

# 6 Meat

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This chapter describes market developments and medium-term projections for world meat markets for the period 2023-32. Projections cover consumption, production, trade and prices for beef and veal, pigmeat, poultry, and sheepmeat. The chapter concludes with a discussion of key risks and uncertainties which have implications for world meat markets over the next decade.

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## 6.1. Projection highlights

### *Inflation dampens growth in demand in the early years*

The *Outlook* expects downward pressure on the growth of meat demand amid high and rising consumer costs and weak income growth. This is anticipated to persist in the early years of the *Outlook*, with reduced purchasing power, despite the government household support offered in some countries. Consumers are expected to shift spending priorities to limit the overall purchase of meat, which constitutes a sizeable share of the food basket in middle- and high-income countries. This may include, *inter alia*, a shift toward cheaper meats and meat cuts, as well as reduced out-of-home food expenditures.

Over the projection period, it is expected that global average per capita demand for meat will increase by 2%, from the 2020-2022 base period to 2032. Consumption growth in middle-income countries will account for a significant share of this increase (Figure 6.1). As noted in last year's *Outlook*, disposable income in high-income countries is no longer a main determinant of changes in meat consumption. Instead, concerns about human health, environmental impacts and animal welfare are the main motivations prompting consumers in these countries to shift towards a diet that shifts demand among meat products (e.g. red vs white meat) or reduces overall meat demand. In middle-income countries, where economic growth, urbanization, and the growth of the fast-food industry progresses, more significant changes in the consumer meat choices are anticipated. In low-income countries, high population growth is expected to remain the key driver of higher meat consumption. However, limited access at relatively low income levels will continue to constrain growth in per capita meat consumption, which is only 15% of the average in high-income countries.

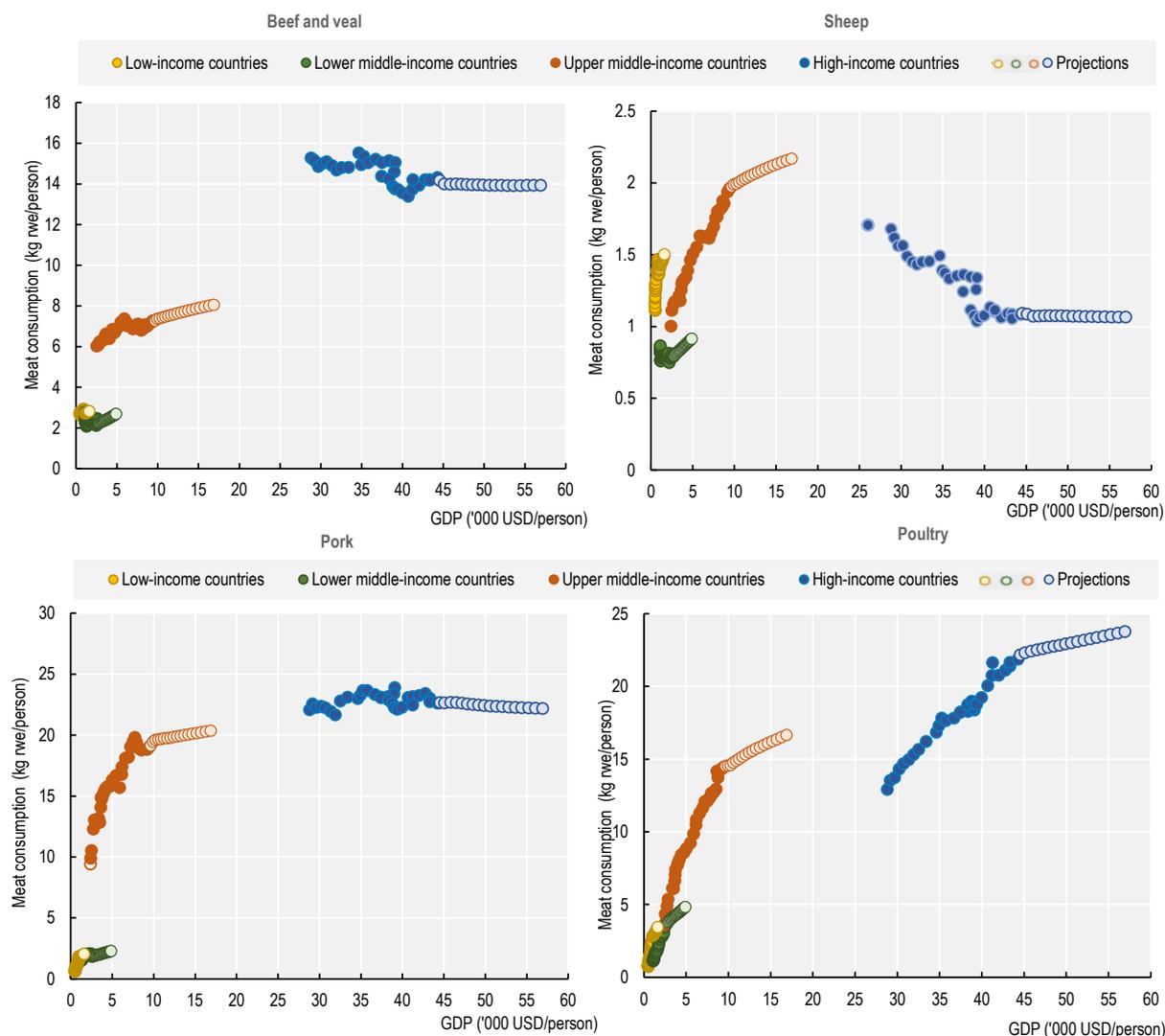
The structure of global meat markets in recent years was affected by the significant decline in pigmeat consumption due to the outbreak of African Swine Fever (ASF) in the People's Republic of China (hereafter "China"), that started in 2018. The *Outlook* projects its per capita consumption to return to the level preceding the outbreak by 2023, as the impact on domestic availability abates and per capita consumption returns to its longer-term trend. The modernisation of the supply chain and improved genetics, combined with increasing investment in large-scale production units, will reduce production costs and increase productivity, and support a rebound in Chinese meat consumption.

### *Growth in meat supply will expand to meet modestly rising demand*

Global herd and flock expansion, combined with continuous improvements in animal breeding, management, infrastructures, and technology will increase production over the outlook period, particularly in upper middle-income countries (+14%). These countries will drive the growth in global meat production to reach 382 Mt (+12%) by 2032. Nevertheless, high inflation and rising costs early in the projection period will limit the medium-term growth per annum (p.a.) to a slower pace (1% p.a.) than in the last decade (1.2% p.a.).

Global meat production will be mainly driven by growth in poultry meat and a significant increase in pigmeat production assuming ongoing recovery from the major outbreaks of ASF in Asia in the first years in the coming decade. The recovery in pigmeat production in the Philippines and Thailand is assumed to be completed by 2026. The various outbreaks have highlighted the need to implement a comprehensive policy approach that combines biosecurity measures, surveillance, compensation, import/export regulations, and the development of a vaccination programme to successfully control and recover from ASF.

**Figure 6.1. Growth in Gross Domestic Product (GDP) and change in per capita consumption for meat, 1990 to 2040**



Note: Per capita consumption beyond 2032 is extended based on trends. The 38 individual countries and 11 regional aggregates in the baseline are classified into four income groups according to their respective per-capita income in 2018. The applied thresholds are: low: < USD 1 550, lower-middle: < USD 3 895, upper-middle: < USD 13 000, high > USD 13 000.

