

EY food and agriculture navigator

EY global agribusiness
2022 H1 semiannual report



Welcome to the EY food and agriculture navigator



Rob Dongoski

EY Global Food and Agribusiness Leader

What will your company's role be in the future food system?

The answer is not easily boiled down to identifying where to play and how to win. Instead, your company must define what role it will play in a constantly evolving food and agriculture environment. Disruption is the norm. While there will always be some degree of uncertainty in an industry dependent on the weather and consumer preferences, the disruptions we face today appear unprecedented and unrelenting. The COVID-19 pandemic exposed how fragile the global food system can be. The war in Ukraine has illustrated how dependent the world is on key commodity producers and how intertwined the agriculture industry is with other industries like oil and gas. Inflationary pressures have sent fuel and food prices soaring. Shifting priorities among the workforce have left agriculture and food businesses strapped for resources. With unprecedented levels of disruption becoming the norm instead of the exception, the decisions your company makes today will determine your place in the future food system — will you be at the table or on the table?

Response to disruption comes in two forms, both of which are equally important but for very different reasons. Duality in both growth and operational efficiency is key.

1. Play defense: Prepare for disruption by building in organizational resiliency so your company can maintain through difficult times. We see this today as companies vertically integrate and invest in their supply chains and operations. In Nebraska, for example, a group of local ranchers are **building their own processing plant** to capture additional value from higher beef prices and to increase their negotiating power with larger meatpackers. Meanwhile, the meat industry incumbents have made their own defensive investments in automation as a response to ongoing labor shortages at processing facilities.

2. Go on the offensive: Disruption can present an opportunity to try new things and capture new markets. Such responses can be seen in investments into adjacent technologies and markets, such as John Deere's **acquisition** of EV battery manufacturer Kreisel Electric. For downstream food manufacturers, we may find such responses in the form of opening new mainstream product categories, like with PepsiCo's **launch** of a hemp seed-infused drink.

It is often difficult to discern offense from defense and no doubt both are vital. As you evaluate your company's current situation, it's going to be critical that you have a strategy to play both to secure your place at the table in the future food system.

What follows in these materials that our EY Food & Agribusiness team put together is a look at the current trends in food and agriculture, along with some key insights from our group. We hope the content provokes thought, dialogue, and exploration. Should you want to discuss any of the topics further, our team stands ready to help.

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The impact of the war in Ukraine on food and agriculture



Throughout the Ag Navigator there are references to agricultural production in both Russia and Ukraine, given the significant influence that both countries have in producing many components and crops that are critical to the global food and agriculture value chain. This report does not aim to address the war or predict its impact on food and agriculture. The content provided in this report related to Russia and Ukraine is intended only to illustrate the historic volumes and values of agricultural output.

For more detailed insights into the possible impact of the war in Ukraine, please see the report “Food Security and the Coming Storm” prepared for the Global Citizen 2022 Now Summit by the Eurasia Group and DevryBV Sustainable Strategies.

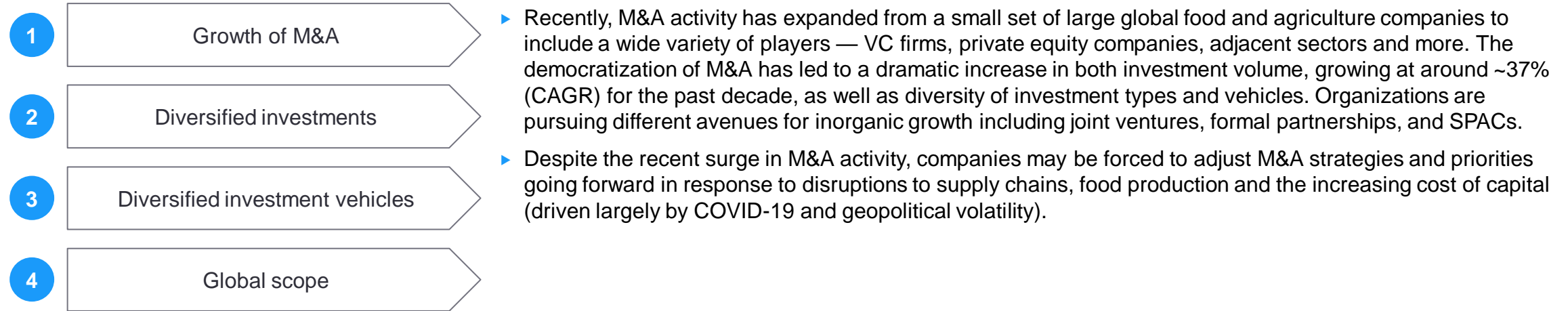
01

Trends in food and agriculture



M&A and investment: executive summary and perspective

The changing dynamic of M&A in food and agriculture



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Heightened levels of disruption and uncertainty in the world are ushering in a new normal. Investors will become more selective and conservative, putting a greater focus on security. This shift will cause an uptick in investment in activities and businesses that society deems critical when compared to recent investment trends. Desires for food security, energy independence, enhanced infrastructure and industrial capacity will likely drive investment as key priorities are changing.

Mark Holland, Principal, Ernst & Young LLP

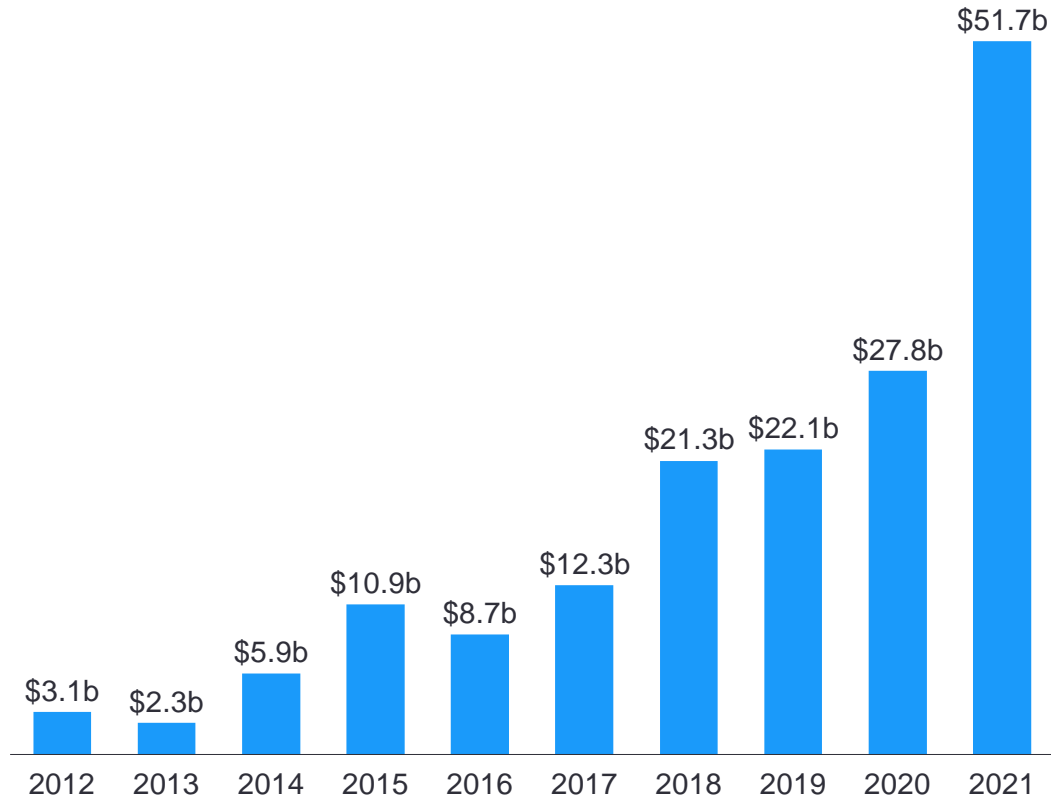
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Today’s food and agriculture organizations are turning to M&A to create the scale necessary to invest in the systems and programs required to promote trust, transparency, and sustainability for the consumer. Increased volatility in the food system, paired with ever-changing consumer demands promote strong M&A activity in the food system that will continue to increase over the coming years.

J.T. Metzger, Senior Director, Ernst & Young LLP

2021 saw a major increase in M&A and investment value for food and agriculture, including several 'mega' deals in the industry and the number of transactions

Ag M&A and investment trend, 2012–21



2021 M&A and investment highlights

\$51.7b	Total M&A and investment value, 137% greater than the total value in 2020
3,155	Total number of M&A and investment transactions carried out globally
\$3b	The largest downstream investment round was in China for eGrocery company Furong Xingsheng
\$500m	The largest amount raised in a single round for an upstream venture, Impossible Foods

Key insights

- ▶ 2021 brought several mega deals with 4 investment rounds valued over \$1b and 13 topping \$500m.
- ▶ M&A and investment activity has largely been led by strategic buyers, but private equity and venture capital firms are comprising an increasingly larger share of transactions.
- ▶ Key motivators for activity in the food and agriculture space have included sustainability, diversification, labor shortages and logistical challenges.

M&A and investment spiked in 2021 in part due to corporate commitments to sustainability and responses to the COVID-19 pandemic.

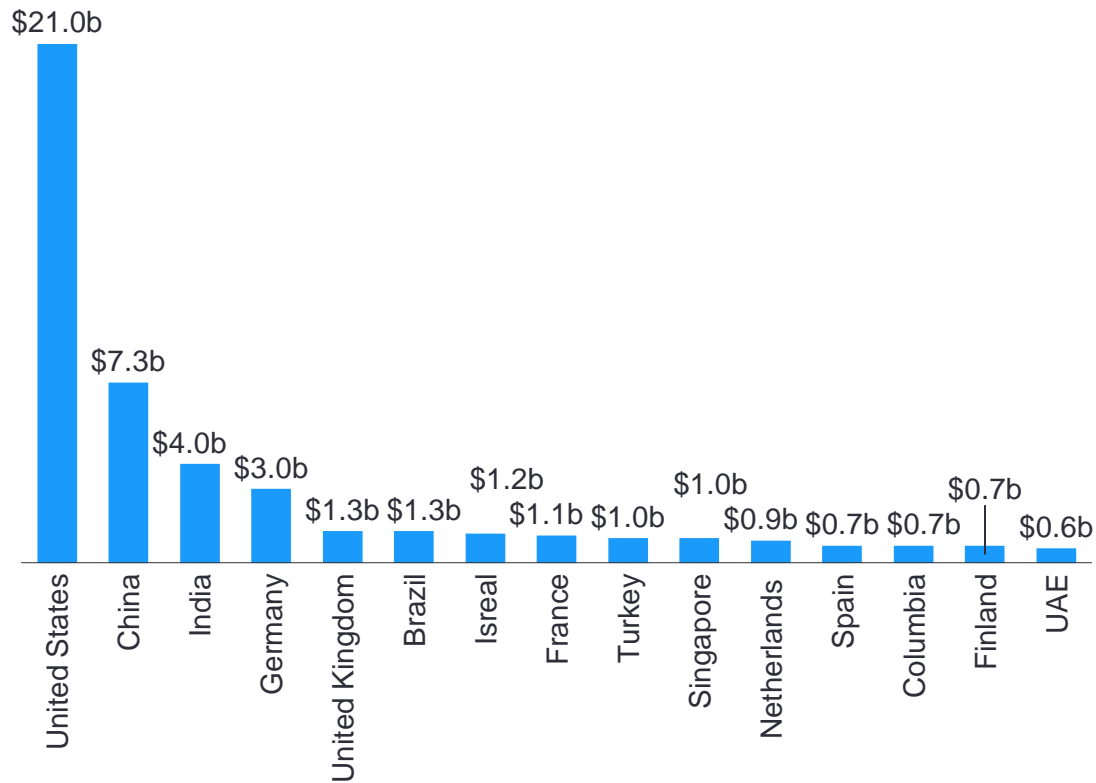
Categories for investment in food and agriculture span from novel farming methods and farm machinery to ag biotechnology and cloud infrastructure

<p>\$2.6b in financing 209 deals</p>	<p>Ag biotechnology On-farm inputs, which include genetics, breeding, microbials, and health of crops, plants and animals</p>	<p>Novel farming methods Controlled Environment Agriculture (CEA), aquaculture, biologic production</p>	<p>\$2.3b in financing 117 deals</p>
<p>\$1.3b in financing 110 deals</p>	<p>Agribusiness marketplace Trading platforms, online equipment procurement, ag equipment sales and leasing</p>	<p>Innovative food Alternative/plant-based protein, cultured meat, innovative additives</p>	<p>\$4.8b in financing 424 deals</p>
<p>\$2.1b in financing 172 deals</p>	<p>Bioenergy and Biomaterials Non-food processing, feedstock/genetic technologies, plant pharmaceuticals (e.g., hemp, cannabis)</p>	<p>Retail and restaurant technology Food waste monitoring, online technology platforms, food processing/preparation robotics</p>	<p>\$7.2b in financing 452 deals</p>
<p>\$1.2b in financing 161 deals</p>	<p>Farm management software, sensing, IoT Farm and agricultural data collection, data analytics, on-farm support software</p>	<p>eGrocery Online marketplaces for sale and delivery of products, both direct to consumer and business to consumer</p>	<p>\$18.5b in financing 343 deals</p>
<p>\$0.9b in financing 810 deals</p>	<p>Farm robotics and mechanization Innovative farm machinery and automated equipment</p>	<p>Cloud infrastructure Technology enabling on-demand access to data and products, delivery tech and services</p>	<p>\$4.8b in financing 185 deals</p>
<p>\$3.8b in financing 382 deals</p>	<p>Midstream technologies Food safety and traceability technology and logistics/transportation tracking</p>	<p>Miscellaneous Ag FinTech, food testing, nutrition technology</p>	<p>\$2.3b in financing 470 deals</p>

Areas for investment in food and agriculture have diversified to include emerging, novel areas of technology and industry disrupting trends

M&A and investments are taking place around the globe and show a shift both in consumer trends and major firm's interest in emerging technology and sustainability

Top 15 countries by value of investments, 2021



The United States still leads M&A and investment, however, in 2021, the largest single investment took place in China and was valued \$3b.

Recent M&A and investment highlights

- ▶ Walmart
- ▶ Plenty

Walmart partnered with California vertical farming company **Plenty** during their **\$400m funding round** and has committed to **sourcing leafy greens** for California stores from indoor agriculture facilities.

- ▶ COX
- ▶ Bright Farms

Cox Cleantech acquired a majority stake in hydroponic greenhouse company **BrightFarms** during a \$100m funding round. Cox Cleantech has committed **\$1b to sustainable projects like CEA and novel technologies**.

- ▶ JBS
- ▶ VIVERA

JBS, the world's largest food producer, acquired Netherlands-based alternative protein brand, **Vivera**, for **\$410m**, marking a major investment in response to **changing consumer demands** and to meet **sustainability targets**.

- ▶ AppHarvest

CEA startup **AppHarvest** completed a SPAC merger **valued at \$1b**, becoming the first CEA company to go public in the US. AppHarvest has plans to expand operations to **12 additional locations by 2025**.

AgTech: executive summary and perspective

AgTech leading the charge for sustainability and food sovereignty

- 1 Sustainability
 - ▶ The AgTech industry is booming — an estimated \$5b of funding entered the industry in 2021, with more than \$1b of funding already deployed in the first months of 2022. The growth is driven primarily by sustainability concerns and providing technology solutions to empower farmers with the resources to farm more safely and efficiently.
- 2 COVID-19 and labor
 - ▶ Additionally, with supply chain disruptions and food manufacturing plants shutting down due to labor shortages during the COVID-19 pandemic — firms are seeking innovative methods to automate, digitize and transform labor.
- 3 Population growth
 - ▶ Finally, population growth and food sovereignty challenges have caused countries to re-evaluate their “national food strategy” — leading to a rise in investment in controlled environment agricultural systems.
- 4 Food sovereignty

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The pace of innovation in applying diverse technology in food and agriculture continues to accelerate from sources within and outside our industry. This landscape can be overwhelming, and it is tempting to assume that technology will be a silver bullet, but it rarely is. To sort through the noise, it is important to remain focused on the business need and then select the right technology tool(s) for the job at hand.

Nathan Ramsey, Principal, Ernst & Young LLP

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AgTech will be the greatest enabler of new value creation in agriculture. There will be two key challenges to capture that value: first, the landscape is crowded, so picking and committing to winners will be as much an art as a science. Second, integrating these technologies at scale is a complex undertaking. If done well, it could position companies for unprecedented success. If not, it could be the difference in determining which side of the ‘at the table or on the table’ paradigm you fall.

James Wilde, Senior Director, Ernst & Young LLP

AgTech is a rapidly evolving sector that aims to improve application of technology to increase yield, growth, quality and harvesting of crops and food

Disruptive trends are reshaping agriculture ...

- 1 Internet of things (IoT)
- 2 Spatial geographic information systems
- 3 Artificial intelligence (AI) and data science
- 4 Blockchain
- 5 Automation
- 6 Regenerative agriculture
- 7 Controlled environment agriculture (CEA)

... creating value to growers, retailers, and the industry in general using big data, smart sensors, interactive apps, high-tech, autonomous machines and more

Leveraging new 5G capabilities, IoT in farming includes various sensors implanted in the farm — including light, humidity, soil moisture, temperature, crop health monitoring, etc.

GIS provides important information on weather, climate, and agriculture development — with spatial modeling capabilities to measure the impact of erosion, crop yields, and irrigation requirements.

Artificial intelligence is providing machines with desired outcomes or specific goals and allowing the machine to maximize those outcomes or goals — AI and data science can provide data analysis and predictions.

Blockchain is aiding farmers in ensuring the safety of their crops, helping to prevent fraud and theft, creating a more efficient supply chain and balancing the food ecosystem.

Farm automation, also called smart-farming is easing the workload on human resources and creating leaner, more efficient farms.

Regen-Ag aims to rejuvenate the biodiversity of soil and soil distribution, reviving the soil for the upcoming cropping period, helping to make fields act as a carbon-sink.

Controlled growing environments offer a solution to changing climatic conditions, growing urbanization, and growing crops in cities via controlled light, humidity, nutrients and water.

Future AgTech trends will have to continue to deliver environmentally friendly sustainable solutions to feed the globe.

Today's agriculture regularly uses sophisticated technologies to allow businesses to be more profitable, efficient, safer and more environmentally friendly

Key industry themes

Geographic information systems

- ▶ Irrigated landscape mapping
- ▶ Crop health assessment
- ▶ Erosion remediation
- ▶ Land degradation assessment

Blockchain

- ▶ Food traceability
- ▶ Transparency in the supply chain
- ▶ Agriculture subsidies
- ▶ Agriculture insurance

Automation

- ▶ Harvest robots
- ▶ Autonomous tractors
- ▶ Seeding and weeding
- ▶ Drones

Regenerative agriculture

- ▶ Reducing tillage
- ▶ No-till farming
- ▶ Crop rotation
- ▶ Cover crops



Industry examples

▶ ArcGIS

Providing a platform to analyze field data in one centralized system, Esri has leveraged **ArcGIS to help farmers make better in-season decisions with imagery, field data, and real-time data streams** to improve efficiency, profitability and sustainability.

