

Regional outlook: North America

The regional briefs in the *Outlook* highlight broad trends for the regions defined by the FAO in the implementation of its global workplan. Recognising regional diversity, the intention is not to compare results across regions. Instead, they illustrate some of the latest regional developments, highlighting responses to global challenges and emerging trends, and relating these to the main messages of the *Outlook*. The assessments generally compare the end point of the *Outlook's* projection (2032) to the base period of 2020-22. The large and diverse Asia Pacific region has been disaggregated into two separate parts: Developed and East Asia, and South and Southeast Asia.

Agriculture and food systems globally have faced multiple disruptions in recent years – first in the form of the COVID-19 pandemic, and subsequently the impact of Russia's war against Ukraine. The subsequent rise in food prices has impacted affordability and food security in multiple regions. These briefs do not present a quantitative assessment of the impacts of these disruptions, though they do account for the latest expectations with respect to macro-economic developments as the world emerges from these disruptions. The trends and issues presented are those expected to underpin the *Outlook* in the medium term. They assume that the adverse effects on food, feed and fuel production, consumption and trade will gradually moderate, recognising that several uncertainties remain.

This chapter contains seven sections, with text, tabular and graphic information for each region following a similar template. A background section provides the key regional characteristics and provides the setting from which the projection is described in the subsequent sections for production, consumption, and trade. Each regional brief contains an annex providing common charts and tables outlining the key aspects for the region.

Background

Productive and resilient agro-food sector

The North American region comprises just two countries, but it covers a vast land area, while its 375 million people comprise just 5% of the world's population. This share could decline somewhat by 2032, as population growth in the region is slow at only 5.8% for the ten-year period. More than 80% of the population already resides in urban areas, with little change expected by 2032. Both the United States and Canada are highly developed countries with mature and diverse economies. This is reflected in the low share of agriculture, forestry, and fisheries in total regional GDP, which is already below 2% and expected to decline further by 2032. This does not detract from its contribution to global agriculture, where it provides 11% of total output.

North America's contribution to global agriculture reflects its sizable land base. It accounts for 10% of the land used for agriculture globally and the availability of agricultural land per capita is the highest amongst

all regions included in the *Outlook*. Its agricultural trade surplus is the third largest among all regions, after Latin America and South and Southeast Asia and it accounts for 12% of global exports. While positive, growth in agricultural production has been among the slowest of all regions, outpacing only Developed and East Asia and Europe and Central Asia over the past decade. By 2032, its share in global output and exports is expected to diminish, while its trade surplus could decline to just a quarter of current levels.

The region is highly productive, with an agricultural sector characterised by significant capital intensity and a predominance of large, commercially orientated farming enterprises that attain impressive yields. Production systems are input intensive and fertiliser application rates per hectare of cropland are high, implying that the sharp rise in fertiliser costs impacted substantially on producer margins. It also induced a reduction in fertiliser use per hectare in 2022, along with a heightened focus on optimising efficiency. Fertiliser imports into the United States declined by 22% in 2022. While prices normalise over the outlook period, fertiliser use per hectare does not fully recover to pre-2022 levels, reflecting the investments made to improve use efficiency, which also enable fertiliser use per calorie produced to decline further. Agricultural land use has stabilised over the past decade, with a consistent share of 37% dedicated to crop production. Thus, output growth has predominantly come from productivity gains. The relative importance of livestock is reflected in its 42% share of total agricultural production value, well above the global average of 36%. North America contributes 13% of the global value of livestock production, but thanks to high productivity, its share in livestock numbers is proportionately lower.

North America has a mature, high income consumer base and food intake is highest amongst all regions. Calories and protein available for consumption is 30% and 36% higher respectively than the world average. Consequently, consumer preferences could play a bigger role than income growth in the evolution of food demand. Consumption is proportionately high in animal products, which comprise almost 30% of total calories and 65% of total protein intake, compared to the global average of 18% and 40% respectively. Diets are also high in vegetable oil and sweeteners, where calorie shares are almost double the global average. Dietary composition and lifestyles in the region have led to higher incidence of obesity and food related chronic diseases such as diabetes, although the COVID-19 pandemic heightened awareness of healthy eating habits. This could have a lasting impact on consumer preferences and total calorie intake is expected to decline by 2032.

