

Chapter 9

Dairy

This chapter describes the market situation and the latest set of quantitative medium-term projections for global and national dairy markets for the ten-year period, 2014-23. The discussion of the medium-term market prospects for dairy covers the developments expected in national milk production, and world and national dairy product prices, production, food consumption and trade (imports and exports). The quantitative projections are developed with the aid of the partial equilibrium Aglink-Cosimo model of world agriculture. Included in the chapter are two boxes on i) challenges and opportunities facing China's dairy sector and ii) milk and dairy products in human nutrition. The chapter concludes with a discussion of some main issues and uncertainties affecting the medium-term outlook for dairy. These include dairy policies, and specific market development influencing production, consumption and trade in dairy.

Market situation

In early 2012, high returns and excellent pasture conditions in Oceania, and parts of South America, generated a supply response triggering a fall in milk and dairy prices. With demand continuing to expand, especially from China, prices bottomed out in mid-2012 at levels much higher than during the previous downturn in 2009. The decline in Chinese milk production by 5.7% in 2013 led to strong import demand for dairy products and to higher world dairy prices. Additionally, during the first half of 2013, major players on the world dairy market – the United States, the European Union, New Zealand and Australia – produced less milk than a year ago. The main reasons were high feed cost and adverse weather conditions in Oceania and parts of Europe. Prices for skim milk powder (SMP) and whole milk powder (WMP) reached a new peak in April 2013, above the level of the 2007/08 commodity boom. Production in the major dairy exporting countries started to increase in mid-2013, as feed prices declined and milk margins improved. Nevertheless, due to continued strong demand on the world market, prices of dairy products remain high into the year 2014.

Projection highlights

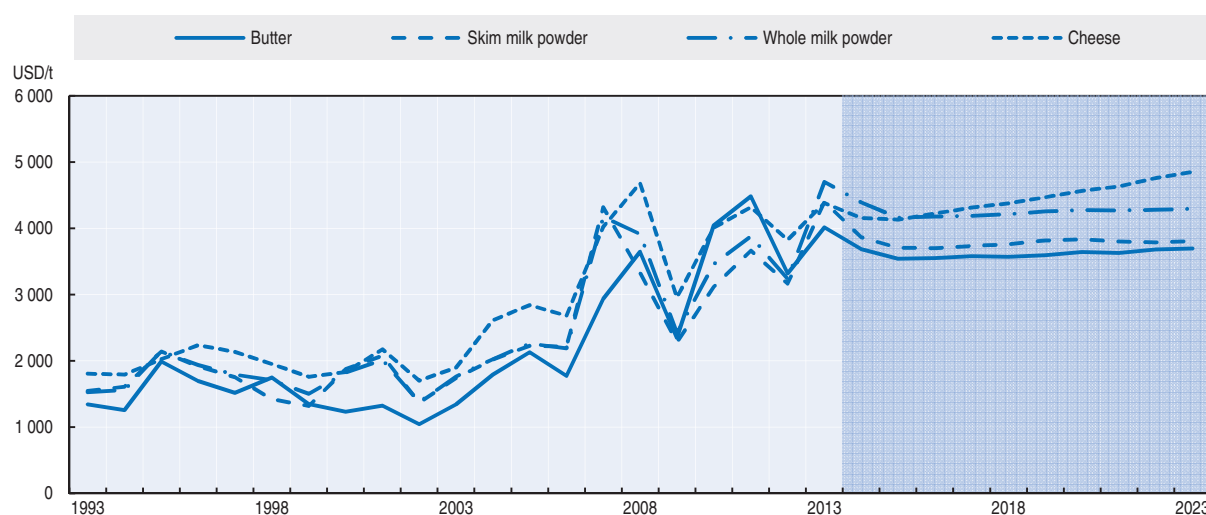
- World milk production is projected to increase by 180 Mt by 2023 when compared to the base years (2011-13), the majority of which (78%) is anticipated to come from developing countries. The average growth rate for the projection period is estimated at 1.9% which is below the 2.2% witnessed in the last decade. The slowdown in growth reflects growing shortages of water and suitable land in developing countries combined with a slow introduction of modern dairy production systems.
- Several dairy product prices reached new highs during 2013, and a correction is expected in the near future, followed by firming nominal prices over the medium-term. Real prices are projected to decline slightly in the next decade, albeit remaining considerably above the pre-2007 levels.
- Per capita consumption of dairy products in developing countries is expected to increase by 1.2% to 1.9% p.a. The expansion in demand reflects robust income growth and further globalisation of diets. By contrast, per capita consumption in the developed world is projected to increase between 0.2% and 0.9% p.a.
- A general expansion of trade in dairy products is expected over the coming decade. Strong growth is expected for whey, cheese and SMP, at more than 2% p.a. Lower growth is expected for WMP, at 1.7% p.a., and especially butter at 0.7% p.a. The bulk of this growth will be satisfied by expanded exports from the United States, the European Union, New Zealand, Australia and Argentina.

