4 Oilseeds and oilseed products

This chapter describes market developments and medium-term projections for world oilseed markets for the period 2023-32. Projections cover consumption, production, trade and prices for soybean, other oilseeds, protein meal, and vegetable oil. The chapter concludes with a discussion of key risks and uncertainties which could have implications for world oilseed markets over the next decade.

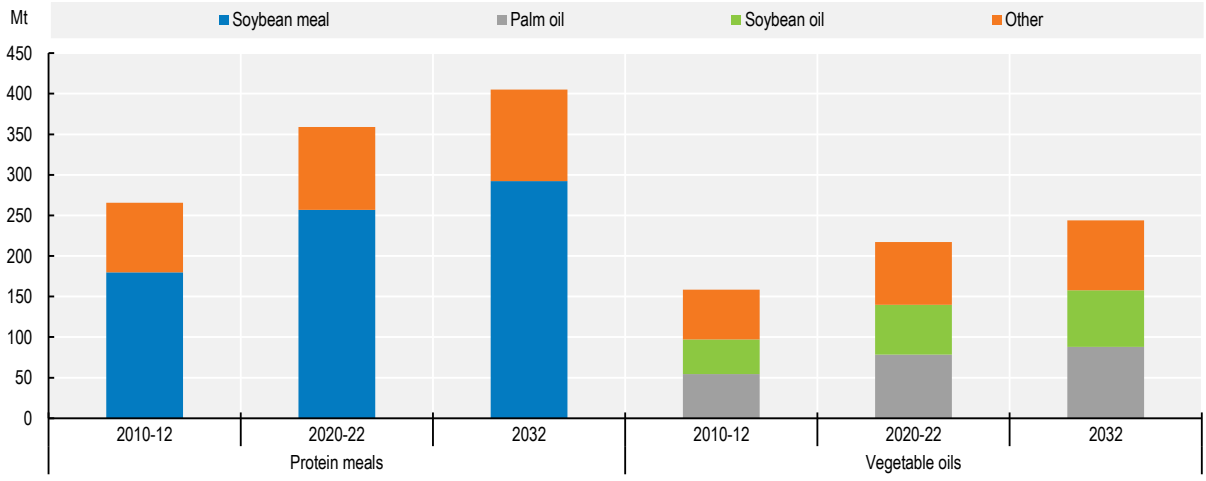
4.1. Projection highlights

Continued demand for vegetable oil will drive oilseed markets

Food use of *vegetable oils* should account for 57% of total consumption in 2032, driven by population growth and increased per capita use of vegetable oil in lower – and middle-income countries. The vegetable oil aggregate in this *Outlook* includes oil obtained from the crushing of oilseeds (about 55% of world vegetable oil production) and palm oil (36%), as well as palm kernel, coconut, and cottonseed oils. The use of vegetable oil for biodiesel, currently about 16% of global vegetable oil use, is projected to grow globally, especially in emerging markets like Indonesia and Brazil and in the United States, while declining use in the European Union, still the largest producer of biodiesel.

Protein meal utilisation will be constrained by slower growth in global poultry and livestock production, especially in high-income countries, as it is almost entirely used as animal feed. Soybean meal accounts for about three-quarters of the global protein meal sector (Figure 4.1). Demand growth in the People's Republic of China (hereafter "China") is expected to slow down considerably, driven by improved feed efficiency combined with efforts to achieve lower protein meal shares in livestock feed rations. In the European Union, the second-largest user of protein meal, consumption is expected to decline as growth in animal production slows and other protein sources are increasingly used in feed. By contrast, in Southeast Asia increasing animal production is projected to raise demand for imports of protein meal.

Figure 4.1. Protein meal and vegetable oil production by type



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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In view of a slowdown in the expansion of the mature oil palm area, *palm oil* production growth in Indonesia and Malaysia is projected to be limited. Assuming increased replanting and increased mechanisation, a slight recovery in palm oil yields is expected over the outlook period. Palm oil production in other tropical countries is expected to expand more strongly, but Indonesia and Malaysia are still projected to account for 81% of global palm oil production.

Soybean production is expected to be dominated by yield improvements accounting for about three-quarters of the global growth while the expansion of harvested area, including increased double-cropping in Latin America, accounts for the remaining quarter. Soybean production is expected to reach 415 Mt by 2032, more than double the combined output of other oilseeds at 189 Mt. Brazil, the world largest producer

and exporter, and the United States are expected to account for about two-thirds of world soybean production and more than 80% of global soybean exports.

Production of *other oilseeds* is projected to increase at a slower rate compared to the last decade, due to increasing competition by cereals for limited arable land in China and the European Union as well as stagnating demand for rapeseed oil as a feedstock in European biodiesel production. In general, the cultivation of other oilseeds such as rapeseed and sunflower seed is much less concentrated than that of soybeans. China, the European Union, Canada, and Ukraine each produce between 16 Mt to 36 Mt of these oilseeds. However, Russia's war against Ukraine is causing disruptions in sunflower seed production, processing and trade.