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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### *Lower growth in trade as domestic supplies rise in importing countries*

The main features of the global meat trade will be the ongoing reduction in China's meat imports, which is expected to be offset by a growing demand from middle-income countries in Asia that shift toward diets that include higher shares of animal products, and from low-income countries with high population growth. On the other hand, rising domestic production in several other countries including Iran, the Russian Federation, Saudi Arabia, South Africa, Viet Nam, and in particular countries in Latin America, is likely to dampen the growth of their meat imports in the medium term. As a result, the global meat trade will expand by only 0.7% p.a., much slower than in the last decade.

### *Lower feed costs and productivity gains bring prices down in real terms*

This *Outlook* projects that while nominal meat prices remain high, they are anticipated to be softened in 2023 and continue to decline modestly in real terms over the next decade with weaker demand, lower feed costs (in real terms), and ongoing productivity growth. As feed prices decrease and consumer spending on meat recovers in middle-income countries, particularly for poultry and pigmeat, overall meat prices will return to their long-term trend levels. However, demand growth for red meat products, particularly in middle-income countries, combined with lower productivity gains, will keep their prices in real terms relatively more expensive over the outlook period.

### *Animal disease outbreaks are significant risks in the meat sector*

The meat sector faces various uncertainties, including changing consumer preferences, public health concerns, climate impacts, international trade policies, and animal welfare concerns. With relatively large income elasticities, meat demand remains sensitive to macroeconomic conditions, particularly in emerging developing countries. On the supply side, recent animal diseases such as African Swine Fever (ASF) and Avian Influenza (AI) have disrupted supply chains and resulted in the culling of large numbers of animals. These outbreaks have also led to trade restrictions and reduced demand for meat products due to public health concerns. The uncertainties related to animal diseases highlight the importance of collaboration between government and industry stakeholders in investing in biosecurity measures and effective treatments to ensure the sector's sustainability.

## **6.2. Current market trends**

### *International market prices rise due to limited supplies*

Global meat production is estimated to have grown 1% to 347 Mt cwe in 2022. Several factors limited growth, including animal diseases, high and rising input costs, and extreme weather events. The expansion was driven primarily by increased output in Asia, specifically a rise in pigmeat production in China for a second year. In North and South America, production remained relatively stable, while it declined in Europe and Oceania. Generally, the industry's profitability improved somewhat toward the end of 2022 as the cost for input such as energy, animal feed, and fertilisers abated. However, disruptions due to animal diseases continue to disrupt meat production in many large-producing countries, with resulting trade restrictions.

In 2022, global meat exports declined by 3% to 40 Mt, primarily due to production shortfalls and higher internal demand in major exporting countries, including Brazil, Canada, the European Union, the United States and New Zealand. In addition, pigmeat imports in ASF recovering regions also contracted as their domestic supplies recovered. However, some countries, including Australia, China, India, Thailand, and Türkiye, experienced a year-on-year increase in meat exports.

With lower export supplies, the FAO meat price index rose to average 118.8 in 2022, an increase of 10% from the previous year. Despite this increase, meat-to-feed price ratios remained low, squeezing profitability in intensive feed-grain livestock operations at the start of the *Outlook* period.

## 6.3. Market projections

### 6.3.1. Consumption

*Meat demand is only expanding marginally in high-income countries*

Meat consumption patterns of consumers in most high-income countries (which represent 33% of total meat consumption for 16% of population in 2022) have started to stagnate, with changes mostly based on the type and quality of the meat consumed. However, due to their lower base intake and more rapid increases in population and incomes, growth will be generated primarily from low- and middle-income countries.

Worldwide, poultry, pigmeat, beef, and sheepmeat consumption is projected to grow 15%, 11%, 10%, and 15% respectively by 2032. Poultry meat is expected to account for 41% of the protein consumed from all meat sources in 2032, followed by pig, bovine and ovine meat. The overall growth in the volume of meat consumption, aside from the United States, Brazil and China, is expected to be greater in low-income countries, especially India, Pakistan, the Philippines, Viet Nam, and the Sub-Saharan region of Africa.

On a per capita basis, global meat consumption is set to rise by 2%. This increase of 0.7 kg/year/person on an edible retail weight equivalent basis (hereafter “rwe”) by 2032 is similar to the previous decade and, again, is mainly due to the increase in the consumption of poultry meat (Box 6.1). Globally, there is a growing trend among consumers to become increasingly sensitive to animal welfare, environmental and health concerns, and poultry has the least carbon footprint. In some instances, these shifts in preferences may lead to shrinking per capita meat consumption, as in the case of the European Union, for which the *Outlook* foresees an ongoing substitution of beef and pigmeat by poultry meat.

#### Box 6.1. Edible retail weight

This *Outlook* introduces a new second-level conversion factor to standardise meat products at different levels of the food chain. The first level converts live animal weight (lw) to carcass weight equivalent (cwe), commonly used as a basis for meat statistics. The cwe unit only includes the meat, fat, and carcass bones. The live to carcass weight conversion factor can vary based on various factors such as age, sex, breed, environment, and diet of the live animal. National authorities typically use representative conversion factors for their production, consumption, and trade statistics, compiled by their national statistics institutes. A second-level conversion factor is employed to obtain a more accurate figure of the edible portion of the carcass, eliminating the non-edible parts. The carcass undergoes further trimming, deboning, and processing to calculate a boneless retail weight equivalent (rwe). However, the values for converting a carcass into edible equivalents can fluctuate significantly depending on the region, chosen methodology, processing techniques and the desired end product. The *Outlook* applies the following standardised conversion factor to the carcass weight equivalent to derive the relevant rwe.

|         | Carcass weight to boneless retail weight % |
|---------|--------------------------------------------|
| Beef    | 67                                         |
| Pigmeat | 73                                         |
| Poultry | 60                                         |
| Sheep   | 66                                         |

Source: USDA, ERS - Loss-Adjusted Food Availability (LAFA).

Global poultry consumption is projected to increase to 91 Mt rwe, accounting for nearly half of the additional meat consumed. The global increase in protein from poultry consumption as a share of total protein from meat has been the main feature in the growth in meat consumption for decades, this trend is expected to continue (Figure 6.2). This is due to several factors, particularly the lower price of poultry compared to other types of meat and that it contains a healthy combination of protein and low fat.

Environmental considerations also contributed to the shift towards poultry meat, as the production of red meat is often resource-intensive and can lead to high greenhouse gas emissions. On the other hand, poultry production is generally considered more efficient and less resource-intensive, making it a more sustainable choice for meat.

The increase in poultry consumption in the last decade was driven by rising consumption in Asia, particularly in China, India and Indonesia, Pakistan and the Philippines. These trends will continue, but consumption is projected to grow rapidly in other regions, including Brazil, Sub-Saharan Africa and the United States, reflecting poultry's significant and increasing role in diets worldwide.

