

Chapter 7. Dairy and dairy products

This chapter describes the market situation and highlights the medium-term projections for world dairy markets for the period 2019-28. Price, production, consumption and trade developments for milk, fresh dairy products, butter, cheese, skimmed milk powder and whole milk powder are discussed. The chapter concludes with a discussion of important risks and uncertainties affecting world dairy markets during the coming ten years.

7.1. Market situation

World milk production (81% cow milk, 15% buffalo milk, and a total of 4% for goat, sheep and camel milk combined) grew by 1.6% in 2018 to about 838 Mt. In India, the largest milk producer in the world, production increased by 3.0% to 174 Mt, although this had little impact on the world dairy market as India trades only marginal quantities of milk and dairy products.

The three major dairy product exporters achieved production increases during 2018, the European Union (0.8%), New Zealand (3.2%) and United States (1.1%), that were almost entirely driven by higher milk yields per cow; in New Zealand, favourable grass conditions also played a role. As a result, the availability of fresh dairy products¹ and processed products for export increased. In the People's Republic of China (hereafter "China"), the world's largest importer of dairy products, milk production increased for the first time in four years by 1.1% in 2018. Official milk production data for China was revised downward in late 2018 by up to 15% for the last ten years.

International dairy prices refer to dairy products, as unprocessed milk is practically not traded. Butter is the reference for milk fat and skim milk powder (SMP) for other milk solids. Milk fat and other milk solids together account for about 13% of the weight of milk, with the remainder being water. In 2018, butter prices declined compared to its record 2017 levels but showed a significant increase around the middle of the year. The strength of milk fat prices (butter) in contrast to the prices of other milk solids (SMP) continued in 2018, supported by strong demand in North America and Europe for cream, butter and other full-fat milk products. SMP prices started to recover from low levels towards the end of 2018 as the European Union considerably reduced its intervention stocks, purchased mainly in 2016 when European Union prices fell below the set threshold of EUR 1 698 per tonne.

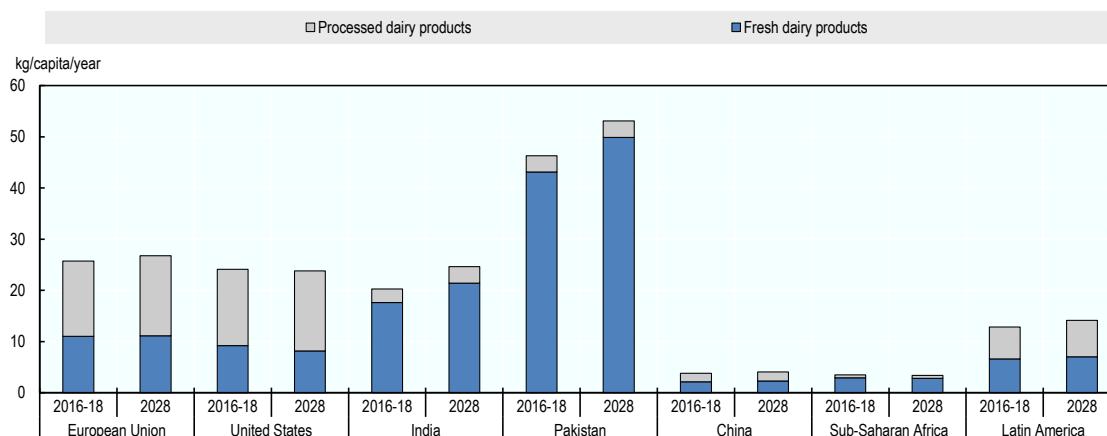
7.2. Projection highlights

World milk production is expected to grow at 1.7% p.a. (to 981 Mt by 2028) over the next decade, faster than most other main agricultural commodities. In contrast to the previous decade, the projected growth of cowherds (1.2% p.a.) is higher than the projected average yield growth (0.4%) as cow herds are projected to grow faster in countries with low yields. It is expected that India and Pakistan, important milk producers, will contribute more than half of the growth in world milk production over the next ten years, and to account for more than 30% of world production in 2028. Production in the second largest milk producer, the European Union, is projected to grow more slowly than the world average as only a small share of production is exported and domestic demand is growing only slightly.

