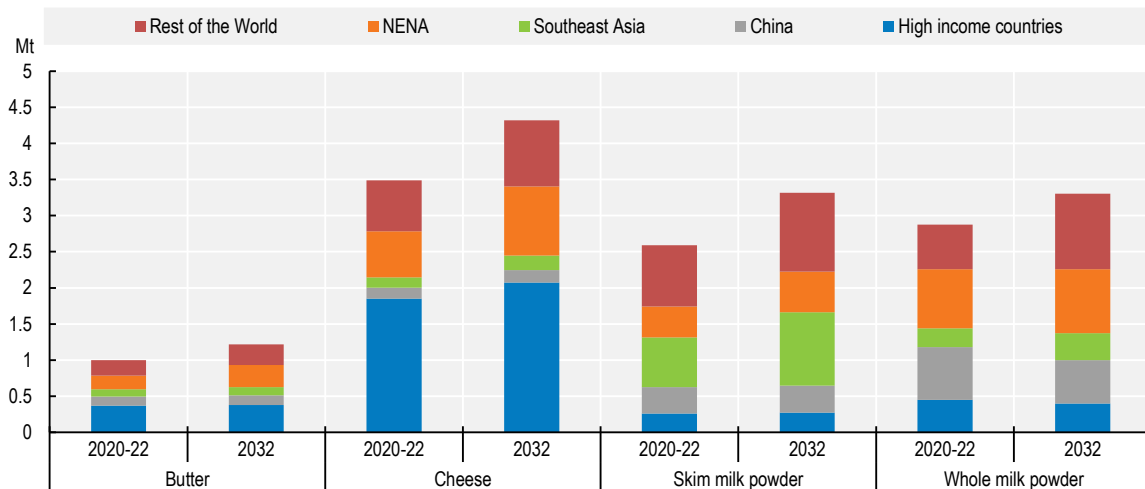
The United States is expected to be the most dynamic large exporter over the next decade and expand SMP exports especially. This would require growth in drying capacity which is beyond current investments. SMP imports are dispersed globally as it is often the easiest dairy product to trade for use in 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, especially for WMP with imports from China projected to represent 21% of global imports in 2032. 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.



While some regions are self-sufficient, such as India and Pakistan, total dairy consumption in Africa, Southeast Asian countries, and the NENA is expected 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 (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

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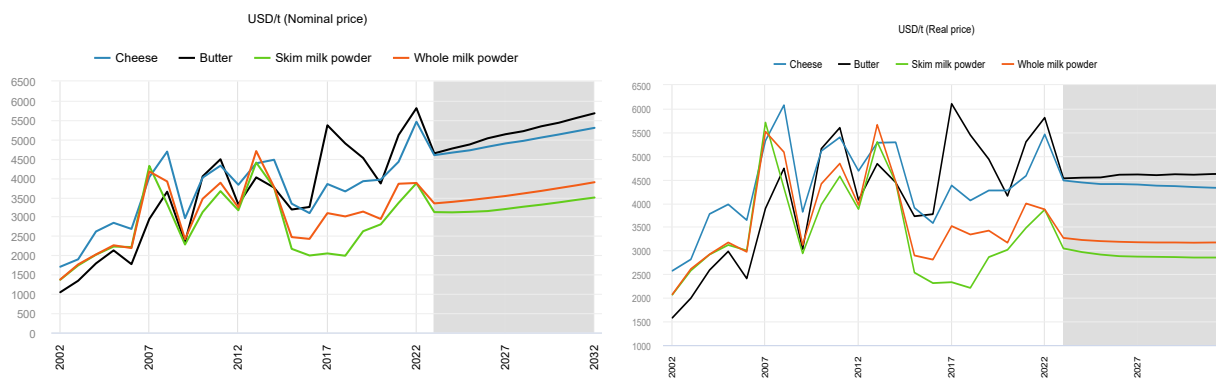
### 7.3.4. Prices

#### *Real international dairy prices will trend downward*

International dairy prices are of processed products of 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 slightly decline over the projection period as supplies respond to current price incentives. 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.

**Figure 7.7. Dairy product prices, 2002-2032**



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 (2022=1).

Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

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 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.

## 7.4. Risks and uncertainties

### *Environmental and health concerns are becoming more significant*

The role of plant-based replacements for dairy (e.g. soya, almond, rice, and oat drinks) in the fluid milk sector has increased 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 and consumer concerns regarding 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 high share of total emissions in some countries (e.g. 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 increasing trend towards sustainable practices such as water access and manure management are associated areas where policy changes could impact on dairy. European dairy sector experts assume decreasing dairy exports caused by the European Union Farm-to-Fork-Strategy. 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.

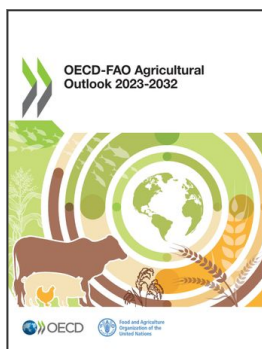
Russia's war against Ukraine has significantly heightened the uncertainty of energy, fertiliser and other agricultural supplies and may slow down economic growth. Market impacts could be felt in related sectors such as dairy through increased input costs for these products. It could also increase the 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 USMCA, Canada has capped SMP exports, allowed increased market access, and eliminated their Class 7 designation, which was initially introduced to comply with the World Trade Organization Nairobi Decision on the removal of export subsidies. 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, or the creation of new, trade agreements would affect dairy demand and trade flows. In addition, India and Pakistan, the big dairy consuming countries, have not been integrated into the international dairy market as domestic production is projected to expand fast to respond to growing home demand. Future investment in cold chain infrastructure in these regions will contribute to an increase their degree of dairy self-sufficiency.

## Note

<sup>1</sup> 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.



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