Even at the height of the pandemic, total food consumption remained high, reflecting the maturity of the region's consumer base, as well as income support measures that mitigated the effects of the economic contraction on spending power. Nevertheless, its influence on the composition and distribution of food sales was profound. Expenditure on food away from home declined, while retail sales increased, inducing significant changes in the food supply chain to adapt to both the type of food and packaging size requirements. Weersink et al. (2021^[10]) note that, despite the time required to adapt to the changes, the adjustments in the supply chain have improved its resilience to future shocks.

Despite high average levels of income and food intake, the region is not immune to food security concerns amongst the lower echelons of its income distribution. Even prior to the pandemic, an estimated 10-13% of the region's population was estimated to experience food insecurity (Tarasuk and Mitchell, 2020^[11]). Despite the mitigating effects of income support measures, the prevalence of moderate to severe food insecurity increased for the first time in 2020 and remained elevated in 2021 amid rising food prices. The current environment of financial tightening, high inflation and persistently high food prices will weaken affordability and likely constrain significant improvements to food security in 2022 and 2023.

The recovery from the pandemic induced recession in 2020 was robust and the 5.4% rebound in per capita GDP in 2021 elevated average per capita income beyond pre-pandemic levels. However, this momentum was short lived and as Russia's war against Ukraine provided new impetus to energy prices and rising inflation, growth in per capita GDP slowed to 1.6% in 2022. Expectations are for a mere 0.1% in 2023. The outlook will continue to be shaped by tightening financial conditions, as monetary policy strives to keep

inflation under control amid Russia's war against Ukraine. In the medium term, growth in per capita income is expected to recover to an annual average of 1.1%, to exceed USD 62 100 per capita by 2032.

Industrial use of agricultural products is high in North America and the United States is the biggest producer of biofuel in the world, accounting for almost 38% of global output. This comprises mainly ethanol, derived from maize feedstocks, with some biodiesel derived from soybean oil and used cooking oils. Biofuel use in the United States is sustained by the Renewable Fuel Standard. The United States also supplies substantial ethanol exports to Canada.

The agriculture sector in North America is mature, productive, and resilient, contributing substantially to global production and exports of several products. Its ability to expand production may be critical to normalising the current high price cycle, amid ongoing war in the Black Sea region, particularly under conducive weather conditions. Nevertheless, it also faces challenges, as evidence suggests that its impressive historic productivity growth has slowed in the past decade (Fuglie, 2015^[12]) and, as environmental costs continue to rise, competitiveness may be eroded in the future.

Production

Productivity gains are the primary driver of growth

Growth in agricultural and fish production in North America is expected to persist, but the expansion of 8% by 2032 is significantly slower than in the past. The strength of the US dollar is a contributing factor, combined with the expectation that most prices will normalise from current high levels and in the medium term, return to a long term trend of a decline in real terms. Growth in crop production is expected to outpace that of livestock, reversing the trend that emerged over the past decade. By 2032, an 12% expansion in crop production sees its share in total agricultural output rise to 55%, compared to 41% for livestock and only 4% from fisheries.

The historic decline in land used for agriculture stabilised over the past decade. By 2032, little change is expected in total agricultural land use, though some reallocation may occur from cropland to pasture in the United States. Despite the consequent decline of 1.9% in total land used for crop production by 2032, output from the crop sector is expected to rise by an annual average of 0.8%, benefitting from a combination of intensification and yield gains. The total area harvested is expected to decline by 1.2 Mha, less than half of the decline in land use. Similarly, the total value of crop production per hectare of land is expected to rise by 14%. This increase is more pronounced in Canada, where it reverses an historic decline.

The area under cereals and oilseeds is expected to expand by only 2.4% by 2032 but will still constitute the bulk of total area harvested, with almost 60% dedicated to maize, wheat and soybeans. Among smaller crops, the area under pulses and cotton could grow by 28% and 11% respectively. Despite the faster expansion, pulses will still only account for 4% of total area in the region, but in Canada their share is more prominent at 14%. Yield gains are expected to remain robust across all commodities, but growth rates differ. Maize yields already average more than 10 t/ha in the 2020-22 base period, which is 80% above the global average. By 2032, they are expected to rise by only 5%. Similarly, soybean yields are expected to rise by 7%, whereas for wheat and other coarse grains, yield gains are expected to be higher at 13% and 16% respectively. This reflects a degree of recovery, as wheat and barley yields were significantly reduced in 2021, due to inclement weather conditions, particularly in Canada.