Milk is a highly perishable product and requires to be processed shortly after collection. It cannot be stored for more than a few days. Nevertheless, most of dairy production is consumed in the form of fresh dairy products, which are not or only slightly processed. The share of fresh dairy products in world consumption is expected to increase over the coming decade due to strong demand growth in developing countries, 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, driven by higher per-capita income growth, especially in India. In Europe and North America, overall per capita demand for fresh dairy products is declining, but the composition of demand has been shifting for several years towards dairy fat. The majority of cheese consumption, the second most important dairy product in terms of milk solids,

occurs in Europe and North America, where per capita consumption is expected to continue to increase.

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 (2019), “OECD-FAO Agricultural Outlook”, OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

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Milk is internationally traded mainly in the form of processed dairy products. China consumes small amounts of dairy per person but is the most important importer of dairy products, especially of whole milk powder (WMP). Japan, the Russian Federation, Mexico, and the Middle East and North Africa are other important net importers of dairy products. International trade agreements (e.g. CPTPP, CETA, and the preferential trade agreement between Japan and the European Union) have specific arrangements for dairy products (e.g. tariff rate quotas) which create opportunities for further trade growth.

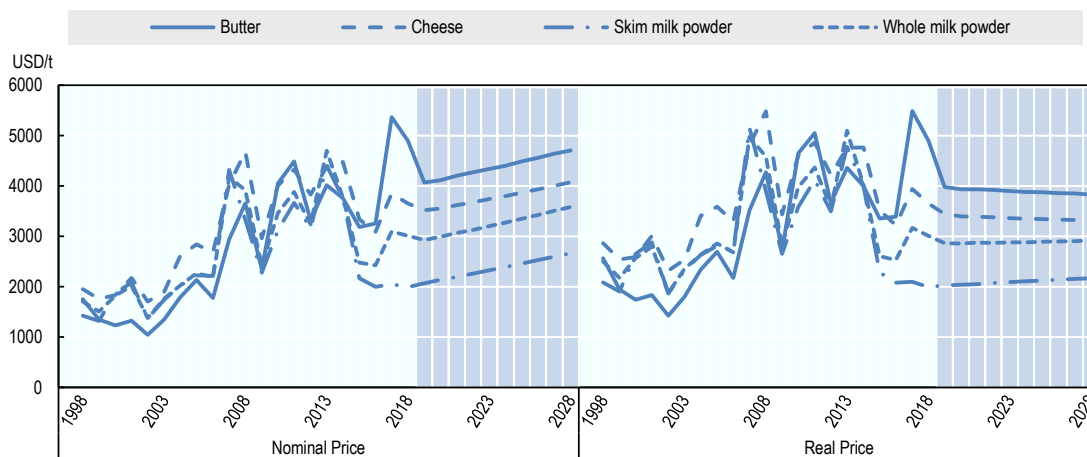
Since 2015, the price of butter is considerably higher than SMP prices. This development is attributed to stronger demand for milk fat compared to other milk solids on the international market and is assumed to be a structural feature over the coming decade.

Dairy trade flows could be substantially altered by changes in the trade environment. For example, large amounts of cheese and other dairy products are traded between the European Union and the United Kingdom, and this could be affected by Brexit, while the USMCA is expected to influence dairy trade flows in North America. So far the big dairy consuming countries, India and Pakistan, are not integrated in the international market. Greater engagement in trade by these countries could have a substantial effect on world markets.

7.3. Prices

International reference prices for dairy refer to processed products of the main exporters in Oceania and Europe. The two main reference prices for dairy are for butter and SMP. Since 2015, the prices of butter have increased considerably more than SMP prices due largely to stronger demand for milk fat compared to other milk solids on the international market. This is expected to continue over the coming decade (Figure 7.2).

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 (2019), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

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SMP prices are currently at a relatively low level and are projected to increase in real terms over the projection period. High intervention stocks in the European Union stalled this price increase, but these were almost entirely released in the second half of 2018 and the beginning of 2019. Annual butter prices peaked historically in 2017 and have been on the decline since. Butter prices are projected to decline slightly in real terms in line with most other agricultural commodities over the projection period. World prices for whole milk powder (WMP) and cheese are expected as functions of butter and SMP price developments, 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 (approximately 8% of world milk production), the dominance of a few exporters and importers, and a 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 further processed.