▶ EY OpsChain Traceability

Enabling **food traceability throughout the supply chain**, EY's OpsChain helps clients identify source inputs, map out the supply chain, collect relevant data, add smart labels and anti-counterfeiting measures, and **identify how to best communicate the information to enhance transparency**.

▶ John Deere

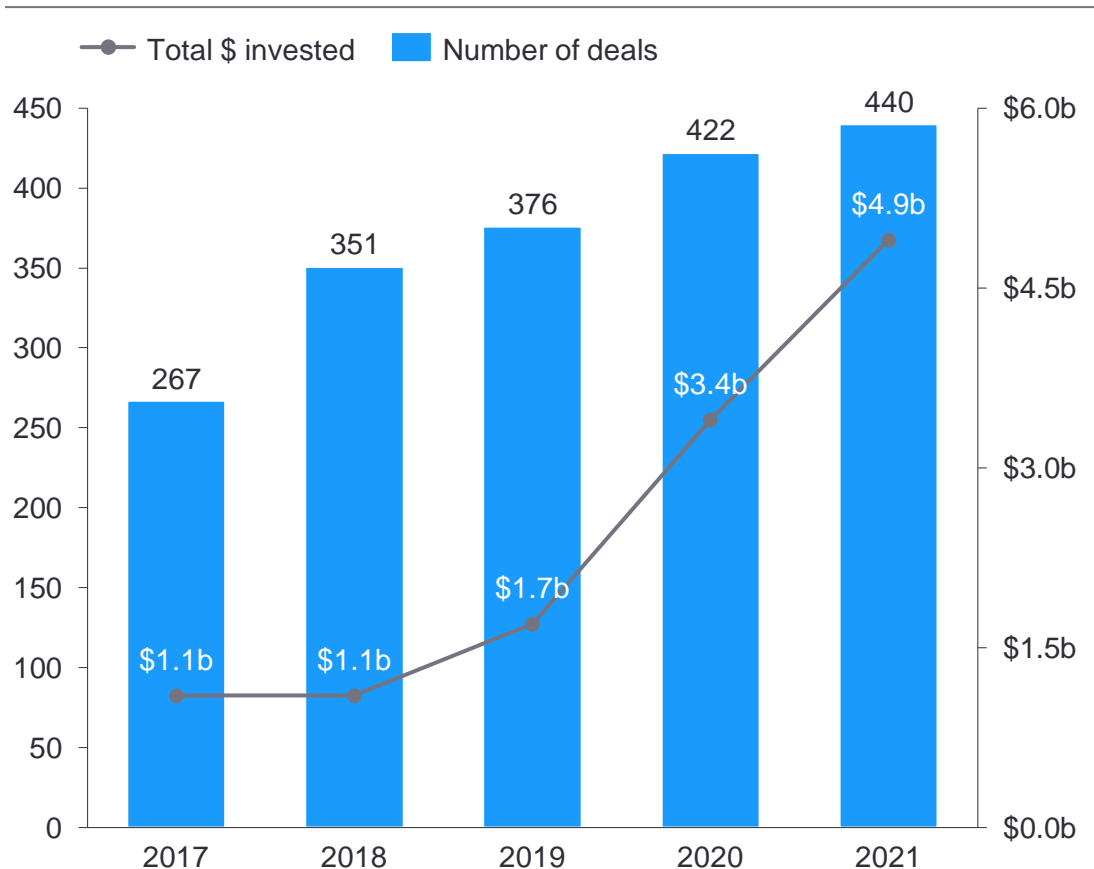
Using just a smartphone, farmers can plow fields, avoid obstacles and plant crops with minimal labor using the new John Deere 8R **autonomous tractor that utilizes six pairs of stereo cameras and artificial intelligence** to scan surroundings and maneuver accordingly.

▶ Nori

Focusing on carbon removal rather than emissions reductions, Nori uses its **innovative marketplace to provide financial incentives to farmers who use regenerative farming practices** that involve soil carbon sequestration.

Shifts in how people think about food, investing, and changes brought about by COVID-19 have led to more deals and investment than ever before in the AgTech sector

AgTech funding, 2017–21



2021 saw four deals of \$250m or more

- ▶ Pivot Bio, an Agtech tech company that looks to take nitrogen from the air and make it available for plants, raised a \$430m Series D last July.
- ▶ Nature’s Fynd, developer of nutritional vegan protein from a microbe, closed a \$350m Series C, also in July.
- ▶ Farmers Business Network (FBN), an Agtech and commerce platform, raised a \$300m Series G in November.
- ▶ Apeel Sciences, which develops plant-derived shelf-life extension technologies, closed a \$250m Series E in August.

Key considerations



1. **Intersection of change:** Buying habits of millennials and people in general when it comes to their food’s taste, nutrition and sustainability.
2. **Rise of vertical farming:** Increased popularity and funding, based on the idea of growing produce on multiple levels, conserving both land and water, while cutting down on pesticides and other chemicals.
3. **COVID-19 and climate:** To combat supply chain disruptions, more countries are seeking to increase the food they produce to improve food security; additionally, the sector has had to adapt as retailers and distributors have adjusted how they secure food considering environmental and climate changes.
4. **Digitization:** With an increased need for supply chain visibility, tech around robotics and automation have become more valuable due to labor shortages.

Throughout the first month-plus of 2022, more than \$1b has come into the sector.

As AgTech continues to reshape the industry, the sector will be faced with many challenges and opportunities for investors to consider in generating future value

Future of AgTech



Challenges

Lack of standardization of data makes cleansing and analytics difficult

Many ag firms and coops have been hit by cybersecurity attacks or ransomware in recent months

Ukraine is one of the leading suppliers of neon and palladium, key components of semiconductors, needed for many AgTech products

Several large, innovative farms are located in areas with limited/no internet connectivity

Opportunities

Increasing demand for locally produced foods

Creating a larger global food supply as a response to population growth

Changing consumer demographics

Negative impacts of climate change on agriculture systems and water availability

Investors see a path forward

Greater opportunity for liquidity

Historically exits existed via sale to a large acquirer — public markets have become more receptive to AgTech through SPACs, IPOs, etc.

Markets are beginning to understand the mega trends and long-term interest from consumers

Supply chain: executive summary and perspective

Multiple disruptions continue to strain supply chains

- 1 Evolving labor market
 - ▶ All levels and sub-sectors of the food and agriculture industry are grappling with labor challenges. COVID-19 restrictions and quarantines reduced the available workforce, and those that remain are demanding more flexibility in when, how and where they work forcing a competitive bidding war to maintain talent.
- 2 Raw material shortage
 - ▶ Global trade disruptions are shutting down ports or continuing to cause backlogs of already short supplies of raw materials adding to delays in production and processing. This is creating longer downstream lead times throughout the value chain and stockouts at the retail level.
- 3 Transportation and logistics challenges
 - ▶ Transportation and logistics issues are adding to shipping delays. A shortage of drivers is making it difficult to keep enough trucks on the road, and the problems are exacerbated by rising costs as inflation has caused fuel prices to surge.
- 4 Regulatory and political uncertainty

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CSCOs are contending with limited visibility of the end-to-end supply chain, along with complicated and hard to analyze risks such as tariffs, trade wars, cyber attacks and climate change. Emerging technologies, such as IoT, control towers, AI and digital twins are poised to improve supply side visibility – when paired with upskilling in data analytics and are implemented thoughtfully and strategically.

Bill McClure, Executive Director, Ernst & Young LLP

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To optimize supply chains while balancing customer choice, efficiency, and resiliency, food and agriculture companies must increase end-to-end visibility, connectivity, and agility. Navigating these demands will require expanding internal capabilities as well as broadening and deepening relationships across supply chains. These transitions will align companies with the megatrend toward a more connected food system enabling them to meet shifting demands and unlock new value.

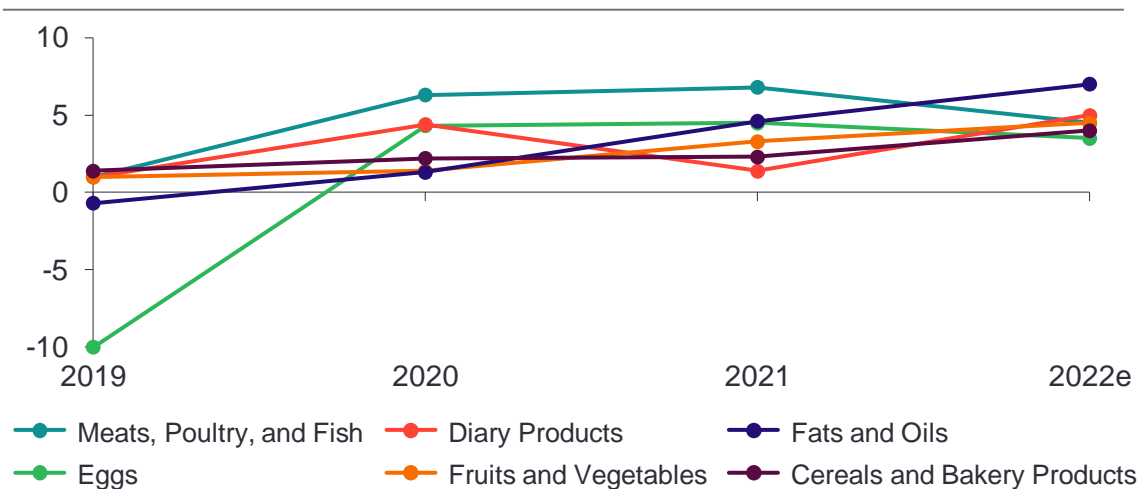
Lauren Chupp, Senior Director, Ernst & Young LLP

Companies are struggling to meet strong consumer demand as supply chain challenges are causing shortages at the point of sale and high prices for available products.

Supply chain disruptions

Consumer demand	Even with rising inflation, consumer demand continues to increase as many geographic areas emerge from COVID-19 restrictions.
Labor market	The labor market continues to fluctuate as workers that remain available following COVID-19 disruptions demand more flexibility in when, how, and where they work, causing a highly competitive bidding war for talent at all levels of the food and agriculture industry.
Raw materials	Geopolitical issues are causing a shortage of many inputs in the food and agriculture value chain — from fertilizers to crops — creating delays in processing and production downstream, which is trickling down to stockouts at retail locations.
Transportation and logistics	Rising fuel costs combined with route blockades and trucker shortages are driving supply issues and increased production timelines in the processing and manufacturing portions of the value chain.
Regulatory and public policy	Further refinement of government regulations supports greater competition in select markets like meat processing to promote more competitive prices for both producers and consumers, while limiting inputs such as GMO crops in food production and as animal feeds.

Percentage change in consumer price indexes, 2019 through 2022 (2018 base year)



Key insights

- ▶ Rate of increase for food prices in most major categories rose for 2020 and 2021.
- ▶ Rate of increase for prices of dairy products, fruits and vegetables, fats and oils, and cereals and bakery products are all expected to continue to rise in 2022.
- ▶ While meats, poultry, and fish along with eggs are expected to have a lower rate of increase in 2022 as compared to 2021, price increases are still expected to exceed pre-COVID-19 levels.
- ▶ Dairy continues to be the most volatile product in terms of price, while eggs have shown the greatest increase compared to 2019 when year-over-year prices had declined.

The war in Ukraine creates disruption of several key agricultural commodities from both Ukraine and Russia

Fertilizer

14%

Russia's share in global urea exports

20%

Russia's share in global potash exports

10%

Russia's share in global phosphate exports

Grow

Prices of crop inputs, including fertilizer, were already on the rise following the 2021 growing season. Further supply shortages are driving input prices higher and creating both financial and supply challenges for producers.



Make

Processing and manufacturing segments of the value chain continue to experience growing challenges with supply shortages that are only expected increase as the 2022 planting season begins.



Consume

Delays upstream combined with growing production costs are already being seen at the consumer level as many items are sold out at retail locations or costing more for the consumer.

Crops

25%

Russia and Ukraine's portion of global wheat exports

16%

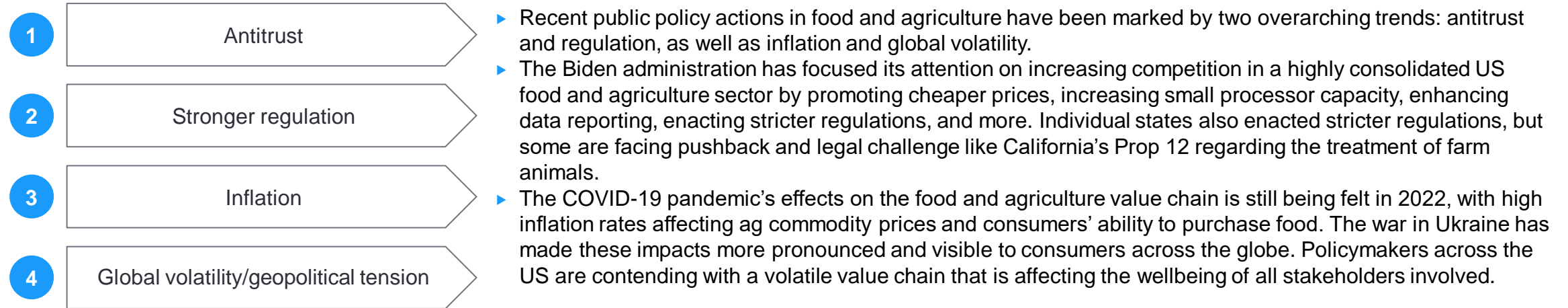
Russia and Ukraine's portion of global corn exports

>70%

Russia and Ukraine's share of sunflower oil exports

Public policy: executive summary and perspective

AgTech leading the charge for sustainability and food sovereignty



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Global events are driving policy change across a range of dimensions, boldly re-shaping our global and domestic landscapes. Will economies become more regional or local vs. global? Will the constitution of regional economies look different than anticipated? Will the pace of near-shoring or energy transition quicken? The shape of the future is evolving rapidly enough to deserve focused attention, examination and innovation in your business.

Asha Lundal, Principal, Ernst & Young LLP

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The business environment is fundamentally different today than it was in early 2020 and these challenges are far less transitory than we originally hoped. Connected global markets once seen as strengths may now be characterized as risks by industries and governments alike. Political and corporate leaders should be mapping and analyzing dependencies to mitigate potential vulnerabilities from future disruptions and build more durable business operations and resilient supply chains.

Tim Kerstein, Senior Director, Ernst & Young LLP

The Biden administration is balancing domestic policy priorities affecting key agriculture sectors while attempting to manage inflationary headwinds accelerated by war in Ukraine

Policy priority overview

Biden administration competition efforts

- ▶ In July 2021, the Biden Administration signed an Executive Order on Promoting Competition in the American Economy.
 - Competitive practices in the beef and poultry processing sector were specifically noted as a “textbook example” of lack of competition.
- ▶ Within beef processing, the main areas of focus include improving price discovery for producers, increasing small processor capacity, and enhancing data reporting from processors.

War in Ukraine and Inflation Impacts

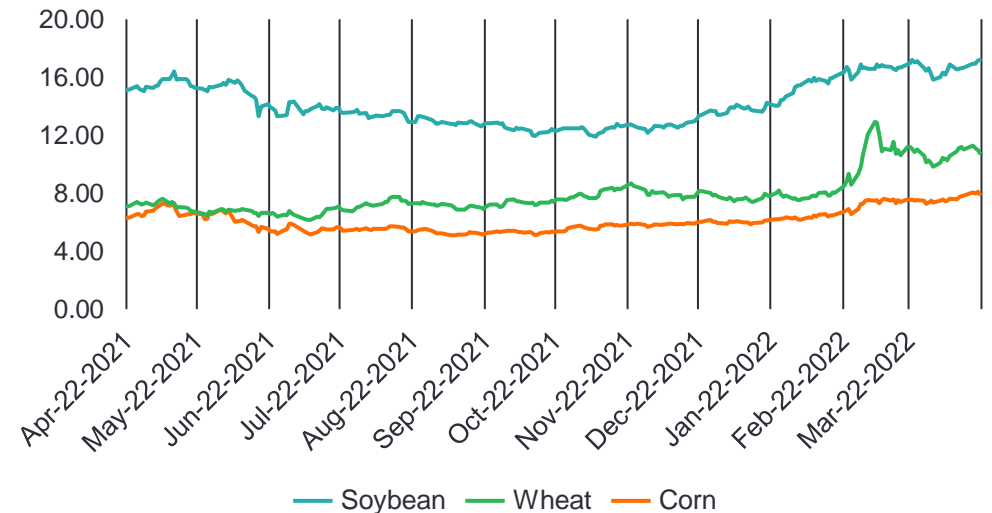
- ▶ The war in Ukraine continues to hamper supply chains and create volatility in global commodities markets.
 - Russia and Ukraine combine for 25% of global wheat production
 - The war will likely cause wheat supply shortages in the Middle East and Africa; more than 40% of Ukrainian wheat and corn exports went to these regions last year.
 - Public policy response from countries like India to ban wheat exports will exacerbate supply problems and add pressure to already high global wheat prices because while much of India’s production is consumed domestically, the world’s second largest producer of wheat had been increasing exports dramatically in recent years.
- ▶ The US Federal Reserve raised the federal funds rate by 50 basis points during their meeting May 3–4 in an effort to slow economic activity and curb persistent inflation.
 - Rates were increased 25 basis points in March
 - Chicago Federal Reserve President Charles Evans indicated that interest rates may rise to 2.5% by the end of the year.