Meat production systems in North America are highly intensive and profitability has come under severe pressure in recent years – initially due to weak prices at the height of the pandemic induced lockdown in 2020 and subsequently due to the sharp and persistent rise in feed costs. In the short term, these factors combined to result in reduced production volumes of both pigmeat and bovine meat, as well as a dramatic slowdown of poultry production. While some recovery is evident in the medium term once feed prices

normalise, the net results is substantially slower growth in meat production, which is expected to rise by only 5.4% by 2032, to approach 56 Mt. The United States is expected to account for 90%. Poultry production is expected to grow faster than any other meat type, expanding by 8.2% over the ten-year period, compared to merely 3.3% for pigmeat and 2.6% for bovine meat, where production cycles are longer and the response to improved profitability takes longer. While improved profitability in the medium term could induce some expansion in poultry and pigmeat operations, bovine production growth is exclusively driven by productivity gains and increased carcass weights, as bovine herd numbers are not expected to fully recover to pre-2022 levels by 2032.

Milk production growth is expected to exceed that of meat and by 2032, could expand by 14% relative to the 2020-22 base period. These gains are derived predominantly from increased milk yields, which are already the highest of all regions. Cow inventories are only expected to rise by 2% – mainly in the United States, as Canada's dairy cow herd remain largely unchanged. By 2032, milk yields in the United States and Canada are expected to rise by 10% and 20% respectively. Consumer preferences dictate that an increasing share of total milk production is expected to be processed into products such as cheese, butter, and milk powders, with less going to fluid milk.

Captured fisheries still constitute the bulk of fish production in North America. Despite relative stability by 2032 in captured fisheries, growth of only 4.3% in aquaculture production implies that 88% of total production is still expected to come from captured fisheries. This also reflects the fact that production will be significantly impacted by environmental regulations. At present, 84% of total production comes from the United States, but the bulk of production growth is expected to come from Canada.

The North American region is responsible for 7% of direct agriculture related GHG emissions globally – less than its share in global output. While total agriculture emissions are expected to rise by 1.5% over the coming decade, the total emissions per unit of output value is expected to decline further. Additional emissions emanate mainly from livestock production, with increases of 0.45% p.a., compared to 0.12% p.a. from crop production.

Consumption

Changing consumer preferences are key to demand prospects

The highly developed nature of the United States and Canadian economies means that its mature, higher income consumers spend on average only 6% of total household expenditure on food. This implies that the current high food price cycle will present less of an affordability challenge than in many other regions, and that medium term demand prospects will to a large extent be dictated by the preferences of these consumers, with comparatively less influence from their economic means. Many of the expected changes in these preferences are centred around an increased focus on healthy eating habits, which was amplified by the COVID-19 pandemic. Such a shift would influence the absolute level of calories consumed, as well as their composition.

Total calories available for consumption, which includes substantial household waste, is the highest in the world. By 2032, it is expected to decline by almost 80kcal/person/day, to 3750 kcal/person/day – still 22% above the global average. Accounting for current estimates of household waste would bring caloric intake to 3480 kcal/person/day. The bulk of the decline emanates from the United States, with a far smaller reduction expected in Canada. In terms of composition, the heightened focus on health may induce a shift to increased fresh produce consumption, with fruit consumption per capita expected to rise by 14%. It is also foreseen to induce a reduction in products such as vegetable oil (-8%), sweeteners (-8.5%) and cereals (-1.2%). Meat consumption is expected to remain fairly stable, increasing by just 0.6% over the ten-year period, whereas the consumption of dairy products, on a dry matter basis, could rise by 3% and pulses, which are often perceived as healthy alternatives, could rise by 24%. This increase is from a small