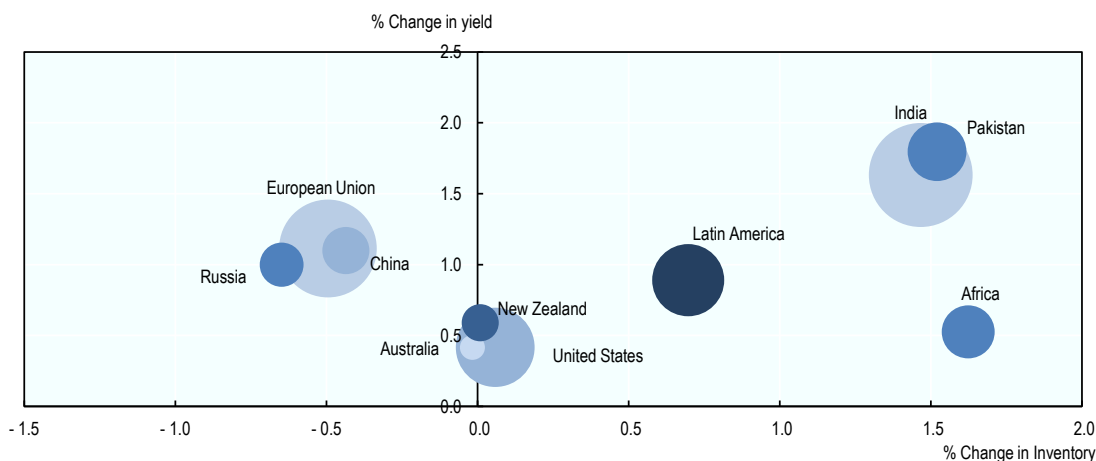
7.4. Production

World milk production is expected to grow at 1.7% p.a. (to 981 Mt by 2028) over the next decade, faster than most other main agricultural commodities. In almost all regions of the world, yield growth is expected to contribute more to production increases than herd growth (Figure 7.3). The contradicting world average observation of a larger growth of herds (1.2% p.a.) than average yield growth (0.4%) is due to herds growing faster in countries with relatively low yields.

India and Pakistan are especially important for milk production, and are expected to contribute to more than half of the growth in world milk production over the next ten years. They are also expected to account for more than 30% of world production in 2028. Production will occur mostly in small herds of a few cows or buffaloes. It is expected that

yields will continue to grow fast and contribute more to production growth. In both countries, the vast majority of production will be consumed domestically as few fresh products and dairy products are traded internationally.

Figure 7.3. Annual changes in inventories of dairy herd and yields between 2019 and 2028



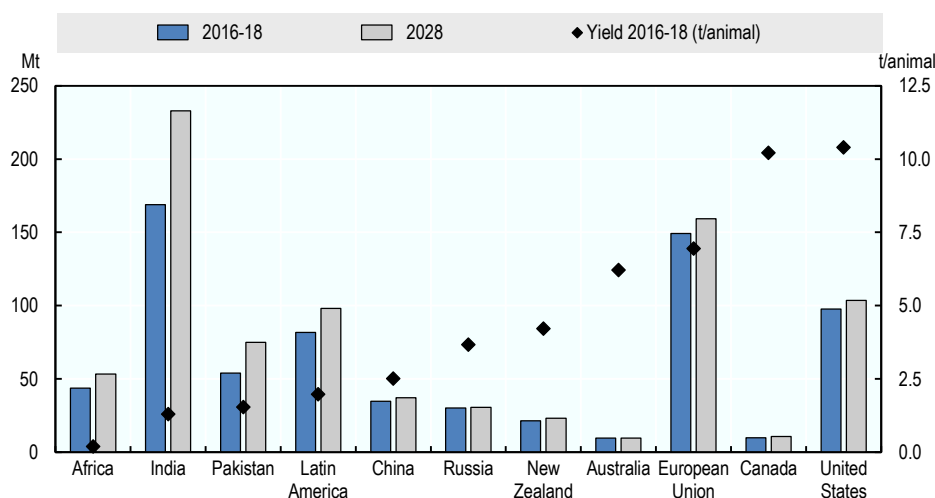
Note: The size of the bubbles refer to the total milk production in the base period 2016-18.

Source: OECD/FAO (2019), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

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Production in the European Union, the second largest producer, is projected to grow more slowly than the world average. The European Union's medium term growth is due to a small increase in domestic demand (cheese, butter, cream, and other products) as well as an increase in global demand for dairy products. Growth in EU milk production will stem from an increase in milk yields, which are projected to grow at 1.1% p.a. over the next decade. Dairy herds are expected to go on a declining trend again (-0.5% p.a.) following an increase in the early years of the projection period in response to the abolition of milk quotas. The European Union production originates from a mix of grass-based and feed-based production systems. In addition, a growing share of milk produced is expected to be organic; more than 10% of dairy cows today are in organic systems in Austria, Sweden, Latvia, Greece, and Denmark. About 3% of European Union milk production at present comes from organic farms with relatively low yields, but a considerable price premium for milk.

