# Chapter 7. Dairy and dairy products

*This chapter describes the market situation and highlights the latest set of quantitative medium-term projections for world and national dairy markets for the ten-year period 2018-27. Growth in world milk production is projected to increase by 22% over the projection period, with a large share of the increase coming from Pakistan and India. In 2027, these two countries are expected to jointly account for 32% of global milk production. Most of the additional production in these countries will be consumed domestically as fresh dairy products. Over the projection period, the European Union's share in global exports of dairy commodities is expected to increase from 27% to 29%. As the 2017 butter bubble continues to deflate, nominal and real prices for butter will decrease over the projection period. With the exception of skim milk powder (SMP), dairy prices are expected to decrease in real terms.*

## Market situation

International dairy prices continued to increase in 2017, driven by declines in milk production in the last quarter of 2016 and first quarter of 2017, and by a strong demand for fat solids. Butter prices showed a spectacular jump in the first half of 2017, but came down by the end of 2017, that on average butter prices were 65% higher than in 2016. During 2017, the prices of whole milk powder (WMP), cheese and skim milk powder (SMP) increased by 28%, 25% and 3%, respectively.

In the short term, butter prices are expected to decline further during 2018 but remain higher than in recent years. The price of cheese is expected to come down, as the supply of fat solids increases relative to its demand and the price of fat solids declines. The prices of milk powders are expected to increase in 2018, although the recovery of the SMP price is likely to be slow given the still relatively high stock levels, especially in the European Union.

World milk production experienced a modest growth rate of 0.5% during 2017, which is much lower than the average growth rate of 2.1% during the last decade. Major exporters such as the European Union, New Zealand, Australia and Argentina witnessed a decrease in production during the first half of 2017 followed by a partial rebound in the second half. In the same period EU milk production declined in some key dairy producing Member States such as France and Germany, due to adverse weather impacts, low milk prices and herd declines. In the United States, stagnant growth in milk cow numbers and in yield per cow curbed supply growth. Despite low feed prices, the US milk margin fell in 2017 following the decline in the farm gate milk price. In Argentina milk production in 2017 recovered slowly from the more than 10% fall in production in 2016. An expected rebound in New Zealand milk production for 2017 has been delayed due to wet and cold spring weather (August-September). In Australia the growth of milk production was hampered by a contraction in the number of dairy farms and herd, due to poor seasonal factors and a low farm gate milk price.

Trade in dairy products is benefiting from stronger GDP growth, though trade growth has slowed down during recent years. The People's Republic of China (hereafter "China"), the largest importer of milk products, increased its 2017 imports of WMP and SMP combined by 6% relative to 2016, but this is still lower than the highs of 2013-2014. In contrast, China's cheese imports increased by 16%, continuing a decade long growth pattern (China is the world's fifth largest cheese importer). Oceania's dairy exports were below their 2016 values, with the exception of New Zealand's cheese exports, which increased for the second year in a row. New Zealand has reduced its production of WMP, but increased its production of cheese in response to growing world demand. Fluid milk exports have been rapidly expanding in recent years and, following a 16% increase in 2016, grew by a further 4% in 2017.

Trade measures affecting dairy trade are India's extended import ban (until 23 June 2018), the Russian import ban (extended till the end of 2018), an import ban by Mexico on all dairy imports from Colombia due to a Foot and Mouth disease outbreak, non-tariff measures (e.g. by Indonesia to US dairy products), and the free trade agreement between the European Union and Canada (CETA), in place since 21 September 2017. In addition, stocking and destocking strategies may have short-term market impacts. During the period 2015-2017, the European Union built up a public intervention stock of SMP of 378 000 tonnes (which is about 6.5% of world SMP production and about 20% of world SMP trade). SMP stocks also increased in the United Sates and India.