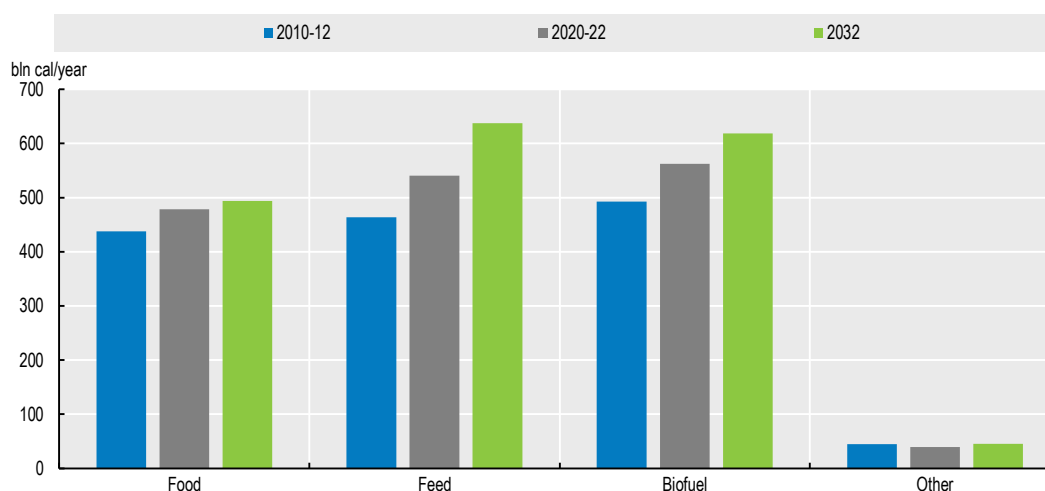
base, however, and by 2032, pulse consumption per capita will still be less than half of the global average, whereas consumption of products such as vegetable oil and sweeteners remain 125% and 77% respectively above the global average.

Protein intake in North America is expected to rise by a mere 1.8g/person/day by 2032, to reach 116g/person/day – still more than 30% above the global average. This increase is derived predominantly from animal sources, which are expected to rise by 2% over the ten year period, compared to just 0.4% from plant-based sources. While meat consumption remains fairly stable, increased intake of poultry and pigmeat products, combined with reductions in bovine and ovine meat consumption still enables a 1.7% increase in protein availability from meat products. Similarly, increased dairy product consumption encompasses an almost 17% increase in cheese intake, compared to a 2.4% gain in butter and reduced milk powder and fresh dairy consumption. Overall, this results in a 1.9% gain in protein available from dairy products by 2032. Per capita consumption of fish products is also expected to rise, to reach 23 kg per capita by 2032, a gain of 2.5% compared to 2020-22. In the case of plant-based protein sources, a gain of 0.4g of protein per person per day from pulses, is almost fully offset by the reduction in cereal consumption.

The intensity of livestock production in the region implies that feed use is already high, with calories dedicated to animal feed already exceeding those consumed as food in the base period (Figure). In line with expansion in pigmeat and poultry production, feed use is expected to rise by 13% over the coming decade, with maize and protein meal comprising almost 90% of the additional feed. By 2032, the share of maize in total feed use could rise to 55%, whereas the share of protein meal remains fairly constant at 17%.

Biofuel production is an important market for feed grains in the region, accounting for more calories than food or feed in the base period (Figure). The increasing focus on sustainability is reflected in further growth of 15% in biofuel production by 2032. Almost two-thirds of this growth is attributed to biodiesel, underpinned by increased renewable fuel targets and biomass-based diesel tax credits. The prevalence of used cooking oil as feedstock is expected to increase. Growth in ethanol production is slower, partly due to reduced gasoline use. Positive production growth reflects some additional E15 blends, but most of the gasoline will still be blended at 10%, as limitations in infrastructure and technology constrains wider adoption of mid to high level blending.

Figure 1. Calories used in food, feed and other use in North America



Note: Estimates are based on historical time series from the FAOSTAT Food Balance Sheets database which are extended with the *Outlook* database. Products not covered in the Outlook are extended by trends.

Source: FAO (2023). FAOSTAT Food Balances Database, <http://www.fao.org/faostat/en/#data/FBS>; 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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Trade

