



# Agriculture, Food and Beverages

Trade challenges  
and opportunities  
post pandemic



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WRITTEN BY



# Foreword



The UK government is leading the transition towards more sustainable and productive food systems by fostering innovation in agricultural products and technology, and promoting British exports on a global scale, all while supporting job security and prosperity domestically. The agri-food sector makes an essential contribution to UK society and the UK economy, generating over £121bn (US\$166bn) of added value every year and employing 4.3m people across the country. The sector will play a significant role in the recovery from the Covid-19 pandemic: as an exporter and an employer. The sector is critical to the UK's long-term prosperity and food security.

The pandemic has highlighted that the world's food systems have become increasingly integrated and complex in recent decades. The global supply chains for food, agricultural products and technology experienced an unprecedented shock due to the pandemic. Despite the disruption, the UK's agricultural and food supply systems remained largely resilient, highlighting the essential role of open trade during periods of crisis. Global food systems are also undergoing a significant structural transformation, not only to feed the world's growing population—expected to reach 10bn by 2050—but crucially to address the devastating impacts of environmental degradation and climate change.

In the long-term, ensuring global food security will require utilisation of new agricultural technology (agri-tech). UK-based agri-food businesses are at the forefront of deploying new technologies, including robotics, artificial intelligence (AI), machine learning and the Internet of Things (IoT), to increase the accuracy and efficiency of their production. UK research institutions are also developing advanced techniques such as gene editing to enable the development of new crop varieties that will deliver increased

quality and higher production yields while limiting environmental impacts. The UK is among the top destinations for investment in agri-tech start-ups, attracting funding of over US\$1.1bn in 2019.

International trade and investment is essential in overcoming the challenges posed by the pandemic. At the same time, we must work to ensure adequate and sustainable food security in the face of climate change, conflict and a growing population. The UK Government will continue to advance trade and investment in agricultural production and technology, including through Free Trade Agreements (FTAs), knowledge development, promotion, and financing, to ensure that UK businesses are able to seize global opportunities while also supporting local economic growth and jobs. The UK Government will also ensure that the UK maintains a leading position in exporting its expertise on a global scale.

A handwritten signature in black ink, appearing to read 'Andrew Mitchell', with a horizontal line underneath.

**Andrew Mitchell**  
Director General  
Exports and UK Trade  
Department for International Trade (DIT)

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# About this report

*Trade challenges and opportunities in the post-pandemic world: Agriculture, Food and Beverages* is an Economist Intelligence Unit (EIU) report, supported by **the UK's Department for International Trade (DIT)**.

Through a range of expert interviews, secondary literature review and a data audit, this report explores the challenges and opportunities for global trade and investment in creative goods and services. The EIU would like to thank all experts for their time and insights.

**Dominic Goudie**, head of international trade at the UK's Food and Drink Federation (FDF)

**David Swales**, head of strategic insight at the Agriculture and Horticulture Development Board (AHDB)

**Christine Gould**, founder and chief executive at Thought for Food

**Rikin Gandhi**, co-founder and executive director at Digital Green

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## Section 01

# Overview of the role of agriculture, food and beverages in international trade

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In a complex and highly integrated global food system, every country in the world depends, to at least some degree, on trade in order to meet its needs.

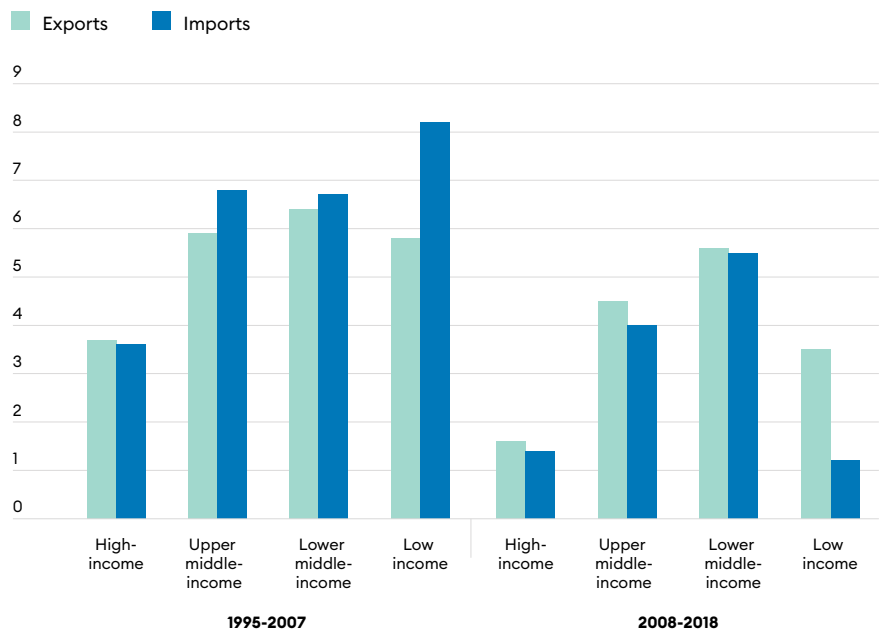
Trade in agricultural commodities and products, agricultural technology, food and beverages in the 21st century is characterised by an increasingly integrated system of complex, global value chains.