The highest average yield per cow is expected to occur in North America as the share of grass-based production is low and feeding is focused on high yields (Figure 7.4). Cow herds in the United States and Canada are expected to remain largely unchanged and production growth to originate from further increases of what are already high yields. As domestic markets are saturated and the milk fat demand continues to increase, US exports will mostly be in the form of SMP.

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 (2019), “OECD-FAO Agricultural Outlook”, OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

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New Zealand is the most export-orientated producer and has seen substantial recent growth in milk production. Milk production is mainly grass-based and yields are considerably lower than in North America and Europe. The efficiency of grass management and the year-round grazing, however, allows New Zealand to be competitive. The main constraining factors for growth are land availability and increasing environmental restrictions. A change to a more feed-based production is nevertheless not expected.

Strong production growth is expected in Africa, mostly due to larger herds. These will usually have low yields, but a considerable share of milk production will come from goats and sheep. Most cows, goats and sheep graze and are used for other purposes, such as meat production, traction, and savings. Over the projection period, about a third of the world-wide herd population is expected to be located in Africa, and account for about 5% of world milk production.

It is expected that less than 30% of milk will be further processed into products such as butter, cheese, SMP, WMP, or whey powder. Butter and cheese have considerable direct food demand, especially cheese, and they presently account for a large share of consumption of milk solids in Europe and North America. SMP and WMP are highly traded and are largely produced for trade only. Both are used in the food processing sector, notably in confectionary, infant formula, and bakery products.

Only the production of butter is projected to grow at 1.9% p.a., a faster rate than for world milk production. SMP is expected to grow at 1.3% p.a.; whereas cheese and WMP are both projected to grow at 1.2% p.a. The slower growth of cheese is due to the high importance of slow growing food markets in Europe and North America.

7.5. Consumption

Most of dairy production is consumed in the form of fresh dairy products. The share of fresh dairy products in world of global consumption is expected to increase over the coming decade due to stronger demand growth in India and Pakistan in particular, which in turn is driven by income and population growth. World per capita consumption of fresh dairy products is expected to increase by 1.0% p.a. over the coming decade, slightly faster than over the past ten years, driven by higher per-capita income growth.

The level of milk consumption in terms of milk solids per capita will vary largely across the world (Figure 7.1). One reason is tied to income per capita but the impact of regional preferences will also be an important factor. For example, the per capita intake in India and Pakistan is expected to be high, but low in China. In all countries, the share of processed dairy products in the overall consumption of milk solids is expected to be closely related to income.

In Europe and North America, overall per capita demand for fresh dairy products is declining, but the composition of demand has been shifting over the last several years towards dairy fat, e.g. full-fat drinking milk and cream. This is to some extent due to recent studies that have shed a more positive light on the health benefits of dairy fat consumption, as well as to growing consumer preference for taste and less processed foods.

Cheese consumption, the second most important dairy product in terms of milk solids, occurs primarily in Europe, North America and Oceania, and per capita consumption is expected to continue to increase. The dominant use of SMP and WMP will continue to be in the manufacturing sector, notably in confectionary, infant formula, and bakery products.

While some regions are self-sufficient, e.g. India and Pakistan, in other parts of the world such as Africa, South East Asian countries and the Middle East, consumption is expected to grow faster than production, leading to an increase in dairy imports. As liquid milk is more expensive to trade, this additional demand growth is expected to be met with milk powders, where water is added for final consumption or further processing.