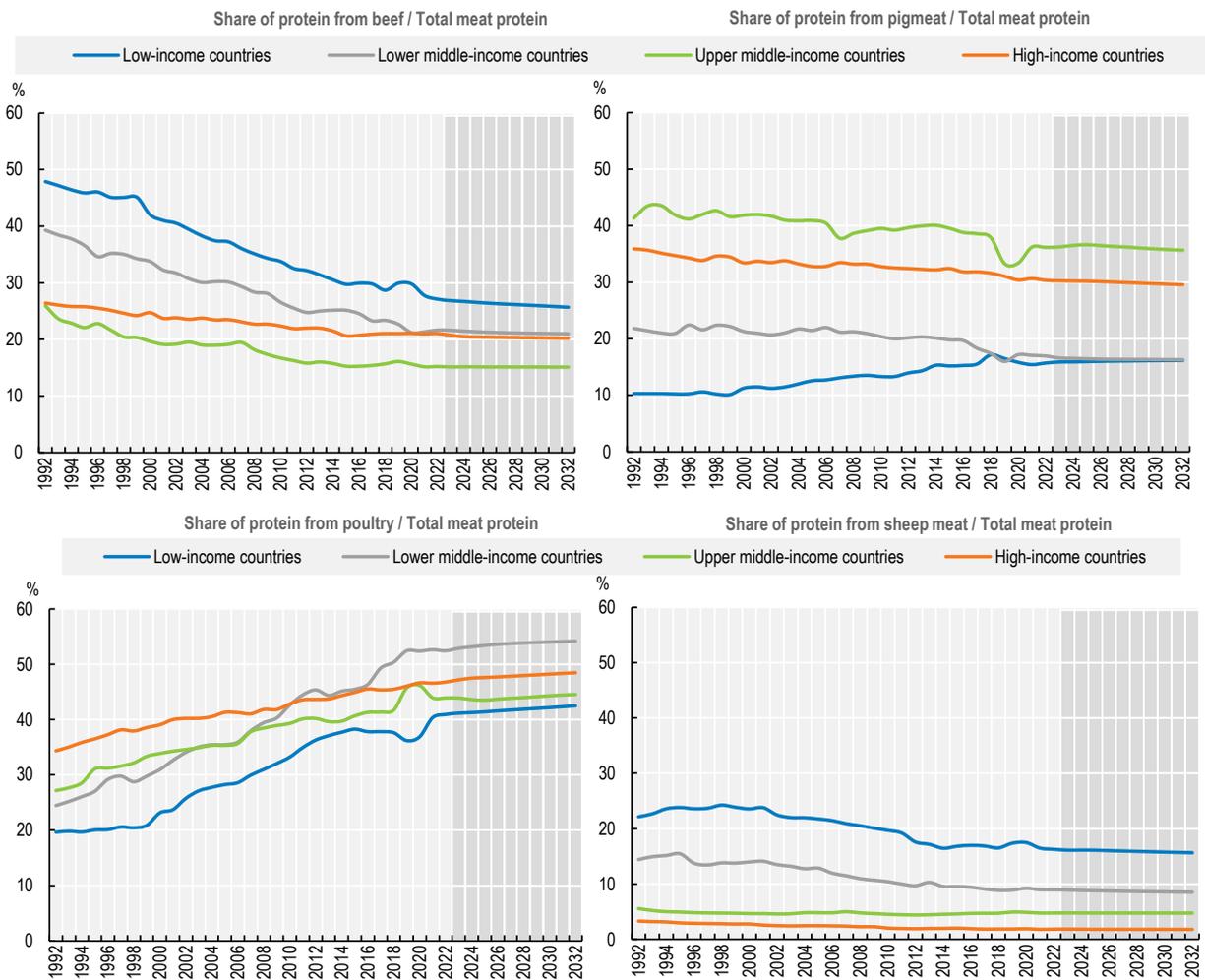
Over the next decade, global pigmeat consumption is also projected to grow globally, apart from Europe, where consumption is already high, and health, environmental and societal concerns significantly impact consumer choice. However, pigmeat will remain the most widely consumed meat in the European region. Pigmeat will be the second largest contributor to the total growth in meat consumption and is projected to reach 93 Mt rwe by 2032. However, in per capita terms, this growth will be stagnant over the projection period. In Latin American countries per capita consumption is projected to increase, due to favourable relative pigmeat/beef prices. Elsewhere, per capita demand is anticipated to be stagnant or decline.

Global beef consumption is projected to reach 51 Mt rwe over the next decade. Global per capita consumption has fluctuated around 6 kg per capita rwe for the last decade and is expected to remain stable over the outlook period. Most regions are projected to reduce their beef intake apart from the Asia-Pacific region, where per capita beef consumption is projected to increase by 0.4 kg/year rwe.

There are growing concerns about the environmental impact of beef production, which is perceived as a significant contributor to greenhouse gas emissions. In addition, deforestation caused by land-use changes for grazing and feed production is also concerning. As a result, many consumers have chosen to reduce their beef consumption in favour of poultry meat which has a smaller environmental footprint. North America and Oceania, which historically have strongly preferred beef, are expected to see the most significant decrease in per capita consumption. In contrast, China, the world's second-largest beef consumer although relatively low in per capita terms, is projected to see a further 0.8 kg/year rwe increase in its per capita consumption by 2032. This is partly due to a growing middle class in China, which has increased demand for meat, including beef.

While sheepmeat consumption is a relatively small part of the global meat market, it remains an essential source of protein for many consumers, particularly in the Middle East and North Africa. While some change is occurring in global dietary patterns, the contribution of sheepmeat to total protein from meat is projected to remain stable (Figure 6.2). It is mainly a traditional (cultural) food choice, although competition from beef and poultry ensures the latter are often more widely available and cheaper than sheepmeat.

**Figure 6.2. Share of proteins for each meat type in total meat proteins consumption**



Note: Per capita consumption. The 38 individual countries and 11 regional aggregates in the baseline are classified into four income groups according to their respective per-capita income in 2018. The applied thresholds are: low: < USD 1 550; lower-middle: < USD 3 895; upper-middle: < USD 13 000; high > USD 13 000.

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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### *Will meat demand fall in the long term?*

Rising meat consumption has raised concerns for long term sustainability, given its pressure on global resources and contribution to GHG emissions. The *Outlook* assumes that consumer preferences will evolve slowly and does not anticipate a significant change in the current trend over the next decade. The implications for GHG emissions are broadly consistent with those of the IPCC. Looking beyond the medium term into the longer term, demographic trends, human health, animal welfare, and environmental concerns may negatively impact meat consumption. Efforts to reduce food loss and waste (FLW), could also lead to a reduction in meat consumption and production (Box 6.2).

## Box 6.2. Meat sector food loss and waste

Global perspectives for the meat sector point to the dilemma between meeting consumers' growing demands on the one hand and being environmentally sustainable on the other hand. The production of meat and meat products significantly impacts the environment, accounting for around 3.8 gigatons of CO<sub>2</sub> equivalent<sup>1</sup> per annum. This has led to a growing concern over the sustainability of the meat sector and the need to balance consumer demand with environmental sustainability. One of the solutions to tackle the sustainability of the meat sector is to reduce food loss and waste, which applies to meat products across all regions. While estimates of food loss and waste differ depending on the methodology used, recent research suggests that this could be advanced by developing regional experience on loss and waste at the production and storage levels, especially as these losses are likely to vary across regions of the world. Compared to low-income countries, in industrialised areas, loss and waste occur towards the end of the food chain.