Market trends and prospects

Prices

Milk and dairy product prices increased in 2013 due to a large production shortfall in China and increasing feed costs. Additionally, during the first half of 2013, major players on the world dairy market – the United States, the European Union, New Zealand and Australia – produced less milk than a year ago. Production in the major dairy exporting countries started to react to the price signals during 2013. In addition, starting mid-2013, prices for feed grains became considerably lower, compared to last year. Combined with an expected recovery of the domestic milk production in China, this will likely lead to declining dairy and milk prices in the near future (Figure 9.1).

Figure 9.1. **World dairy prices in nominal terms**



Notes: F.o.b. export price, butter, 82% butterfat, Oceania; F.o.b. export price, non-fat dry milk, 1.25% butterfat, Oceania; F.o.b. export price, WMP 26% butterfat, Oceania; F.o.b. export price, cheddar cheese, 39% moisture, Oceania.

Source: OECD and FAO Secretariats.

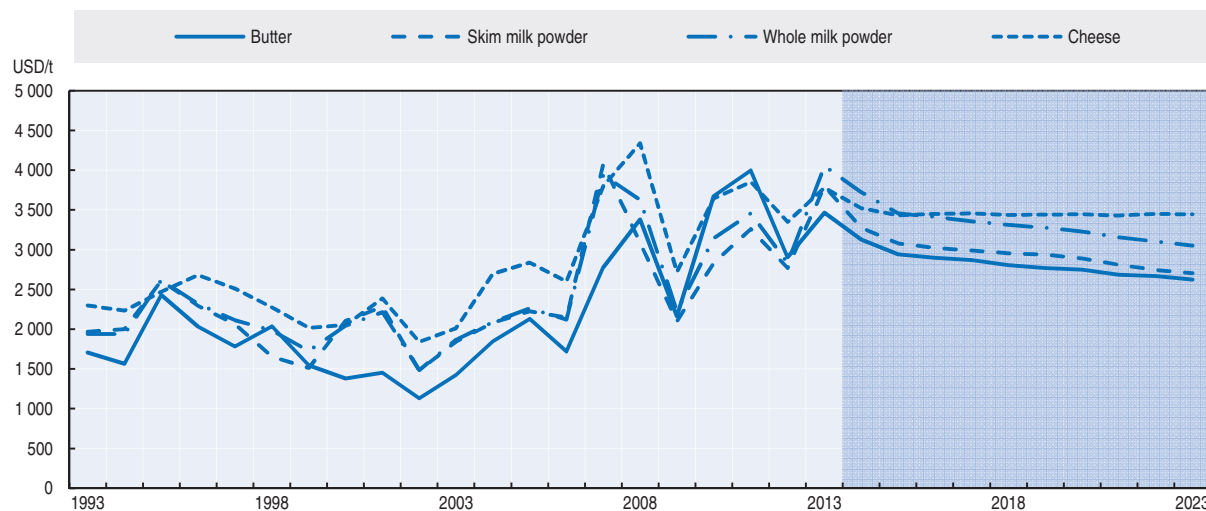
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Over the medium-term, increasing incomes and globalisation of diets are expected to raise the demand for milk and dairy products in developing countries. Most of the growth in demand will be satisfied domestically by increasing dairy herds and rising yields. The increasing import demand will support prices of dairy products during the next decade. Cheese prices are expected to develop the strongest over the outlook period. On the other hand, butter prices are expected to remain below SMP prices in the next decade.


Over the next ten years, it is expected that real dairy product prices will decline slightly. This is partly due to the current higher price levels but also to the expected continued productivity growth in the dairy sector (Figure 9.2). Nevertheless, real prices will be substantially higher than in the period before 2007.

The Outlook price projections reflect the usual assumptions of stability in weather and in economic and policy conditions. Under these “normal” conditions, prices are not expected to reach the peak levels of 2007/08, 2011 or 2013. However, actual price outcomes are likely to exhibit significant variations around the projection trend.