7.6. Trade

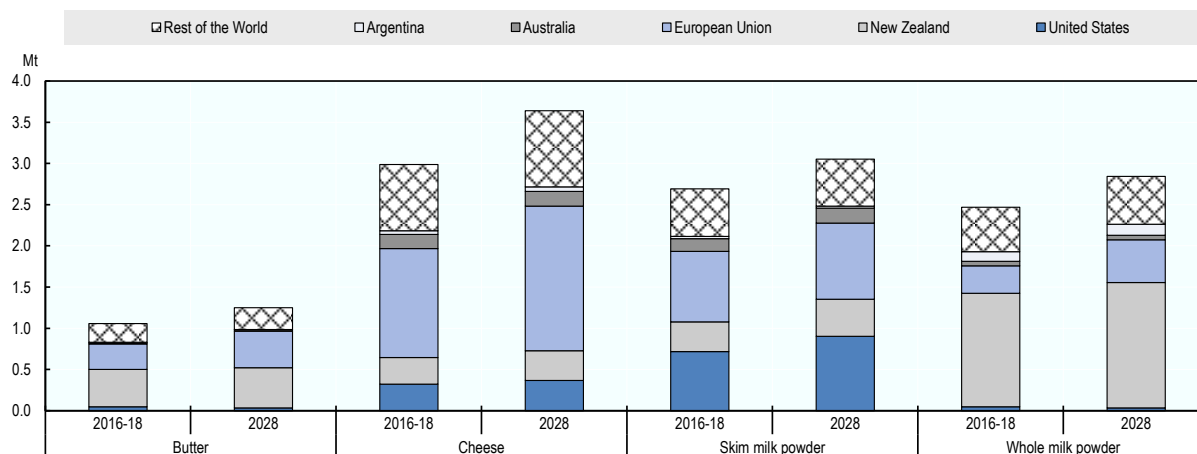
Approximately 8% of world milk production is traded internationally. This is primarily due to the perishability of milk and its high water content (more than 85%). Nevertheless, in recent years, imports of liquid milk by China from the European Union and New Zealand have increased considerably. The trade share of WMP and SMP is high at more than 40% of world production, but these products are often only produced to store and trade milk over a longer period.

The four major exporters of dairy products in the base period are New Zealand, the European Union, the United States, and Australia. These four countries are expected to jointly account for around 75% of cheese, 78% of WMP, 79% of butter, and 81% of SMP exports in 2028 (Figure 7.5). In the case of WMP, Argentina is also a main exporter, and is expected to account for 5% of world exports in 2028. In recent years, Belarus became an important exporter, orientating its exports primarily to the Russian market.

New Zealand remains the primary source for butter and WMP on the international market, and its market shares are expected to be around 39% and 53%, respectively, by 2028. Given that China, a major importer of WMP, has drastically decreased its purchases, it is projected that New Zealand will have a lower production growth rate of 0.3% p.a. over the next

decade compared to 6.9% p.a. over the last decade. It is also projected that New Zealand will diversify and slightly increase its production of cheese over the outlook period.

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>.

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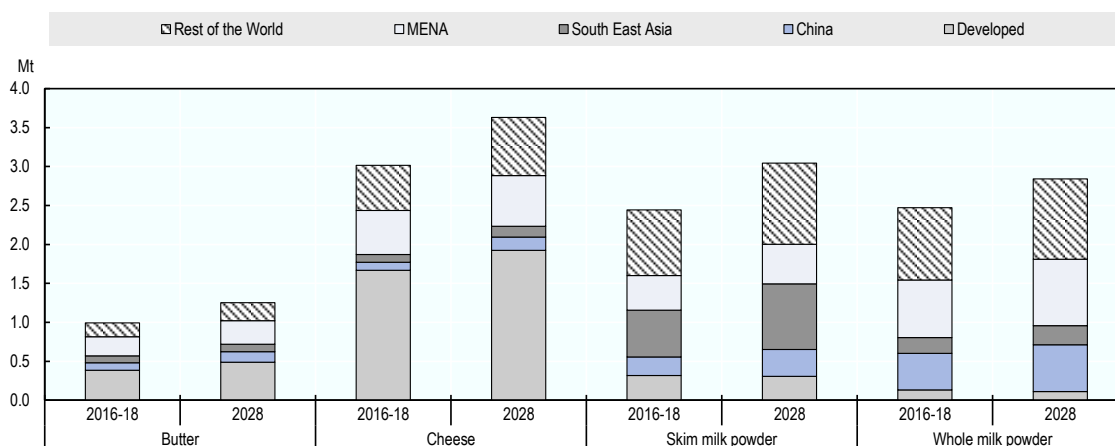
The European Union will continue to be the main world cheese exporter, followed by the United States and New Zealand. It is projected that the European Union’s share in world cheese production will be around 48% in 2028, and sustained by increased cheese exports to Canada via the CETA agreement and to Japan following the ratification of the bilateral trade agreement in 2019.