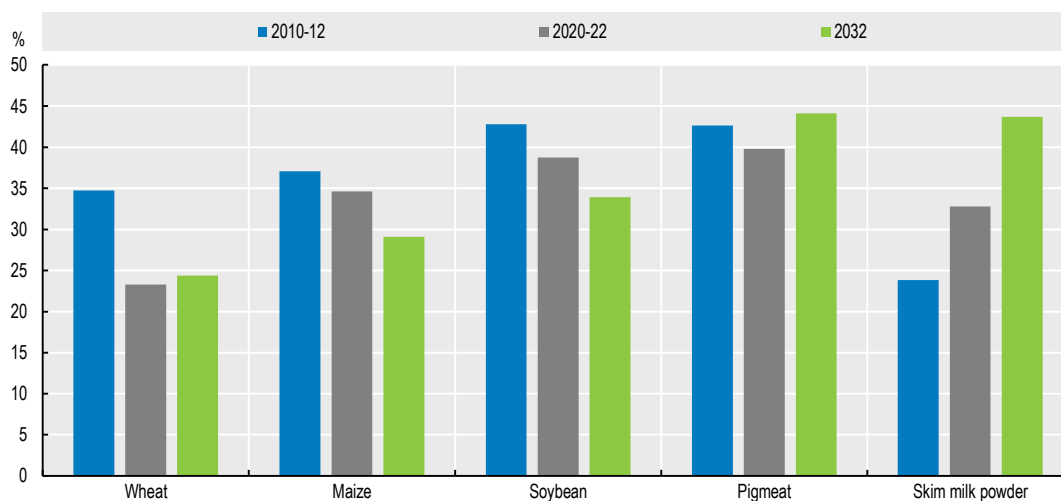
Trade surpluses continue to shrink

In line with the prevailing trend of the past decade, North America's trade surplus in agriculture and food products is expected to decline further and, by 2032, could be almost 75% smaller than current levels. This follows growth in net imports, which are expected to increase by 20% over the ten-year period, more than double the expected gain in net exports, which only rise by 8.6%. Trade developments in the United States also diverge from Canada, where the trade surplus is expected to grow by 3% p.a., but the United States is expected to move from a surplus in the 2020-22 base period, to a deficit position by 2032.

Amongst the factors contributing to the marked deceleration in export growth from the United States, is the slowdown in global demand, as well as its trade relations with China, which is the single biggest importer of US products, and rising competition from Latin America. After a period of turbulence, trade relations between the United States and China have improved, suggesting that the projected slowdown is mostly a factor of China's demand dynamics. Historic trade growth was driven mainly by feed products, such as soybeans and maize, due to rapid expansion in China's pigmeat and poultry operations, particularly in the years of rebuilding from the devastating impact of ASF. Consequently, soybean imports increased by nearly 4% p.a. over the past decade. In line with China's meat production dynamics, these imports are expected to be sustained, but further growth is limited at just 0.7% p.a. In the case of maize, China's imports are expected to decline. Amid rising competition from Latin America, the concomitant reduction in US exports of 8% for both soybeans and maize represents a marked turnaround, as these two products combined accounted for 45% of export growth over the past decade. Amid the slowdown in demand from China, opportunities for export growth could come from within the region, through the United States-Mexico-Canada (USMCA) Agreement, which was implemented on 1 July 2020 to replace the North American Free Trade Agreement (NAFTA). Canada is already the second biggest export destination for US products and trade under the agreement has already grown substantially since its inception.

In line with its diminishing surplus, the North American region is also expected to account for a smaller share in global trade for several products. These include soybeans and maize, where its share in global exports could decline to 34% and 29% respectively by 2032, due to increasing competition from Latin America and the Caribbean. Conversely, it is expected to gain market share in wheat, partly due to the ongoing war in the Black Sea region, which constrains export growth from Ukraine in particular. The North American region is also expected to expand its share in global ethanol exports to almost 58% by 2032. Similarly, its share in global pigmeat exports could rise to 44%, while its contribution to global dairy exports could reach 17%, due mainly to growth in skim milk powders.