Figure 9.2. **World dairy prices in real terms**
2005 USD



Notes: F.o.b. export price, butter, 82% butterfat, Oceania; F.o.b. export price, non-fat dry milk, 1.25% butterfat, Oceania; F.o.b. export price, WMP 26% butterfat, Oceania; F.o.b. export price, cheddar cheese, 39% moisture, Oceania.
Source: OECD and FAO Secretariats.

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Production

World milk production growth is expected to decrease over the next decade, from 2.2% to 1.9% p.a. The growth in milk production originates to 78% from developing countries, where growth rates slowdown from 3.6% to 2.8% p.a. In developing countries, most of the production growth stems from an increase in the dairy herd (1.6% p.a.), compared to yield growth (1.2% p.a.), reflecting a slow introduction of modern dairy production systems; but especially the herd growth is limited due to constraints in water and land availability. In Asia, for example, the milk yield growth will contribute more to production increases in the coming decade as the environmental constraints are more binding than in Africa and Latin America.

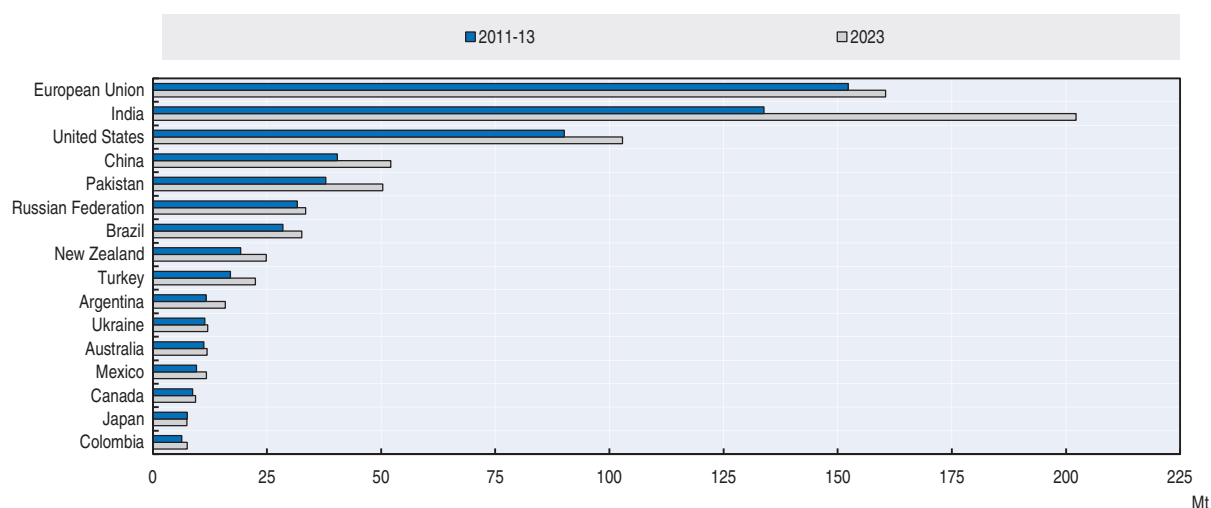
India is expected to outpace the European Union and will become the largest milk producer in the world. Almost the entire Indian production, with a very high share of buffalo milk, is consumed fresh, and only very small amounts are further processed (Figure 9.3).

China, although a much smaller producer and consumer of milk and dairy products than India, is more important for international dairy markets. China's self-sufficiency in milk and dairy products has declined substantially in recent years, which was partly fuelled by slow growth in domestic milk production in the last five years, following food safety problems related to milk adulterated with melamine in 2008, and a substantial decline in 2013. It is expected that the Chinese dairy sector can overcome its challenges in the coming decade and a further deterioration in self-sufficiency is limited (Box 9.1).

In developed countries milk yield growth (0.84% p.a.) is projected at a higher rate than total production growth (0.80% p.a.), which implies a slightly declining dairy herd. This observation is a continuation of the trend in the last decade. Nevertheless, there are considerable differences between major milk producing countries and regions.

The rate of production expansion in New Zealand, the largest milk exporter, is expected to fall, compared to the previous decade, from 4.5% to 1.9% p.a., because of an

Figure 9.3. Outlook for milk production



Source: OECD and FAO Secretariats.

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Box 9.1. Challenges and opportunities facing China's dairy sector

China's dairy sector is characterised by scattered small-scale production and low milk yields. Small-scale farmers accounted for 40% of the dairy cows at the end of 2013. As a result of this small-scale structure, prospects for improving total milk production are limited.