Key policy movements

Cattle Market Transparency Act	March 2021: Introduced in the Senate
Cattle Contract Library Act	December 2021: Approved in the House
Food Supply Chain Guaranteed Loan Program	December 2021: Released \$1b in funding to expand food supply chain capacity ✓
PRICE Act	February 2022: Signed into law ✓
Packers and Stockyards Act (amending under the A-PLUS Act)	April 2022: Introduced in the House



Key global agriculture commodities, dollars per bushel

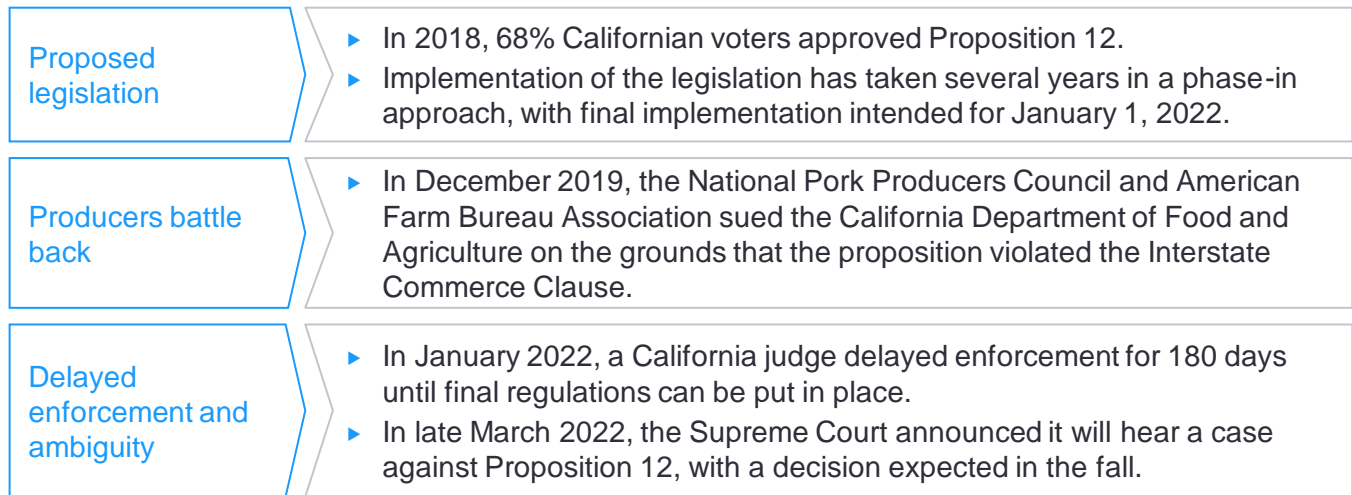


The Supreme Court will hear a case on the implementation of California’s Proposition 12, a case that has the potential to upend the pork industry amid rising prices

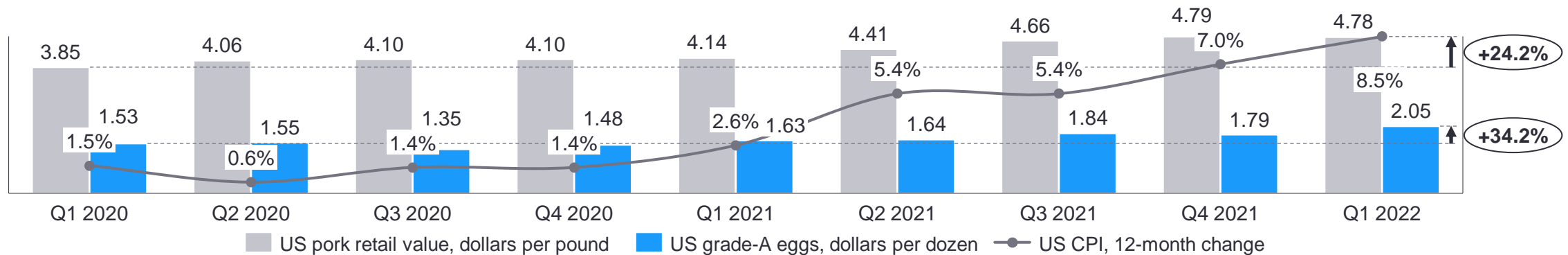
Proposition 12 key details

- ▶ California’s proposed Proposition 12 would prohibit confining farm animals in a “cruel” manner and prohibits the sale of products within the state of California from farm animals confined in this manner.
- ▶ Covered products include:
 - Whole uncooked pork, uncooked pork cuts, shell eggs, liquid eggs, whole uncooked veal, and uncooked veal cuts
- ▶ Covered products include any products produced out-of-state but sold within the state of California. It is estimated less than 1% of US pork production meets this standard.
 - California is estimated to account for 15% of the national pork consumption, while making up less than 1% of the national pork production

Proposition 12 timeline

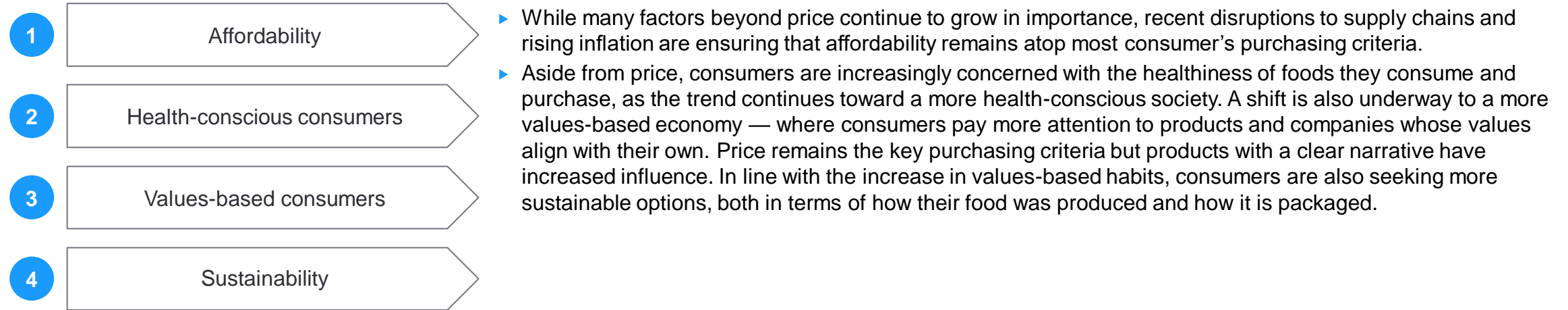


US pork and egg prices have outpaced total inflation



Consumer trends: executive summary and perspective

Purchasing criteria continues to evolve, but affordability remains key



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As food companies move to act on new consumer preferences, such as a desire for more functional ingredients and value-driven brands, they still must navigate tensions of sustainability and cost as they try to deliver. To be a top performing company will require not only good consumer insights, but the organizational ability to collaboratively set strategy and move quickly in the market.

Lee Addams, Principal, Ernst & Young LLP

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Businesses that want to compete for consumer interest must rise to the challenge of meeting the ever-evolving consumer demands but must do so at a price where consumers are still willing to pay. A large majority of consumers are unwilling to pay extra for a growing list of brand traits/characteristics that used to commend a premium but are now expected as a standard.

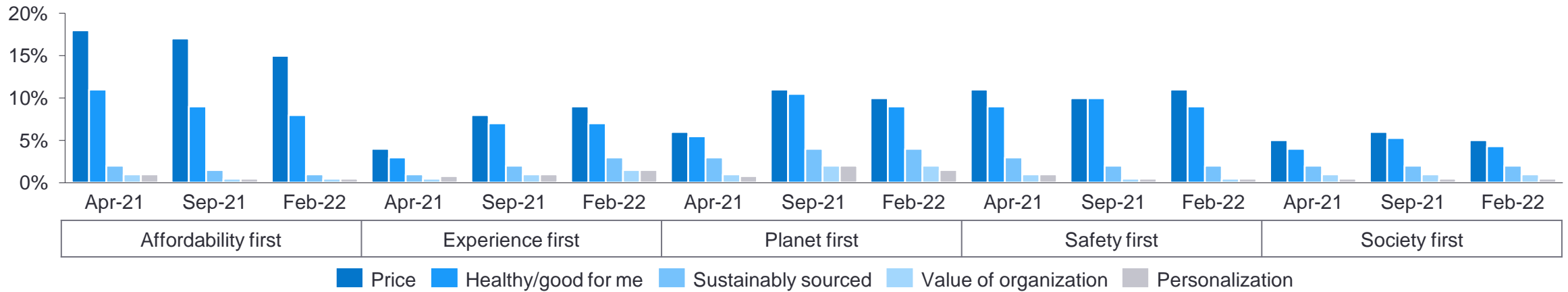
Laura James, Senior Director, Ernst & Young LLP

As we move further away from the impacts of COVID-19, we see a shift in consumer purchasing criteria, but price remains the top consideration for packaged foods

EY Future Consumer Index (FCI) survey

- ▶ The EY Future Consumer Index (FCI) surveys ~7,000¹ consumers to classify their attitudes and determine their focuses related to purchasing patterns and behaviors — the answers to these questions will determine the consumer type categories referenced below and on the following slide.
- ▶ One key trend during the survey period was the shift of consumers categorized as Affordability First into other groups like Experience First and Planet First, reflecting increased consumer savings during the period. However, given recent inflation and price increases, we expect the next iteration of the survey to reflect a reversal of that trend and Affordability First to grow as the largest category of consumer type.

Selected top purchase criteria by consumer type for packaged foods

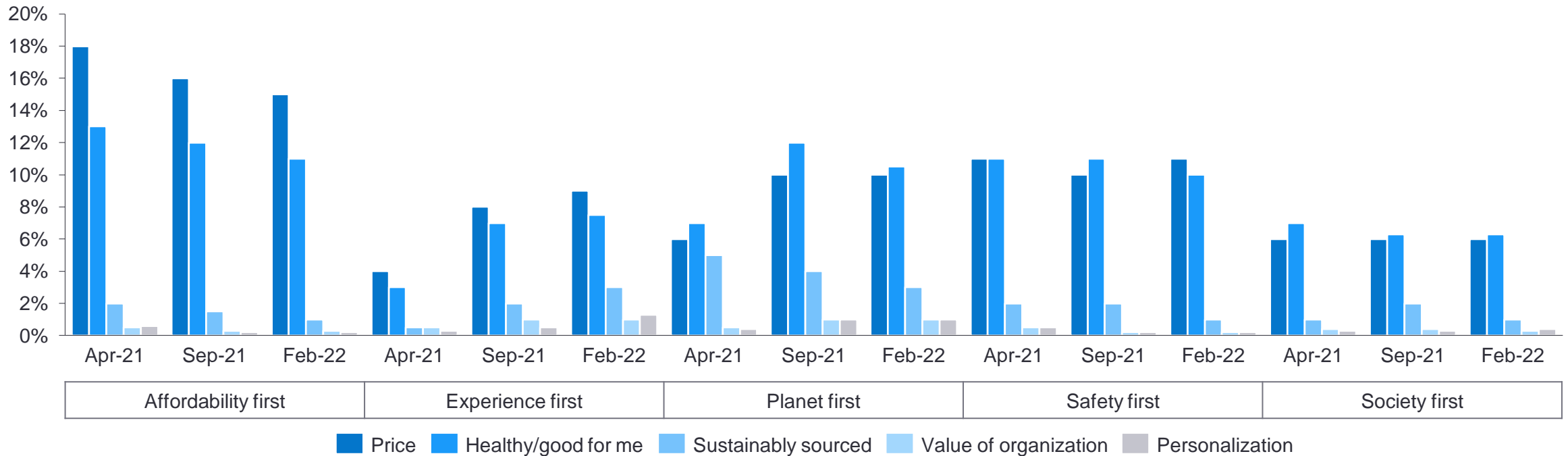


- ▶ When buying packaged goods, **price has been and remains the top purchase criteria** across all consumer types, even for those not categorized as the Affordability First type.
- ▶ In the February 22 survey, even as the trend of movement from Affordability First to other consumer types continued, **there was an uptick in consideration of price** across other consumer types likely reflecting inflationary pressure.

1. Average number of consumers who responded to the questions used in this analysis
Source: EY Future Consumer Index

When considering fresh foods instead of packaged, consumers place a greater emphasis on healthy/good for me relative to price

Selected top purchase criteria by consumer type for fresh foods



▶ When purchasing fresh foods, **healthy/good for me surpasses price as the top consideration** for multiple consumer types reflecting the way consumers differentiate key criteria for fresh food versus packaged food.


▶ Similar to packaged goods, in the February 2022 survey **there was an uptick in price as the top consideration** for consumers of fresh foods reflecting new inflationary pressures since the prior survey.

02

Agriculture regional health check



COVID-19 continues to impact the availability of data related to food and agricultural production and trade



Amid a host of disruptive events occurring throughout the world, the lingering impact of the COVID-19 pandemic continues to delay the availability of current data related to global food and agriculture production and trade. This issue of the EY Food and Ag Navigator presents the most up-to-date figures as of the time of writing. However, it must be noted that many traditional sources of global food and agriculture data have not been updated or are incomplete as they pertain to certain global regions. In these instances, we have included the older data to provide context or for comparison purposes.



03

North America

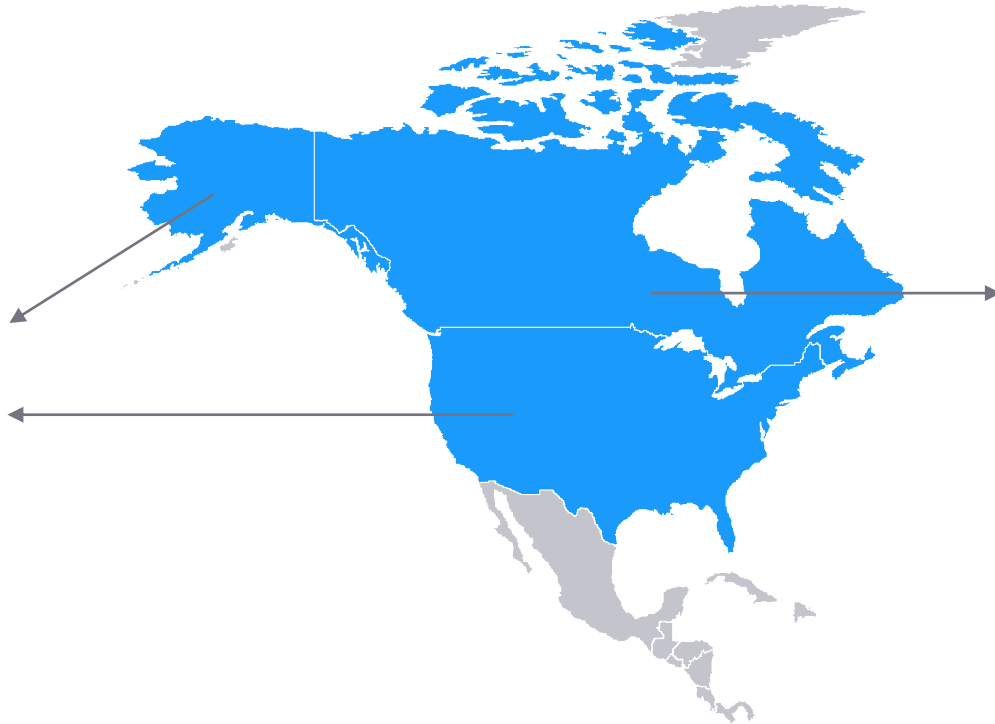
- ▶ Canada
- ▶ US

North American agricultural products market expected to grow to \$324b by 2025 with cereals and oil-crops leading the way

- ▶ North American agricultural products market grew by 18% y-o-y in 2020 (5% during 2016-20) to \$300b and is expected to grow by 8% during 2020–25 to \$324b.
 - Cereals is the largest segment of the agricultural products market in North America, accounting for 35% of the market's total value. Oil-crops segment contributed \$77.1b in 2020 (26% of the market's aggregate value).
 - In terms of geography, US accounted for 79% of North American agricultural products market value in 2020.
- ▶ Agricultural products market volume grew by 5% in 2020 to 1b tons and is expected to further grow by 6% during 2020–25 to reach 1.1b tons.

By production, corn is the largest crop in the **US**. In FY22, total exports are expected to grow by 7% y-o-y led by growth in most commodities.

The nation is now investing in innovation and technology to increase agricultural productivity by 40% and reduce environmental footprint by 50% by 2050.

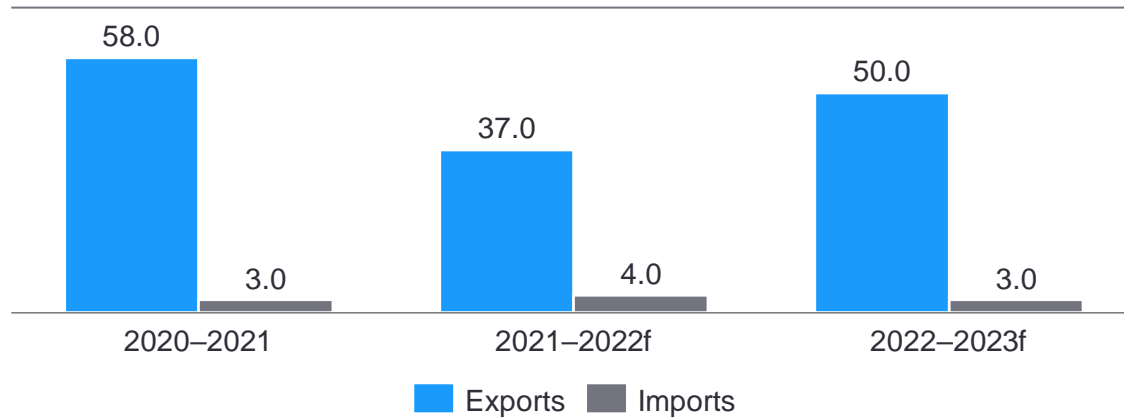


Wheat is **Canada's** largest crop and the single biggest export earner of all agricultural products. It is the world's largest producer of high-protein milling.

During 2021–22 market season, the nation's exports are expected to fall due to tight supplies and poor weather in some areas.

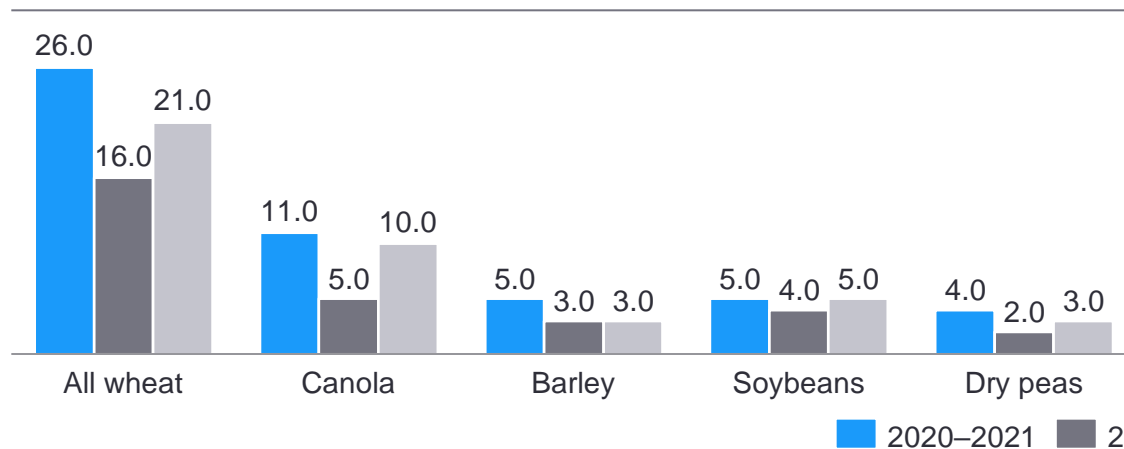
Canada: Exports are expected to decline significantly in 2021–22 due to tight supplies and poor weather in some regions

Canada principal field crops export and import (MT¹)

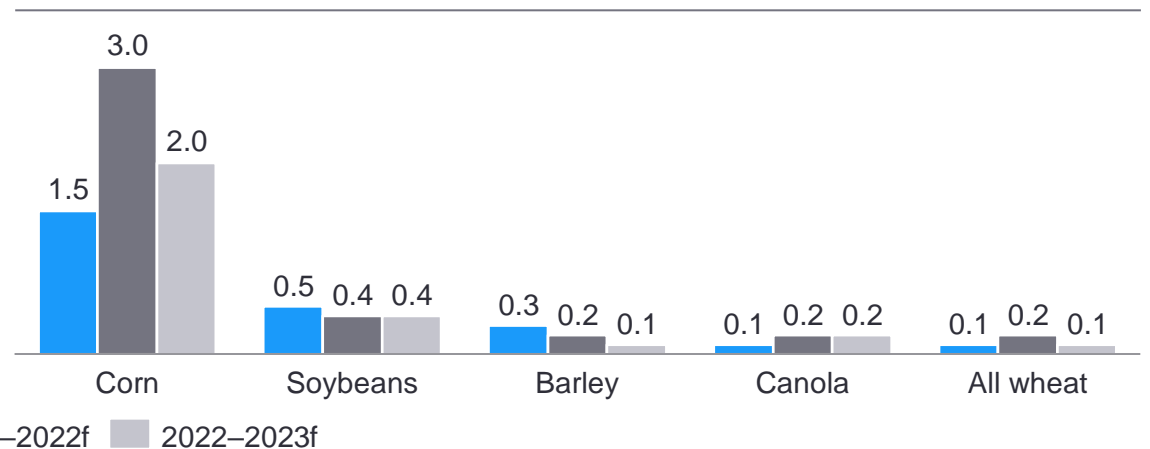


- ▶ **Wheat:** Durum wheat exports are expected to decline by 59% vs. previous year in 2021–22 due to low yields (caused by drought in Western Canada). Other wheat exports are also expected to fall by 32%.
- ▶ **Barley:** Exports are expected to decline significantly in 2021–22.
- ▶ **Corn:** Imports to Western Canada are expected to grow rapidly in 2021–22.
- ▶ **Canola:** Exports are expected to decline in 2021–22 due to tight supplies and logistical issues from the temporary disruptions to rail and road access to the Port of Vancouver as a result of a severe weather event in November 2021. Key importers include Japan, China, Mexico and the European Union (EU).
- ▶ **Soybean:** Exports are expected to fall in 2021–22 as support from strong global demand is muted by tighter domestic supplies.
- ▶ **Dry peas:** China is the largest market for exports (0.6MT to date).