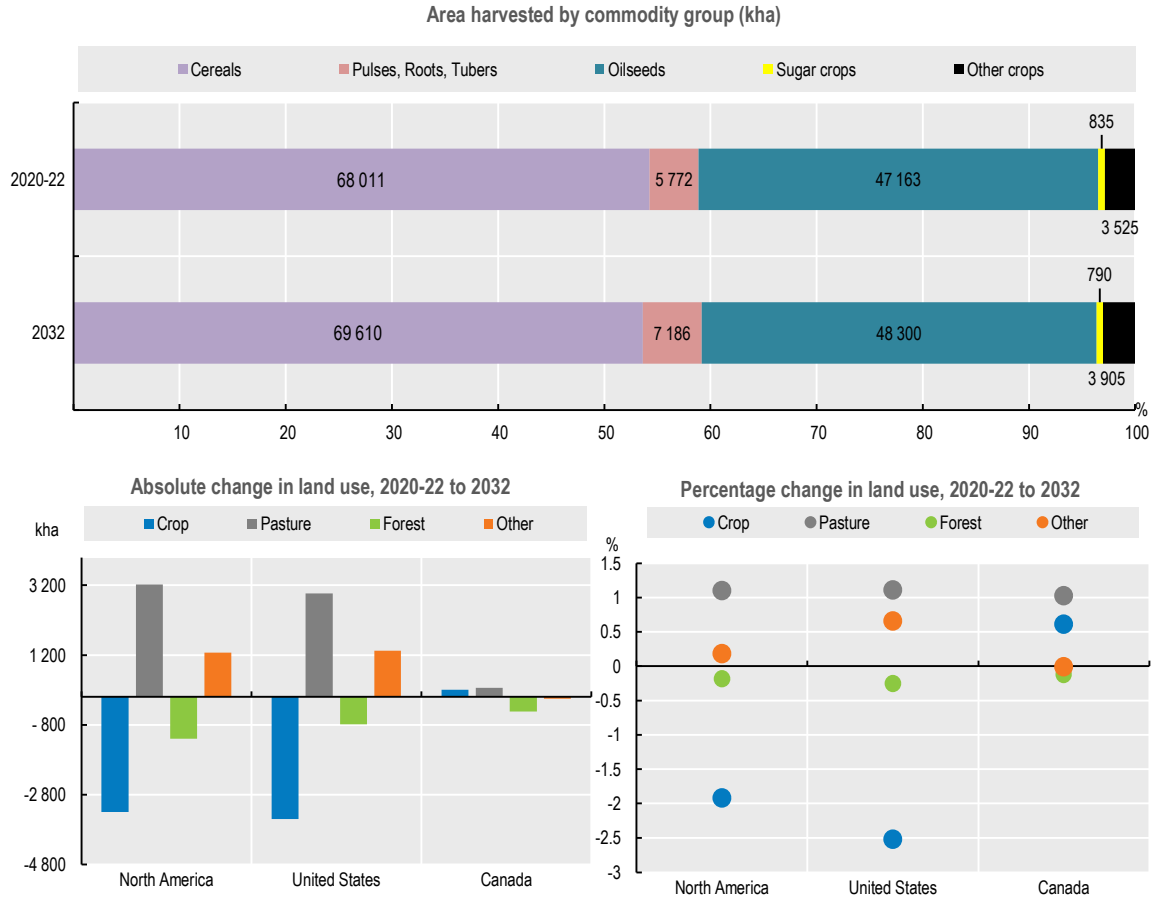
Despite its trade surplus and prolific role in global exports, the North American region is also a significant importer of several products. These include fish, bovine and ovine meat. Its share in bovine and ovine meat imports continues to decline, to the extent that it has in the past decade become a net exporter of bovine products, but it is still expected to account for 14% of global imports by 2032. In the case of fish, its imports continue to rise by 1.1% p.a. and by 2032, it will account for almost 16% of global fish imports. The region is also a major importer of fresh fruit and vegetables, which is expected to rise further to account for 18% and 23% of global imports respectively by 2032.

Figure 2. Trends in export market shares of selected commodities of North America

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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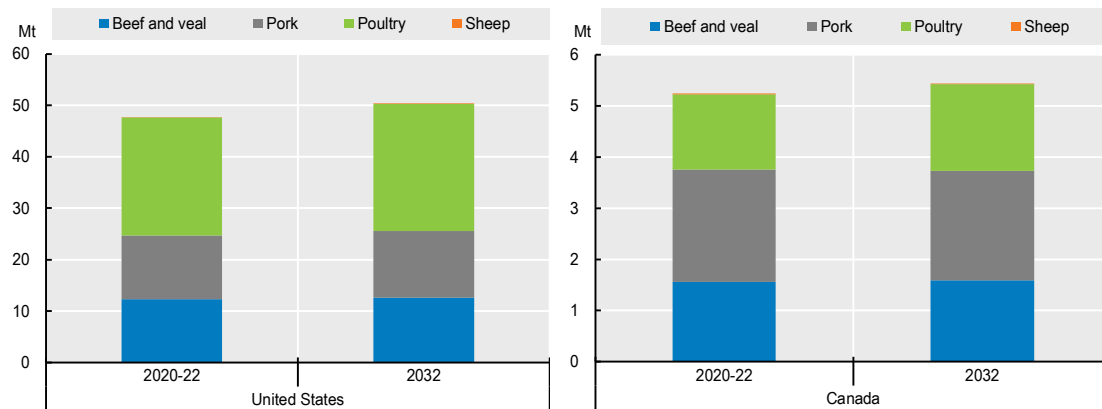
Figure 3. Change in area harvested and land use in North America