China's raw milk price leaped from USD 0.46/kg in the early part of 2008 to USD 0.68/kg in the early part of 2014. In 2013, average milk prices in China were about 30% higher than the average world price. Main drivers behind this increase were increasing feed costs (37.7% for maize and 13.9% for soybean meal since 2008), and rapid growth in labour and land costs. This led to a situation where, despite the surge in milk prices, milk production margins have declined.

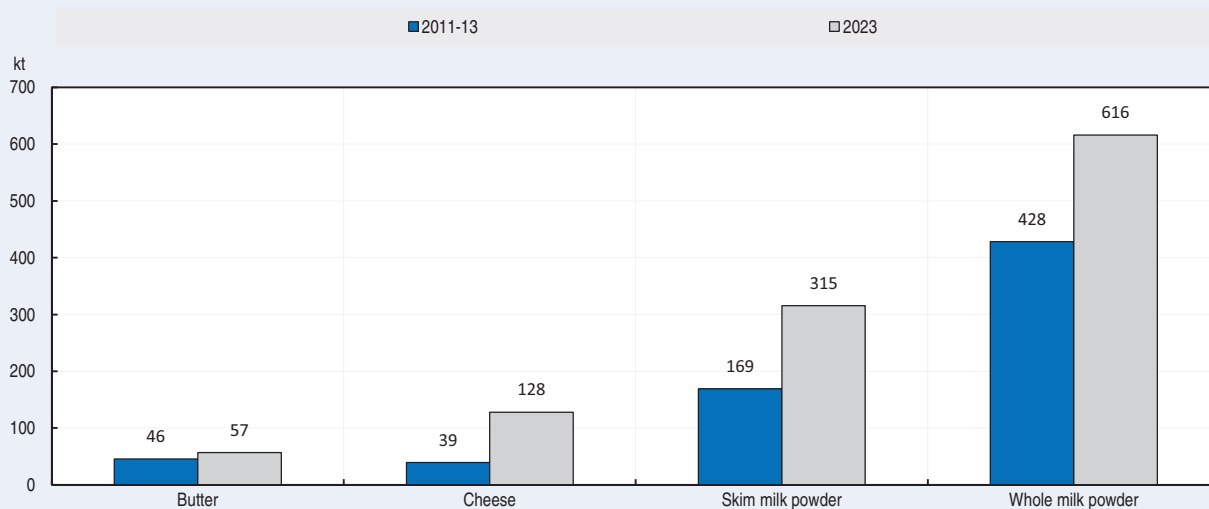
The majority of China's dairy processing enterprises have been operating at a loss, and a large number of farmers have abandoned milk production. Consequently, China's inventory of dairy cows fell by about 10% in 2013, which caused China's total milk production to decline by 5.7%. The resulting cow milk production of 35.3 Mt was 2.1 Mt below the 2012 level representing China's biggest annual fall since 1949. This was far more significant than the fall in milk production caused by the food safety problems related to milk adulterated with melamine in 2008.

Considering that China's per capita consumption of dairy products is less than one-third of the world average, the Chinese dairy market has significant growth potential. This is mainly driven by urbanisation and rapidly increasing household incomes. By 2023, the consumption of dairy products in China is expected to increase by around 35% from the 2011-13 base period, with fresh dairy products, butter, cheese, skim milk powder (SMP) and whole milk powder (WMP) gaining 2.2%, 1.5%, 4.3%, 3.5% and 3.0% p.a., respectively. China's total milk production is expected to reach almost 52.1 Mt by 2023, with an estimated average growth rate of 2.7% p.a., which is below the 3.5% p.a. witnessed in the last decade and the expected 2.8% p.a. growth in consumption. To meet the growing demand, China's imports of dairy products will continue to increase over the outlook period. China's imports of butter, cheese, SMP and WMP are expected to reach 57, 128, 315, and 616 Kt, respectively, in 2023. This marks an increase of 23.9% for butter, 228.2% for cheese, 86.4% for SMP and 43.9% for WMP compared to the base period (Figure 9.4). Imports of SMP and WMP will account for 83.4% of total dairy product imports in 2023.


Box 9.1. Challenges and opportunities facing China's dairy sector (cont.)

China's dairy industry is at a crossroad facing a number of challenges and opportunities. A growing share of imported dairy products in Chinese dairy consumption will increase the pressure on the Chinese dairy sector, especially on small-scale farmers and dairy processing enterprises. However, increasing competition from imports, may also spur China's dairy sector to transform and upgrade, providing a platform for large-scale development, which could lead to significant increases in milk yields.

Figure 9.4. China's dairy product imports continue to increase over the outlook period



Source: OECD and FAO Secretariats.