Top five principal field crops exports (MT)



Top five principal field crops imports (MT)

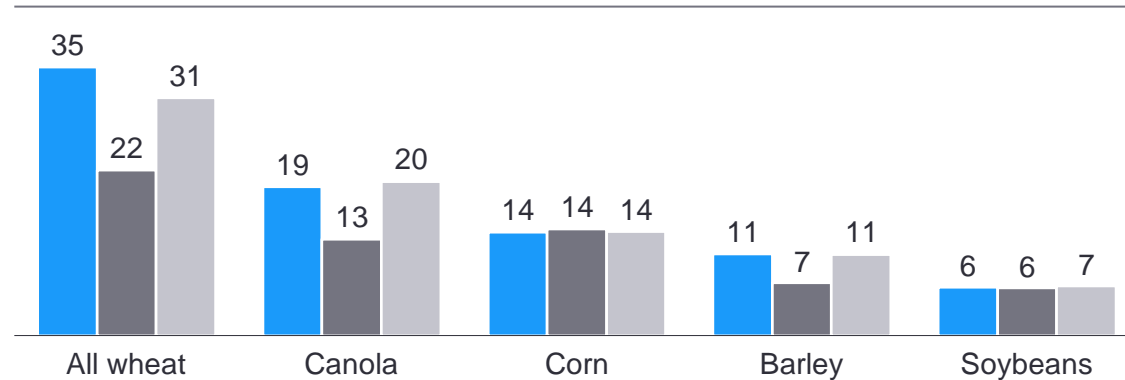


1.f refers to forecasted; "all wheat: includes durum and others; export and import does not include products; MT – million tons
Source: AGR Canada, EY Knowledge consumer analysis

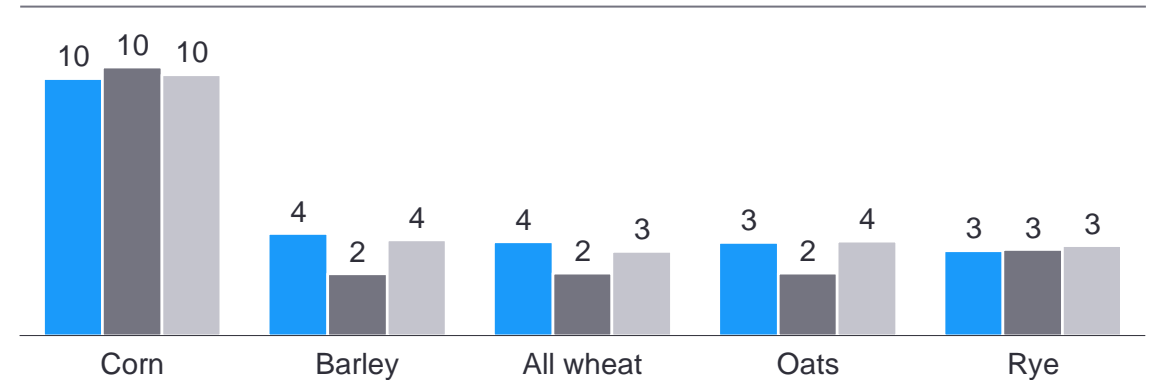
Canada: Many key crops expect decline in production and yield in 2021–22 due to drought and supply-related concerns; expect to regain positive momentum in 2022–23

2020–2021 2021–2022f 2022–2023f

Canada's top five crops by production¹ (MT)



Canada's top five crops by yield¹ (tons/hectare)

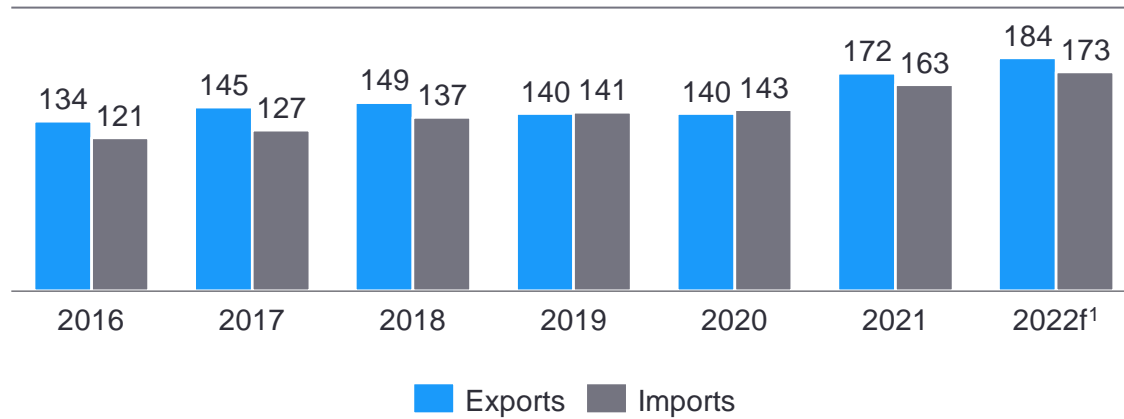


- ▶ Wheat is Canada's largest crop and the single biggest export earner of all agricultural products. Canada is the world's largest producer of high-protein milling, a crop that has maintained healthy demand with an average of \$7b worth exported annually.
- ▶ Field crop production for Canada for 2021–22 is projected to be 30.2% lower than in 2020 and 27% below the previous five-year average, as drought significantly decreased yield and production in Western Canada.
 - Carry-out stocks (ending-year inventories) for all principal field crops are expected to end the year at a record low level, as a sharp decline in production combined with a low level of carry-in stocks (beginning-year inventories) more than offset a decrease in exports and domestic use.
 - Grain prices are forecast to remain relatively strong on support from: (i) tight Canadian supplies, (ii) more comfortable but still relatively tight global grain supplies, and (iii) expectations for a continuation of firm international demand.
- ▶ For 2022–23, rotation considerations, moisture conditions, expected prices and input costs/availability are expected to be the main factors determining seeding decisions in the spring. Based on current market conditions and historical trends, the area seeded to field crops in Canada is forecast to increase marginally from 2021–22. The area seeded for wheat, coarse grains, pulse and special crops is expected to increase, while area seeded to oilseeds decreases.
 - The average yield and production for all crops is forecasted to increase significantly compared to the drought year of 2021–22, based on a return to trend or just below trend yields, resulting in expected total field crop production and supply rebounding to more normal levels.
 - Prices are expected to remain relatively strong, but lower than the high levels experienced in 2021–22 as Canadian and world production is expected to increase.

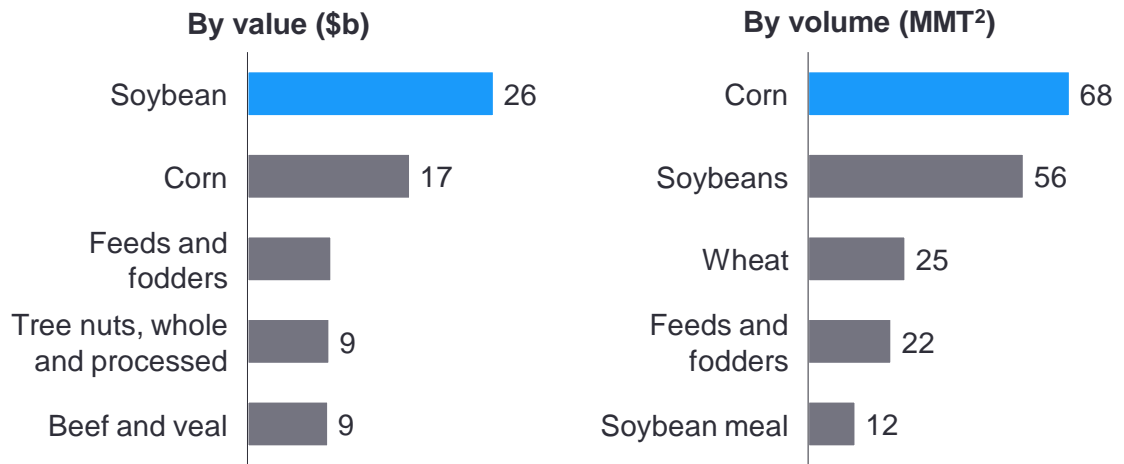
1.f refers to forecasted; "all wheat" includes durum and others; as of 2020–21
Source: MarketLine, AGR Canada, EY Knowledge consumer analysis

US: FY22 exports are expected to grow by 7% y-o-y led by growth in most commodities; imports' unit value growth was the highest in a decade in 2021

US agricultural export and import, FY16–FY22f (\$b)

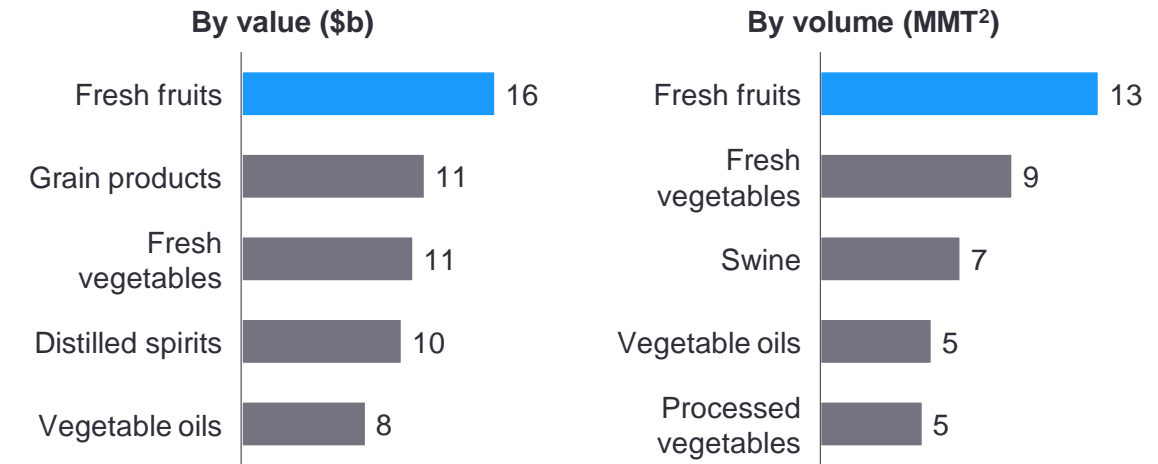


Top five agricultural exports, FY21



- ▶ **US agricultural exports** for FY22 are estimated to grow by \$11.3b to reach \$183.5b, led by growth in most commodities.
 - Soybean exports are expected to reach \$31.3b driven by increased prices and lower global supplies. Horticulture product exports are forecasted to grow by \$800m to reach \$38.5b, partly driven by projected growth in tree nut exports.
 - China is expected to remain US's largest agricultural export market with exports forecasted to reach \$36b. Mexico is forecasted to overtake Canada as the second largest market, with exports projected to reach \$27b.
- ▶ **US agricultural imports** for FY22 are estimated to grow by \$9.2b to reach \$172.5b. Import unit value growth in 2021 was the highest in 10 years, leading to increased import values despite largely stagnant import volume growth. Positive unit value growth is expected to continue (though at a slower pace) into FY22.

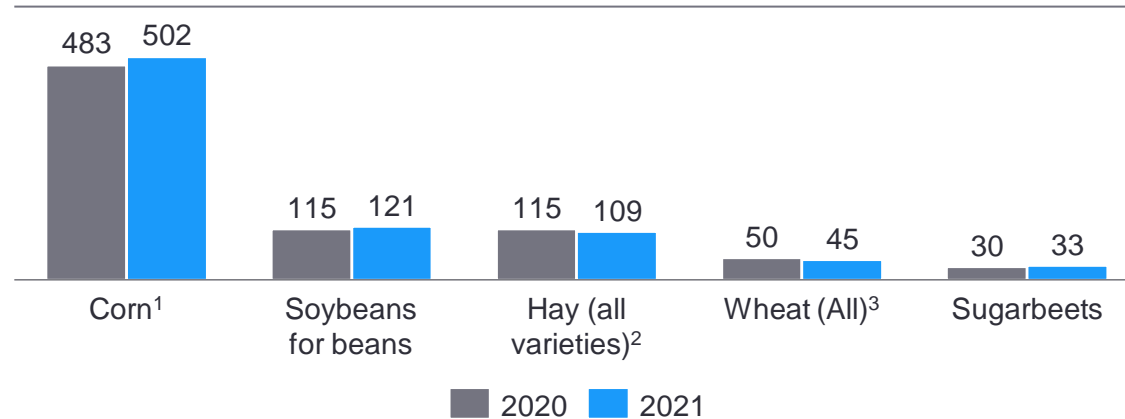
Top five agricultural exports, FY21



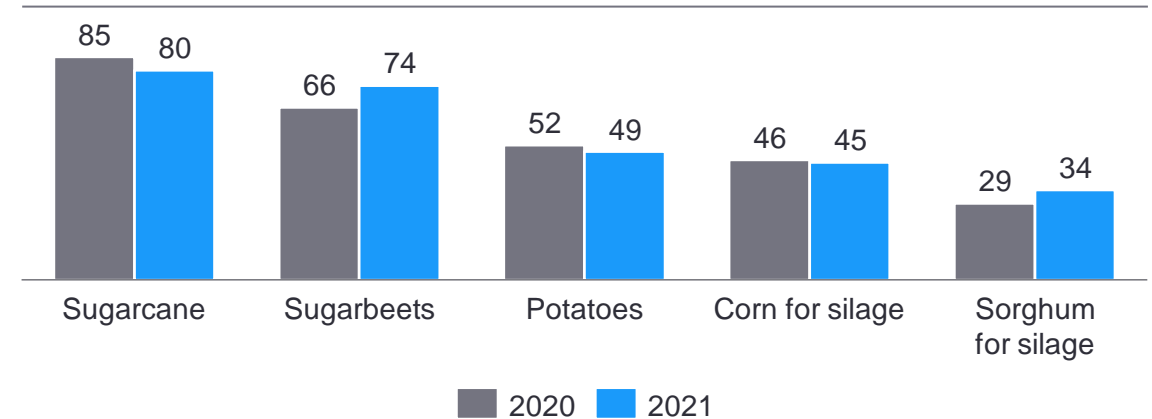
1. f refers to forecasted (February 2022 forecast)
 2. MMT – million metric tons
 Source: MarketLine, USDA, EY Knowledge consumer analysis

US: Among key crops, US production of hay and wheat decreased due to poor weather conditions in 2021; yield improved for sugar beets and sorghum silage

US top five crops by production (as of FY21, MMT¹)



US top five crops by yield (as of FY21, million tons/hectare)



- ▶ The largest US crop (by total production) is corn. US produces an average ~14b bushels of corn p.a.
- ▶ Corn for grain production in the US was estimated at 15.1b bushels, up 7% from 2020 estimates. The average yield was estimated at a record high 177.0 bushels per acre, 5.6 bushels above the 2020 yield of 171.4 bushels per acre.
- ▶ 95% of 2021 corn acreage was harvested by November 21, 2 percentage points (ppt) lower than last year but 3 ppt higher than five-year average pace.
- ▶ All wheat production reached 1.65b bushels in 2021, down 10% compared to 1.83b bushels in 2020. Yield was estimated at 44.3 bushels per acre, down 5.4 bushels from 2020. Winter wheat, Durum wheat and other spring wheat production reached 1.28b bushels (up by 9%), 37.3m bushels (down by 46%) and 331m bushels (down by 44%)
- ▶ For all hay, record low harvested acres were estimated in seven states, while record high yields were seen in four states.
- ▶ Soybeans' record high yields occurred in 20 states including the largest producing states across the Midwest. The 2021 soybean objective yield survey data indicated that final average pod counts were lower than 2020 in the combined eleven objective yield States of the US.
- ▶ For potatoes, the growing season in Idaho endured extreme heat leading to a lower harvest than usual. In North Dakota, planting began in mid-April and progressed ahead of 2020. Dry conditions during the growing season resulted in mostly short and very short topsoil and subsoil moisture conditions.
- ▶ In 2020, the US announced the USDA Agriculture Innovation Agenda (AIA) to improve financing for agricultural innovation and technology, with the aim of increasing agricultural productivity by 40% and decreasing the sector's environmental footprint by 50% by 2050.

1. MMT – million metric tons; includes corn for grain and silage

2. Includes alfalfa and all others

3. Includes winter, durum and other spring

Source: MarketLine, USDA, EY Knowledge consumer analysis



04

South America

- ▶ Argentina
- ▶ Brazil

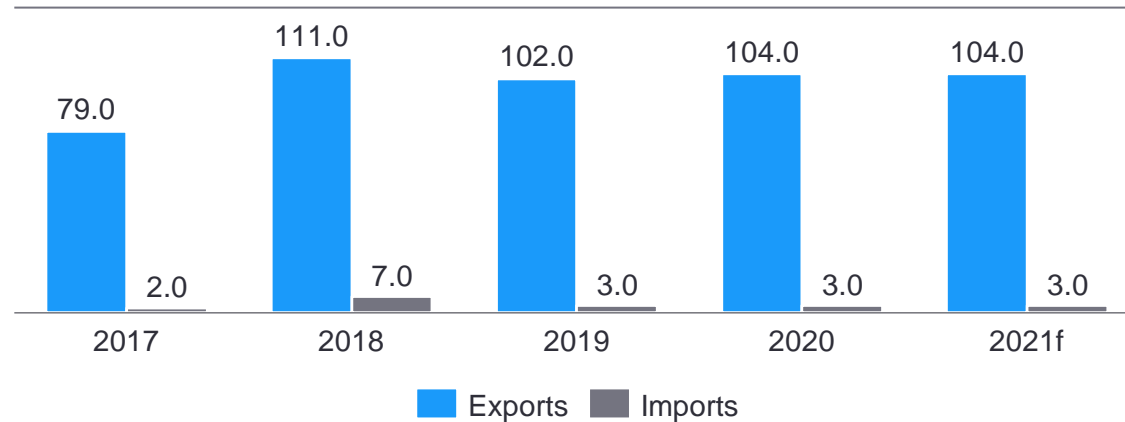
South America: Attractive prices, strong global demand and continued US-China trade conflicts are expected to drive growth in region's agriculture industry

- ▶ South America is a leading trade participant in global agriculture value chain, with Argentina and Brazil being among the top global producers and exporters for commodities like cereals, oilseeds, coffee, fruits, meat and milk. Agriculture is the primary industry and is among the main drivers of the local economy.
- ▶ Unlike other economic activities, COVID-19 had limited impact on the South American agriculture sector. The impact was limited to logistical problems caused by social isolation and supply chain interruptions. However, production increased in key crops such as cereals and oilseeds.
- ▶ Technological innovations in animal and crop genetics, chemicals, equipment and farm organization are driving continued output growth.
- ▶ The region accounts for ~1/3rd of global oilseed output. Brazil and Argentina are No. 1 and No. 3 soybean producers globally. Other popular crops in the region include sugarcane, maize and coffee.