The world's leading suppliers of *palm oil*, Indonesia and Malaysia, will continue to dominate the vegetable oil trade, exporting more than 60% of their combined production and jointly accounting for nearly 60% of global vegetable oil exports. India, the world's biggest importer of vegetable oil, is projected to maintain its high import growth to satisfy growing domestic demand. Due to declining use for biodiesel production, imports of vegetable oil by the European Union are expected to decline strongly. Growth in world exports of soybeans, another product with a high trade share dominated by the Americas, is expected to slow considerably over the next decade due to the projected slower growth in soybean import demand by China.

While in the 2021 marketing year prices in the oilseed sector were at record highs, the current downward adjustment is expected to continue during the first years of the outlook period. Thereafter, prices are expected to increase slightly in nominal terms, while declining in real terms for oilseeds and protein meal following the long-term trend of agricultural commodity prices. Prices of vegetable oil could increase in real terms due to continued strong demand growth and limited potential for production expansion.

The use of vegetable oil as biodiesel feedstock is mostly determined by biofuel policies, which include countries' mandated blending ratios. In particular, the use by some countries of Sustainable Aviation Fuel (SAF) holds potential and could result in strong demand growth for vegetable oil. The future demand for protein meal in China depends on the balance between feed intensity and efficiency especially in rebuilding the pig meat sector, following African Swine Fever (ASF) as from 2018. The scope to increase palm oil output in Indonesia and Malaysia will increasingly depend on oil palm replanting activities and accompanying yield improvements (rather than area expansion), creating new challenges as yields of palm oil have been stagnant for several years. Sustainability concerns (i.e. deforestation and the use of sustainability certifications for vegetable oil) and concerns about the high saturated fat content of palm oil also influence the consumer acceptance and demand for palm oil.

4.2. Current market trends

Nominal prices are high but declining from record levels

International prices for oilseeds fell from record high levels observed in 2022 but remained above the average level of recent years in early 2023, mainly reflecting fluctuating prices for soybeans, sunflower seeds, and rapeseed. Meanwhile, world vegetable oil prices continued declining from record highs observed in early 2022, driven by lower world prices of palm, soy, sunflower seed and rapeseed oils. Concerning oil meals, international soymeal quotations rebounded in recent months, primarily underpinned by prospects of deteriorating production and crushing in Argentina.

Global soybean production in 2022/23 was lower than initially expected, largely tied to protracted dry conditions in Argentina, while harvest expectations in Brazil remain positive due to favourable weather conditions in most of the growing regions. In Indonesia, palm oil production is expected to increase in 2023, despite recent excessive rainfall in some areas that impeded the harvesting activities. In February, the Indonesian Government imposed temporary exports limits on palm oil, in order to secure enough domestic

cooking oil. In Malaysia, palm oil production is also growing, thanks to generally conducive weather as well as to the gradual improvement of lingering labour shortages issues.

There are many uncertainties that can influence the market in the coming months, such as adverse climatic conditions, changes in policies, and the evolution of the Russia's war against Ukraine.

4.3. Market projections

4.3.1. Vegetable oil consumption

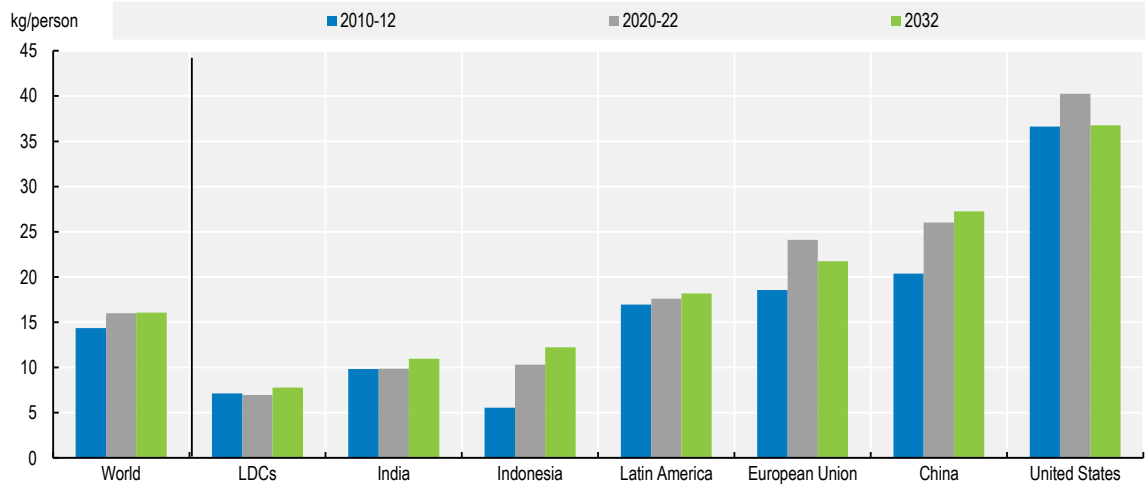
Demand for vegetable oil for food is slowing down

The two dominant uses of vegetable oil are for human consumption (57%) and a feedstock for the production of biodiesel (16%). In addition, vegetable oils are also used for cosmetics, varnishes, and increasingly in animal feed, especially for aquaculture.