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appreciating exchange rate, increasing production costs and environmental factors that constrain milk output growth. Most of the growth will come from a further increase in the dairy herd, assuming that the mainly pasture-based, extensive milk production, implying a low yield per dairy cow, will be maintained.

Following declining dairy herds in Australia during the last decade (-2.3% p.a.), a turnaround is projected (+0.6% p.a.). Consequently, milk production will grow by 2.0% p.a. which will satisfy additional import demand during the next decade.

An increase of the US milk production by 0.9% p.a. is expected during the next decade, implying a slightly declining dairy herd (-0.1% p.a.). So far no effects of the policy changes due to the 2014 Farm Act are incorporated in the baseline.

Sluggish growth in EU milk production is projected over the coming decade (0.5% p.a.) in response to slow growth in domestic demand and relatively high costs. The latter constrains the European Union's ability to participate in the faster growing export markets. The end of the EU milk quota in 2015 is likely to have a small impact on overall milk production in the European Union, but it may lead to a further concentration of milk production in some regions. In addition, the environmental constraints in these regions might limit further growth. Overall, due to the shifts, a faster increase in average yields is expected during the outlook period (2.3% p.a.) than in the decade before (1.3% p.a.).

The processing of milk into the four main dairy products – butter, cheese, SMP and WMP – is increasing at world level at similar pace as milk production. In the outlook period it is expected that butter (2.1% p.a.), SMP (1.9% p.a.) and WMP (2.2% p.a.) increase slightly faster than world milk production (1.9% p.a.), whereas cheese (1.6% p.a.) grows slower. The growth rates also reflect that in the case of butter and WMP the majority of the production occurs in developing countries with a faster growth in milk production, whereas in the case of cheese and SMP it is in the developed ones.

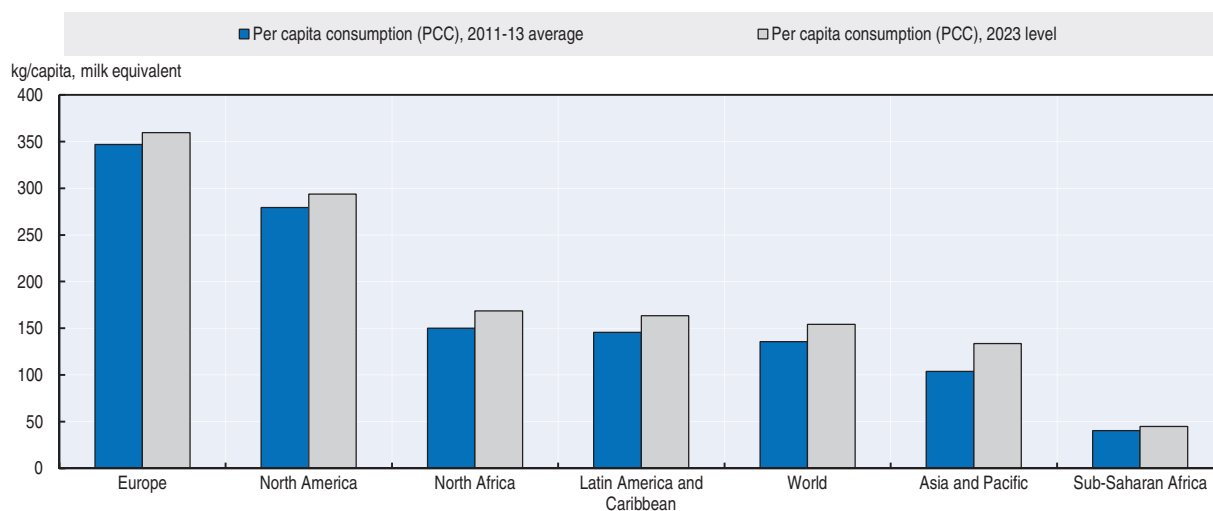
Consumption

The largest share of milk and dairy product consumption is in the form of fresh dairy products, taking up about 70% of total milk production. This share continues to increase due to raising milk production in developing countries where this share is considerably higher. A publication by the FAO (2013) looks into milk and dairy products in human nutrition and assesses especially the situation in developing countries (Box 9.2).

Per capita consumption of dairy products in developing countries is expected to increase on average by 1.9% p.a. for cheese and butter and by 1.2% p.a. for SMP and WMP. The expansion in demand reflects robust income growth, expanding populations and a further globalisation of diets.