For example, in the European Union, 23% of production in the meat sector, taken together at all stages of the food chain, is estimated to be lost and wasted. The method for accounting is the mass flow analysis. The consumption level accounts for 64% of total food waste, followed by manufacturing (20%), distribution (12%), and primary production and post-harvest (3.5%). Aside the amount of food that can be saved from losses, there is a potential to reduce GHGs from the meat sector or to increase production with the same climate impact. For example, in 2020 Sweden beef, pigmeat and milk on farm losses represented 9% of GHGs from animal husbandry.<sup>2</sup>

Various measures have been adopted to address these issues, including promoting dietary solutions to reduce meat consumption and reducing loss and waste through technological improvements, product innovation, or the development of more differentiated sales channels to increase the value of different meat parts including their non-edible portions.<sup>3</sup> Such measures can lead to higher efficiency and reduce the need for more animal production to meet the increasing demand for meat, thus addressing both demand and sustainability issues.

### Notes

1. Gerber, P.J., H. Steinfeld, B. Henderson, A. Mottet, C. Opio, J. Dijkman, A. Falcucci, and G. Tempio (2013), *Tackling climate change through livestock – A global assessment of emissions and mitigation opportunities*, Food and Agriculture Organization of the United Nations (FAO), Rome.

As indicated by Gerber et al., food animal production all over the world contributes 7.1 gigatons of CO<sub>2</sub> equivalent. The largest share in the formation of greenhouse gases has beef production (35.3%), followed by swine (9.5%) and poultry (8.7%).

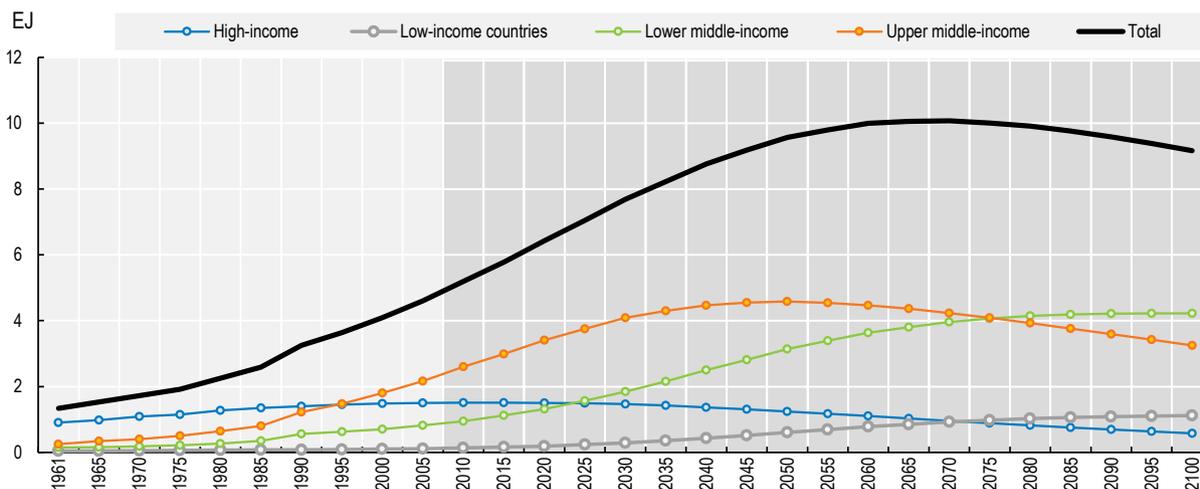
2. Lindow et al. Jordbruksverket, *Rapport 2022:19 Losses of pork, beef and milk at farm level*.

3. While these portions are not consumed directly by humans, they can still have value and uses within the broader food and agricultural industry.

Source: Karwowska, M., S. Łaba, K. Szczepanski (2021), "Food Loss and Waste in Meat Sector—Why the Consumption Stage Generates the Most Losses?" *Sustainability*, Vol. 13, 6227. <https://doi.org/10.3390/su13116227>.

As discussed in last year's meat chapter of the *Outlook*, empirical data on consumer behaviour in low-income countries indicates that when income rises beyond a certain level, the proportion of meat protein in the diet increases. As populations and incomes grow, global food demand analysis suggests that low-income groups will consume a greater share of animal-based calories. However, the relationship between income and animal product consumption becomes less clear for higher-income groups.

Long-term scenario analysis, as illustrated in Figure 6.3, reveals that upper middle-income countries will drive the increase in demand until 2040. After that, lower middle-income countries will lead, causing demand to grow until 2075. At some point during the remainder of the twenty-first century, global meat demand may begin to decline. Nevertheless, resource and environmental constraints could limit further growth in meat supply and demand, potentially causing the turning point to arrive earlier.

**Figure 6.3. Total animal-based food energy demand projections per region over time in EJ**

Notes: The Intergovernmental Panel developed the four Special Report on Emissions Scenarios on Climate Change (IPCC). The graph shows the B2 middle-of-the-road emissions scenario, which has a balanced approach of slow economic growth, modest population growth, some technological advances, and social and environmental sustainability.

EJ (Exajoule) is an energy unit. It's equivalent to  $1 \text{ EJ} = 10^{18}$  Joules per year

Source: Bodirsky B.L., S. Rolinski, A. Biewald, I. Weindl, A. Popp, H. Lotze-Campen (2015), "Global Food Demand Scenarios for the 21<sup>st</sup> Century", *PLoS ONE*, Vol.10 (11): e0139201, <https://doi.org/10.1371/journal.pone.0139201>.

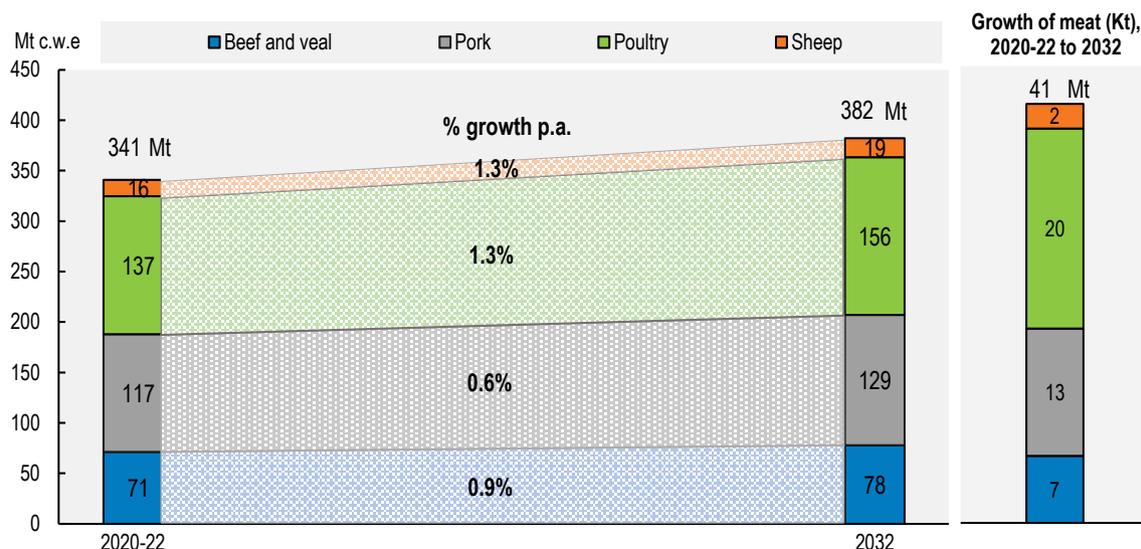
### 6.3.2. Production

#### *High feed and labour costs are slowing growth*

According to projections, world meat production is expected to increase by 41 Mt cwe to an estimated 382 Mt cwe by 2032, with most of the growth occurring in Asia, led by a 20 Mt increase in poultry production (Figure 6.4). In China, the rise in pigmeat production will offset the projected decline in European output, impacted by factors such as ASF outbreaks, stricter environmental laws, and animal welfare regulations in some EU countries. The ASF outbreak continues to impact Asia, mainly in the Philippines and Thailand and will continue to do so in the early years of the outlook period (Figure 6.7).