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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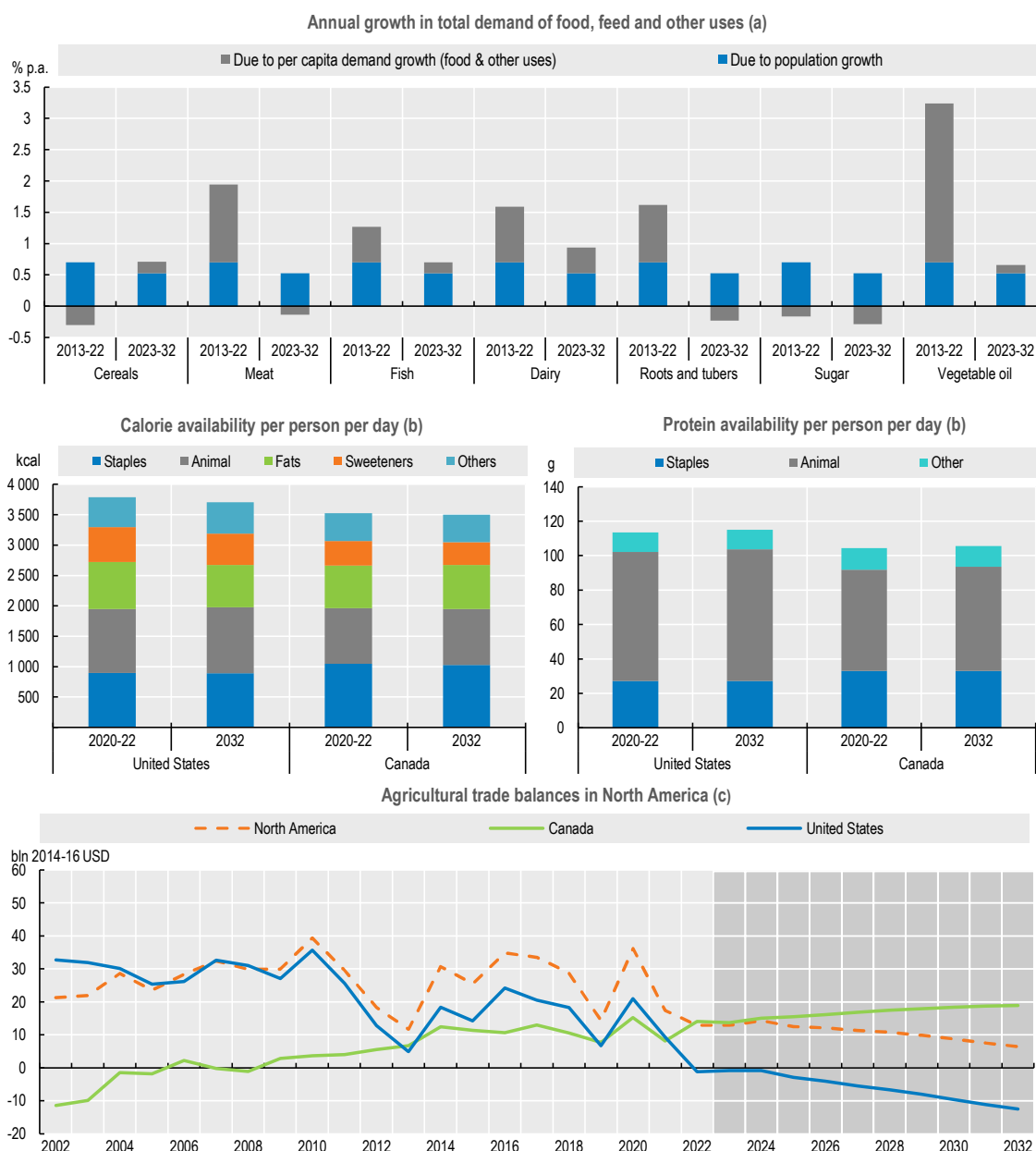
Figure 4. Livestock production in North America



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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Figure 5. Demand for key commodities, food availability and agricultural trade balances in North America



Notes: Estimates are based on historical time series from the FAOSTAT Food Balance Sheets and trade indices databases and include products not covered by the *Outlook*. a) Population growth is calculated by assuming per capita demand constant at the level of the year preceding the decade. b) Fats: butter and oils; Animal: egg, fish, meat and dairy except for butter; Staples: cereals, oilseeds, pulses and roots. c) Includes processed products, fisheries (not covered in the FAOSTAT trade index) based on outlook data.