By 2023, per capita consumption of fresh dairy products in India is expected to increase to around 171 kg per capita, compared to per capita consumption of 104 kg in Australia, 93 kg in the European Union, 86 kg in New Zealand, 75 kg in Canada, 72 kg in the United States and 26 kg in China. Nevertheless, total consumption of dairy products in milk equivalent is considerably higher in developed countries than in developing ones (Figure 9.5). The difference stems mostly from the per capita consumption of cheese which is more than tenfold in developed countries compared to developing ones.

Figure 9.5. **Major dairy product consumption**
in milk equivalent



Note: The coefficients used to calculate the consumption in milk equivalent are: Fresh dairy products 1, butter 18.2, cheese 9.247, skim milk powder 11.944, and whole milk powder 8.37.

Source: OECD and FAO Secretariats.

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Box 9.2. Milk and dairy products in human nutrition

Billions of people consume milk and dairy products every day. Not only are milk and dairy products a vital source of nutrition, they also present livelihood opportunities for farmers, processors, shopkeepers and others in the dairy value chain. The FAO has just published a book entitled *Milk and Dairy Products in Human Nutrition*,¹ which draws together information on nutrition, dairy farming and dairy-industry development from a wide range of sources and explores the linkages between them. An important focus is the development of dairy value chains, a key strategy for improving diets and raising income levels amongst the poorest segments of the world's population.

With rising incomes and increased production, milk and dairy products have become an important part of the diet in some parts of the world where little milk was consumed in the 1970s – particularly in Asia. The interconnectivity between dairying, human nutrition and health are highlighted. While, growing consumption of dairy and livestock products brings important nutritional benefits to large segments of the population in developing countries, there are still many millions who cannot afford better-quality diets owing to the higher cost.

The report highlights the role of dairy-industry development programmes in promoting food and nutrition security and reducing poverty. Increasing demand and relatively high prices for milk and dairy products provide an opportunity for millions of smallholder dairy farmers to improve their livelihood. In many parts of the world, milk and dairy products are highly valued and have an important role in both household food security and income generation. Experience has shown that dairy-industry development projects often have a positive effect on household health and nutrition, in addition to providing employment and income, and can make a substantial and sustainable contribution to poverty reduction. In examining sustainable approaches, the report concludes that support to national or regional groupings, such as co-operatives or associations, assisted by the integrated supply of inputs and support services, can benefit tens of millions of farm families.

Dairying is important in agriculture in that it can provide not only daily food at the household level but also a regular income. Moreover, dairy animals may be used for traction and provide manure for use as both fertiliser and fuel. Strategic investment in, and promotion of, dairy farming can raise farm income, contribute to improved nutrition and create employment in the wider community via processing and distribution and related activities.

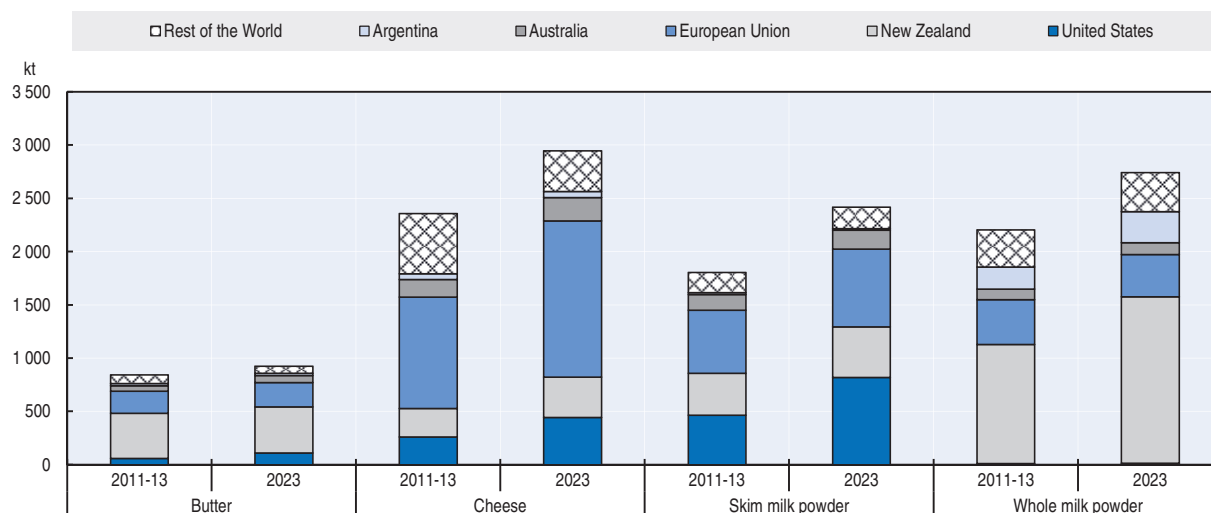
1. The book represents a revisiting of the subject by FAO, with the title first published in 1959 and a revised second edition released in 1972.