Per capita consumption of vegetable oil for food is projected to grow by 0.1% p.a., considerably less than the 0.8% p.a. increase observed during 2013-22 due to declining food demand in high-income countries. In emerging markets such as China (27 kg/capita) and Brazil (23 kg/capita), the consumption of vegetable oil for food is set to reach levels comparable to those of wealthier economies (Figure 4.2).

India, the world's second largest consumer and main importer of vegetable oil, is projected to sustain a per capita consumption growth of 1% p.a., reaching almost 11 kg/capita by 2032. This substantial increase will be the result of both increases in its domestic production, crushing of increased domestic oilseed production, and imports of mainly palm oil from Indonesia and Malaysia. As urbanisation increases in low-income countries, dietary habits and traditional meal patterns are expected to shift towards processed foods that have a high content of vegetable oil. For least developed countries (LDCs), the per capita availability of vegetable oil is projected to increase by 1.2% p.a., to reach 8 kg per capita by 2032 due to higher incomes.

Figure 4.2. Per capita food consumption of vegetable oil in selected countries



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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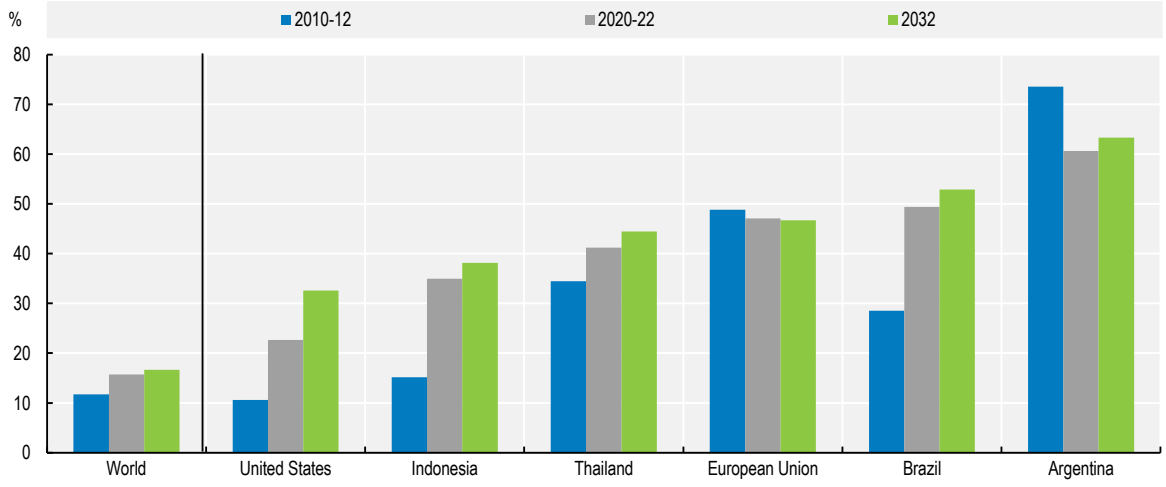
The uptake of vegetable oil as feedstock for biodiesel (about 16% of global vegetable oil use) is projected to increase slower over the next ten years, compared to the 6.5% p.a. increase recorded over the previous decade when biofuel support policies took effect (Figure 4.3). The use of vegetable oil as feedstock for biodiesel depends on the policy setting (Chapter 9) and the relative price development of vegetable oil and crude oil (see below). In general, national targets for mandatory biodiesel consumption are expected to increase less than in previous years. In addition, used oils, tallow, and other feedstocks are increasing their share in the production of biodiesel, especially in the European Union, largely due to specific policies. In the United States, Hydrotreated Vegetable Oil (HVO) or Renewable Diesel is considered an advanced biofuel and is expected to drive the considerable growth of biodiesel production. In Indonesia, the growth in the use of vegetable oil to produce biodiesel is projected to remain strong and reach 10.1 Mt by 2032 due to supportive domestic policies.

Figure 4.3. Share of vegetable oil used for biodiesel production



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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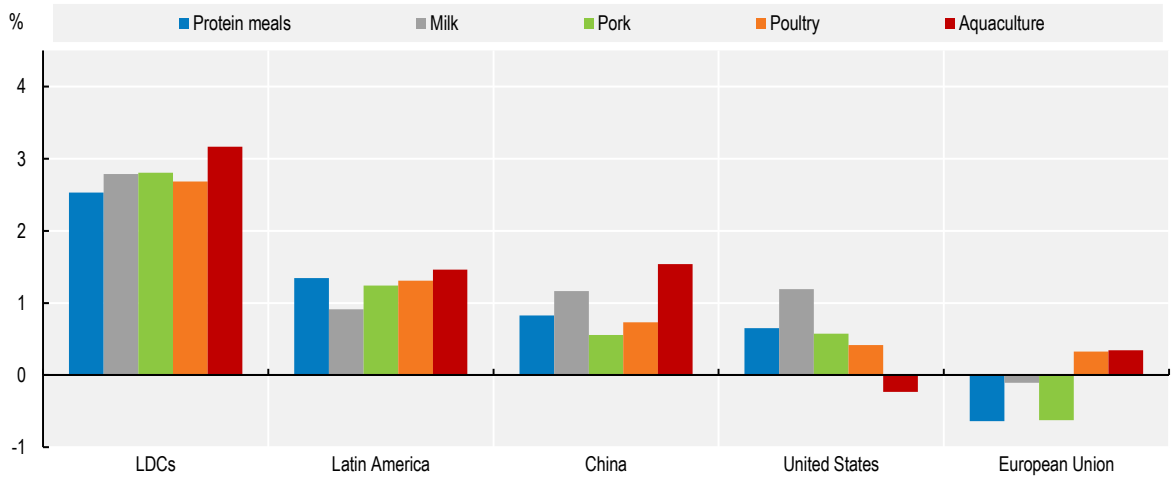
4.3.2. Protein meal consumption