## Projection highlights

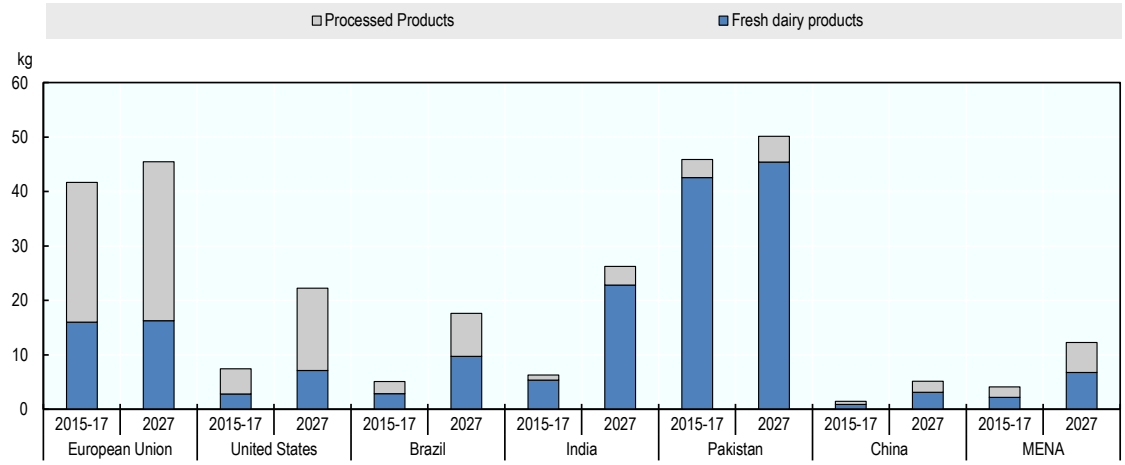
Although growth in world milk production has been limited in recent years, it is projected to increase by 22% in 2027, compared to the 2015-17 base period. The majority of the increase in milk production (80%) is anticipated to come from developing countries, in particular Pakistan and India, which are expected to jointly account for 32% of total milk production by 2027, compared to 26% in the base period. Milk production in developing countries is projected to expand at a rate of 3.0% p.a., but most of this additional production will be consumed domestically as fresh dairy products[1]. The share of production from developed countries is projected to decrease from 48% in 2017 to 43% in 2027. As compared to the previous *Outlook*, dairy product prices are lower, which curbs supply growth, in particular of developed countries. At the world level, production of butter, WMP, SMP and cheese are projected to increase by 2.2% p.a., 1.6% p.a., 1.3% p.a., and 1.3% p.a. respectively.

Dairy demand in developed countries has been shifting for several years towards butter and dairy fat and away from substitutes based on vegetable oil. This trend can be attributed to a more positive health assessment of dairy fat and a change in taste. As incomes and population increase, and diets become more globalised, more dairy products are expected to be consumed in developing countries. In developed countries, per capita consumption is projected to grow from 22.2 kg in 2015-17 to 23.1 kg in 2027 in milk solids, compared to an increase from 10.6 kg to 13.5 kg in developing countries. There are, however, significant regional disparities amongst developing countries, where predominantly fresh dairy products are consumed; this contrast with developed countries, where consumer preferences tend towards processed products (Figure 7.1).

Whereas the butter price is expected to continue its decline after the butter bubble in the first quarter of 2017, after that the price of cheese will increase by about 2.1% p.a. over the projection period. The prices of milk powders are expected to show a stronger increase (SMP 3.4% p.a., WMP 3.4% p.a.), but in the case of the SMP price this percentage should be put in perspective as it starts from a low base in 2017 and is expected to recover only slowly in the short run due to stock levels that hang over the market. Despite the relatively strong growth in milk powder prices in nominal terms, they are not foreseen to return to the highs of 2013-2014 and hence will remain stable in real terms.

Currency depreciations (2027 relative to 2015-17, with respect to the United States dollar) in Argentina (104%), Brazil (14%), and Mexico (13%) will encourage growth in exports from these countries as they become more competitive relative to the United States, but also compared to the European Union and Oceania. On the import side, the currencies of most large importers – in particular China, Philippines and Indonesia – are expected to be stable or even slightly appreciate and are not likely to negatively affect their dairy product import demands. An exception is Egypt, whose currency is projected to depreciate strongly. In Japan, import demand is constrained by an ageing population, while in Canada it is limited by domestic dairy policies. Between the base period and 2027, the European Union's share in global exports of dairy commodities is expected to increase from 24% to 28%. India –the world’s largest milk producing country – has a large expanding domestic market, but is not projected to become an important player on the international market.