Imports are spread more widely across countries and the dominant destinations for all dairy products are the Middle East and North Africa (MENA), developed countries, South East Asia, and China (Figure 7.6). Imports by the Middle East and North Africa are expected to originate primarily from the European Union, while United States and Oceania are expected to be the main suppliers of milk powders to South East Asia.

China is expected to continue to be the world’s major dairy importer, particularly for WMP. Most of its dairy imports come from Oceania, although in recent years, the European Union has increased its exports of butter and SMP to China. China is also a major importer of fresh dairy products. Net imports over the base period were about 0.7 Mt, and it is expected this will increase over the projection period by 2.7% p.a.

Developed countries import a high level of cheese and butter, around 55% and 39% of world imports in 2016-18, respectively. These percentages are expected to be similar in 2028. The United Kingdom, the Russian Federation, Japan, the European Union, and China are projected to be the top five cheese importers in 2028. There will be some changes in the order, but most of the main cheese importers are developed countries. These countries often also export cheese and international trade is expected to increase the choice of cheeses for consumers.

Figure 7.6. Imports of dairy products by region



Note: MENA refers to Middle East and North Africa; South East Asia contains Indonesia, Malaysia, Philippines, Thailand and Viet Nam.

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

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7.7. Main issues and uncertainties

World production may be constrained because of unforeseen weather events, which affect grazing based milk production, the dominant production method worldwide. 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).

The seasonality of milk production in the case of grass-based systems resulted in seasonal variation of international prices with peaks around the mid of the calendar year, especially for butter. This development was more visible during the period of high butter prices in recent years.

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 (for example New Zealand, Ireland). Any changes in related policies could affect dairy production. The increase trends toward sustainable practices such as water access and manure management are additional areas where policy changes could have an impact.

Specialisation and restructuring of milk production in the European Union were given impetus by the removal of milk quotas in April 2015. In several countries – the Netherlands, Germany, Denmark, France, and Italy – concerns about environmental issues may limit future milk production increases. Constraints for dairy production can come from farm-level nutrient balancing in the European Union, especially for specialised feed-based production.

Animal diseases can have a big impact on milk production. Mastitis is the most common infectious disease in dairy cattle worldwide and across all types of farm sizes. It is also the most damaging from an economic point of view, with a significant impact on milk yield and milk quality. Future developments in awareness, identification and treatment of this disease could lead to significant increases in milk production through smaller losses.

In order to control many diseases including mastitis, treatments based on antimicrobials are commonly used. This has raised concerns on the overuse of antimicrobials and the development of antimicrobial resistance, which would reduce the effectiveness of existing treatments and require the development of new ones. The evolution of this process remains an uncertainty for the next decade.

The relatively high price for milk fat may lead to the substitution of milk fat with vegetable fats (e.g. fat-filled powders and other dairy products) for certain uses and destinations. This adds to the uncertainty on the long- term relative valuation of milk fat and non-fat milk solids.

In recent years, the role of plant-based dairy substitutes (e.g. soya, almond, rice and oat drinks) in the fluid milk sector has increased in many regions, e.g. North America, Europe and East Asia. Causes include lactose intolerance but also discussions on the health and environmental impact of dairy. Growth rates are strong from a low base, but conflicting views exist regarding the environmental impact and relative health benefits of plant-based dairy substitutes. As a result, there is again uncertainty on the long-term impact this will have on dairy demand.

Changes in domestic policies also remain an uncertainty. In Canada, the SMP export projections are uncertain due to changes in its domestic dairy industry in reaction to the World Trade Organization Nairobi Decision, which eliminates the use of export subsidies in agriculture beyond 2020. In the European Union, intervention buying of SMP and butter at fixed prices remains possible and this has had considerable market impact in recent years for SMP.

Dairy trade flows could be substantially altered by changes in the trade environment. To date, the big dairy consuming countries, India and Pakistan, are not integrated into the international dairy market as domestic production is projected to expand fast to respond to demand.

Changes or creation of trade agreements would affect dairy demand and trade flows. For example, large amounts of cheese and other dairy products are traded between the European Union and the United Kingdom, and this could be affected by Brexit, while the USMCA is expected to influence dairy trade flows in North America. The Russian Federation's embargo on several dairy products from major exporting countries is expected to end in 2019 and imports are expected to increase slightly, although they do not seem likely to return to the pre-ban levels.

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 and, for some cases casein and whey). The quantities are in cow milk equivalent.