The globalisation of supply and markets has seen agri-food sectors become more integrated with other sectors of the economy, both within countries and across those value chains. International trade in food and agriculture has more than doubled in real terms between 1995 and 2018 to reach US\$1.5trn, with emerging and developing countries accounting for

a rapidly growing proportion of imports and exports.<sup>1</sup> Agri-food value chains have been driven by foreign direct investment (FDI) and trade, allowing companies to operate across multiple regions and making it easier for developing countries to integrate into global markets.

Those trade flows have been supported by economic growth and urbanisation in the developing world, reduced transport and communication costs, lower barriers to trade and investment and technological advances that have helped transform production and trade processes.

**Figure 1:** Globalised food: Agri-food exports and imports, average annual growth rates



Source: FAO calculations using UN Comtrade data

Prior to the pandemic, the market was forecast to reach a value of **\$8.6trn** by 2025, before climbing to nearly **\$12trn** by the end of the decade.

Global demand for agricultural products is projected to rise by **15%** between 2019 and 2028.

### The state of play

Agri-food trade grew at around 8% a year in real terms between 2001 and 2014, up from 2% annually in the decade up to 2000.<sup>2</sup> Markets expanded in response to lower tariffs, technological advances, a more rules-based trading environment and the growing importance of emerging and developing countries both as suppliers and as markets. That growth continued in the second half of the last decade, albeit at a slower pace.

The total global food and beverages market was worth almost US\$6trn in 2019, following annual growth of 5.7% since 2015. Prior to the pandemic, the market was forecast to reach a value of \$8.6trn by 2025, before climbing to nearly \$12trn by the end of the decade.<sup>3</sup> The global food system has also become more “global”, as exports from developing countries and emerging economies made up more than one-third of global agri-food exports by 2018, with around a third of global agricultural and food exports traded within global value chains (GVCs).<sup>4</sup>

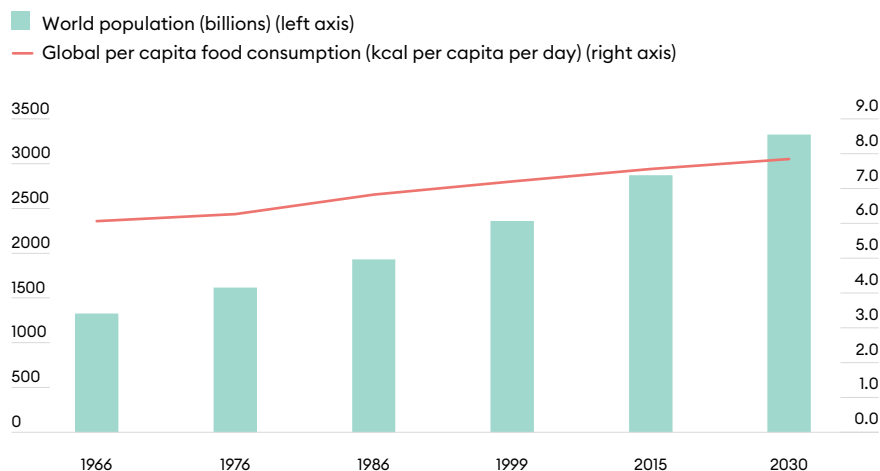
### Looking ahead

While trends vary between different countries, depending on their level of development and economic status, the ongoing expansion of the global population will remain the single biggest driver of growth.<sup>5</sup> Global demand for agricultural products is projected to rise by 15% between 2019 and 2028. However, productivity growth is likely to ensure that inflation-adjusted major agricultural commodity prices remain at or below 2019 levels, according to a report by the OECD and the UN’s Food and Agriculture Organisation (FAO).<sup>6</sup> The report also warned that trade is “critical for global security”, with the regions experiencing the fastest population growth often unable to increase food production through sustainable methods.

In the long term, sustainability is another critical theme in the agri-food outlook for the coming decade. With the world’s population forecast to hit the 10bn mark by 2050, global food demand is expected to continue to grow significantly, according to UN estimates. As pointed out by the EIU’s Food Sustainability Index, meeting the needs of the growing population is not just about producing more to meet the demand, but also tackling food wastage, as around a third of the food that the world produces is lost or thrown away.<sup>7</sup> This requires action through the value chain: in the field through pests and diseases, in transport and distribution through poor storage, and by consumers over buying and wasting food. At the same time, however, the supply of crop groups such as rice, wheat, maize and soybean will be hit by the effects of climate change on both location and yield of production.<sup>8</sup>