Feed demand is slowing, shaped by developments in China

Protein meal is exclusively used as feed and its consumption is projected to continue to grow at 0.9% p.a., considerably below that of the last decade (2.9% p.a.). The link between feed use of protein meal and animal production is related to the intensification of animal production, which increases demand for protein meal, whereas feeding efficiencies lead to a reduction of protein feed per animal. Moreover, the composition of animal husbandry and herd sizes are additional factors. The link between animal production and protein meal consumption is associated with a country's level of economic development (Figure 4.4). Lower income countries, which rely on backyard production, consume less protein meal, whereas higher income economies which employ intensive production systems use higher amounts of protein meal. Because of a shift to more feed-intensive production systems in developing countries in response to rapid urbanisation and increasing demand for animal products, growth in protein meal consumption tends to exceed growth in animal production.

Figure 4.4. Average annual growth in protein meal consumption and animal production (2023-32)



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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In LDCs, where the use of protein meals is very low, intensification in livestock production with growing use of compound feed is expected to continue. Nevertheless, due to strong growth of animal production, average use of protein meal per animal output continues to decline.

China accounts for more than a quarter of global protein meal demand and is therefore shaping global demand. Growth in China's demand for compound feed is expected to be slower than in the previous decade due to declining growth rates for animal production and the existing large share of compound feed-based production. The protein meal content in China's compound feed is expected to remain stable after it surged in the last decade but continues to exceed current levels in the United States and European Union.

In the European Union, and the United States, protein meal consumption is expected to grow at a slower rate than animal production due to improving feeding efficiencies. In addition, animal products, primarily poultry and dairy, are increasingly marketed in the European Union as produced without feed use from genetically modified crops, driven by large retail chains that results in lower demand for soybean meal.

4.3.3. Oilseed crush and production of vegetable oils and protein meal

Slowing global oilseed crush and limited growth in palm oil production

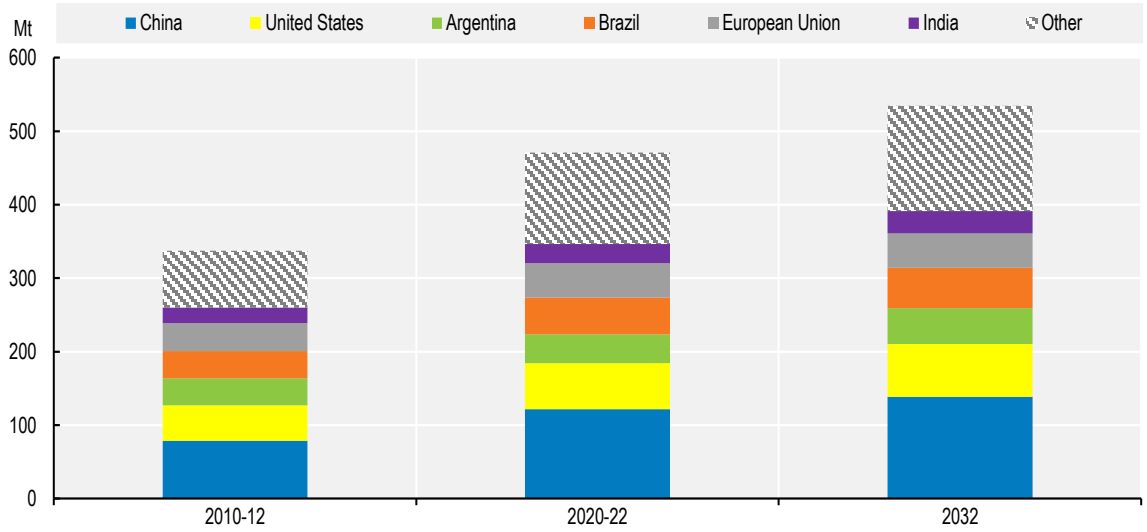
Globally, the crushing of soybeans and other oilseeds into meal (cake) and oil accounts for about 90% of total usage. The demand for crush will increase faster than demand for other uses, notably direct food consumption of soybeans (including for meat and dairy replacements), groundnuts and sunflower seeds, as well as direct feeding of soybeans. The crush location depends on transport costs, trade policies (e.g. different tariffs for oilseeds and products), acceptance of genetically modified crops, processing costs (e.g. labour and energy), and infrastructure (e.g. crushing facilities, ports and roads).

Soybean crush is projected to expand by 44 Mt over the *Outlook* period, significantly less than the 75 Mt in the previous decade. Chinese soybean crush is projected to increase by 9 Mt, accounting for about 21% of the world's additional crush, the bulk of which will utilise imported soybeans. The growth in China, although large, is projected to be considerably lower than in the previous decade. Global crush of other

oilseeds is expected to grow in line with production by 19 Mt over the *Outlook* period and to occur more often in the producing country.