In recent years, high feed and labour costs have been significant challenges for meat producers worldwide. Feed costs are a significant share of the total cost of meat production, particularly for monogastric animals such as poultry and pigs<sup>1</sup> (Figure 6.5). This means that fluctuations in feed prices can have a marked impact on meat producers' profit margins. Similarly, rising labour costs<sup>2</sup> make it more difficult for meat producers to expand their operations increasing their financial risk, especially at the beginning of the outlook period, when inflation and interest rates are assumed to remain high.

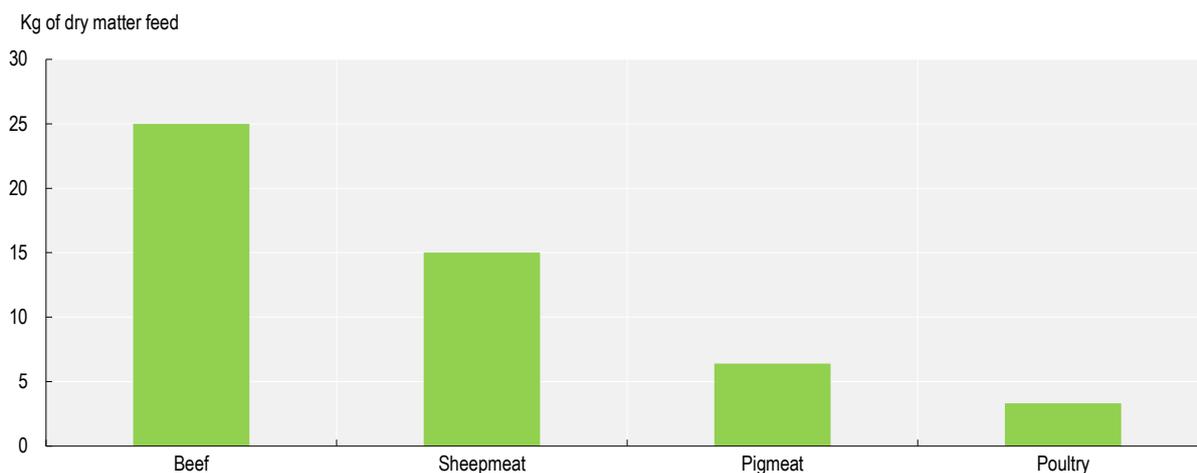
**Figure 6.4. Growth of meat production by meat type, 2032 vs. 2020-22**



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

StatLink  <https://stat.link/e51q24>

**Figure 6.5. Kilogram of dry matter feed required per kilogram of edible weight, 2013**



Note: The nutritional requirements of monogastric livestock (i.e. poultry and pigs) were assumed to be met solely from feed, while nutrients for ruminant species (e.g. cattle and sheep) come from feed and grazed pasture.

Source: Livestock conversion efficiencies are given as reported Alexander et al. (2016), "Human appropriation of land for food: The role of diet", *Global Environmental Change*, 41, pp. 88-98.

StatLink  <https://stat.link/zatln9>

Poultry will increase its dominance within the meat complex, accounting for half of all additional meats produced in the next decade. Poultry production will expand rapidly in countries with a surplus of feed grains, such as Brazil and the United States. Expansion is also foreseen in Asia as the shift away from pigmeat triggered by ASF outbreaks has benefitted poultry, particularly in China in recent years. In India, Türkiye and Indonesia, the poultry industry remains one of the fastest growing segments of the agricultural sector, primarily driven by the expanding demand for animal protein and the rising utilisation of eggs for

the bakery and confectionery sectors. Poultry has advantages over other meats in terms of production length, costs, feed conversion ratio, and proximity to growing urban markets.

However, a high density of poultry production may lead to disease issues. For example, ongoing outbreaks of highly pathogenic avian influenza (HPAI) affect poultry and egg production in many countries (Figure 6.6.). However, outbreaks are easily detected due to high mortality rates and clinical signs associated with the disease. This allows for the rapid implementation of control measures and effective vaccines to prevent their spread. In addition, once contained, the short poultry production cycle allows for quick recovery. As a result, the outlook does not assume that HPAI will impact the medium term projection.

### Figure 6.6. Animal diseases around the world

January 2023-March 2023



Note: HPAI: Green dots; ASF: Blue dots.

Source: © FAO (2023) Animal disease <https://data.apps.fao.org/> (Accessed March 2023).

While a range of factors has driven the shift towards poultry, its production also faces environmental and health challenges, particularly regarding antibiotic use and animal welfare. Therefore, promoting sustainable and responsible poultry production practices will be critical to the long-term growth of the sector.

In several European countries, pigmeat output will decline throughout the outlook period. This is because ongoing cost pressures in feed, energy, disease outbreaks (Figure 6.6) and current and future environmental regulations and welfare standards are part of the European Commission's Farm to Fork Strategy (such as the "End the Cage Age").

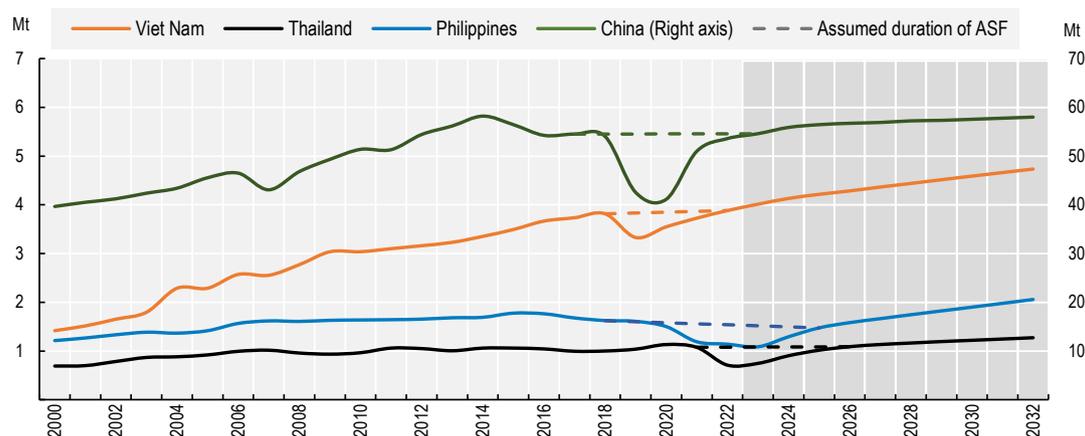
#### *Asian ASF recovery is partly due to the modernisation of the sector*

China's pigmeat production is assumed to recover, and its share of world production will return to the level of the last decade (45%) after reaching the pre-ASF level in 2023 (Figure 6.7). Viet Nam, which has suffered from ASF-reduced output since 2019, recovered faster as production was not as much affected, and it resumed its pre-ASF trajectory by 2022. As most ASF recovery in Asian countries affected by the disease is assumed to occur in the first half of the *Outlook* projection, global production is projected to increase by 0.6% p.a. during the next decade. Most of the increase in pigmeat production will occur in the

Asian ASF-affected regions where conversion from largely small-scale backyard holdings to large-scale commercial enterprises with higher biosecurity standards is taking place.<sup>3</sup>

**Figure 6.7. Assumptions on the impact of African Swine Fever on meat production**

Selected Asian countries



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

StatLink  <https://stat.link/kcgsbt>

Beef production will reach 78 Mt cwe by the end of the outlook period (Figure 6.3). The main contributors to this expansion are China's growth following technological improvements, better cattle management and genetics, and increasing milk production in Pakistan, where animals are used for milk and draft purposes. Türkiye will also be one of the main contributors to the production expansion as is expected from government intervention in the form of imports of livestock genetics, higher producer support, and interventions to offset high feed prices. In Australia, increasing slaughter capacity and profitability will trigger higher beef production over the outlook period.