**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 products include butter cheese, skim milk powder and whole milk powder.
*Source*: OECD/FAO (2018), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

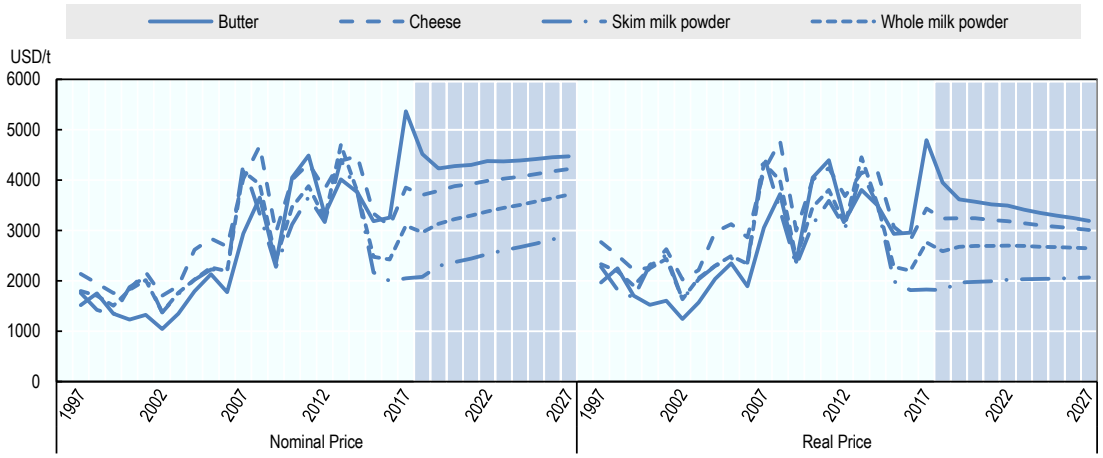
StatLink http://dx.doi.org/10.1787/888933743442

## Prices

International dairy commodity prices surged during the second half of 2016, in particular for fat-based products, following sharp declines from their 2013-2014 highs, which stemmed from a contraction in demand and excess supply. On the demand side, China – the largest importer of WMP and SMP – increased its imports in 2017, while the Russian Federation prolonged its ban for several dairy products on several major exporters (including the European Union and United States). Unfavourable weather conditions limited the increase in the 2017 milk supply for some major exporters, thereby putting upward pressure on prices. Both in 2016 and 2017 world supply growth lagged behind the demand growth.

World prices of dairy products will be supported by strong but slowing demand increases for milk and dairy products, which will be 19% higher in milk-solid basis by 2027 compared to the base period. Over the next decade, the real price of butter will decline relative to its peak value of 2017. In the short term, as the 2017 butter bubble dissipates, butter prices will decline relative to other dairy products, though they are expected remain at a higher level than before due to structural changes in demand for milk fat solids. The price of SMP starts from a low level in the base period and is expected to recover only very slowly during the coming years as stock levels in the European Union (and to a lesser extent in the United States) are high (Figure 7.2). Over the projection period, the SMP price is the only dairy product price that shows an increase in real terms. Nominal prices will increase for all products except butter, but they are not expected to return to previous highs (with cheese being the product coming closest). As compared to the previous *Outlook* dairy product prices are lower, inducing a lower production increase for major exporters.

**Figure 7.2. Dairy product prices**




*Note*: Butter FOB export price, butter, 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 (2010=1).
*Source*: OECD/FAO (2018), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink http://dx.doi.org/10.1787/888933743461