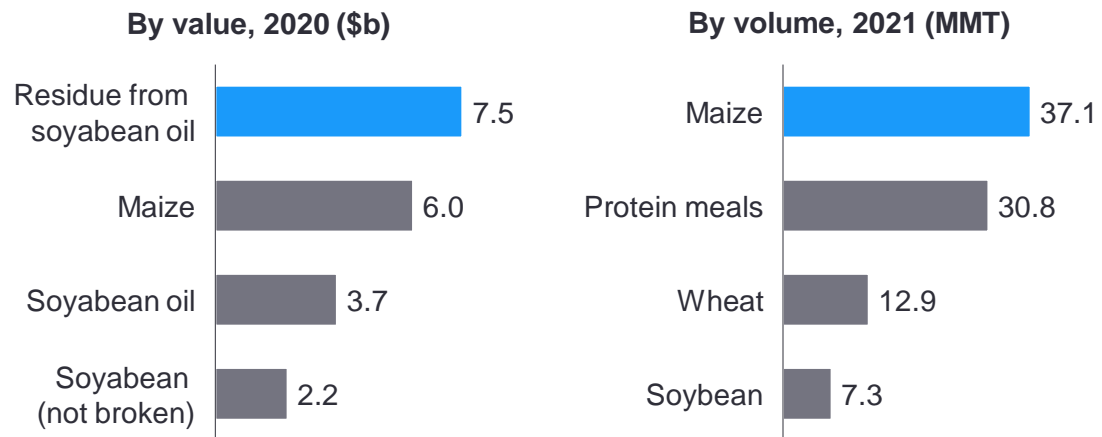


Argentina: Exports of soybean and maize are expected to continue to grow led by the demand from China, post US-China trade disputes

Argentina agricultural products export and import, 2017–21f (MMT)

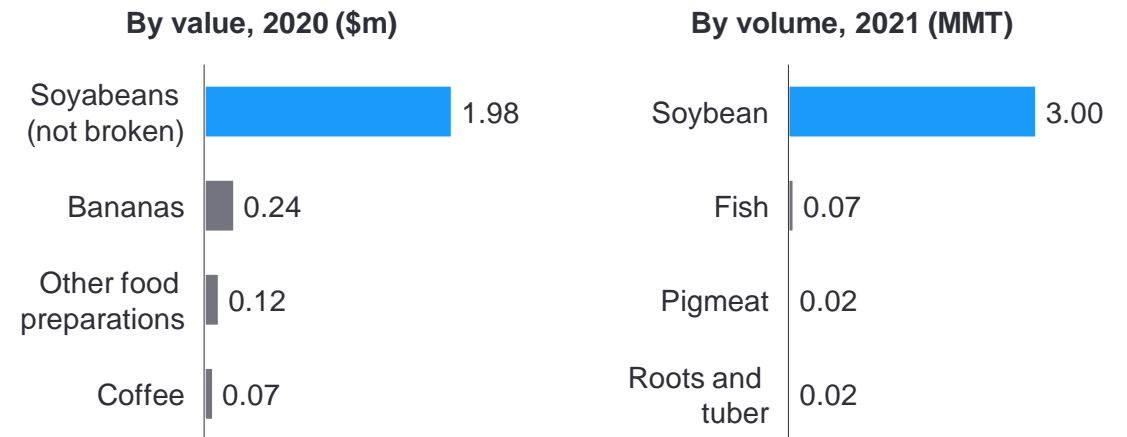


Top agricultural exports¹



- ▶ Argentina's major agricultural exports include **soybean, maize and wheat**.
 - **Positive trade gap:** Its imports are minimal as compared to its exports, led by its rich agricultural productivity across the nation.
 - **Trade deal with China:** China-US trade disputes have encouraged China to find new trading partners. Argentina anticipates a boost in demand for soymeal led by global dynamics.
- ▶ Inflation, high input costs, and the impact of COVID-19 on the local economy discouraged investments in agricultural machinery. This could impact the trade surplus.
- ▶ The government is working on a 10-year project “National Promotion of Investment and Agricultural Exports” to increase export volume by ~35% and create new economic opportunities for the sector by 2035

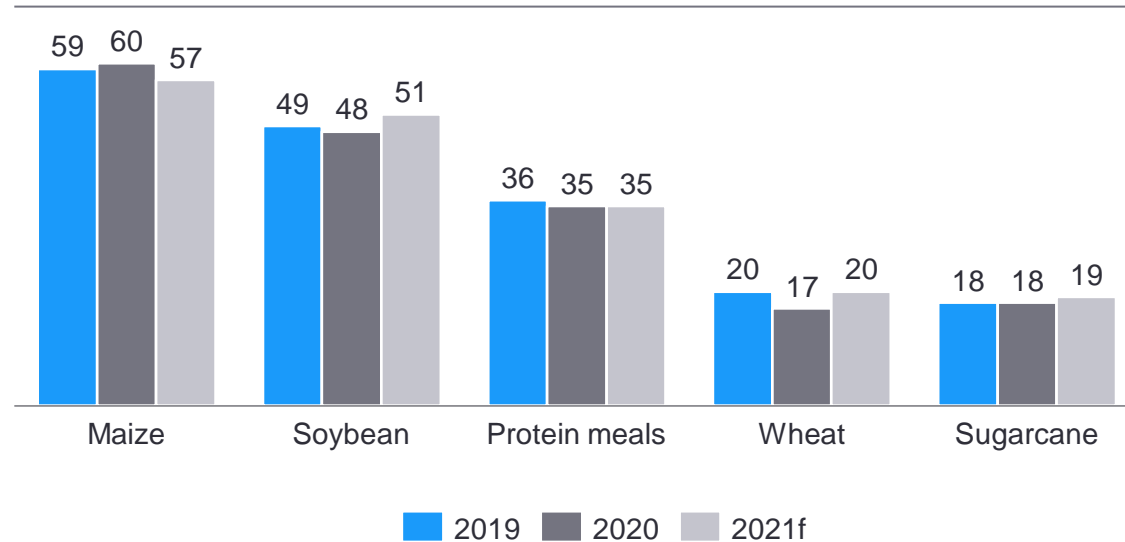
Top agricultural imports¹



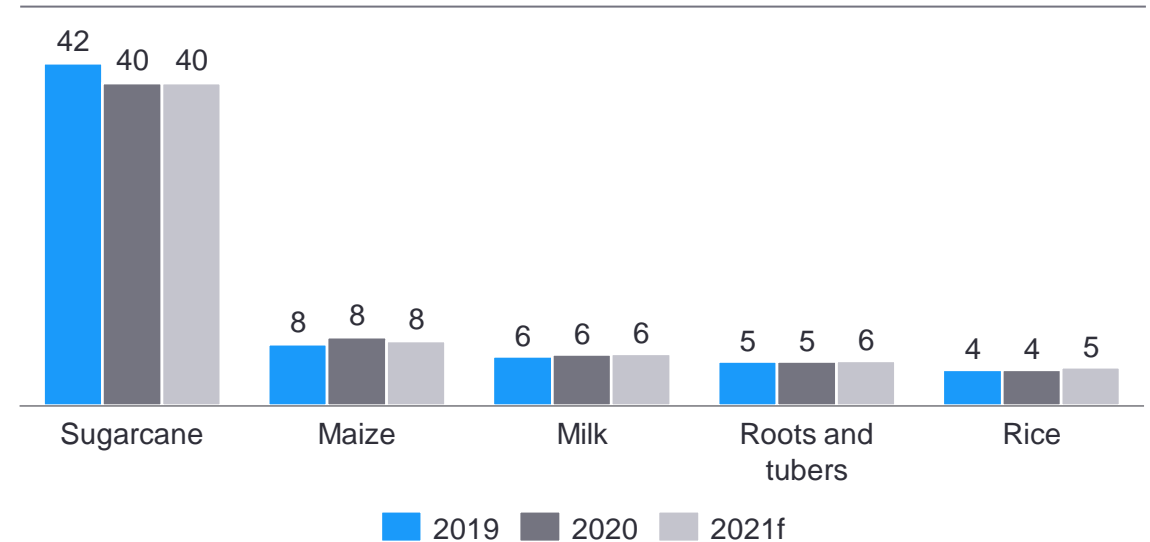
1. As per the latest data available

Argentina: Maize and soybeans continue to be major agricultural outputs; however, unfavorable weather conditions have negatively impacted the overall production

Argentina's top five crops and livestock products by production (MMT)



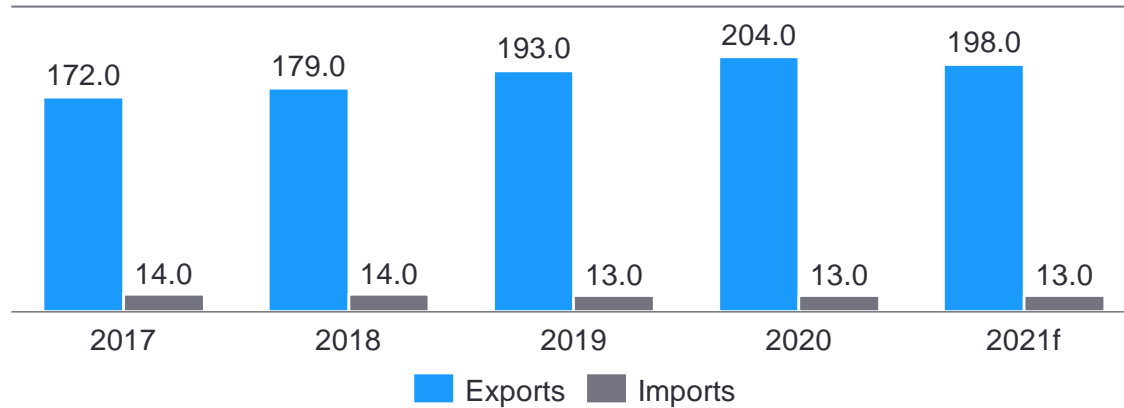
Argentina's top five crops by yield (tons/hectare)



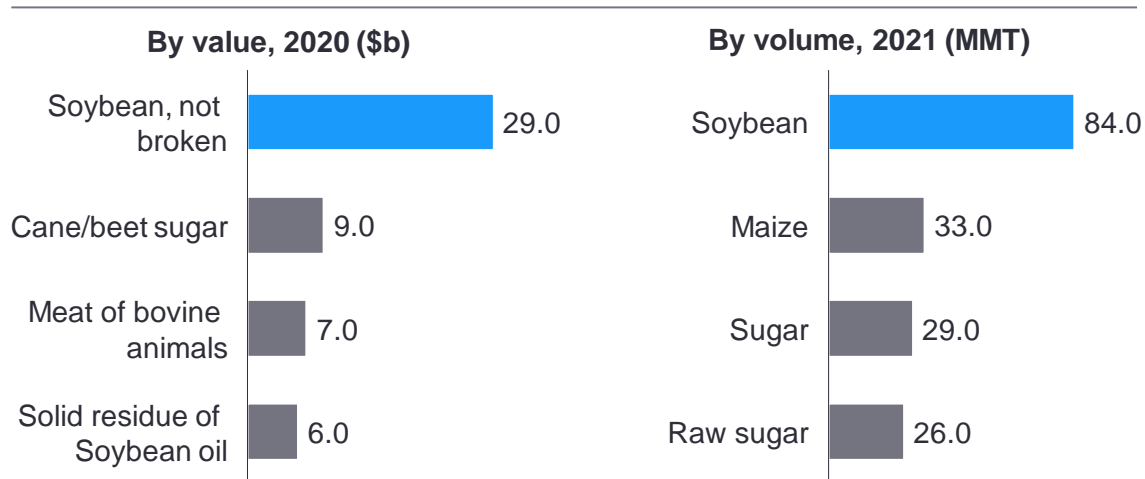
- ▶ Argentina has vast natural resources for both energy and agriculture and is a leading food producer with large-scale agricultural and livestock industries. It is endowed with extraordinarily fertile lands, gas and lithium reserves, and has great potential to expand in building renewable energy.
- ▶ The nation is agriculturally rich producing a host of valuable crops such as soybeans, maize and wheat.
 - **Maize:** Maize/corn grew at a CAGR of 6.3% during 2015–21 to reach 57.2MMT. The pace of corn planting for the 2021–22 season has slowed down due to a lack of adequate rainfall and other required weather conditions.
 - **Soybean:** Soybean production has consistently grown y-o-y to reach 50.9MMT in 2021. The production growth rate has outpaced the growth in consumption, resulting in Argentina becoming a key exporter of soybeans.
- ▶ The World Bank has approved a \$400m loan to implement climate-smart, innovative practices to boost the productivity and competitiveness of Argentina's agri-food system.

Brazil: A leading net exporter of agricultural products; the US-China trade disputes provides it a great opportunity to be the preferred trade partner for soybean and meat

Brazil agricultural products export and import, 2017–21f¹ (MMT)

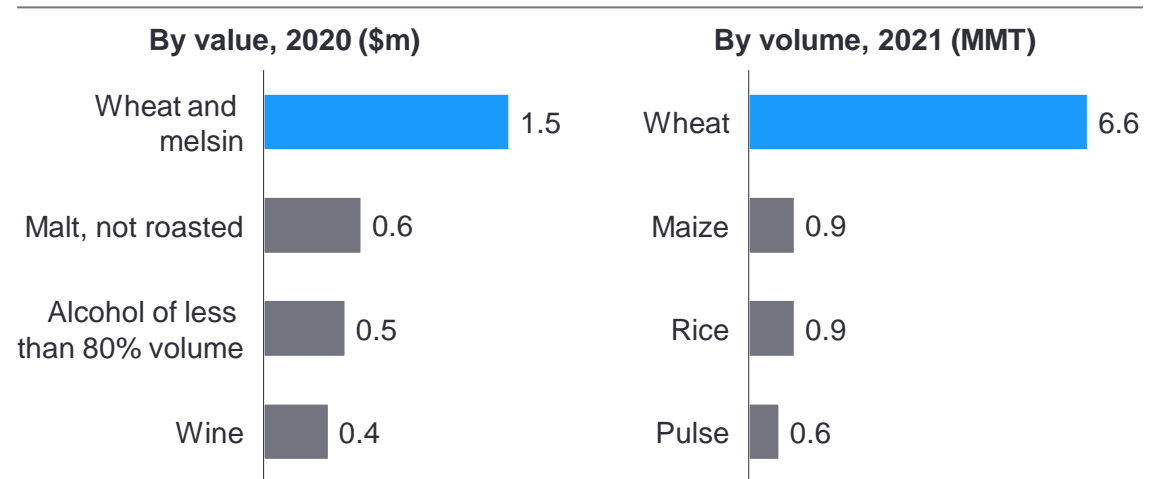


Top five agricultural exports, FY21



- ▶ Brazil's agricultural export has remained higher as compared its imports in the past decade.
- ▶ Major export commodities include soybean, cane/beet sugar and beef.
 - **China** is a key importer of Brazil's agriculture products — accounting for ~42% of Brazil's agricultural exports in 2020
 - The US-China trade disputes have created an opportunity for Brazil to become a preferred trade destination for soybeans and meat.
 - Additionally, there was a rapid devaluation of the Brazilian real during the pandemic which made its agricultural exports more attractive in the international market.
- ▶ Major imported goods include grain such as wheat and maize

Top agricultural imports¹

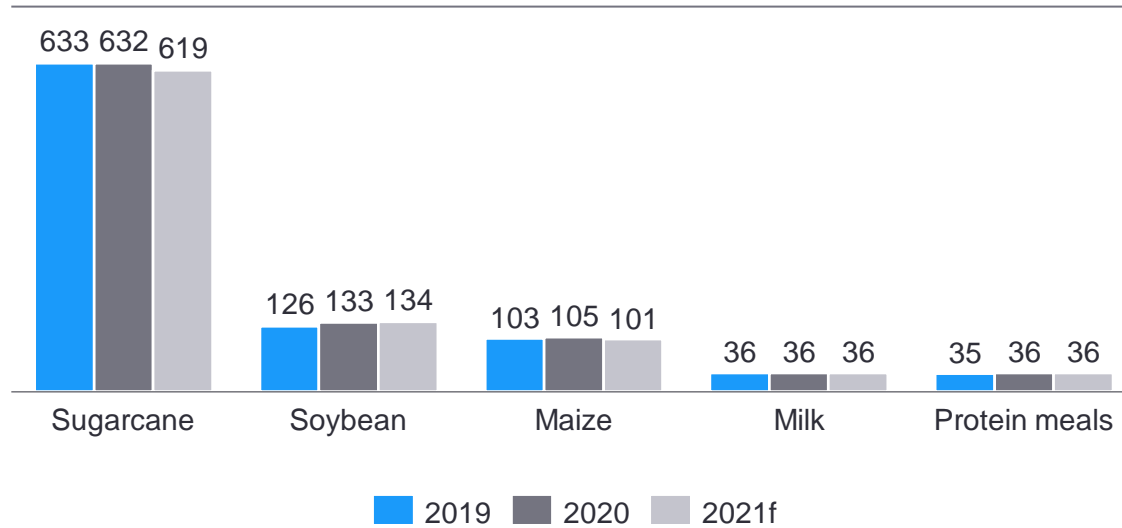


1.f refers to forecasted as per the latest data available

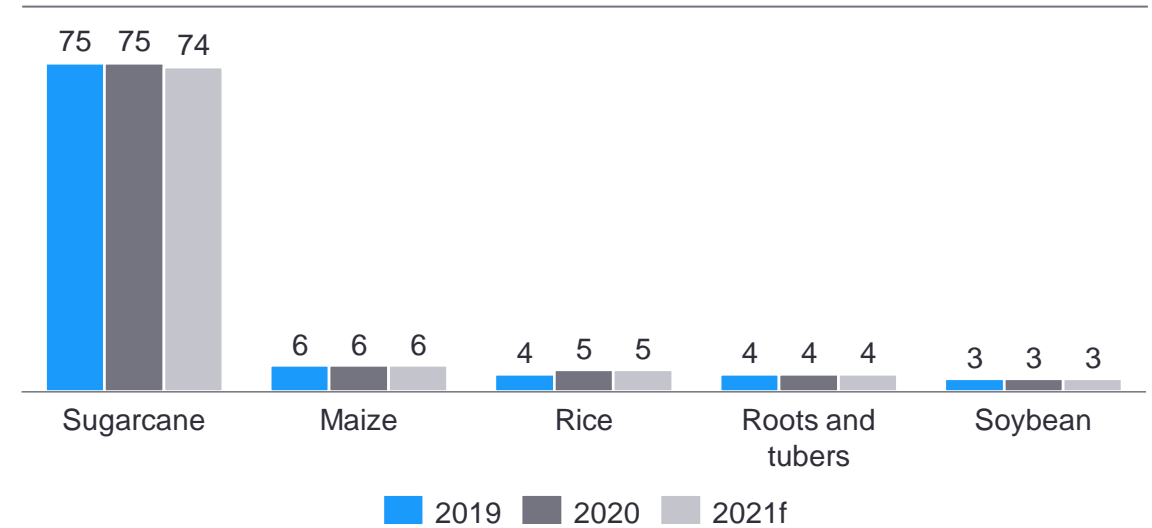
Source: OECD FAO database, MarketLine report (2020), World Trade Organizations, EY Knowledge consumer analysis

Brazil: Among key crops, Brazil's production of sugarcane and soybean drives its agriculture industry; beef remains predominant in the livestock products

Brazil's top five crops and livestock products by production (MMT)



Brazil's top five crops by yield (tons/hectare)



- ▶ Enabled by its tropical climate, Brazil is a leading producer of sugarcane, soybean and maize. The overall agriculture sector contributes ~6% to the GDP.
- ▶ The country witnesses a great variation across geographic regions contributing to the diversity of crops cultivated throughout the country.
 - **Northern Brazil** witnesses hot and humid summer with wet winter — contributes to soy production.
 - **North-eastern Brazil** witnesses hot and humid summer with dry winter — contributes to coffee, dairy and cane production.
 - **Southern Brazil** witnesses hot and humid summer with wet winters — contributes to both corn and soy productions.
 - **South-eastern Brazil** witnesses hot summer with dry winters — contributes to coffee, dairy and cane production.
- ▶ **Sugarcane** is grown mostly in the south-east region and is one of the major crop produced and accounted for 23% of global sugar production and 49% of global sugar exports in 2020.