Beef production will increase with higher carcass weights as feed costs decline and animal genetics are improved. Increased livestock slaughter numbers also contribute after multiple years of higher herd numbers in several African producing regions (particularly in Sub-Saharan) and Asia.

Sheepmeat production is anticipated to reach 19 Mt cwe by 2032 (Figure 6.4). Chinese production is projected to increase in response to high prices and contribute 17% of additional production. Increased availability in the global sheepmeat market will be due to flock rebuilding and increased lambing rates in Asia and Sub-Saharan Africa. Production in the European Union is projected to increase slightly from the current level due to production-coupled income support and favourable producer prices in the main sheep-producing Member States. The share of Africa in global sheepmeat production will slowly increase despite limitations linked to urbanisation, desertification, and feed availability in some countries. New Zealand's pledge to reduce GHG emissions is expected to constrain flock size as productive sheep land is converted into plantations for carbon credits.

### 6.3.3. Trade

#### *Concentration of meat exports will decrease*

Global meat exports are projected to rise 3% by 2032 from the base period, reaching 42 Mt cwe with almost 11% of meat output traded. Still, the growth in the meat trade is projected to decelerate compared to the

past decade. Developed countries are still expected to account for more than half (55%) of global meat exports by 2032, a share which is 3% point lower than in the base period. However, the share of Brazil and the United States, each representing 20%, will remain stable over the projection period.

Australia and Türkiye are expected to record the most significant increase in world meat exports globally, benefiting from a favourable exchange rate and ample feed grain availability. Other traditional exporting countries, such as Argentina, Paraguay, and Thailand, are also expected to contribute to the increase in the global meat trade. On the other hand, the European Union export share will decline from 18% in the base year to 15% in 2032.

The most significant growth in import demand originates from Africa, which will account for the 78% of additional imports of all meat types. Asia, excluding China, is another fast-growing meat importing region. While Chinese meat imports remain high in the early part of the projection period, a gradual decline is projected as pigmeat production recovers from the ASF outbreak. In terms of composition, poultry will account for two third of the additional meat imports, bringing its share of total meat imports to 40% by 2032.

Australia and New Zealand will continue to lead global sheepmeat markets. Australia is expected to increase lamb exports (of higher value) to high end restaurants at the expense of mutton, while in New Zealand, exports will slowly decline as land use shifts from sheep farming. The source of higher import demand is the rising middle-class consumer in the Middle East.

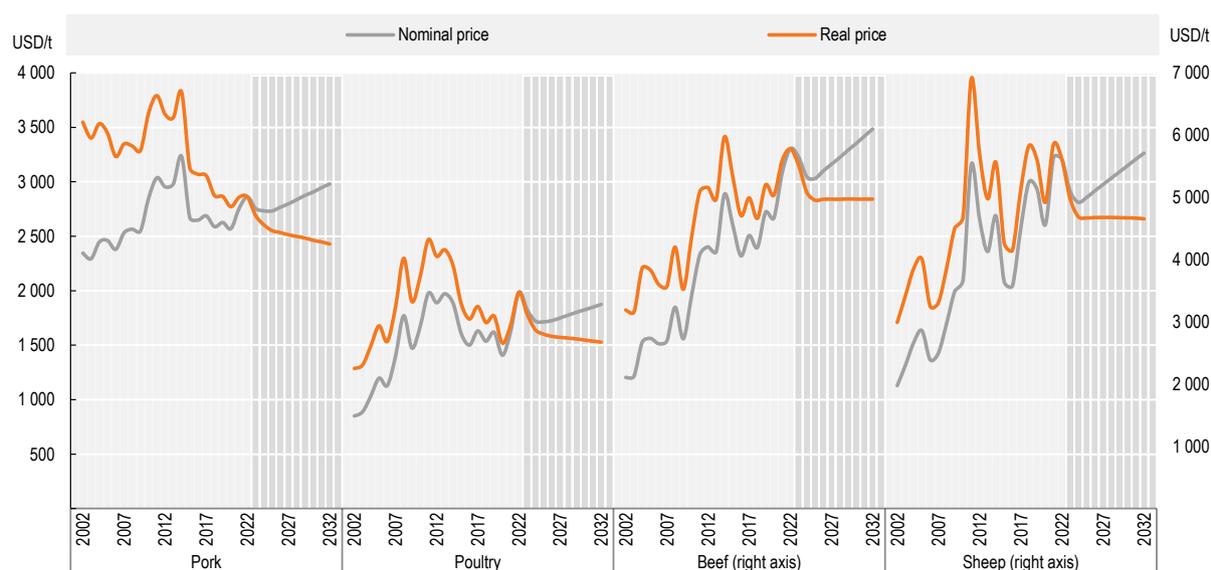
#### **6.3.4. Prices**

##### *China is a key factor affecting meat prices*

The *Outlook* projects that although meat prices are currently high, they are expected to decrease in both nominal and real terms at the start of the outlook period (Figure 6.8) under weaker demand and higher supplies as the impact of disease outbreaks wanes, particularly in China. The evolution of the situation in China impacts the world reference price of pigmeat and, to a lesser extent, that of other meats. In fact, at the start of the outlook period, the faster China recovers from ASF and lowers its meat imports, the lower prices will be in subsequent years.

As markets recover from these disruptions and consumer spending on meat in middle-income countries resumes, particularly for poultry and pigmeat, prices are expected to return to their long-term trend decline in real terms. As a result, by 2032, meat prices in real terms are projected to be 10% to 15% lower than their 2020-2022 averages. Moreover, red meat prices will be increasingly higher than pigmeat and poultry due to more limited productivity gains.

**Figure 6.8. World reference prices for meat – rising in nominal, but falling in real terms**



Note: Real prices are nominal world prices deflated by the US GDP deflator (2022=1). United States of America: Meat of Swine (Fresh, Chilled Or Frozen) export unit value USD/t, Brazil: Meat And Edible Offal Of Poultry (Fresh, Chilled Or Frozen), export unit value USD/t, Australia and New Zealand: Beef, mixed trimmings 85%, East Coast, FOB port of entry. USD/t, New Zealand: Lamb 17.5kg, USD/t cwe.

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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## 6.4. Risks and uncertainties

### *Animal disease outbreaks remain the most significant risk in the meat sector*

The meat sector faces several uncertainties in meeting the increasing demand for meat products while addressing concerns about animal disease, environmental sustainability, consumer preferences, animal welfare, public health and trade policies.