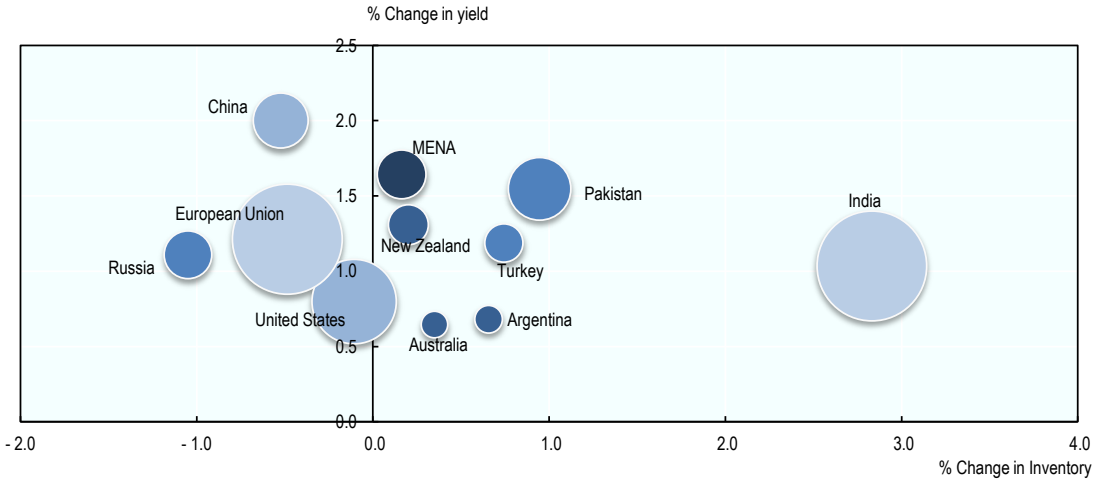
## Production

Growth in world milk production is expected to average 1.8% p.a. over the next ten years, compared to 2.1% p.a. during the previous decade. A 22% increase in milk production is projected by 2027 compared to the base period. Developed and developing countries will respectively produce an additional 9% and 33% of milk output by 2027. Dairy product prices are lower in this *Outlook* than in last year's report, with the lower prices curbing production growth, especially in the developed countries. Developed countries' share of milk production will, however, drop from 48% to 43% in 2027. Although dairy herds in developed countries are projected to decrease by 0.2% p.a., milk yield per dairy cow will grow by 1.0% p.a. over the medium term. Production growth in developing countries will be based on an increase in dairy herds of 1.1% p.a. and a yield increase of 1.6% p.a. Despite these projected yield improvements, the absolute increases in productivity will remain small given that many developing countries start from a low base. For most countries, increases in milk production over the medium term will come from yield increases rather than larger herds (Figure 7.3).

The five largest milk producers during base period are the European Union (with a 20%) share in global production, India (20%), the United States (12%), Pakistan (6%), and China (5%). Around 70% of the increase in world milk production will take place in Asia, with India and Pakistan accounting for most of the increase in production. India is poised to have the largest growth in milk production, outpacing the European Union to secure its position as the largest milk producer with a global share of 25% in 2027, followed by Pakistan with an average growth rate of 2.5% p.a. and a global share of 7% in 2027. In both countries, the vast majority of production is consumed domestically as fresh products. The shares of the European Union and the United States in world milk

production are projected to decline from 20% to 18% and 12% to 11%, respectively. However, they will remain major players in export markets for processed dairy products.

**Figure 7.3. Annual changes in inventories of dairy herd and yields between 2017 and 2027**




*Note*: The size of the bubbles refer to the total milk production in the base period 2015-17.
*Source*: OECD/FAO (2018), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink http://dx.doi.org/10.1787/888933743480

European Union milk production is projected to grow at 0.7% p.a. in the coming decade, which is slower than the 1.2% p.a. observed during the previous decade. Although the producer price of milk declines, growth is expected in 2018, mainly due to a recovery in production in EU member states that were affected by adverse weather in 2017. The European Union's medium term growth is due to an increase in domestic demand (cheese, butter, cream and other products) as well as an increase in global demand for dairy products. The European Union's milk production growth stems from an increase in milk yields, which grow at 1.2% p.a. over the next decade, while the dairy herd is on a declining trend again (-0.5% p.a.) after earlier increases as a response to the milk quota abolition. The European Union's share in global cheese production decreases from 44% to 43%, its share of butter production from 21% to 19%, SMP production from 34% to 33% and WMP production from 14% to 13%. The growth rates of SMP production, cheese and butter declined relative to 2008-2017 rates, while that of WMP will increase from zero annual growth during the 2008-17 period to 1.7% p.a. for the projection period.

Milk production in the United States is expected to increase by 0.7% p.a. during the next decade through an increase in milk yields (0.8% p.a.). Compared to the past decade, production growth is slower, at 1.5% p.a. for SMP, 1.6% p.a. for WMP, 1.8% p.a. for cheese and 1.7% p.a. for butter.

Although China will increase its production at 1.5% p.a., its share of world production remains at the same level (5%) in 2027. Most of the production will go towards fresh dairy products. China will remain a major importer of dairy products and is projected to increase its imports over the next decade but at a slower pace.