Global protein meal output from oilseed crush is projected to increase by 0.9% p.a., reaching 405 Mt by 2032. World production of protein meals is dominated by soybean meal, which accounts for more than two-thirds of world protein meal production. Production is concentrated in a small group of countries (Figure 4.5). In China and the European Union, most protein meal production comes from the crushing of imported oilseeds, primarily soybeans from Brazil and the United States. In the other important producing countries – Argentina, Brazil, India, and the United States – domestically-produced soybeans and other oilseeds dominate.

Figure 4.5. Oilseed crush by country or region



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

Global *vegetable oil* production depends on both the crush of oilseeds and the production of perennial tropical oil plants, especially palm oil. Global palm oil output has outpaced the production of other vegetable oils over the past decade. However, growth in production is expected to weaken due to increasing sustainability concerns and the aging of oil palm trees in Indonesia and Malaysia, which account for almost one-third of the world's vegetable oil production and for more than 80% of global palm oil production.

At the global level, palm oil supplies are projected to expand at an annual rate of 0.8%. Increasingly stringent environmental policies from the major importers of palm oil and sustainable agricultural norms (e.g. in line with the 2030 UN Agenda for Sustainable Development) are expected to slow the expansion of the oil palm area in Indonesia and Malaysia. This implies that growth in production comes increasingly from productivity improvements, including an acceleration of replanting. Palm oil production in other countries is expected to expand more rapidly from a low base, mainly for domestic and regional markets. For example, Thailand is projected to produce 3.5 Mt by 2032, Colombia 2.6 Mt, and Nigeria 1.7 Mt. In several Central American countries, niche palm oil production is developing with global sustainability certifications in place from the outset, positioning the region to eventually reach broader export markets.

The vegetable oil complex includes palm kernel, coconut and cottonseed oil, as well as palm oil and oil extracted from the crush of oilseeds as noted above. Palm kernel oil is produced alongside palm oil and follows the production trend of the latter. Coconut oil is mainly produced in the Philippines, Indonesia, and Oceanic islands. Palm kernel oil and coconut oil have important industrial uses, now dominated by palm

kernel oil with a bye-product of the growing production of palm oil. Cottonseed oil is a by-product of cotton ginning (Chapter 10), with global production concentrated largely in India, the United States, Pakistan, and China. Overall, vegetable oil production is projected to increase globally by 0.9% p.a., driven mainly by food demand in low- and middle-income countries resulting from population and income growth.

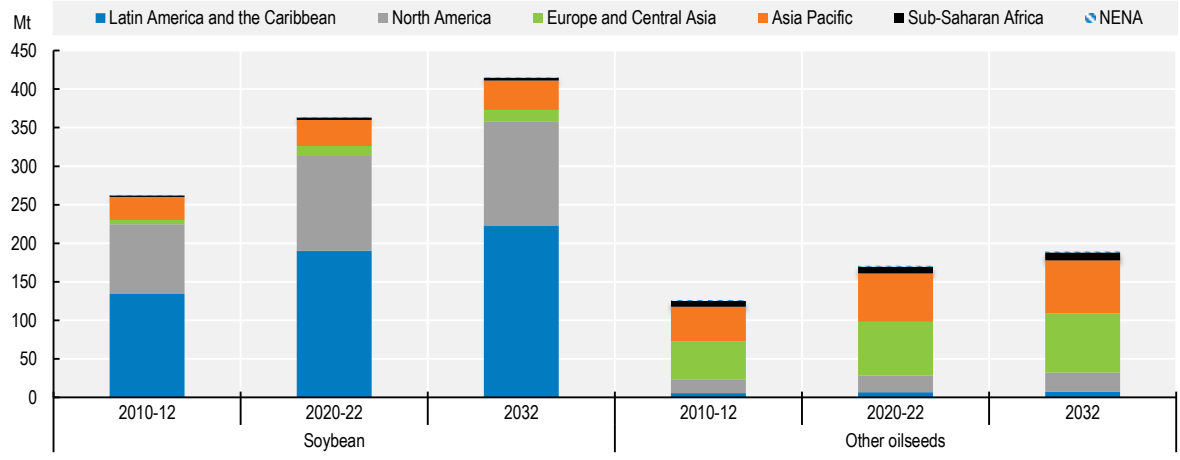
4.3.4. Oilseed production

Soybean production shifts to Latin America while palm oil and rapeseed yield growth is sluggish

The production of soybeans is projected to grow by 0.9% p.a., compared to 2.2% p.a. over the last decade. Growth will be dominated by yield increases, accounting for almost three-quarters of production growth. Soybeans benefit from their fast growth, which allows for double cropping, especially in Latin America. Consequently, a considerable share of additional harvested area increase will result from double-cropping soybeans following maize in Brazil and wheat in Argentina.