The high butter to vegetable oil price ratio is assumed to constrain demand for butter and milk fat. The increasing replacement of milk fat by vegetable oils occurs in food preparations, fat-filled powders, table spreads and cooking oil, exerting downward pressure on butter consumption and prices. Overall, the demand for milk protein is growing faster than the demand for milk fat over the next decade, which implies that the butter price will remain below the SMP price on the world market.


Trade

A general expansion in dairy trade is expected over the coming decade. The growth rates differ between dairy products at 0.7% annually for butter, cheese (2.4% p.a.), SMP (2.5% p.a.) and WMP (1.7% p.a.). The vast bulk of this growth will be met by increased exports from the United States, European Union, New Zealand and Australia. These four countries account jointly for 74% of world cheese, 74% of world WMP, 81% of world butter and 86% of world SMP exports in 2023 (Figure 9.6).

Figure 9.6. Dairy product exporters



Source: OECD and FAO Secretariats.

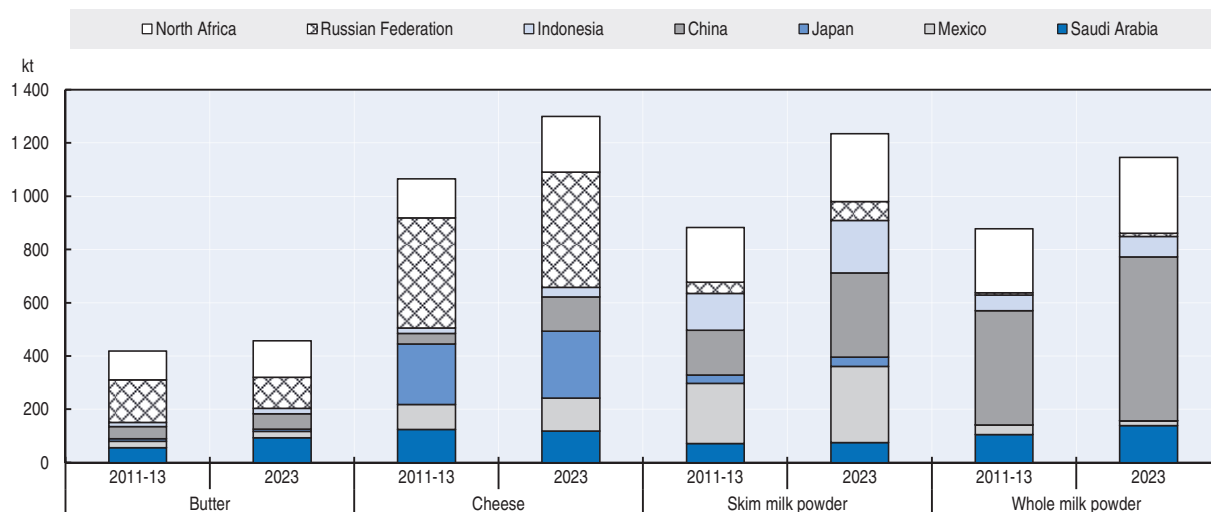
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The European Union will remain the main cheese exporter (accounting for 39% of world exports in 2023), but its growth rate is below that of the other major cheese exporters, i.e. New Zealand, the United States and Australia. Several other countries like Saudi Arabia, Belarus, Ukraine, Egypt, Turkey and Argentina export considerable amounts of cheese predominantly to neighbouring markets. New Zealand remains the primary source for butter on the international market, at 47% market share, although losing some share to the other major exporters. In case of WMP, it is expected that New Zealand can increase its share in world trade over the next decade to 57% in 2023. Other important exporters are the European Union, Argentina and Australia. The United States is the largest source of SMP exports, at 34% in 2023, and is expected to expand more rapidly than the other major suppliers like the European Union, New Zealand and Australia. Considerable increases are expected for Indian SMP exports, to about 90 Kt by 2023. Country coverage of the whey powder market is limited, but trade is projected to increase considerably in the coming decade. Exports of the European Union, the United States and New Zealand are all expected to grow by more than 3% p.a. and will reach a combined 1.2 Mt of exports in 2023.