The livestock and meat sector often face severe economic impacts due to disease outbreaks. These disruptions have socio-economic costs, depending on the country and situation, including the loss of export markets, reduced imports from affected countries, or decreased consumer purchases due to health concerns. While these costs can be high globally, they can be mitigated by supplies from alternative disease-free markets or by following World Organization for Animal Health (WOAH) protocols that localise disease impacts on trade<sup>4</sup> (Box 6.3).

The ASF outbreaks in Asia have illustrated how disease outbreaks can affect domestic and international markets. In the European Union, the other producing region most affected by ASF outbreaks, a study<sup>5</sup> has suggested that an ASF outbreak can reduce the production of pigmeat, export quantities and the national pig inventory in the short and medium term. On average, new cases of ASF reduced the exports of pigmeat by close to 15%, production by more than 4% in the year after the cases occurred, and the national pig inventory by 3-4% in the current and the following year. However, only indirect effects on pigmeat prices, (such as the amount received in compensation and the market value), were observed.

After discovering the ASF virus in wild boars in Germany, several countries decided to suspend imports of German products. Exports to the usual international markets were thus mainly redirected to the European market. The countries that accept German products have been unable to compensate for the loss in

volume and value that occurred on the international markets. Germany's experience with the disease served as an object of study by the French Pork Institute (IFIP) to extrapolate the situation and estimate the potential economic impact of ASF on the French industry. The export market's estimated loss is between EUR 157 and EUR 364 million, underscoring the higher "market risks" associated with disease outbreaks.

The impact of climate change on livestock production, such the availability of feed, water, and other resources critical to livestock production, is gaining increased attention. Droughts, floods, and extreme weather events are expected to become more common, reducing productivity and increasing producer costs. A growing trend in consumer preferences is toward more healthy and environmentally conscious purchases, which may result in a shift away from traditional meat products and could have significant implications for the meat industry. Furthermore, public health concerns such as antibiotic resistance are increasing, and there are pressures to reduce the use of antibiotics in animal agriculture. International trade plays a vital role in the meat sector, and changes in trade policies – tariffs and trade bans can also significantly impact national and global markets.

Globally, the meat industry faces pressure to reduce greenhouse gas emissions due to their significant contribution to climate change. The FAO reports that the livestock sector is responsible for 14.5% of all anthropogenic GHG emissions (7.1 gigatonnes of Co2-equivalent per year),<sup>6</sup> with beef and dairy production being the main contributors. The production and consumption of meat, particularly red meat, require large amounts of resources, including land, water, and energy, resulting in emissions of greenhouse gases that can harm human health and the environment. The livestock industry needs to adopt sustainable practices such as improving feed, manure management and energy efficiency to reduce emissions. The Global Livestock Environmental Assessment Model (GLEAM) estimate the mitigation potential for the sector to be around 33%, or about 2.5 gigatonnes CO2-eq.<sup>7</sup> This figure arises from the assumption that producers in a given system, region and agroecological zone apply the practices of the 10<sup>th</sup> percentile of producers with the lowest emissions intensities while maintaining constant output. Achieving this will require investment in research, technology, and infrastructure and collaboration between the industry and government stakeholders to implement policies and regulatory frameworks that support a sustainable and climate-resilient livestock sector.

### Box 6.3. Implications of Foot and Mouth Disease (FMD) and global meat market segmentation

The *Outlook* projections generally assume integrated global markets, where the "law-of-one-price" applies across national and international markets, subject to border measures which may weaken price linkages. In this respect, it is assumed that there is one integrated international market for a given commodity, and price shocks are transmitted spatially across borders. An important exception has been for the global markets of bovine and pigmeat due, among other things, to the significance of foot and mouth disease (FMD), which continues to be present in 77%<sup>1</sup> of the global livestock population in countries that hold some three quarters of the world's population. Segmentation arises from the application of sanitary barriers by countries free from FMD, given their concern for the disease's highly contagious nature that enables transmission readily via live animals, traded meat, or human movement. In 1927, the United States introduced sanitary legislation banning meat imports from countries where FMD was endemic, leading to the creation of two different beef markets, known as the Pacific and Atlantic markets.<sup>2</sup>

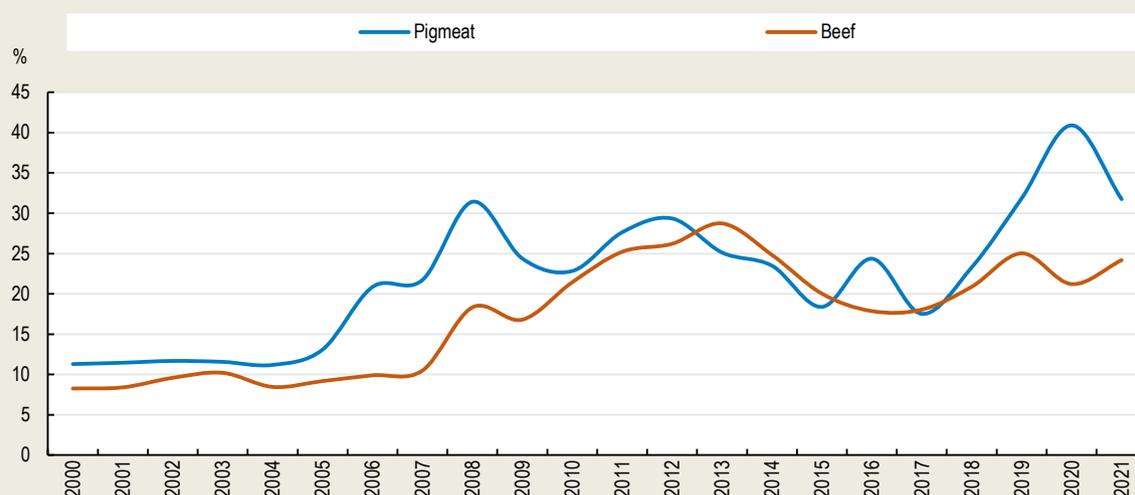
The Pacific area, free of FMD, experienced gradual expansion, while the Atlantic market, endemic to the disease, produced growing surpluses and was unable to access more wealthy FMD free markets, resulting in significant price differentials between the two zones, to the advantage of the Pacific traders. However, with changing technologies, institutional arrangements and market structures, some analysts have questioned whether the international bovine and pigmeat markets remain effectively segmented in product flow and price transmission.

The nature of FMD market segmentation has changed considerably over time. First, policy changes, such as status assessments and conditions established by the World Organization for Animal Health, have enabled FMD-free zones within FMD endemic countries adopting mitigation risk measures, allowing trade to occur (for more details, see <https://www.woah.org/en/disease/foot-and-mouth-disease/#ui-id-2>)<sup>3</sup>. For example, such zoning has allowed Brazil, the world's largest exporter of bovine meat and fourth largest pigmeat exporter, establish trade with the Pacific market.<sup>4</sup> Vaccines for FMD have also become more widely used in FMD infected countries, enabling tighter disease control and trade, and vaccination strategies have been widely pursued.

Second, from a market structure perspective, some FMD-free countries of the Pacific zone have been shipping large quantities of bovine and pigmeat into the FMD endemic market of the Atlantic zone (Figure 6.9), reaching at times 30-40% of their total shipments. Their participation in the FMD market has grown over time. Such a surplus situation is anticipated to continue for the foreseeable future, implying a considerably stronger connection between the two zones.