Brazil has in recent years been the largest producer of soybeans and is expected to grow at 0.8% p.a. over the next decade – slightly stronger than the United States, the second largest producer, at 0.6% p.a., due to double cropping with maize. The production of soybeans is projected to grow strongly elsewhere in Latin America, with Argentina and Paraguay producing 51 Mt and 12 Mt, respectively, by 2032 (Figure 4.6). In China, soybean production is expected to continue to increase in response to reduced policy support for the cultivation of cereals, but at slower pace than the previous decade. Soybean production is also expected to increase in India, the Russian Federation (hereafter “Russia”), Ukraine, and Canada.

Figure 4.6. Oilseed production by region



Note: NENA stands for Near East and North Africa, and is defined as in Chapter 2.
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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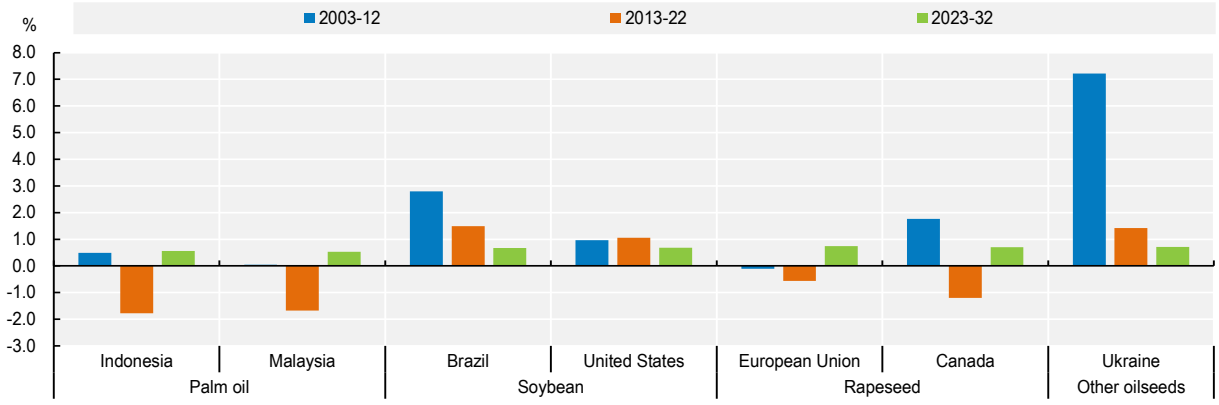
The production of other oilseeds (rapeseed, sunflower seed, and groundnuts) will also grow at a slower pace, at 0.9% p.a. compared to 2.6% p.a. over the previous ten years (2013-2022). China (a major producer of rapeseed and groundnuts) and the European Union (which mainly produces rapeseed and sunflower seeds) are the most important producers of other oilseeds, with a projected annual output of 40 Mt and 30 Mt, respectively, by 2032. However, limited growth in output is projected for both regions (0.8% p.a. for China and 1.0% p.a. for the European Union) as relatively higher prices for cereals are expected to generate strong competition for limited arable land. Canada, another major producer and the

largest exporter of rapeseed, is projected to increase its production of other oilseeds by 1.2% p.a., to reach 20 Mt by 2032.

Decomposing production between the contribution of yield and area shows that yields for major producers of palm oil and for some major suppliers of rapeseed have fallen or grown slowly during the last decade (Figure 4.7). There are many reasons for this development; 1) a strong increase in production area so that less favourable land is used for production reducing average yields; 2) the ageing of oil palms as well as labour shortages has reduced yields; 3) restrictions in the use of pesticides adversely affected average rapeseed yields in the European Union; and 4) shifting weather patterns adversely affected yields. It remains uncertain how this will play out over the coming decade, but lower area expansion could result in a recovery in yields over the *Outlook* period. If this is not the case it will be a challenge to satisfy growing demand, especially for vegetable oil.

Soybean stocks are projected to reach a stock-to-use ratio of almost 12% by 2032, which remains low compared to the past two decades, so harvest failures could quickly lead to market shortages.

Figure 4.7. Average annual yield growth for palm oil and oilseeds



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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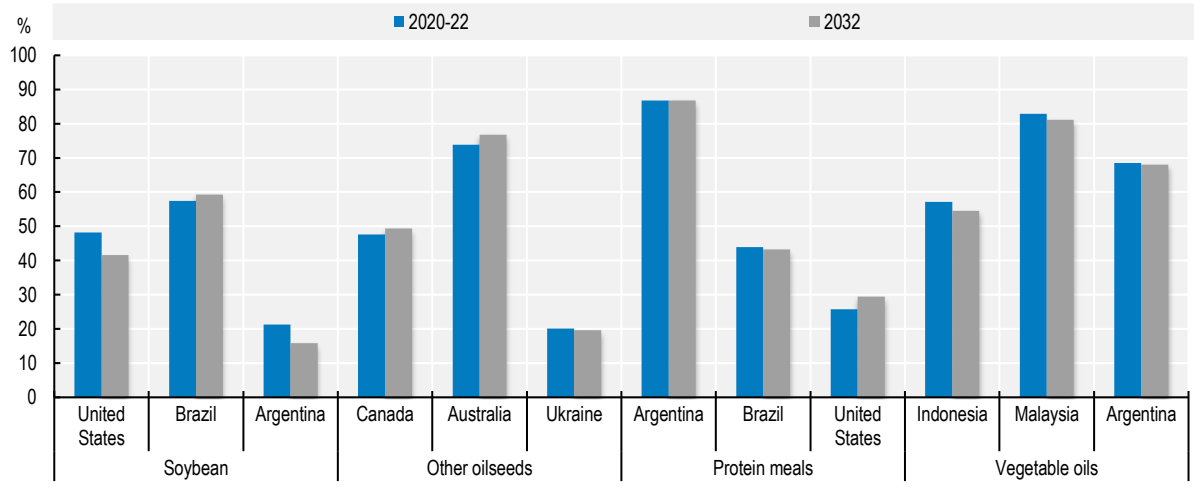
4.3.5. Trade