05

Western Europe

- ▶ France
- ▶ Germany
- ▶ UK

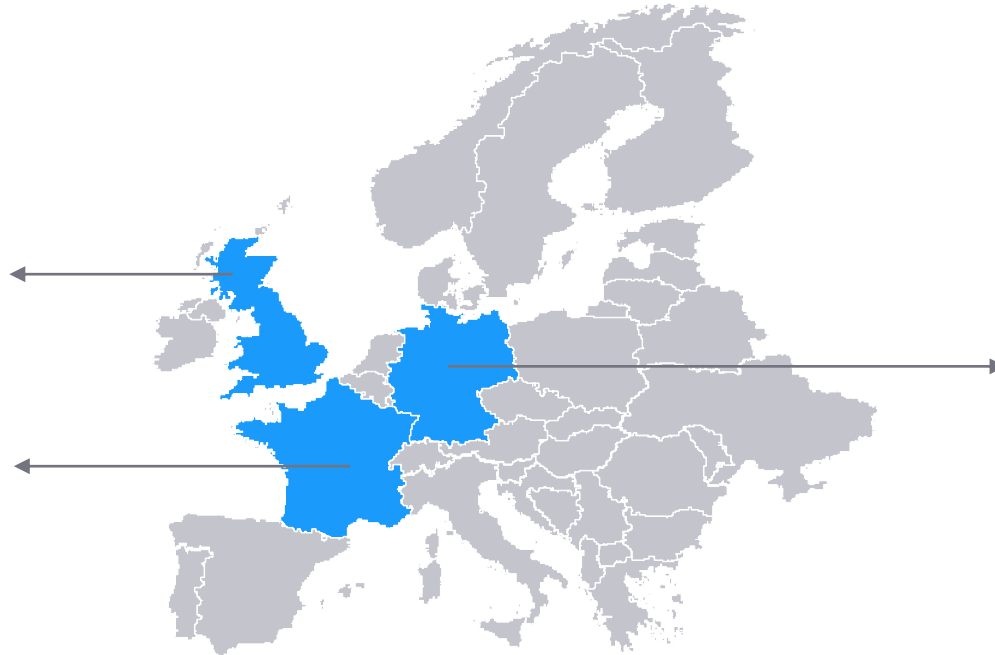


Western Europe: Agricultural product markets have recovered considerably from severe flooding events in 2018 and the sector is now focusing on sustainability

- ▶ The European cereal crops industry has recorded consistent growth at a CAGR of 7.1% over the past five years.
- ▶ The total EU agricultural area is forecasted to decrease slightly, mainly driven by reduced arable crops acreage. The area dedicated to organic production is expected to account for 15% of the total agricultural land by 2031.
- ▶ The UK, post-departure from the EU, signed a trade deal with the EU under which its farmers can continue to export produce to the EU without tariffs or quotas. The agreement also allows EU farmers to export goods to the UK, thereby ensuring fluid trade to drive growth between the UK and the EU nations.
- ▶ In June 2021, the European Parliament, the Council of the EU and the European Commission agreed on the reform of the Common Agricultural Policy (CAP). The new edition, expected to implement in 2023, aims to drive sustainability in the agricultural sector by supporting farmers and providing healthy and sustainable food to consumers.

Wheat is one of the **UK's** primary products, but in 2020 its production declined by 40% y-o-y to 9.7MT (the lowest since 1981). The nation aims to benefit from the EU-UK Trade Agreement which allows tariff-free trade with the EU

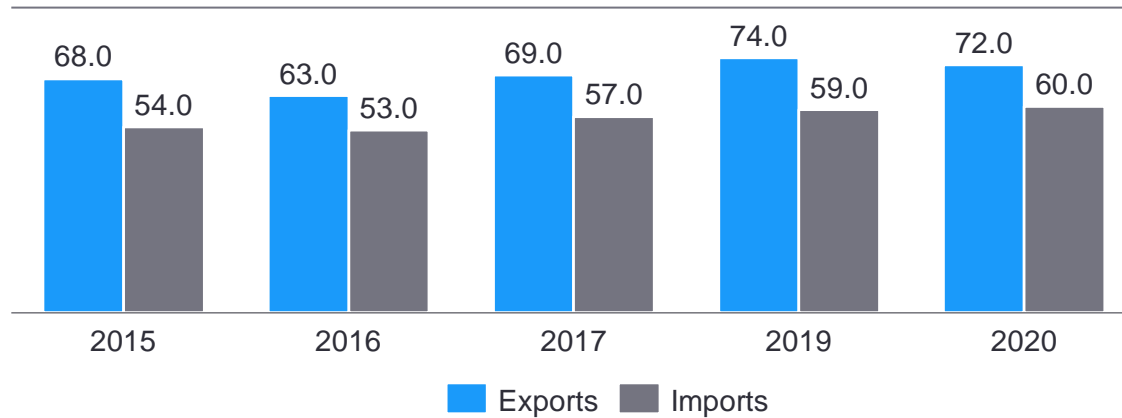
France is the largest agriculture products market in Europe, accounting for 47% of the European market value during 2020. It has the largest agricultural area in the EU (utilizes >15% of agricultural area in the EU)



Germany is witnessing improvement in its agricultural production following damage from unusually hot weather during the summer of 2018. Sugar beet is the major crop recording a high yield of 818 quintals/hectare during 2021–22

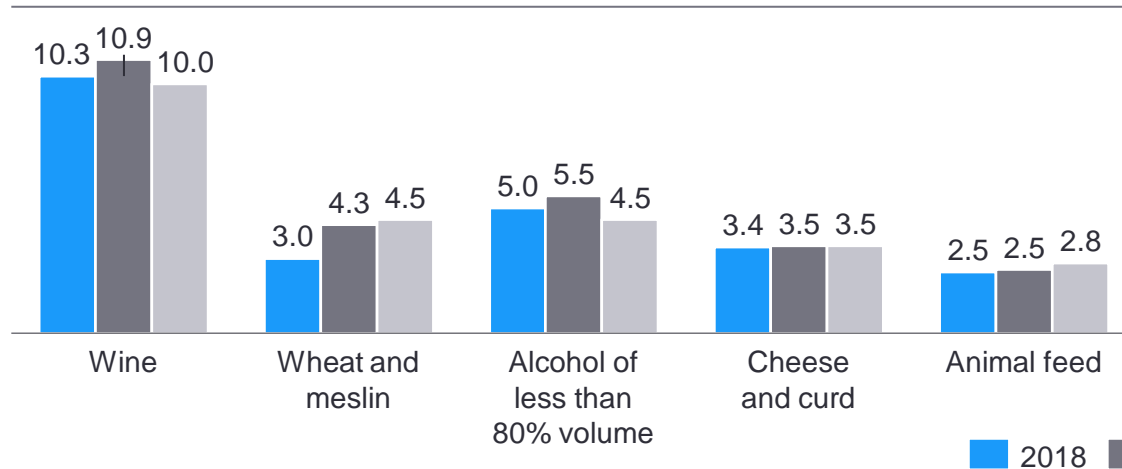
France: Wine exports are expected to continue growing boosted by post-pandemic economic recovery and eased trade tariffs by the US

France agricultural products export and import, 2015–20¹ (\$b)

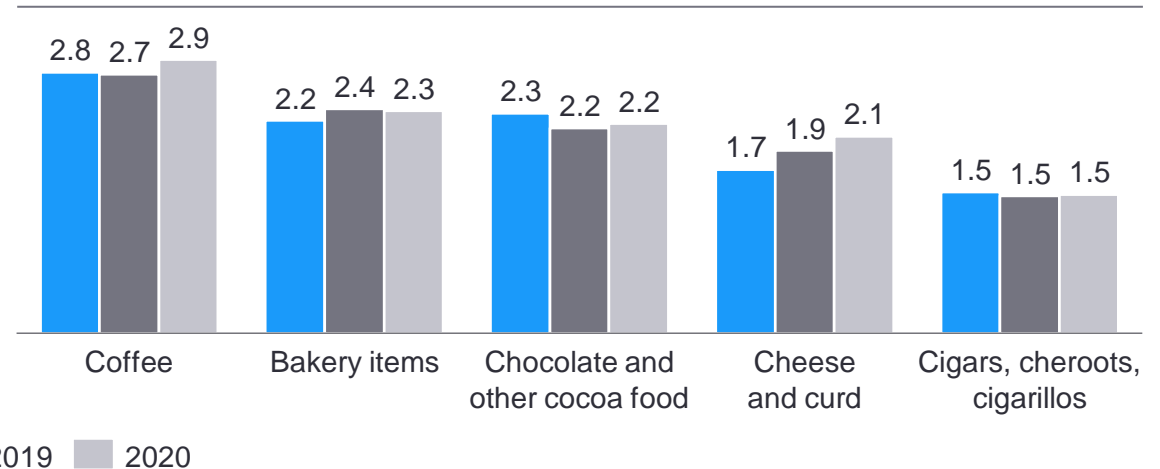


- ▶ France's **main agricultural export** includes grape wine valued >\$10b in 2020.
 - As per the International Organization of Vine and Wine (OIV), the country is the No. 1 and No. 3 exporter of wine by value and volume respectively.
 - Spring frosts and heavy summer rainfall in future could result into decreasing wine production. Grape output is expected to suffer leading to weak agriculture exports in 2022, contributing to a decline in market revenues.
- ▶ **Agricultural products imports** increased 11.2% during 2015–20, led by surge in demand for coffee, cocoa and livestock products.
- ▶ The government aims to accelerate investment in the agri-food industry which is expected to enable market entry of new entrants.

Top five crops and livestock product exports (\$b)



Top five crops and livestock products imports (\$b)

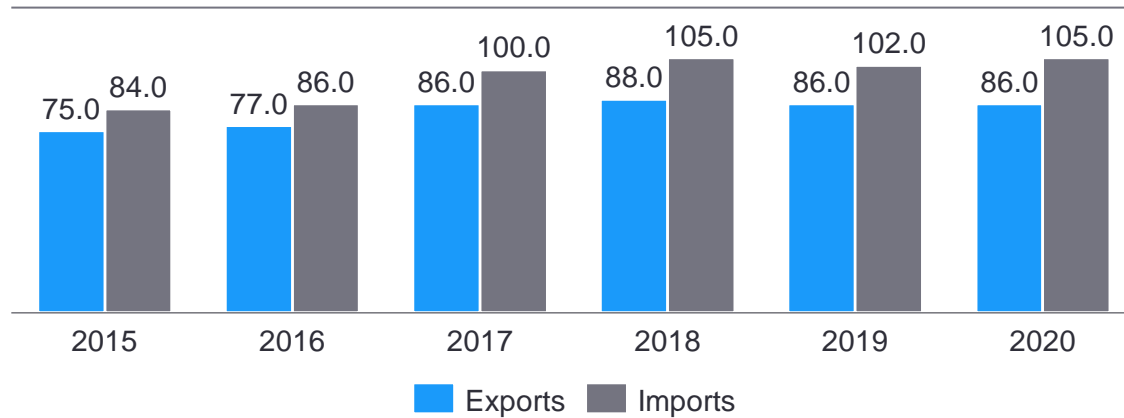


1. Data for 2018 is not available

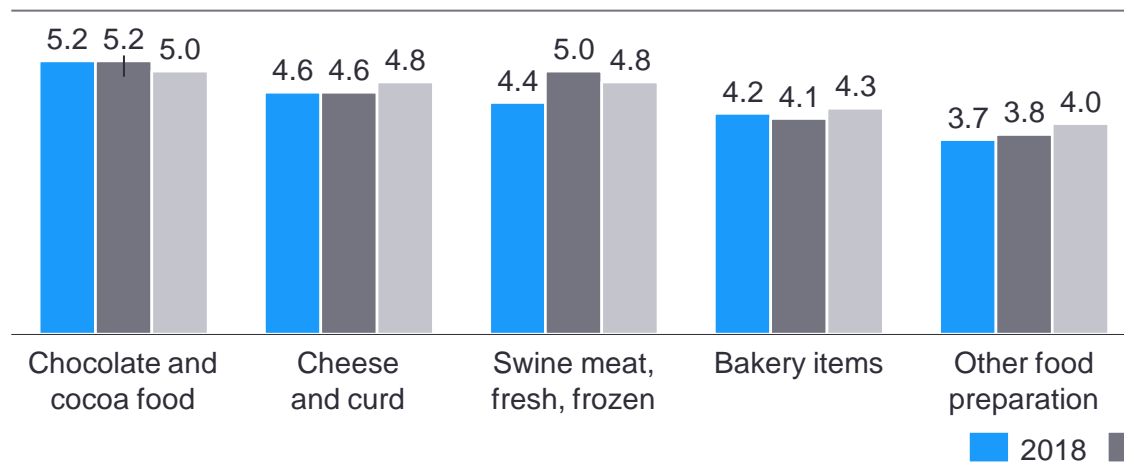
Source: MarketLine report (2020), World Trade Organization, FAO Website, EY Knowledge consumer analysis

Germany: EU remains the primary export destination for agricultural products especially livestock commodities

Germany agricultural products exports and imports, 2015–20 (\$b)

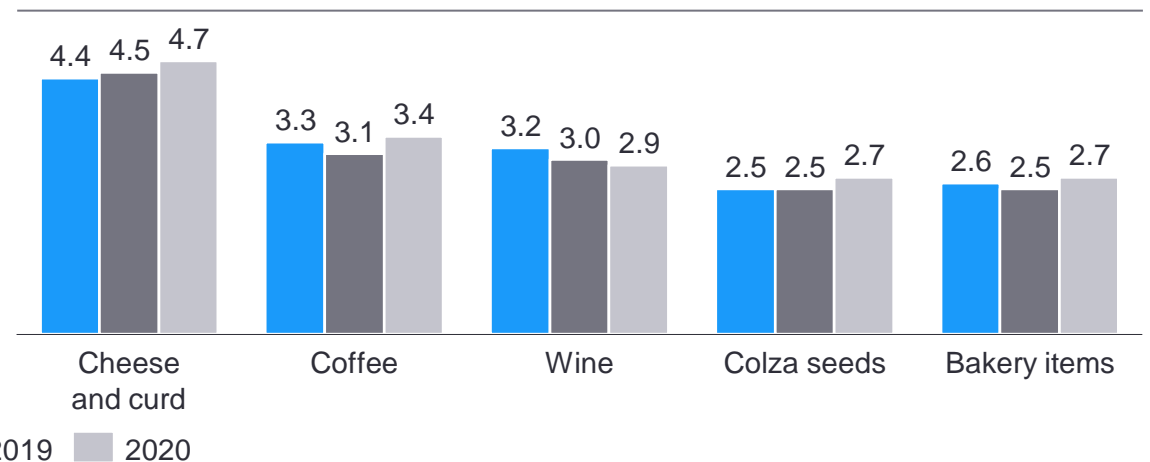


Top five agriculture and food related product exports (\$b)



- ▶ Germany's **agricultural export** increased by 14.6% during 2015–20 and accounted for ~6.3% of the nation's total exports.
 - Key exports include **dairy products** such as cheese and curd (5.6%) and swine meat (5.6%), respectively in 2020.
 - **EU is the main destination** for agricultural exports, accounting for 75% share. The Netherlands is a key trade partner within the EU, accounting for 27% of the country's agriculture exports in 2020.
- ▶ The **Federal Ministry of Food and Agriculture** has an agricultural export support program to enable agribusinesses collaborate with international industries, thereby helping them to enhance their exports.
- ▶ In 2020, German wine imports were valued at over \$2.9b. **Italy, France, and Spain are the leading suppliers of wine** to Germany with a combined import market share of 79%.