Other uncertainties facing agri-food markets, pandemic aside, include the spread of diseases such as African swine fever – forecast to wipe out around a quarter of the global pig population, with up to 100m dying in China after it broke out there in 2018<sup>9</sup> – and greater resistance to antimicrobial substances, according to the OECD/FAO. Among the demand-side variables are changing diets – often in response to rising awareness of health and sustainability issues – and policy responses to obesity trends. More broadly, agri-tech and digital innovation will have a bigger impact on both supply and demand, and markets will be affected by shifts in trade relations among the big global players.<sup>10</sup>

**Figure 2:** Still growing: *Global population and average food consumption*



Source: UN World Population Prospects 2019; FAO



**UK perspective:**  
**Hit hard by the pandemic, but ready to grow again**

The agri-food sector generates over £121bn of added value for the UK economy every year, employing some 4.3m people across every region. It comprises a number of sub-sectors that each make a considerable contribution to the country's economy. This includes the food and drink industry, the UK's largest manufacturing sector, which generates £31.1bn a year and employs some 450,000 people.<sup>11</sup>

Food and drink exports amounted to £21.3bn (US\$29bn), which was down £23.7bn (US\$32.6bn) in 2019 due to the Covid-19 pandemic.<sup>12</sup> Ireland, France and the US remain the biggest export markets, but growing markets, such as China, Singapore, Hong Kong, or the UAE are significant consumers of British agri-food products. The biggest export contributor by some distance is the beverages sub-sector, thanks largely to Scottish whisky, at £7.9bn (US\$11bn) in 2019, followed by cereals (£24bn) (US\$33bn) and meat, fish, dairy and eggs (£2bn) (US\$2.8bn).<sup>13</sup>

Some areas of the food and drink sector were hit hard in 2020, by a combination of businesses adjusting to a new trading relationship with the EU and weaker demand in Europe, where restaurants, hotels and other hospitality outlets remained closed for a large part of the year.<sup>14</sup> On the other hand, the value of exports in some products, such as pork, cereals or chocolate, not only remained resilient, but increased in 2020. Overall, as a sector that makes a significant contribution to the UK economy and society as a whole, agri-food is well positioned to play a role in the recovery from the pandemic, both as an exporter and an employer.<sup>15</sup>

Moreover, the sector offers crucial avenues for innovation. Investment in agri-tech has increased rapidly with the UK placed fourth for the amount of investment after the United States, China and India. In 2019 the UK agri-tech sector attracted funding of US\$1.1bn, accounting for a third of the total raised in Europe that year.<sup>16</sup> In 2018, the UK was the nation with the highest number of new vegan food products launched, with as many as one in six (16%) food products launched having a vegan/no animal ingredients claim.<sup>17</sup>

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## Section 02

# Changing patterns and challenges in global food trade



## Changing patterns and challenges in global food trade

The complex and interconnected nature of global food trade ensures that the forces driving it are constantly shifting.

The theme of increased globalisation and deepening integration was shaped by forces including technological advances, economic growth in developing nations and reduced trade barriers, among others. Long-term trends driving the agri-food sector fall into several broad categories. They include demographics (i.e. the world's population is forecast to reach 10bn by 2050); changes in consumption patterns; technological innovation and digitisation; competition for natural resources; and, of course, climate change (both the more variable climate and the challenge of reducing agricultural emissions).

### The impact of Covid-19

While the extent to which the pandemic will disrupt or accelerate long-term trends is not yet clear, it quickly shone a harsh spotlight on the issues of supply chain resilience and food security. National lockdowns and movement restrictions affected both supply (causing production and distribution bottlenecks, for instance) and demand (leading to price hikes and changes to consumption patterns).

Some sectors were hit harder than others. Global consumption of staple food commodities such as cereals continued to grow, for example, whereas commodities such as oil crops (i.e. palm, soybean, cottonseed and sunflower seed) stagnated and sugar consumption decreased. Dairy prices declined in the early weeks of the pandemic, reflecting reduced demand, while meat production slowed and fishing activity fell sharply. Overall, food and agricultural trade and global value chains have proved resilient to the pandemic shock, especially in

basic foodstuffs. Global trade in basic food commodities, such as cereals, oil crops, vegetable oils, sugar and fruits and vegetables remained stable, and even increased in the first half of 2020. By contrast, imports of the more income-elastic commodities, such as beverages and fish, declined over the same period.<sup>18</sup>

Yet food supply remained resilient on the whole, certainly in the developed world, with predictions of widespread stockpiling and empty supermarket shelves not fully realised as supply chains responded quickly to changing demand patterns.<sup>19</sup> Agri-food trade was up 3% and 7% in quarters three and four respectively, compared to the corresponding periods in the previous year, as the sector began to recover from the initial waves of the pandemic.<sup>20</sup>

In the UK, the impact was mainly on the demand side, with lockdowns effectively closing some of the channels through which consumers buy food, such as restaurants, while boosting other channels, most obviously supermarkets. "Sector-wise, the most adversely affected were those where it's harder for supply chains to move supplies from one of those channels to another channel," explains David Swales, head of strategic insight at the Agriculture and Horticulture Development Board (AHDB). "For instance, many farmers supply processors that have a big proportion of milk going to restaurants, whereas others mainly distribute to supermarkets. So, while we saw examples of some dairy farmers not having their milk collected, those with supermarket contracts weren't affected."