Trade is significant for oilseeds and products, but slowing down

Over 40% of world soybean production is traded internationally, a high share compared to other agricultural commodities. The expansion in world soybean trade is directly linked to projected slower growth of the soybean crush in China and Chinese imports are projected to grow by 0.7% p.a. to about 102 Mt by 2032 (down from 4.0% p.a. in 2013-2022), accounting for about 60% of world soybean imports. Exports of soybeans originate predominately from Brazil and the United States. Whereas the United States was historically the largest global exporter of soybeans, Brazil has now taken over with steady growth in its export capacity and is projected to account for 53% of total global exports of soybean by 2032.

For other oilseeds, the internationally traded share of global production remains much lower at about 14% of world production as the two largest producers, China and the European Union, are net-importers. The main exporters are Canada, Australia, and Ukraine, which are projected to account for 70% of world exports by 2032. In Canada and especially in Australia, more than half of the production of other oilseeds (primarily rapeseed) is exported (Figure 4.8). Additional oilseed production is crushed domestically and exported in the form of vegetable oil or protein meal.

Figure 4.8. Share of exports in total production of oilseeds and oilseed products for the top three exporting countries



Note: The figure only shows the direct share of exports and does not include the export of further processed products, which would lead to higher export shares.
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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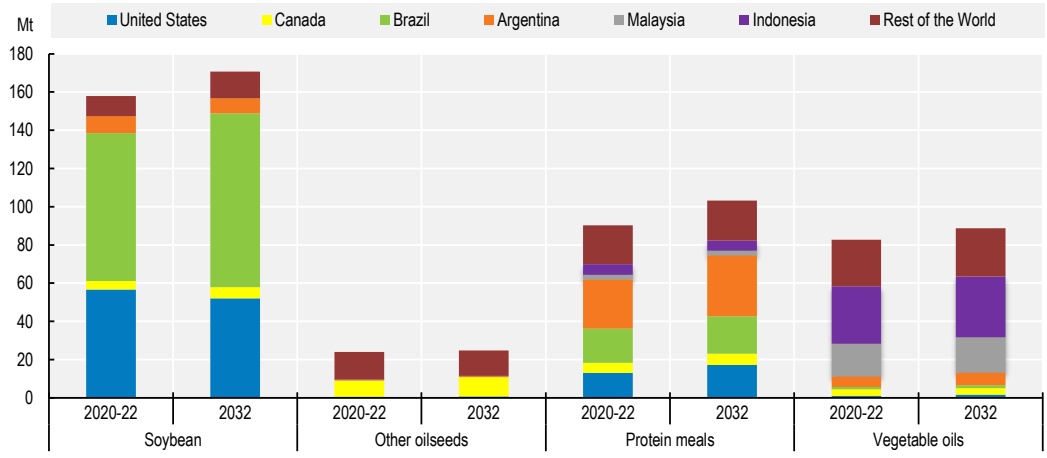
Vegetable oil exports, which amount to 38% of global vegetable oil production, continue to be dominated by a few players. Indonesia and Malaysia are expected to continue to account for almost 60% of total vegetable oil exports during the *Outlook* period (Figure 4.9). However, the share of exports in production is projected to contract slightly in these countries as domestic demand for food, oleochemicals, and, especially, biodiesel uses is expected to grow. India is projected to continue its strong growth in imports at 1.5% p.a., reaching 18 Mt by 2032, to meet increasing demand driven by population growth, urbanisation, and rising disposable income.

The projected growth in world trade of protein meal is 0.9% p.a. over the *Outlook* period and Argentina is expected to remain by far the largest meal exporter with its clear export orientation. The largest importer is the European Union, with imports expected to decline due to reduced domestic demand for protein meal. More than three-quarters of the global import growth in protein meal is projected to occur in Asia, in particular in Southeast Asia with its increasing animal production. As the domestic crushing capacity in Asian countries is not expected to keep pace with protein meal demand, expansion of the livestock sector is expected to require imported feed.