Milk production in Latin American and Caribbean countries will increase by 18% compared to the base period, and their share in world production remain at 9%. Argentina – a major producer – suffered from one of its worst crises in the last 20 years (*El Niño*-

induced adverse weather in 2016 and poor economic conditions in 2017), causing a more than 10% decrease in milk production in 2016, with only a slight recovery in 2017 (+2%) and 2018 (+2%). Over the medium term, production is projected to increase by 1.3% p.a. as the sector recovers. Brazil's 2017 production recovered from drought conditions experienced in 2015-2016, and its milk production is projected to expand by 2.2% p.a. over the projection period.

The share of Oceania in world milk production is only 3.8% during the base period and is projected to decline to 3.6% by 2027. Nevertheless, the region is the world's largest dairy exporter. Milk output growth in New Zealand is expected to be lower compared to the previous decade, with growth slowing from 3.3% p.a. during the previous decade to 1.5% p.a. over the projection period. The main constraining factors are land availability and increasing environmental restrictions. During the last decade the milk solids produced per hectare of land steadily increased by 2% p.a., while for the next decade this will decline to 1.8% p.a. New Zealand is both a leading producer and exporter of WMP, and is projected to account for 24% of global production and 55% of global exports in 2027. Over the next decade, most of the growth will come from a further increase in the dairy herd (0.2% p.a.) and yield (1.3% p.a.).

The share of developing countries in world dairy production in the base period varies from 19% (cheese) and 25% (SMP and WMP) to 38% (butter). In all cases their share in the world's 2027 production level increases, indicating that production tends to follow demand, though for SMP and WMP there still remain big gaps between production and consumption levels.

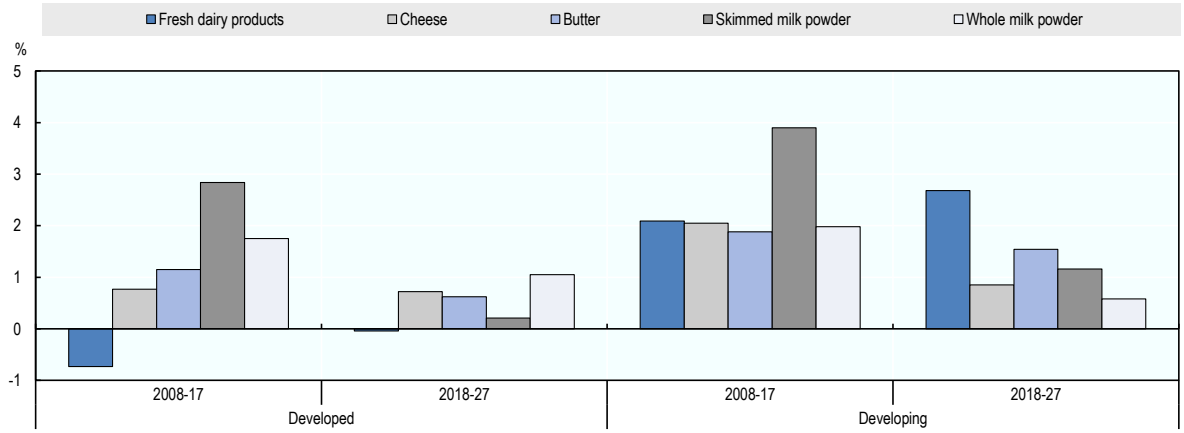
In developed countries, the majority of milk production is transformed into butter, cheese, SMP and WMP. In terms of milk-solid basis, developed countries will increase milk production by 9%, with 37% of that increase going to cheese production, around 23% to SMP, 20% to butter, 10.5% to WMP and 8.5% to fresh dairy products. In developing countries, of the 33% increase in milk production in 2027, 85% will go to the production of fresh dairy products, 7% to butter, 4% to WMP, 3% to cheese and 0.6% to SMP.

## Consumption

World consumption of fresh dairy products and processed dairy products is poised to grow by 2.1% p.a. and 1.7% p.a. respectively, over the next decade. The largest share of milk and dairy product consumption is in the form of fresh dairy products, taking up about 50% of the world's total milk production. This share continues to increase to 52% over the next ten years due to rising milk consumption in developing countries. Consumption dynamics differ considerably between developed and developing countries. Developed countries consume primarily processed milk products, with per capita consumption of cheese increasing by 0.7 p.a., butter by 0.7% p.a., WMP by 1.1% p.a., fresh dairy products per capita consumption remaining stable and SMP decreasing by -0.3% p.a. (Figure 7.4).

in Asia. This share will rise to 73% over the decade. Per capita consumption of dairy products in developing countries is expected to increase by an average of 0.5% p.a. for WMP, 1.1% p.a. for SMP, 0.8% p.a. for cheese, 1.7% p.a. for butter, and 1.9% p.a. for fresh dairy products. Except for butter, these growth rates are considerably slower than those seen in the last decade. This is partly due to higher initial levels of consumption.