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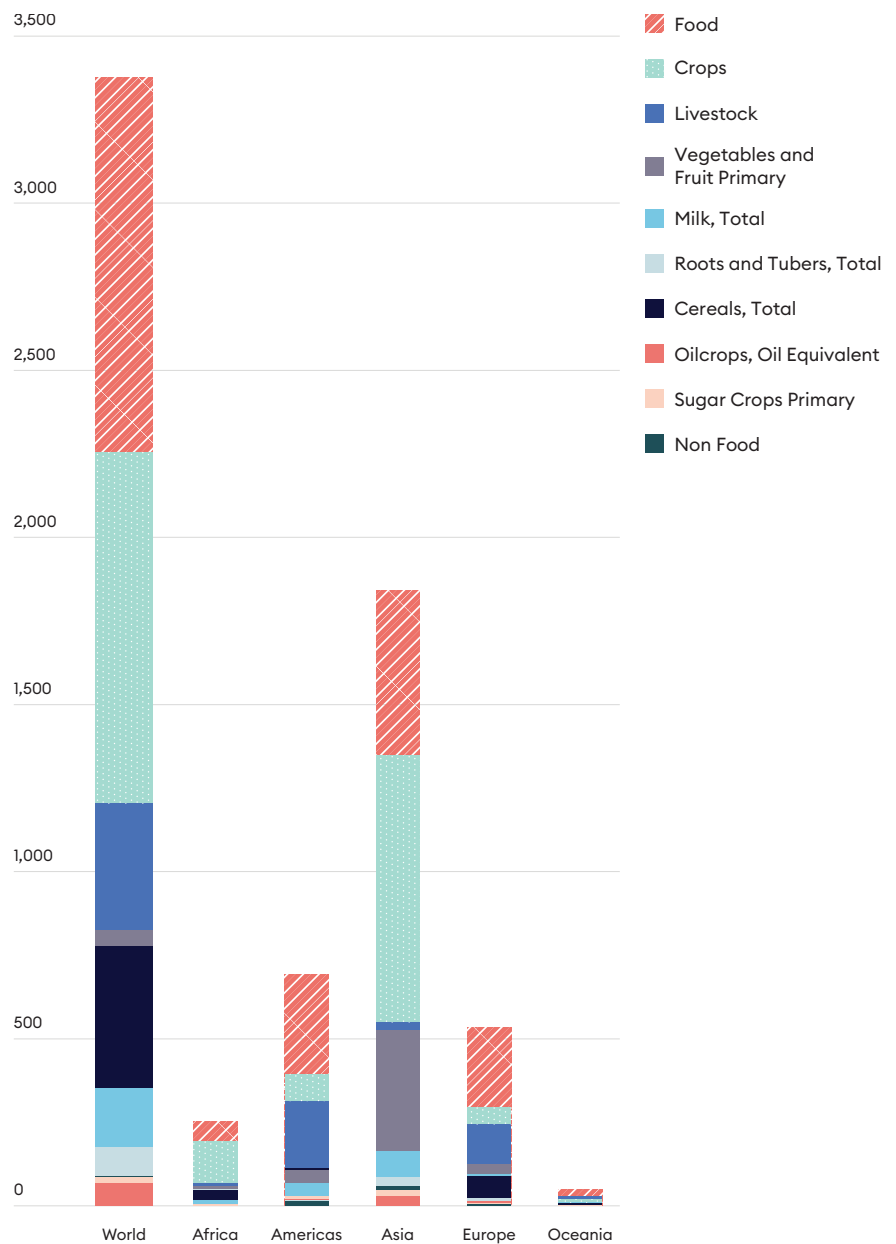
**David Swales**, head of strategic insight at the Agriculture and Horticulture Development Board (AHDB)

### Changing patterns of trade in agri-food products

Most of the main exporting countries opted against restrictive trade measures during the pandemic. As in other global value chains, however, a shift towards localisation of production and greater self-sufficiency is expected, to some extent, as firms seek to strike a balance between efficiency and resilience. Changes in trade patterns are also following long-term trajectories.

Low- and middle-income countries' share of world agricultural produce exports has increased from around 30% to 40% since the early 2000s, with emerging market countries including Brazil, Russia, India, China, Indonesia and South Africa increasingly dominant in agri-food trade.<sup>21</sup>

**Figure 3: Global affair:**  
Global agri-food production (US\$ 000,000s)



Source: FAO

## In the UK, recent policy developments may have long-term structural implications, especially from a supply perspective.