Source: FAO (2023). FAOSTAT Value of Agricultural Production Database, <http://www.fao.org/faostat/en/#data/QV>; 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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Table 1. Regional indicators: North America

	Average			%	Growth ²	
	2010-12	2020-22 (base)	2032		Base to 2032	2013-22
Macro assumptions						
Population ('000)	348 230	375 243	397 039	5.81	0.70	0.52
Per capita GDP ¹ (kUSD)	48.76	54.78	62.19	13.53	1.24	1.14
Production (bln 2014-16 USD)						
Net value of agricultural and fisheries ³	289.5	342.9	371.6	8.36	1.20	0.65
Net value of crop production ³	154.2	182.4	203.6	11.62	0.24	0.81
Net value of livestock production ³	117.6	144.8	152.1	5.05	2.97	0.53
Net value of fish production ³	17.8	15.8	16.0	1.06	-1.92	-0.22
Quantity produced (kt)						
Cereals	426 672	489 245	540 956	10.57	-0.29	0.59
Pulses	7 769	10 432	14 519	39.18	0.95	2.13
Roots and tubers	5 146	5 706	5 968	4.58	1.23	0.33
Oilseeds ⁴	17 574	21 874	25 423	16.22	-0.08	1.07
Meat	45 775	52 927	55 780	5.39	2.03	0.44
Dairy ⁵	12 126	14 429	16 397	13.64	1.75	1.25
Fish	6 367	5 647	5 695	0.85	-1.72	-0.23
Sugar	7 175	7 820	8 510	8.82	0.98	0.72
Vegetable oil	13 990	18 407	20 842	13.23	2.74	1.15
Biofuel production (mln L)						
Biodiesel	3142.18	10210.14	16860.78	65.14	8.46	2.80
Ethanol	54 223	59 571	63 495	6.59	0.88	0.26
Land use (kha)						
Total agricultural land use	462 953	463 775	463 698	-0.02	0.05	0.00
Total land use for crop production ⁶	171 953	172 077	168 781	-1.92	0.05	-0.18
Total pasture land use ⁷	291 000	291 698	294 917	1.10	0.06	0.10
GHG Emissions (Mt CO₂-eq)						
Total	435	442	448	1.54	0.29	0.41
Crop	120	117	117	0.64	-0.72	0.18
Animal	295	301	306	1.61	0.60	0.48
Demand and food security						
Daily per capita caloric food consumption ⁸ (kcal)	3 584	3 762	3 686	-2.01	0.55	-0.16
Daily per capita protein food consumption ⁸ (g)	108.2	112.6	114.4	1.6	0.7	0.0
Per capita food consumption (kg/year)						
Staples ⁹	129.2	125.4	124.6	-0.62	-0.09	-0.08
Meat	73.4	79.4	79.1	-0.36	1.17	-0.11
Dairy ⁵	32.0	34.6	35.7	3.15	0.78	0.41
Fish	21.6	23.3	23.4	0.59	0.85	0.31
Sugar	32.2	30.6	29.9	-2.31	-0.31	-0.29
Vegetable oil	35.7	39.1	36.6	-6.37	0.36	-0.23
Trade (bln 2014-16 USD)						
Net trade ³	29	22	6	-71.13
Value of exports ³	148	179	195	8.64	0.54	1.00
Value of imports ³	119	157	188	19.88	2.02	1.58
Self-sufficiency ratio¹⁰						
Cereals	124.5	125.8	125.8	-0.03	0.01	-0.03
Meat	116.5	115.0	114.4	-0.52	0.13	0.03
Sugar	64.0	66.7	70.6	5.80	0.40	0.49
Vegetable oil	99.4	93.9	97.4	3.82	-0.62	0.46

Notes: 1 Per capita GDP in constant 2010 US dollars. 2. Least square growth rates (see glossary). 3. Net value of agricultural and fisheries data follows FAOSTAT methodology, based on the set of commodities represented in the Aglink-Cosimo model valued at average international reference prices for 2014-16. 4. Oilseed represents soybeans and other oilseeds. 5. Dairy includes butter, cheese, milk powders and fresh dairy products, expressed in milk solid equivalent units. 6. Crop Land use area accounts for multiple harvests of arable crops. 7. Pasture land use represents land available for grazing by ruminant animals. 8. Daily per capita calories/protein represent food consumption per capita per day, not intake. 9. Staples represent cereals, oilseeds, pulses, roots and tubers. 10. Self-sufficiency ratio calculated as $\text{Production} / (\text{Production} + \text{Imports} - \text{Exports}) * 100$.

Sources: FAO (2023). FAOSTAT Food Balance Sheets and trade indices databases, <http://www.fao.org/faostat/en/#data>; OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.