**Figure 7.4. Annual growth rates of per capita consumption for dairy products**




*Source*: OECD/FAO (2018), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink http://dx.doi.org/10.1787/888933743499

Developing countries consume 68% of fresh dairy products, most of which is consumed

While fresh dairy products intake will still make up more than 75% of the per-capita consumption of milk solids in developing countries by 2027, consumption of processed products differs between regions. Butter and cheese will respectively account for 11% and 18% of dairy consumption in North Africa and 12% and 13% in the Middle East. SMP and WMP will account for 35% and 13% respectively of the per capita consumption of milk solids in Southeast Asia. Per capita consumption of cheese and WMP in South America will remain at respectively 16% and 18% of total dairy per capita consumption. While some regions are self-sufficient, e.g. India, in other parts of the world, such as Africa, Asian countries and the Middle-East, consumption is growing faster than production, leading to an expansion in dairy imports.

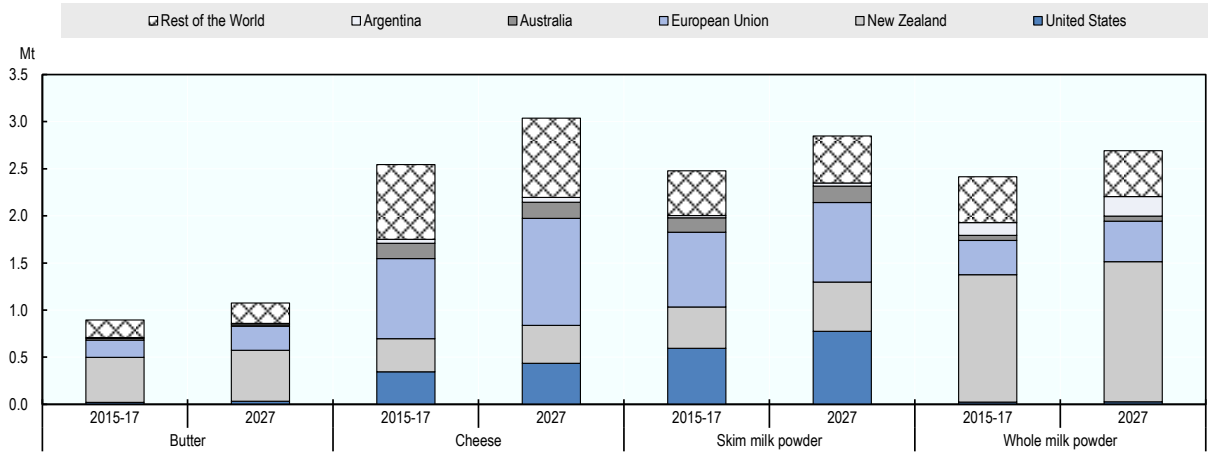
In developed countries, increasing per capita consumption of processed dairy products – cheese and WMP – is also expected, although at lower growth rates than in the last decade. The high butter to vegetable oil price ratio is assumed to limit demand growth for butter and milk fat. Nevertheless, consumers in developed countries will consume an additional 0.3 kg of butter in 2027 due to preferences shifting in favour of butter over other oils and fats. Recent studies that have shed a more positive light on the health implications of dairy fat consumption, as well as consumers' preference for taste and less processed food, have encouraged its use in bakery products and recipes. Per capita consumption of fresh dairy products decreases slightly over the outlook period. Most of the increase in consumption of SMP is used in the manufacturing sector, notably in confectionary, infant formula, and bakery products.