The nature of that demand is changing too, with the rise of middle-class consumers in developing countries, particularly across Asia and Africa, driving increased consumption of meat, dairy and vegetable oils. Demand for meat alone is expected to rise 74% by 2050.

“In some cases, this can lead to a stronger focus on production for domestic consumers rather than supplying export markets, with broader impacts on global supplies and commodity markets,” points out Dominic Goudie, head of international trade at the UK’s Food and Drink Federation (FDF).

In parts of the developing world, the burgeoning middle-class population is engaging digitally to change consumption and trade patterns. In the global south, the middle classes have become more accustomed to getting food delivery, while farmers in rural communities in South Asia are increasingly sourcing supplies and information online, according to Rikin Gandhi, co-founder and executive director at Digital Green, which works with rural communities around the world to develop digital solutions appropriate for them.

“Rural internet usage in India now surpasses urban usage, partly because migrants are going back to their villages and taking their connectivity with them, such as laptops and mobile phones,” he explains.

In the UK, recent policy developments may have long-term structural implications, especially from a supply perspective. The Agricultural Bill that took effect in England in late 2020 includes the phasing out of direct payments to farms and will see government funding go down a public-bid route. “This will bring a shift in what we produce and a shift towards larger farms, as well as the geography of what’s produced where,” according to Swales. “We’re coming from a period where direct payments made up a large proportion of profits, so if that’s being taken away, many farms, in

livestock sectors in particular, could become loss-making. They’ll need to adapt and do things differently.”

### Food security

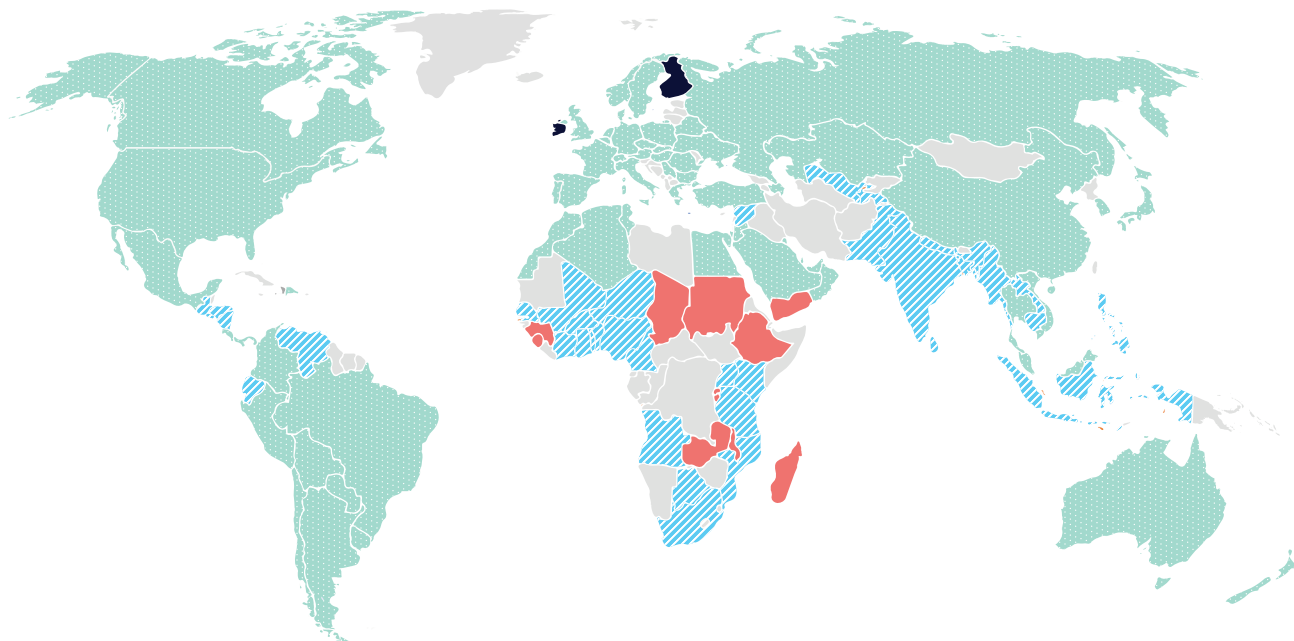
Food supply chain resilience is understood as ‘the system’s capacity to maintain a desired state of food security when exposed to stresses and shocks’, by the Global Food Security programme, a UK cross-government food security research initiative.<sup>22</sup> Covid-19 provided a stern test of that capacity. With the World Trade Organisation (WTO) predicting that the pandemic would cause world merchandise trade to contract by up to 32%, food security and supply chain resilience was a priority in agri-food trade and production in 2020.