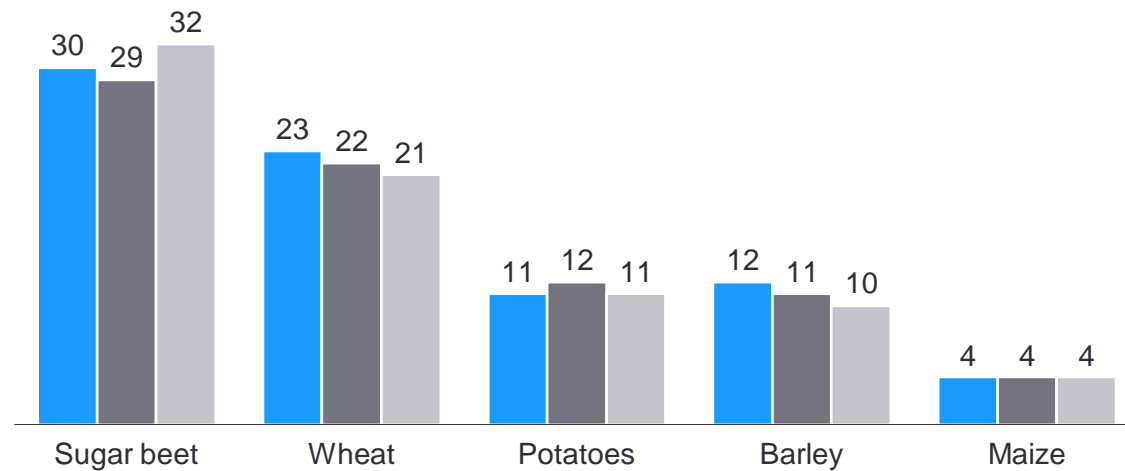
Top five agriculture and food related products imports (\$b)



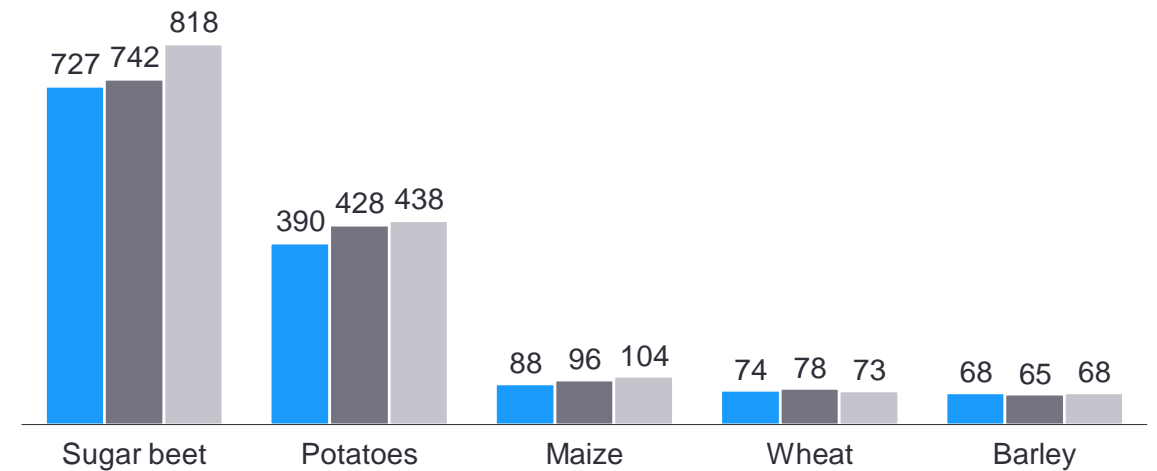
Germany: Sugar beet is the top crop and recorded highs in production and yield during 2021–22, led by favorable weather and increased government efforts

2019 2020 2021f

Germany's top five crops by production (MMT)



Germany's top five crops by yield (quintals/hectare)



- ▶ Germany's agricultural products market grew at a CAGR of 2.1% during 2016–21 to reach \$24.8b in 2021. Germany accounted for **~4.7% of the total European agricultural products markets share** in 2020.
 - **Sugar beet:** Per the NASDAQ¹, Germany's refined sugar production from sugar beets in the 2021–22 season was forecasted to rise y-o-y from 4.1MT¹ to ~4.4MT.
 - **Cereals and fruits** held 33% and 28% of the total agricultural market share to reach ~\$8.0b and ~\$6.5b respectively in 2020.
 - **Wheat** is the most commonly produced field crop in Germany with production reaching 22.2MMT² in 2020, followed by barley (10.8MMT) and maize (4MMT).
- ▶ The European Parliament, the Council of the EU and the European Commission agreed on the reform of the Common Agricultural Policy (CAP). The new edition, expected to be implemented in 2023, aims to drive sustainability in the agricultural sector by supporting farmers and providing healthy and sustainable food to consumers.

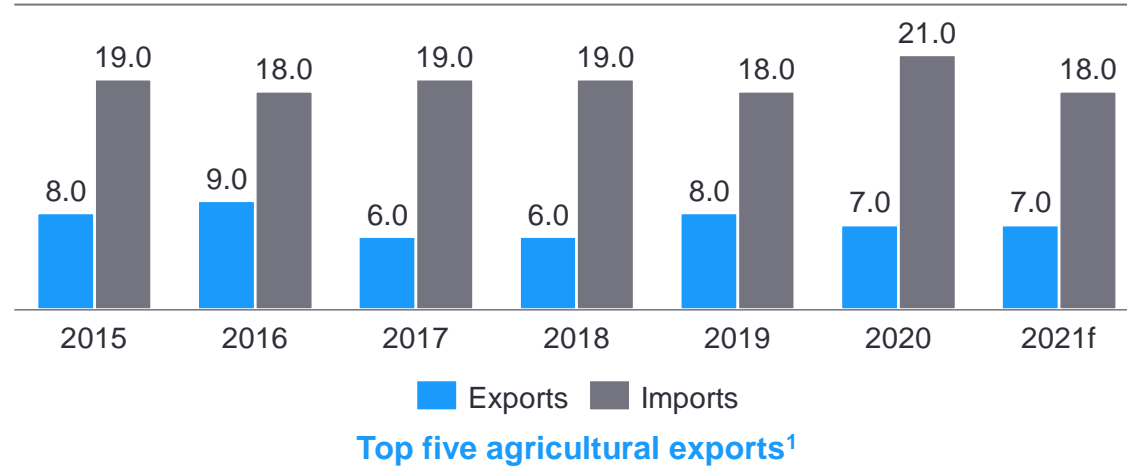
1. NASDAQ stock market is an American stock exchange based in New York; MT – million tons

2. MMT – million metric tons

Source: MarketLine report (2020), World Trade Organization, FAO Website, EY Knowledge consumer analysis

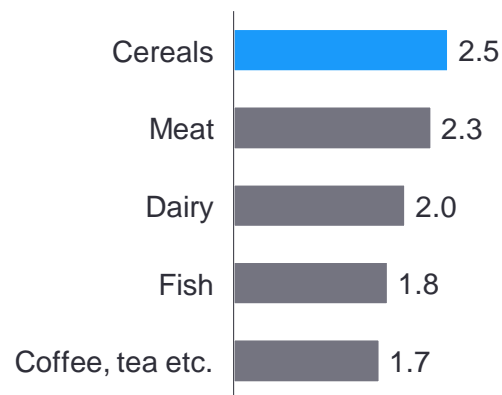
UK: Imports ~40% of the total food it consumes, making it reliant on other economies to feed itself and drive economic growth

UK agricultural products export and import, 2015–21f (MMT)

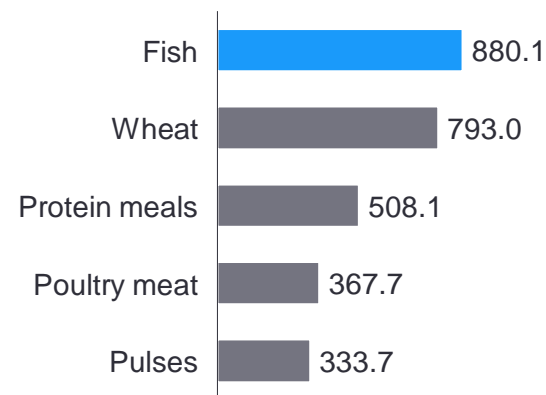


- ▶ In December 2020, UK signed the EU-UK Trade and Cooperation Agreement allowing farmers to continue to export their goods to the EU nations without tariffs.
 - **Export value of highly processed foods** (e.g., confectionery, canned meats, jams, alcoholic drinks) fell by 3.8% (in real terms) during 2011–20.
 - **Export value of lightly processed foods²** (e.g., meat, cheese, butter, oils) rose by 1.9% (in real terms) during 2011–20.
- ▶ Principal export destinations include Ireland, France and the US.
- ▶ Key import nations include the Netherlands, Germany and Ireland. UK's agricultural trade relies heavily on imports of products such as wheat, maize, meat, etc. to feed its economy.

By value, 2020 (\$b)

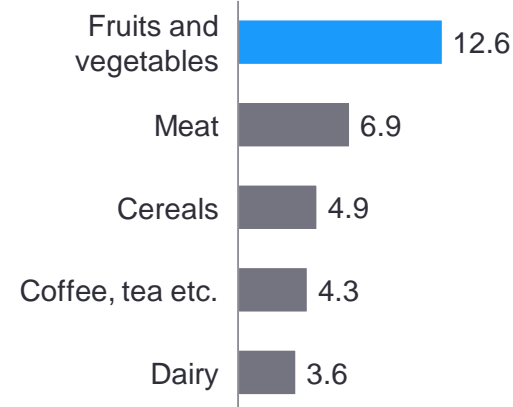


By volume, 2021 ('000 tonnes)

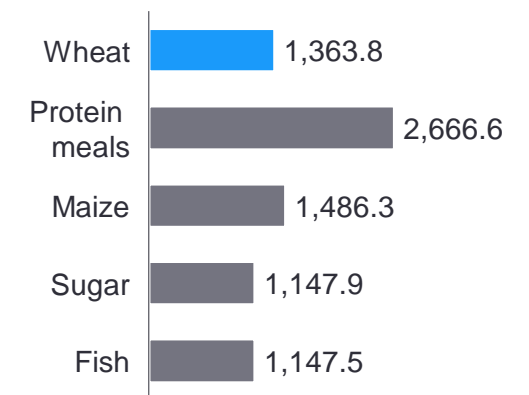


Top five agricultural imports¹

By value, 2020 (\$b)



By volume, 2021 ('000 tonnes)



1. MMT – million metric tons

2. As per the latest data available

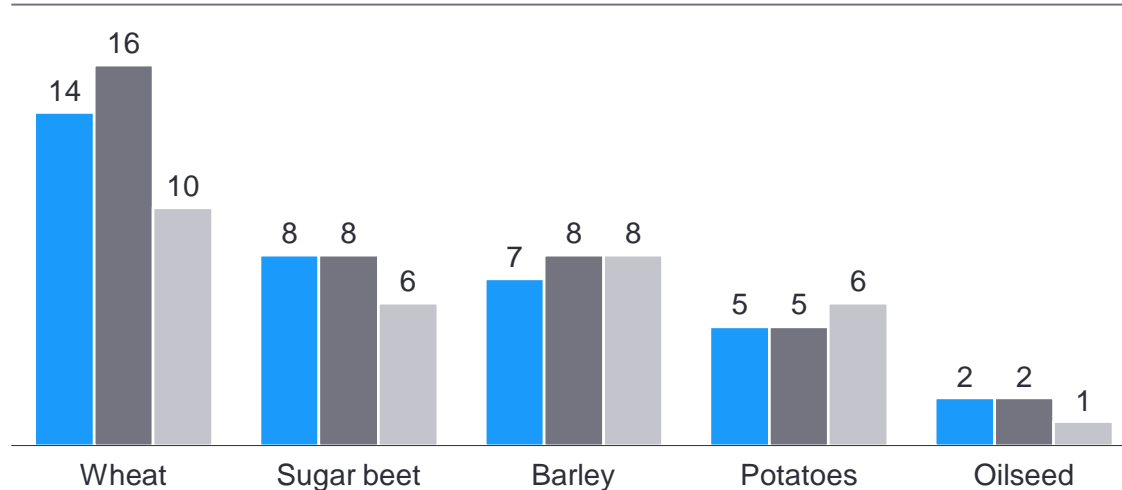
3. Products that retain raw recognisable form

Source: MarketLine report (2020), Department for Environment, Food and Rural Affairs, HMRC — Tax Authority of UK, FAO website, EY Knowledge consumer analysis

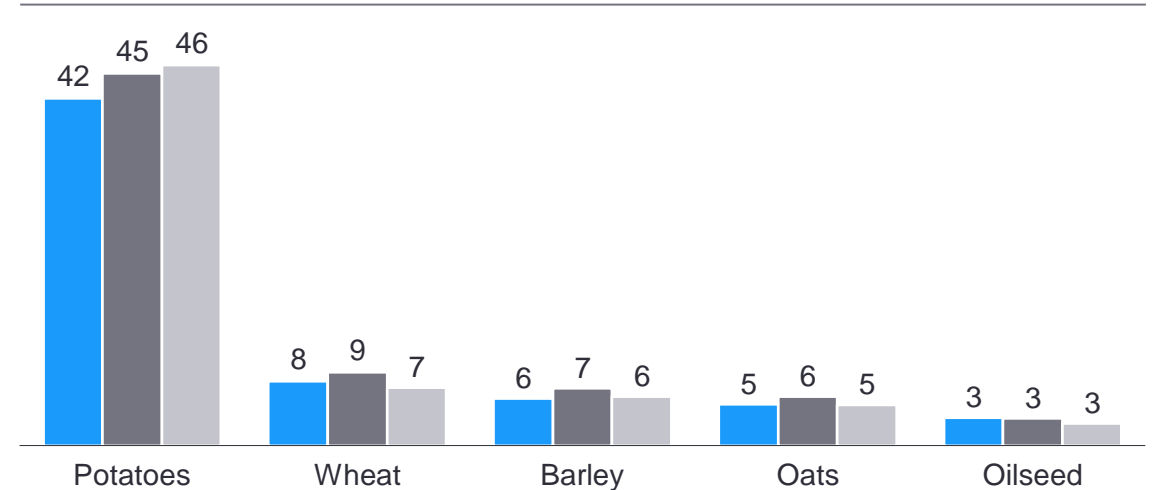
UK: Growth prospects in the UK are plagued by past droughts; however, recent government initiatives aim to accelerate its agricultural productivity

2018 2019 2020

UK's top five crops by production (MMT)



UK's top five crops by yield (tons/hectare)



- ▶ Cereal crops accounted for **50% of total plantable area** in 2020. Wheat and barley are the predominant cereal crops.
- ▶ The arable crops were impacted by two contrasting weather conditions — heavy rainfall during the winter planting season which caused waterlogging and compaction, followed by a spring drought that affected the harvest of spring sown crops.
 - Total **cereal production** of wheat, barley, oats and minor cereals (rye, triticale and mixed grain) in the UK decreased by 26% y-o-y in 2020.
 - While **wheat** remained one of the primary crops harvested in the nation, its production declined by 40% in 2020 to 9.7MT¹, the least harvest since 1981. The value also lowered by 36% y-o-y in 2020 to reach <\$2b.
- ▶ Government is encouraging farmers to diversify from food production to increase biotechnology capabilities focused on developing value-added products in order to enhance profit margins.
- ▶ EU-27 is a significant exporter of agri-food products to the UK. In December 2020, the UK signed a trade deal with the EU as per which farmers can continue to export produce to the EU without tariffs or quotas, with an aim to provide stability to agricultural producers.

1. MT – million tons

06

Eastern Europe

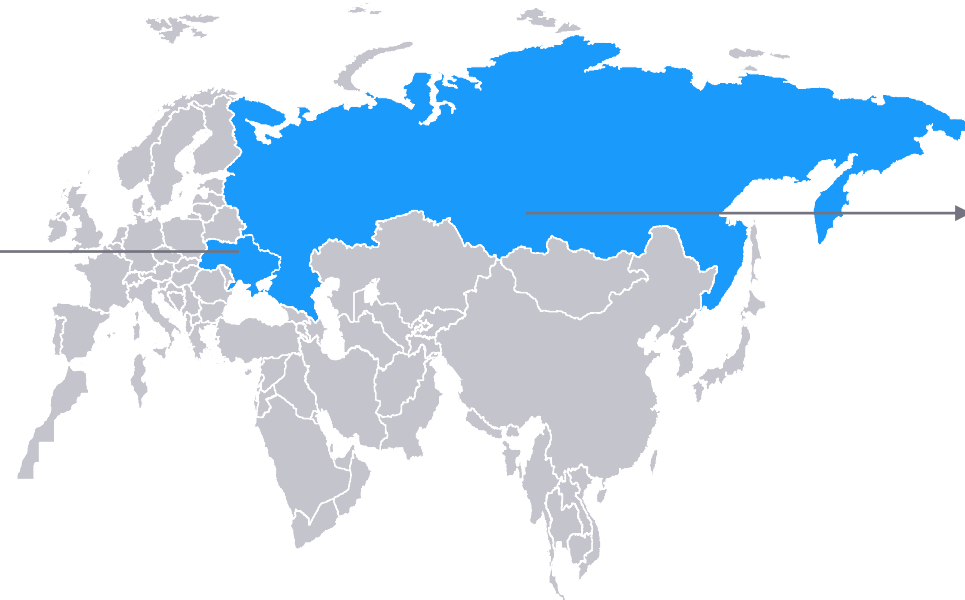
- ▶ Russia
- ▶ Ukraine



Eastern Europe: The region traditionally hosts rich agricultural productivity and trade

- ▶ Eastern Europe's recent growth had been led by Russia and Ukraine, with both countries hosting nutrient-rich soils.
- ▶ Crop production value had been expected to grow by 11% over the next ten years, primarily driven by rising cereals and oilseeds output in the Black Sea region. Maize and wheat production were expected to experience the fastest growth in Ukraine and Russia, respectively.
- ▶ EU and China have been the main export destinations for the regions agriculture produce:
 - Russia exported 41.3% and 13.4% to EU and China, respectively, in 2020, making them main trading partners for crops such as wheat, maize and barley.
 - Ukraine exported 36.5% and 14.5% to EU and China in 2020 making them main trading partners for its produces such as sunflower, corn and sugar beet.

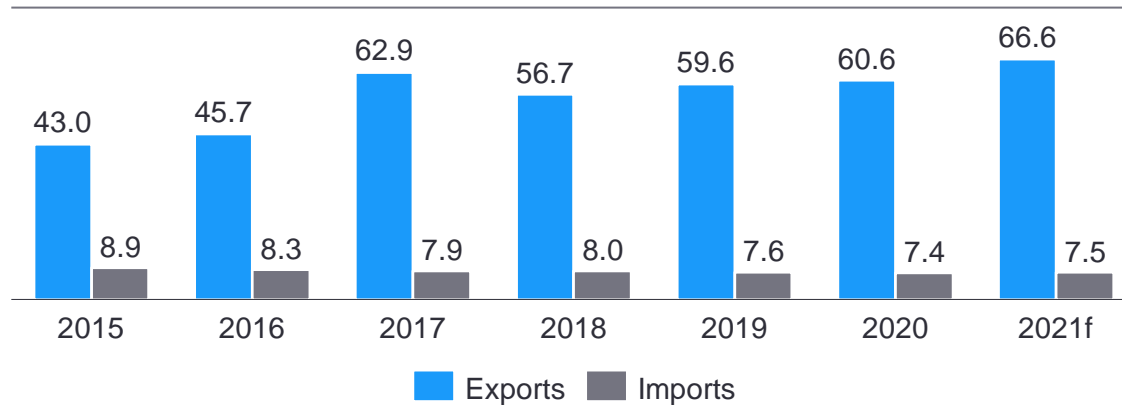
Ukraine is one of the largest contributors of maize and sunflower derivatives in Europe and witnessed trade surplus led by favorable environmental factor and abundant harvest for past decade.



Russia's abundance in rich black soil, favorable weather and growing conditions leads to high agricultural yield. Wheat is a major agricultural export by both value and volume across years.