## Trade

Around 81% of world exports of dairy products come from developed countries; this rate is projected to increase to 82% by 2027. Over the next decade, developed countries are projected to increase exports by 22%, implying an annual growth rate of 1.8% p.a. This is lower than the past decade as the projected growth in consumption of dairy products in developing countries slows down from 3.4% to 2.9% p.a. Growth rates in exports differ

among dairy products: 1.8% p.a. for butter; 2.4% p.a. for cheese; 1.7% p.a. for SMP; and 1.3% p.a. for WMP. The four major exporters of dairy products in the base period are New Zealand with a share of 32%, the European Union (24%), the United States (12%) and Australia (6%). Except for Oceania (New Zealand, Australia), which sees its export share decreasing from 38% in the base year period to around 33% in 2027, export shares increase slightly for the United States, the European Union and Argentina. The four developed countries will jointly account for around 69% of world cheese, 80% of world WMP, 79% of world butter, and 81% of world SMP exports in 2027 (Figure 7.5). In the case of WMP, Argentina is also one of the main exporters accounting for 8% of world exports in 2027. While demand for fresh dairy products is much greater than for processed products, higher costs for transport and storage of fresh products generally limit such trade.

**Figure 7.5. Exports of dairy products by region**




*Source*: OECD/FAO (2018), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink http://dx.doi.org/10.1787/888933743518

New Zealand remains the primary source for butter and WMP on the international market, with market shares of around 53% and 55%, respectively, by 2027. Its market share for WMP remains the same, while that of its butter exports increases to 56% in 2027. Given that China, a major importer of WMP, has drastically decreased purchases, it is projected that New Zealand will have a lower production growth rate of 1.3% over the next decade compared to 9.3% over the last decade. It is also projected that it will diversify and slightly increase its production of cheese over the outlook period.

The European Union will remain the main cheese exporter, accounting for 37% of world exports in 2027, followed by the United States and New Zealand at around 14% and 13% respectively. Over the next decade, export growth for these three countries will average 2% p.a. The European Union's share in the world cheese production is projected to be around 43% in 2027 and is sustained by increased exports to Canada via the CETA agreement, and the assumed end of the ban imposed by the Russian Federation in 2018. China and Egypt are expected to more than double their imports of cheese by 2027. Only about 10% of world cheese production is traded internationally, of which 60% is projected to be imported by developed countries in 2027. The European Union is also an exporter of fresh dairy products, which after a spectacular growth in the past (18.9% p.a.

in the period 2008-2017) will stabilise in the projection period with net trade averaging around 1.3 Mt.

The share of world WMP production that is exported in 2027 is projected to decrease from 46% to 42%, while the share of the other dairy products will remain unchanged. In the case of WMP, it is expected that New Zealand's share of world trade will remain stable at 55% in 2027. The European Union is another main exporter of SMP, and will account for 16% of world exports in 2027. The European Union will slightly increase its share in world SMP exports by 1 percentage point by 2027. Developed countries export 90% and 76% of SMP and WMP, and developing countries import around 45% of the world SMP and WMP production in 2027.

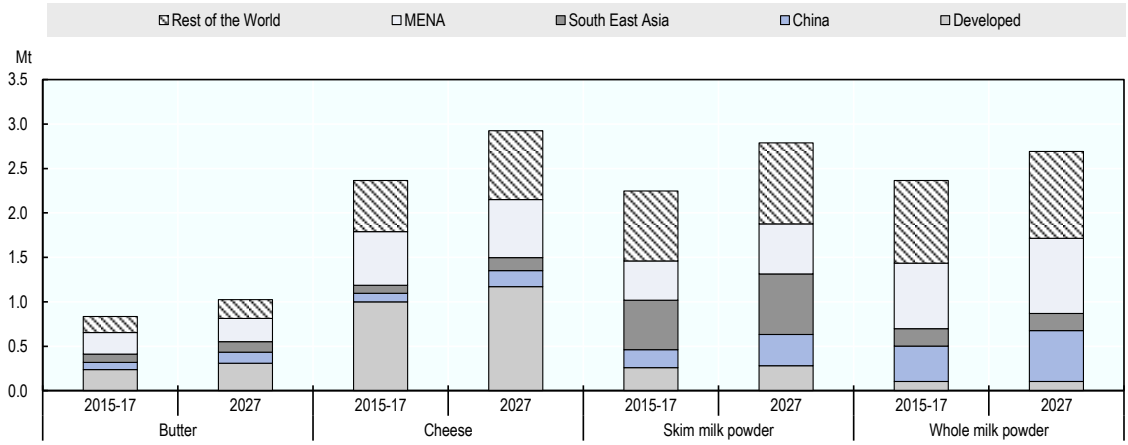
In contrast to dairy exports, imports are spread more widely across countries and the dominant destinations for all dairy products (product weight basis) will be developing countries, with MENA accounting for 24% of world imports in 2027, South East Asia for 12% and China for 13%, whereas the share of developed countries will be 20%. Developed countries import considerable levels of cheese and butter at around 42% and 11% of world imports in 2015-17, respectively; these percentages will remain at similar levels in 2027. The Russian Federation, Japan, China, the United States, and Mexico are projected to be the top five cheese importers in 2027. It is expected that cheese imports in developing countries will grow at a faster rate (2.4% p.a.) than in developed countries (1.0% p.a.). The main importers of butter are the Russian Federation, Egypt, China and Saudi Arabia, a reflection of increases in domestic consumption (Figure 7.6).