While supply chains proved largely resilient, parts of the developing world experienced food security crises as a result of the pandemic. The Covid-19 pandemic further exacerbated the trends that saw the number of undernourished people increase by as many as 161 million from 2019 to 2020.<sup>23</sup> In its 2021 Global Report on Food Crisis, the World Food Programme reported the highest number of hunger cases in the five years of its publication, with a higher severity of cases and higher numbers of populations facing hunger crises in 55 countries, primarily because of the pandemic and associated conflicts.<sup>24</sup>

The biggest risk to food security is not availability, according to the OECD, but access to food, with a need for safety nets to be in place to ward off increases in hunger and food insecurity.<sup>25</sup> Similarly, the UN FAO warned in March 2021<sup>26</sup> that while agri-food systems had proved resilient, the economic effects of the pandemic would cause acute and chronic food insecurity to increase, with the most vulnerable groups in society hit by lower incomes and employment. One logical consequence might be a shift towards more localised food production in order to protect against failures in global food systems.

**Figure 4:** (In)secure supplies:  
Global Food Security Index

0-19.9   20-39.9   40-59.9   60-79.9   80+



Source: The Economist Intelligence Unit

However, while localisation and diversification clearly have a vital part to play in bolstering resilience, the pandemic also demonstrated that in some instances, global transport and logistics chains can be more accessible than local chains, says Christine Gould, founder and chief executive at Thought for Food. “It is easier for a farmer to sell products in another part of the world than in their own region, just because of the current lack of logistical arrangements.”

Innovators have sought to tackle the problem by reformulating food logistics to open nearby markets for farmers.

There’s also been an increase in governments focusing on local farming practices to increase resilience and reaching out to the UK to source expertise and technology to help improve farming systems. “Food security has again risen on political agendas, and countries that are net food importers are investing in developing local solutions to mitigate risks and shocks,” says Gould. “The consciousness to support local communities and local farmers has increased dramatically. This acceleration of interest is due to local production being correlated with being more ethical and safe.”

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## Section 03

# Structural changes in global food systems

## Structural changes in global food systems

Longer term trends remain in place regardless of the pandemic, albeit with some inevitable adjustments as a result.

For instance, on-going structural shifts in commodities from food to feed crops and livestock production reflect population growth and greater consumption of meats, fruits and vegetables amid income growth in low- and middle-income countries.<sup>27</sup> Global food systems will also be shaped by the growing influence of technology and digitalisation, climate change, consumer preferences (particularly with regard to sustainability), evolving production techniques and the interventions of policymakers.

### Agri-tech and food resilience

Much of the innovation in recent times has been driven by advances in digital technologies, with transformative effects throughout the global value chain. In developing countries, for instance, agricultural technology (agri-tech) helps to empower the huge population of smallholder farms in areas including Africa and South Asia by giving them platforms for trading, connecting, learning and creating greater efficiency.

“Shared platforms can give farmers economies of scale and enable them to trade things like fertilisers and livestock more directly with each other,” explains Rikin Gandhi, co-founder and executive director at Digital Green, which works with rural communities around the world to develop digital solutions appropriate for them. “Traditionally the government and others would tell farmers what to do, but farmers can now find their own information online.” The data collected by farmers is becoming a new asset for farmers, albeit one that remains difficult to monetise. “But if they can control their data, they can sell it in ecosystem service markets or sell produce to buyers who can see that they followed certain practices,” says Gandhi.

Artificial intelligence (AI) now plays a large role in agri-tech and is expected to become increasingly focused on

precision agriculture with the optimisation of decisions on cropping, livestock husbandry and land management etc. and the use of technology and data to improve farm efficiency and productivity. “There are opportunities with respect to remote sensing, using satellite and low-altitude drones using data to help farmers make better decisions with respect to water use, fertiliser use and balancing things better,” says Gandhi.

Robotics, Internet of Things (IoT) devices and other precision agriculture approaches are often too expensive for smallholder markets, but they are likely to become more accessible and affordable as opportunities arise from shared economies. The focus now should be on using technology to help rebuild trust in the food system and ensuring that devices are inclusive, accessible, equitable, and transparent, says Gould at Thought for Food. “It is about taking advantage of affordable technologies and innovations (like cell phones) to give access to products and services that were previously too expensive to deliver to the smallholder farmers who produce 80% of the global food supply, and who are usually the ones who undertake the highest risk.”

Agri-tech also contributes to climate change resilience through the use of genetic resources to make crops, livestock and fish more tolerant to rapidly changing environments. For example, identifying crop varieties with genetic traits that can allow for adaptation, and then incorporating those traits into viable varieties, can make crops more resilient to heat, drought, pests and diseases (and also reduce the usage of harmful and unsustainable resources such as pesticides). As a result of these new opportunities, the global agri-tech market is growing rapidly. The new emerging precision ‘smart’ agriculture market is estimated to grow rapidly from US\$13.8bn in 2020 to US\$22bn by 2025, at a Compound Annual Growth Rate (CAGR) of 9.8%.<sup>28</sup>

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### Food production sustainability