In recent years, considerable growth has occurred in fresh dairy trade, which is not incorporated in this *Outlook*. This comprises not only products like yogurts and cream but also liquid milk. One important trade flow is liquid milk exported from the European Union to China (100 Kt in 2013, up from 56 Kt in 2012). Nevertheless, this remains small in relation to the trade in the dairy products covered and might only be a temporary phenomenon.

In contrast to dairy exports, imports are much wider spread and generally the dominant destinations for dairy products are developing countries, especially in Asia and Africa. Only for cheese considerable imports occur in developed countries (Figure 9.7).

Figure 9.7. **Major dairy product importers**



Source: OECD and FAO Secretariats.

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Cheese imports in developed countries are currently higher than in developing countries, but it is expected that cheese imports in developing countries will grow at a much faster rate (4.4% p.a.) than in developed countries (0.7% p.a.). The Russian Federation remains the primary importer followed by Japan. China is expected to overtake Mexico, the United States, Saudi Arabia and Korea, which are all projected to import more than 80 Kt (3% of world imports) by 2023. Butter imports by developed countries continue to decline (-2.3% p.a.). The Russian Federation remains the main destination of butter, but domestic production increases faster than consumption. Increases in butter imports are expected in developing countries. The two main destinations are Egypt and Saudi Arabia which are closing the gap on the Russian Federation. WMP imports skyrocketed in recent years in China, and a further continuation in growth is expected but at a much slower rate (0.6% p.a.). Other important destinations remain Algeria, Nigeria and Saudi Arabia. In the case of SMP, China will become the world's major importer. Mexico, Indonesia, Algeria, Malaysia and Egypt are other important importers; all with continued growth but at a considerably slower pace than in the preceding decade.

Main issues and uncertainties

The development of Chinese self-sufficiency in milk and dairy products is a main determinant of the future price development on world dairy markets. It is currently expected that the Chinese milk production will start to grow again from this year onwards. Any delay would result in higher dairy prices worldwide.

In 2015, the EU system of milk quotas is scheduled to end. The Outlook projects a smooth transition, because actual output remained well below EU quota levels in historic years for most EU member states. Other observers expect a strong supply reaction in the European Union to the end of quota which would increase exports and result in lower

world market prices for dairy products. This may also cause higher volatility of milk production and dairy product supply from the European Union.

The 2014 US Farm Act redesigned the support to dairy in the United States. The new Margin Protection Program (MPP) makes payments to dairy producers when the difference between milk prices and feed costs falls below a minimum level. The differences will be calculated nationally on a rolling two-month's average, and producers can opt to secure differences in the range from USD 4 to USD 8 per hundredweight (cwt) for 25% to 90% of their historic production. The baseline makes no assumption about the effect of the policy change. Nevertheless, it could result in increasing US output and exports.

As we have seen in recent years, unusual weather events can have a major impact on dairy markets through their impact on feed grains or pasture conditions. The *Outlook* assumes normal weather conditions from 2013 onwards. However, as climate change models increasingly predict an increase in the incidence and severity of extreme weather events, the probability of abnormal conditions may be increasing. The largest supplier of dairy exports, New Zealand, is weather dependent due to the predominantly pasture-based production.

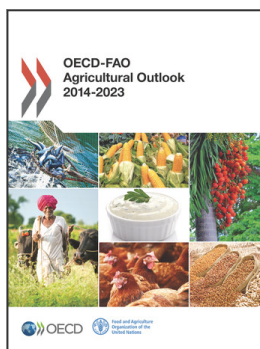
Environmental legislation can have strong impacts on the future development of dairy production. The greenhouse-gas emissions from dairy activities make up a considerable share of the total emissions in some countries, and any changes in related policies could affect dairy production. Water access and manure management are additional areas where policy changes could have an impact on the dairy industry.

Dairy demand and export opportunities could also be affected by the outcome of various Free Trade Agreements (FTA) and Regional Trade Agreements (RTA) agreements currently under discussion. These agreements could increase international dairy trade through specific market access changes and also by simplifying bilateral sanitary requirements. Another important point for international trade are applied tariffs among developing countries which are often set below their bound WTO levels and thus can be varied at short notice.

Underlying the outlook for international dairy prices is the assumption of continued strong growth in incomes among developing countries, especially in the Middle East, North Africa, South East Asia and China. Any slowdown in economic activity in any of these regions could trigger a significant downturn in dairy prices. It is also assumed that no major outbreaks of animal diseases occur during the outlook period, which could alter the setting rapidly.

Reference

FAO (2013), *Milk and Dairy Products in Human Nutrition*, FAO publications, Rome, <http://www.fao.org/docrep/018/i3396e/i3396e.pdf>



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