**Figure 6.9. Increasing share of meat traded from FMD free zone to FMD markets**

Beef and pigmeat, 2000-2021



Note: Countries used as a proxy for FMD free region; Australia, Canada, Colombia, Indonesia, Japan, Korea, Mexico, New Zealand, Peru, and The Philippines.

Source: UN COMTRADE database.

StatLink  <https://stat.link/d3roix>

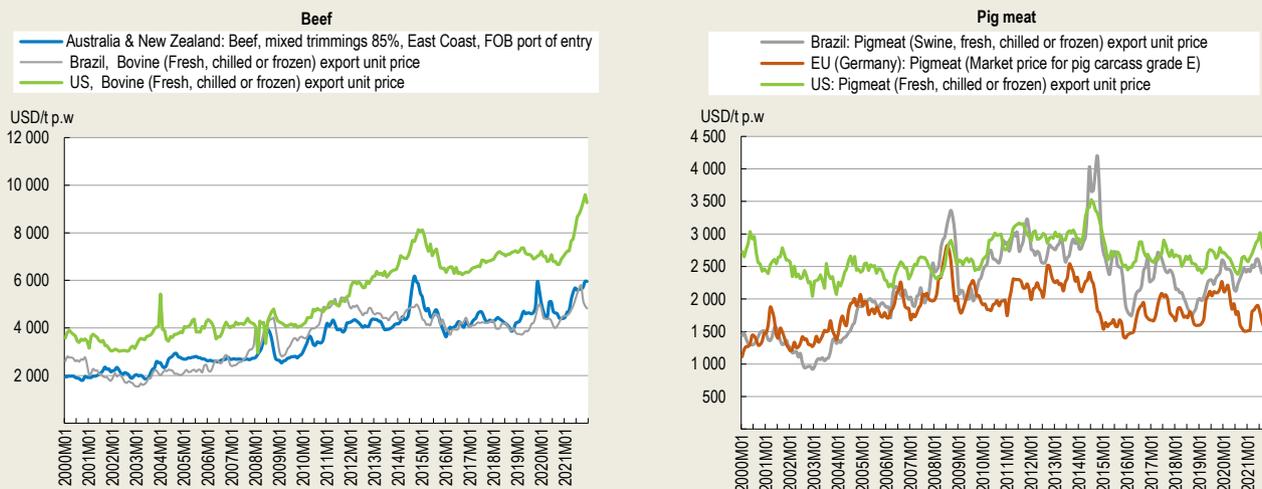
Third, evidence of this connection can be seen in the co-movement of indicative prices of the two zones displayed in Figure 6.10 over the past two decades. Formal statistical tests using monthly data for unit export values of frozen boneless beef for Australia, Brazil, and the United States from 2000 to 2021 do not reject the hypothesis of co-integration between these series, with the Australian price influencing Brazil and US price movements. Similar tests using monthly export unit values for pigmeat for Brazil, Germany and US prices indicate co-integration between the United States and Brazil series only, with detection of causality between the US price influencing the Brazilian price.

In previous editions of the *Outlook*, it has been presumed that segmented markets between the Pacific or FMD free zone and the Atlantic or FMD zone exist for bovine and pigmeat. The Aglink-Cosimo model underlying the projections of the *Outlook* has specified such segmentation in the trade between the two regions. Supported by an updated analysis of markets (as described above), the projection of this Outlook presumes a high degree of integration of trade between these zones, such that quantity flows will bind common price movements as is the

case for the other commodities. The underlying model assumption is that the law of one price applies across the two zones for both bovine and pigmeat. Should any of the conditions for such integration fail over the outlook period, such as a significant outbreak of FMD in a large FMD-free exporting country, market structures could change quickly and significantly affect the market assessment of this *Outlook*.

**Figure 6.10. Selected beef and pigmeat reference prices**

2000-2021



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

- <https://www.woah.org/en/disease/foot-and-mouth-disease>.
- Blackwell JH (1980), "Symposium: international challenges and perspectives: Internationalism and survival of foot-and-mouth disease virus in cattle and food products", *J Dairy Sci.*, Jun;63(6):1019-30. doi: 10.3168/jds.s0022-0302(80)83040-2. PMID: 7400424.
- Article 3.3 of the SPS agreement indicates that WTO Members may not follow the WOH recommendations, leaving the final decision to accept or not the proposed zone on the side of the trading partners of the infected country.
- "Zone means a clearly defined part of a country containing an animal subpopulation with a distinct health status with respect to a specific disease for which required surveillance, control and biosecurity measures have been applied for the purpose of international trade" OIE - Terrestrial Animal Health Code Twenty-ninth edition, (2021). For more information see Junker, F., J. Ilicic-Komorowska and F. van Tongeren (2009), "Impact of Animal Disease Outbreaks and Alternative Control Practices on Agricultural Markets and Trade: The case of FMD", *OECD Food, Agriculture and Fisheries Papers*, No. 19, OECD Publishing, Paris, <https://dx.doi.org/10.1787/221275827814>.

## Notes

<sup>1</sup> The proportion of feed costs in the cost of producing meat can vary depending on the type of meat and the specific production system. In major meat producing countries with intensive farming systems chicken feed costs can account for 60-70% of the total cost of production, while in pig production, it can account for 50-70% of the total cost. In ruminant animals such as cattle and sheep, feed costs are generally a lower proportion as these animals can graze on pasture and consume a wider range of feed sources. In the case of feedlot operations, it can represent around 25% of the total cost. However, the total cost of cattle production is much higher, as is total feed use per kg of meat produced.

<sup>2</sup> For example, in broiler chicken production, labour costs can account for around 5-10% of the total cost of production, while in pig production, it can be around 10-20%. In the case of ruminant animals, labour costs are generally lower as they require less intensive management, with some exceptions, such as feedlot operations, for which labour cost can represent around 8% (publications.gc.ca/pub?id=9.581110&sl=0).

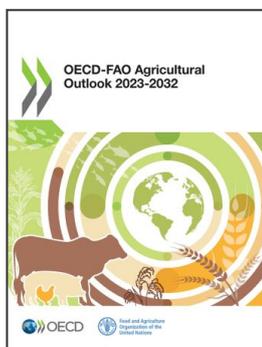
<sup>3</sup> For more information on how ASF may impact agricultural markets and to compare various outcomes induced by the ASF outbreak in China see Frezal, C., H. Gay and C. Nenert (2021), "The Impact of the African Swine Fever outbreak in China on global agricultural markets", *OECD Food, Agriculture and Fisheries Papers*, No. 156, OECD Publishing, Paris, <https://doi.org/10.1787/96d0410d-en>.

<sup>4</sup> Currently, a country affected by ASF is not obliged to completely stop its exports if it takes the measures recommended by the WOAHA.

<sup>5</sup>Niemi, J.K. (2020), "Impacts of African Swine Fever on Pigmeat Markets in Europe", *Front. Vet. Sci.*, Vol.7:634, doi: 10.3389/fvets.2020.00634.

<sup>6</sup> Gerber, P.J., H. Steinfeld, B. Henderson, A. Mottet, C. Opio, J. Dijkman, A. Faluccci, and G. Tempio (2013), *Tackling climate change through livestock – A global assessment of emissions and mitigation opportunities*, Food and Agriculture Organization of the United Nations (FAO), Rome. (<https://www.fao.org/3/i3437e/i3437e.pdf>)

<sup>7</sup> Using 2015 as a reference year (<https://www.fao.org/gleam/dashboard-old/en/>).



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