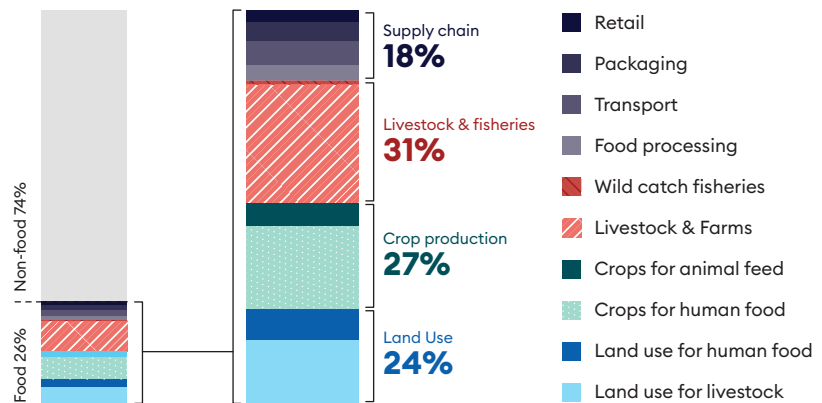
Many of the solutions developed by agri-tech providers target the urgent challenge of sustainability in supply chains and food production. “The fragility of our just-in-time supply chains has been exposed, serving as a wake-up call for tech providers and policymakers to prioritise the needs of smallholder growers and poor consumers in emerging markets,” says Gould. “This is critically important as we deal with the effects of climate change.”

With the food supply chain accounting for a quarter of all global emissions – 82% of which are attributed to food production<sup>29</sup> – cutting emissions, ecological harm and waste are at the core of national sustainable development strategies.<sup>30</sup> The projected growth in the global population and rising middle-class affluence in developing countries add to the urgency of addressing sustainability and preserving natural resources. Global emissions need to be falling towards net zero, yet it is forecast that by 2050, the agricultural sector will be

emitting 16% more carbon than it did in 2017.<sup>31</sup> Climate change, through flooding, changing seasons and other weather changes, has an impact on the growing seasons of specific crops. This is already affecting food production in some areas and will do so more widely unless action is taken.

More generally, food systems also have a negative impact on biodiversity, contributing to the mass extinction of species, ecocide, soil loss, land degradation, air pollution and emissions. New and underutilised sources of alternative sustainable proteins for livestock and aquaculture feed are being developed from insect biomass conversion (Entocycle) or bio proteins (Calysta).<sup>32</sup> These will remove the reliance on soya which therefore significantly reduces air-miles as well as deforestation which soya production causes. It also reduces reliance on harvested krill from the oceans in the aquaculture industry.

**Figure 5:** Heavy emitters: *Global agricultural greenhouse gas emissions*



Source: Our World in Data

There is an important role here for nature-positive food practices, such as conservation agriculture, sustainable aquaculture (fish farming) and vertical farming, which occupies much less space and uses less water than traditional farming without pesticides.<sup>33</sup> Each of these has its limitations, so there is a need in some instances to incentivise the use of alternative production approaches.

The transformation of practices and production can be shaped by governance, such as the Voluntary Sustainability Standards (VSS), which address environmental, social and ethical issues in global supply chains. There has been widespread uptake of the standards across the agriculture industry, with a number of food sectors putting certification schemes at the centre of their

sustainability approaches.<sup>34</sup> This partly reflects consumer demand for certified products in food markets, as well as recognition of the need to safeguard reputations and govern supply chains.

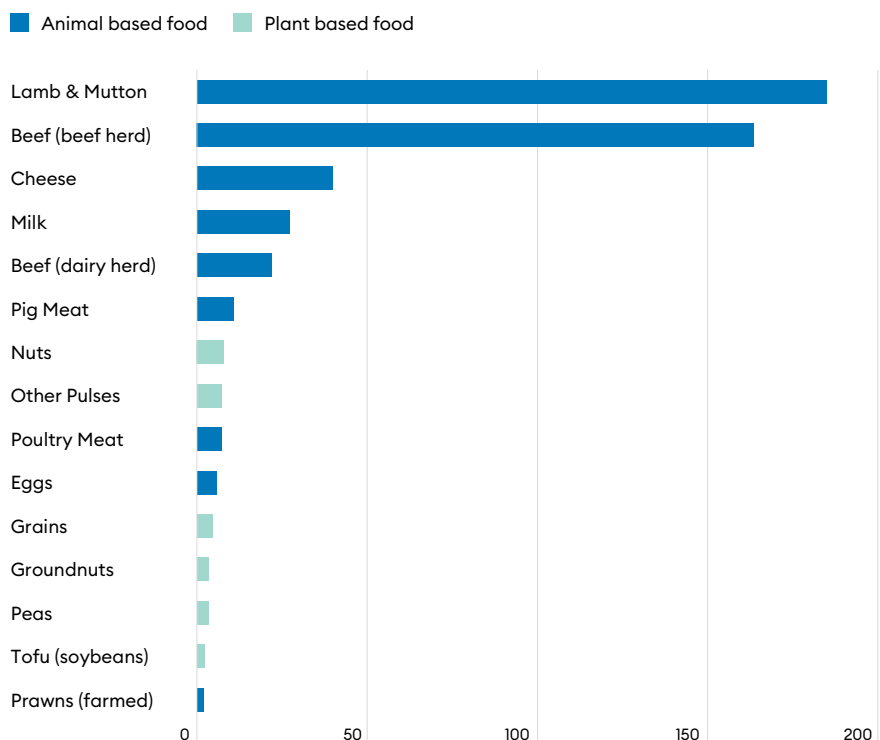
But while the VSS can contribute to making production more sustainable, smallholders lacking the financial and resource requirements to meet the criteria risk being marginalised from the export market. “With climate change getting worse there’s a need for more thinking around the incentives we create for farmers from a sustainable point of view, so that they maintain their land and the water tables beneath them in a way that is resilient,” says Gandhi at Digital Green.