Figure 4.9. Exports of oilseeds and oilseed 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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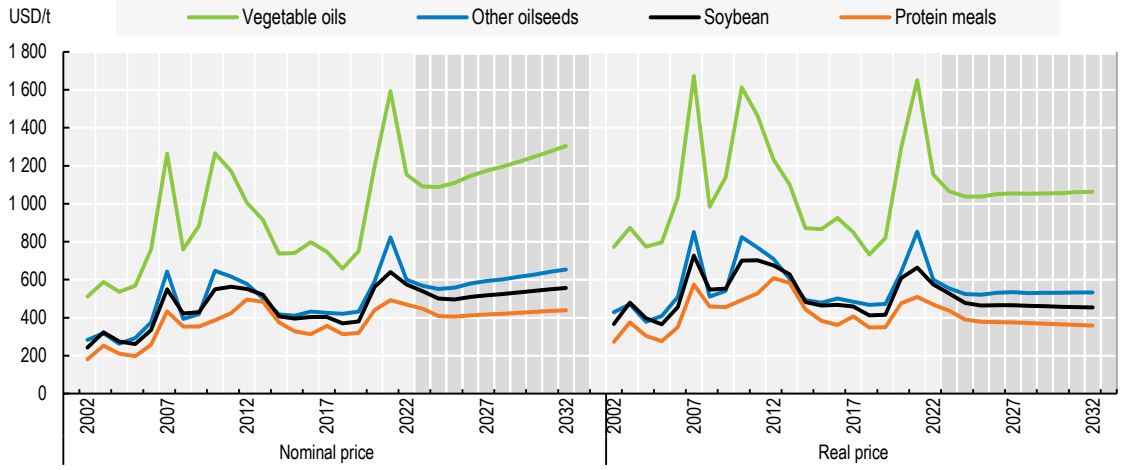
4.3.6. Prices

Current high prices will weaken over the next decade

A downward adjustment is expected during the first years of the *Outlook* period, reflecting expectations of better production prospects, partly fueled by the incentive of current high prices. Thereafter, prices are expected to increase slightly in nominal terms, while declining in real terms following the long-term trend of agricultural commodity prices (Figure 4.10). Due to expected stronger demand for vegetable oil than protein meal, prices of vegetable oil are projected to rise compared to protein meal. This will also favour other oilseeds prices over soybeans as they contain higher shares of vegetable oil.

Figure 4.10. Evolution of world oilseed prices



Note: Soybeans, US, c.i.f. Rotterdam; Other oilseeds, Rapeseed, Europe, c.i.f. Hamburg; Protein meal, production weighted average price for soybean meal, sunflower meal and rapeseed meal, European port; Vegetable oil, production weighted average price for palm oil, soybean oil, sunflower oil and rapeseed oil, European port. 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.

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4.4. Risks and uncertainties

Environmental concerns will influence global oilseed supply chains

The scope for increasing palm oil output in Indonesia and especially in Malaysia will increasingly depend on replanting and yield improvements rather than new area expansion. In recent years, growth in production has been sluggish given the low profitability of the sector and rising labour costs in Malaysia. There has been some replanting progress by major palm oil companies in Indonesia. In addition to the slowdown in yields, sustainability concerns will also influence the expansion of palm oil output as demand in developed countries favours deforestation-free oils and seeks sustainability certification for vegetable oil used as biodiesel feedstock and, increasingly, for vegetable oils entering the food chain. However, there are concerns with competing certification schemes in Malaysia and Indonesia.

Other consumer concerns regarding soybeans stem from the high share of production derived from genetically modified seeds. In the European Union in particular, retailer certification schemes of animal products based on feed free of genetically modified products are gaining momentum and may shift feed demand to other protein sources than soybean meal. This may further reduce protein meal demand as the European Union accounted for 13% of global demand in 2020-22. Heightened environmental concerns are especially related to a potential link between deforestation and increasing soybean production in Brazil and Argentina. These concerns have motivated the private sector to incentivise the use of land already cleared for further area expansion to avoid further deforestation. If successful, these voluntary initiatives should discourage clearing of land by soybean producers.

Biofuel policies in the United States, the European Union, and Indonesia remain a major source of uncertainty in the vegetable oil sector given that about 16% of global vegetable oil supplies go to biodiesel production. In Indonesia, attaining the recently proposed 30% biodiesel mandate is questionable as – in addition to requiring government subsidies – they may impose medium-term supply constraints. In the United States Renewable Diesel or HVO receive considerable support in some states that show strong production growth rates. In the European Union, policy reforms and the emergence of second-generation biofuel technologies will likely prompt a shift away from crop-based feedstocks. Globally, Sustainable Aviation Fuels (SAF) are expected to be a substantial use of biofuels but the timing of introduction remains largely uncertain. The development of crude oil prices, which affects the competitivity and profitability of biodiesel production, remains a major source of uncertainty.

China's import demand for soybean remains uncertain and many factors influence it. Overall, the development of the meat demand is shaped by declining population, slower but still substantial economic growth which will be the main determinant of feed and especially protein meal demand. The pig meat industry recovery from ASF combined with its restructuring will have a large influence on feed demand, especially for protein meal for feeding. Protein meals compete in part with other feed components in the production of compound feed and are thus reacting to any change in cereal prices. Any adjustment of feed mixtures will influence protein meal use.

Russia's war against Ukraine poses large uncertainty around the sunflower complex as both countries are the largest producers of sunflower seed (each accounting for more than a quarter of global production) and exporters of sunflower products. Especially, Ukraine is also an important regional exporter of rapeseed and soybeans. Thus, any production shortfall reduces available oilseeds and products on the global market while also leading to a shortfall of vegetable oil and protein meal for feed in Ukraine.