Developing countries imported 96% of global shipments of WMP in 2015-17 and this share is expected to remain constant over the medium term. Asia is projected to increase its share of imports from 57% to 59% by 2027. China is the main importer and will import 21% of world trade by 2027. China's imports of cheese and butter should expand annually by 4.8% and 2.4%, respectively; by 2027, its share of world imports will be 12% for butter and 6% for cheese. Most of its dairy imports have been from Oceania, although in recent years, the European Union has increased its exports of butter and SMP to China.

Developing countries account for 88% of total SMP imports. The SMP market was less affected by decreases in China's imports, as there are a large number of importers on the market. China continues to be the world's major importer, with 4.9% p.a. growth in SMP imports over the projection period. China's share in world imports will increase from 9% in the base period to 13% in 2027. China is also a major importer of fresh dairy products: net imports in the base period are about 580 kt, which are expected to increase over the projection period by 44%. Growth in other major importing countries – Egypt, Mexico, Algeria, Indonesia, Malaysia, the Philippines and Viet Nam – are projected to decrease over the outlook period compared to the last decade, due to higher base levels but also to limited growth in demand given the preference for fresh dairy products.

The Middle East and North Africa will remain key destinations, accounting for 35% of world butter imports and 19% of world cheese imports by 2027. The European Union has traditionally been an important trade partner for dairy products and has recently expanded its exports, especially of butter and cheese. Egypt is confirming its position as a major importer of butter, as is Saudi Arabia, which also is a large importer of cheese (see Chapter 2 of the *Outlook* for more details).

**Figure 7.6. Imports of dairy products by region**




*Source*: OECD/FAO (2018), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink http://dx.doi.org/10.1787/888933743537

## Main issues and uncertainties

The relatively high prices for milk fat may induce substitution of milk fat by vegetable fats (e.g. fat-filled powders) for certain uses and destinations, which may not fully reverse when the butter price comes down from its current. This adds to the uncertainty about the long- term relative valuation of fat and non-fat milk solids.

China's role as a major importer of dairy products is a key uncertainty. Small variations in domestic production and consumption can have a significant impact on the world market, as shown in 2011-2015 period when the country's imports of WMP expanded and then decreased rapidly.

High growth in milk production, and growing demand in India is a major feature of the outlook, and such high growth in either one may appear not to be sustainable in the medium term. While India does not currently participate in international dairy markets, if this were to change, it could have major impacts given the size of its market.

Specialisation and restructuring of milk production in the European Union has been given impetus by the removal of milk quotas in April of 2015.

In several countries – Netherlands, Germany, Denmark, France and Italy– concerns about environmental issues may limit milk production increases.

Dairy demand and export opportunities could also be affected by the outcome of free trade agreements (FTA) and regional trade agreements (RTA) currently under discussion. The Russian Federation's embargo on several dairy products from major exporting countries is expected to end in 2018 and imports will increase slightly but will likely not return to the pre-ban levels.

World production may be constrained because of unforeseen weather events. Climate change increases the chances of drought, floods and disease threats which can affect the dairy sector in several ways (price volatility, milk yield, cow inventory adjustments).

Environmental legislation can have a strong impact on the future development of dairy production. Greenhouse-gas emissions from dairy activities make up a high share of total

emissions in some countries. Any changes in related policies could affect dairy production. Water access and manure management are additional areas where policy changes could have an impact.

Changes in domestic polices remain an uncertainty. In Canada, the SMP export projections beyond 2021 are uncertain as changes are going on in the dairy industry in reaction to the World Trade Organization Nairobi Decision. In the European Union, the release of its considerable SMP intervention stocks may limit the rise in SMP prices.

## Notes

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