### Alternative food products

We’ve noted already that population growth and rising developing world incomes will increase demand for animal-based proteins such as meat and dairy.

In Africa, for example, consumption of animal products could grow by 80% by 2030, compared to 2010.<sup>35</sup> In the developed world, however, plant-based and cell-based alternatives, as well as organic and naturally healthy foods, are increasingly popular as consumers become more conscious of the impact of their food choices. Widespread adoption of a plant-based diet would represent a global shift towards sustainable food consumption and production.<sup>36</sup> Plant-based burgers produce greenhouse gas emissions around 90% lower than meat equivalents, and need 99% less water.<sup>37</sup> Demand is increasing among meat eaters too, as more people adopt a ‘flexitarian’ diet. “We’ve seen a lot of growth in plant-based and alternative products,” reports Swales at the AHDB. “It’s not due to people becoming vegan or vegetarian, but they are becoming flexitarian and eating a bit less meat and using a bit less dairy, primarily for health reasons.”

**Figure 6:** Resource-intensive animal production: Land use (m2) per 100 gram of protein



Source: Our World in Data



Consumer insights research by the AHDB found that the environment ranked third after coronavirus and the economy as an issue of significant concern for UK consumers in 2020. Pollution from plastic waste and climate change were in the top tier of issues of concern, while food waste, the humane treatment of farm animals and the safety of food imports were also prominent.<sup>38</sup> This underlines the importance of farmers communicating with consumers about how they work and what they do to mitigate their environmental impact. It also requires a degree of innovation to respond to those changing trends. The horticulture, cereals and potatoes sectors are among those with opportunities to capitalise on shifting consumption habits.

Some alternative and plant-based products have performed well due to a high demand for convenience-focused home-cooking solutions, with more meat and dairy producers now starting to offer alternative products as well. The food and drink sector is known for innovation and its ability to meet ever-changing demands, says Gould. “We have seen growth over the past couple of years in alternatives to meat and dairy products, while at the same time seeing innovation in the meat and dairy sectors themselves. The gluten-free sector continues to grow with new products all the time, and one to watch is products with cannabidiol (CBD), which are part of a growing trend on wellness.”



### **UK perspective: Agri-tech innovation is changing farming for the better**

Digitalisation and technology are already having a transformative effect on the agri-food industry, from their impact on global value chains to the production processes and efficiencies at individual operations.

Many of the newer developments in the UK agri-food sector are underpinned by technologies including robotics, artificial intelligence (AI), machine learning and the Internet of Things (IoT). For instance, the Robocrop InRow Weeder developed by Garford Farm Machinery uses video image analysis techniques to locate individual plants in order to mechanically remove weeds between plants as well as between rows.<sup>39</sup> Further development of the technology aims to improve differentiation between crop and weed to maximise efficiency gains while removing the need to use herbicides.

At the John Innes Centre in Norwich, scientists have used state-of-the-art techniques such as gene editing to enable the development of ‘dwarf’ varieties of wheat.<sup>40</sup> These varieties produce more yield because less of the plants’ energy is wasted on producing straw and more of it goes into the harvested grain.

Their research has also identified genes that control the size of wheat grains, enabling them to increase both their width and their length. The discoveries in wheat at the John Innes Centre were estimated in 2018 to be worth £4.9bn (US\$6.8bn) globally.

Elsewhere, in 2016, Harper Adams University, in partnership with precision agriculture specialist Precision Decisions, created autonomous machines out of agricultural vehicles so that crops could be sown, tended and harvested by automated systems. The Hands Free Hectare project has continued to integrate existing technology with a developing autonomous platform to provide precision control across the farm, with a recent focus on improving accuracy and efficiency, obstacle avoidance and automated harvest logistics.<sup>41</sup>

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#### **Department for International Trade**

The UK's Department for International Trade (DIT) has overall responsibility for promoting UK trade across the world and attracting foreign investment to our economy. We are a specialised government department with responsibility for negotiating international trade policy, supporting business, as well as delivering an outward looking trade diplomacy strategy.

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