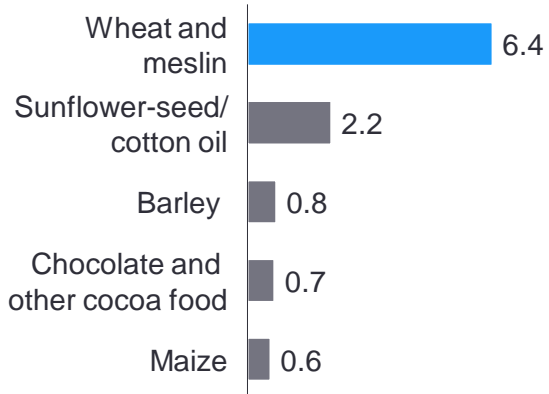
Russia: Experienced positive trade momentum prior to 2022, aided by its strong trade relations with China and Middle East as well as high agricultural productivity

Russia agricultural products export and import, 2015–21f (MMT)

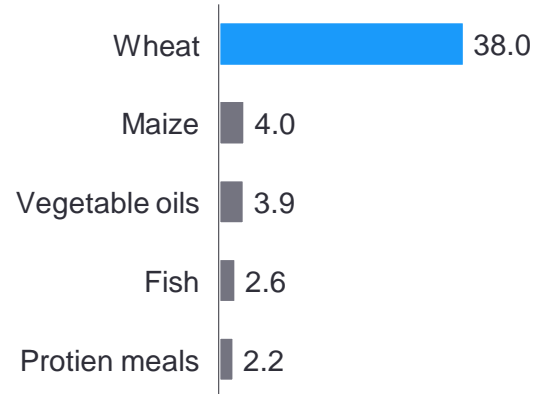


Top five agricultural exports¹

By value, 2020 (\$b)

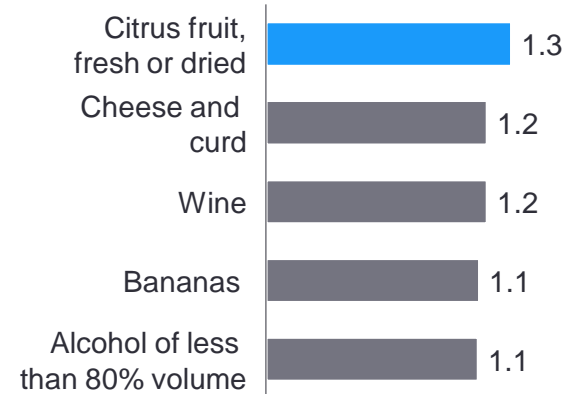


By volume, 2021 (MMT)

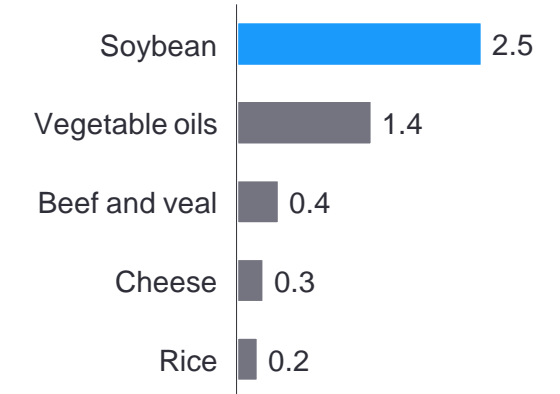


Top five agricultural imports¹

By value, 2020 (\$m)



By volume, 2021 (MMT)



- ▶ **Agricultural exports** volume grew by 40.9% during 2015–20 to reach 60.6MT¹.
 - Growth was led by **grain exports**, fueled by a higher harvest in Russia and increased global demand especially during COVID-19.
 - Wheat was the major agricultural export, both in value and volume.
- ▶ **Strong international trade relations** with China and the Middle East had enhanced demand for Russia's cheap agricultural commodities.
- ▶ The sector is also expected to benefit from stable domestic demand for sunflower and increased demand for soybeans from China.
- ▶ Agricultural import volumes decreased by 15.7% during 2015–20. The major imports include soybean and vegetable oils.

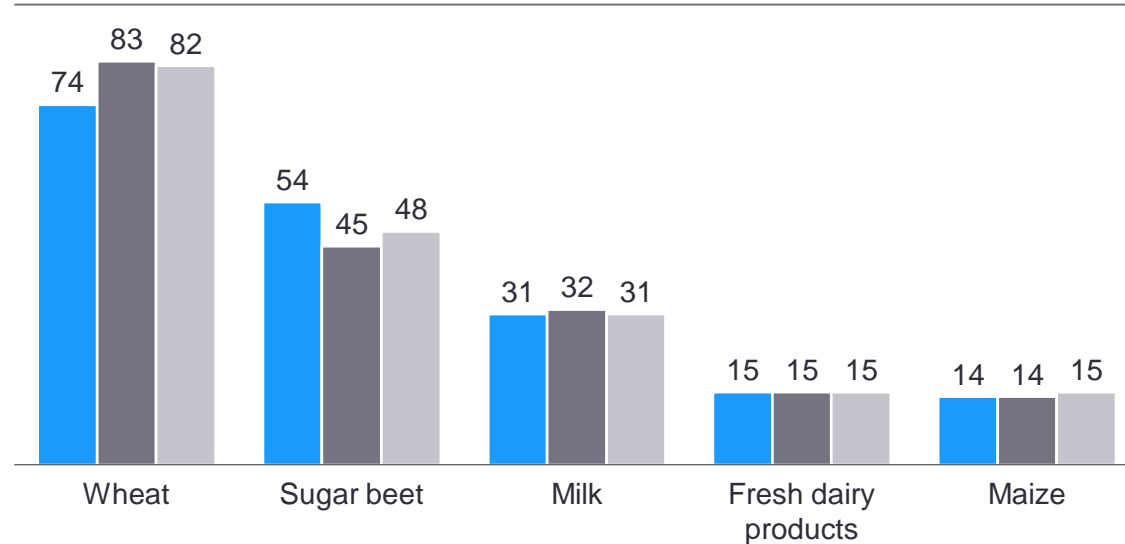
1. MT – million tons; As per the latest data available

Source: OECD FAO database, Agricultural Products in Russia by MarketLine via EMIS World Trade Organizations, EY Knowledge consumer analysis

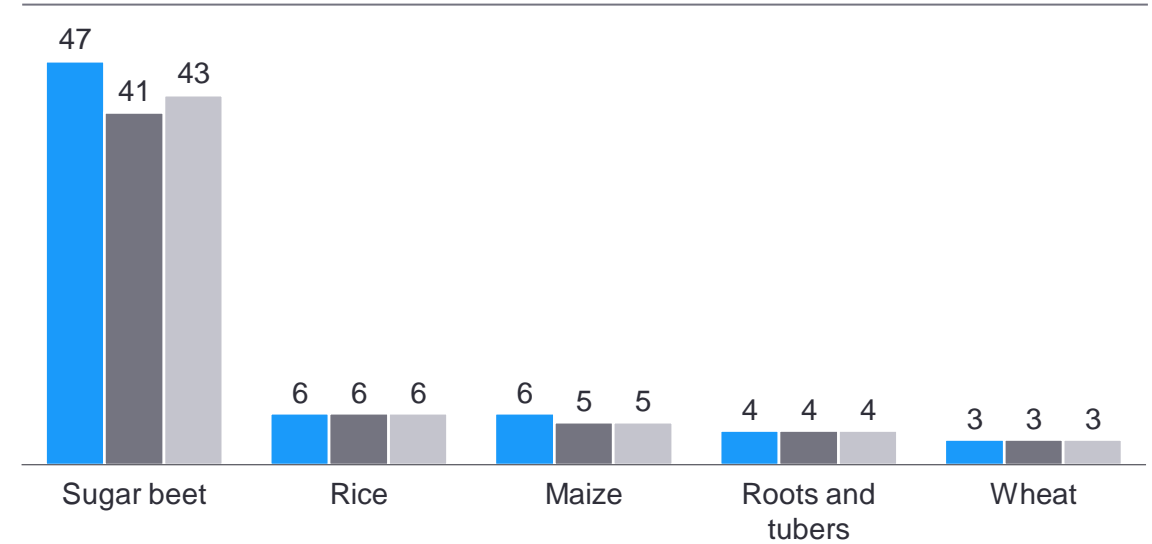
Russia: A vast fertile black soil belt is a key enabler for high production and yield of wheat and sugar beet

2019 2020 2021f

Russia's top five crops and livestock products by production (MMT)



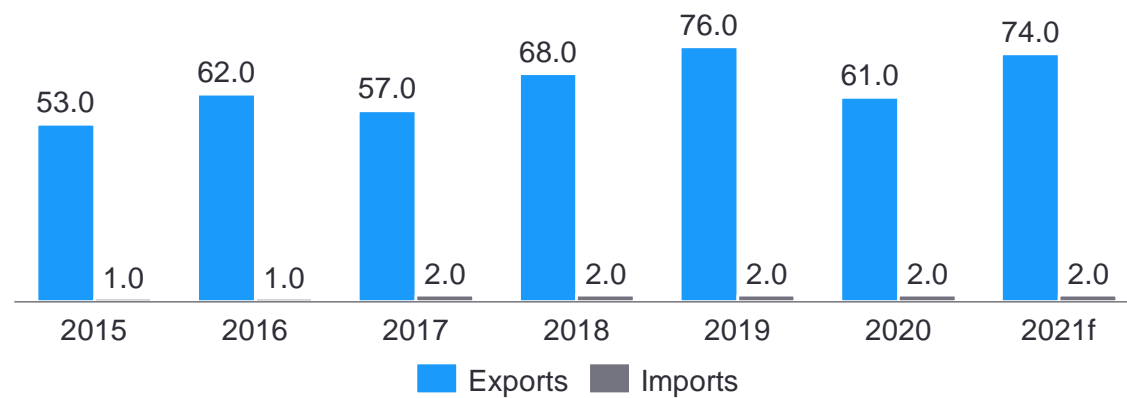
Russia's top five crops by yield (tons/hectare)



- ▶ Russia's agriculture sector had become one of the fastest growing sectors in the nation in recent years. Agricultural output had grown almost every year over the past decade.
 - According to the Russian Federal Service for State Statistics, harvest of main grains (wheat, barley, corn, etc.) was up 11% y-o-y to reach ~121MT in 2020–21 season.
- ▶ **Grains such as wheat** are grown in abundance across Russia due to its rich black soil. The growth in production of wheat is primarily due to improvements in agricultural technologies. Hence, it had become the world's leading wheat exporter, despite moving to limit the amount shipped abroad in an effort to dampen prices on its home market.
- ▶ **Cereals** were the most lucrative crops in 2020, occupying 37% overall agriculture market value share with value reaching \$17.8b in 2020. Wheat is the dominant cereal crop accounting for 61% of Russia's cereal market value share. Other cereal crops including barley, maize, and rice, accounted for 18%, 10% and 2% share, respectively.
- ▶ **Oil-crops** were valued at \$15.1b in 2020, accounting for 32% of overall agriculture value share.

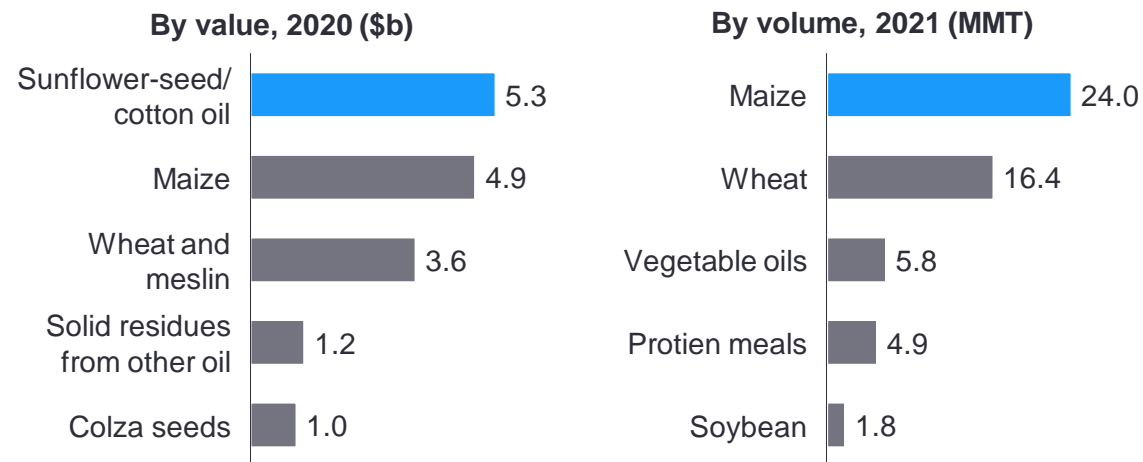
Ukraine: Witnessed trade surplus over last decade led by favorable environmental factors such as mineral rich soil, sunshine and year-round rainfall

Ukraine agricultural products export and import, 2015–21f (MMT)

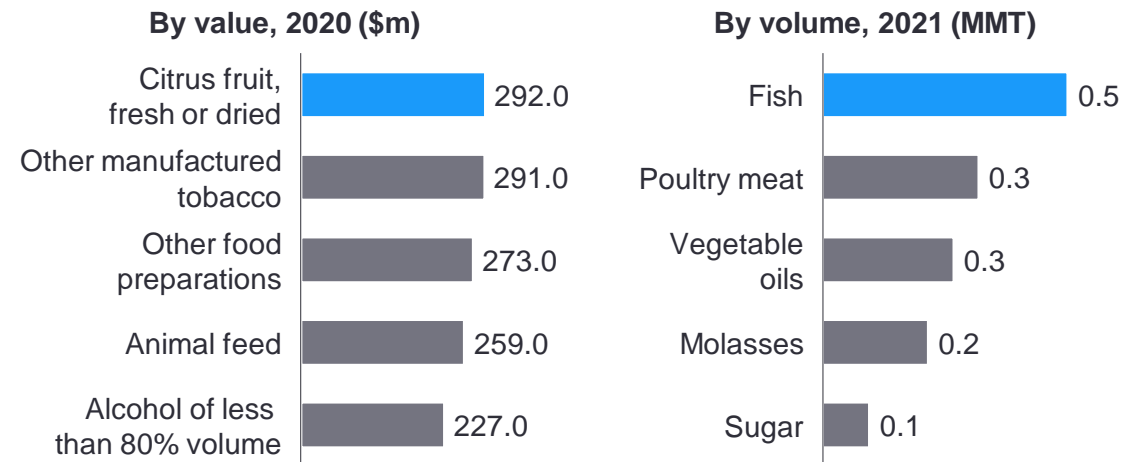


- ▶ Ukraine has been among the top global **exporters of grains and vegetable oils**. Key agriculture exports include wheat, maize and sunflower derivatives.
- ▶ In 2021, Ukraine was the second-largest supplier of grains to the EU and also the key food supplier to low and middle-income countries in **Asia and Africa**.
- ▶ The nation witnessed a **major trade advantage** led by the high agricultural production.
- ▶ Ukraine imports certain livestock products such as fish and poultry meat.
- ▶ Major export destinations have included the EU, Russia, Turkey, China and India, while key importers included the EU, Russia, Belarus and the US.

Top five agricultural exports¹



Top five agricultural imports¹



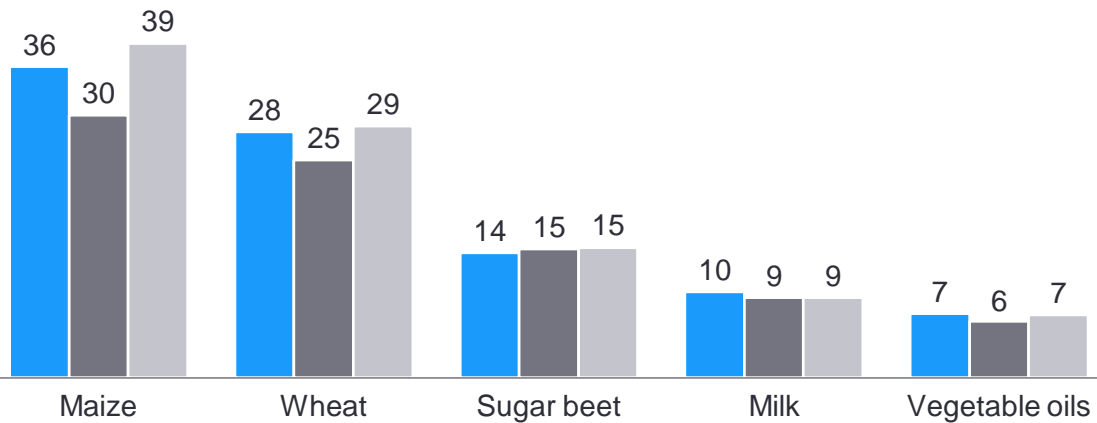
1. As per the latest data available

Source: OECD FAO database, MarketLine report (2020), World Trade Organizations, EY Knowledge consumer analysis

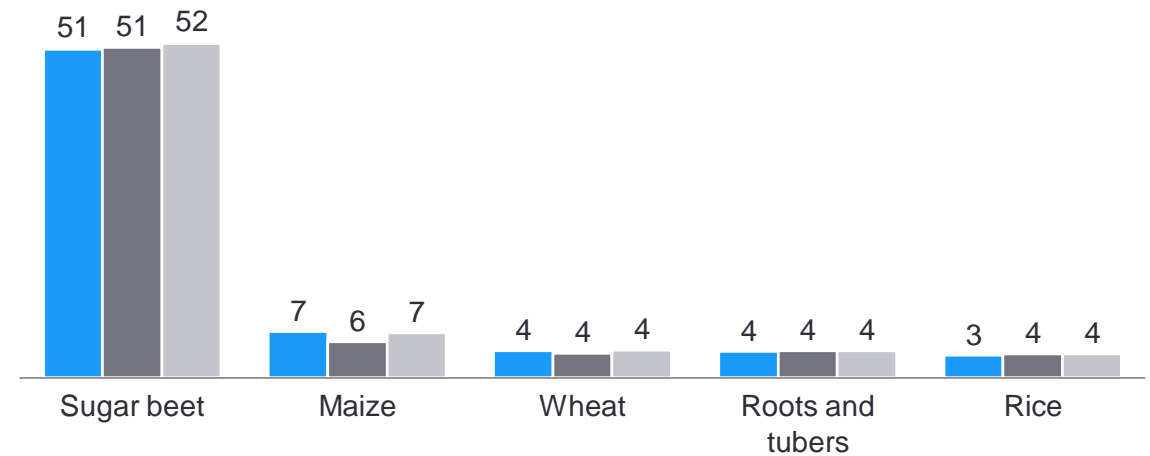
Ukraine: Production for key crops such as wheat and maize declined from 2019 to 2020, led by environmental challenges caused by an extended summer season

■ 2019 ■ 2020 ■ 2021f

Ukraine's top five crops and livestock products by production (MMT)



Ukraine's top five crops and livestock products by yield (tons/hectare)



- ▶ **Maize and wheat** are grown throughout the country, with central and south-central Ukraine being the key production zones.
 - The **production of maize and wheat** is forecasted to increase to 38.6 MMT and 29.0 MMT respectively in 2021.
- ▶ **Sugar beets** are grown primarily in central and western Ukraine. Beets are planted in late April and early May and harvested from mid-September through the end of October.
 - In 2021, Ukraine expanded the area planted with sugar beet to 227,100 hectares from 201,600 hectares in 2020.
 - Ukraine had planned to further increase sugar beet output to **1.4MT** in 2021–22.
 - The country produced ~1MT white sugar in 2020–21 season.
- ▶ **Oilseed** is an important subsector in Ukrainian crop farming.
 - The major oil crops grown are sunflower, soy, and rapeseed. In the mid-2000s, after implementation of export tariffs for unprocessed sunflower seed, Ukraine developed leading sunflower oil industry and became one of the biggest exporter of sunflower oil in the world.

07

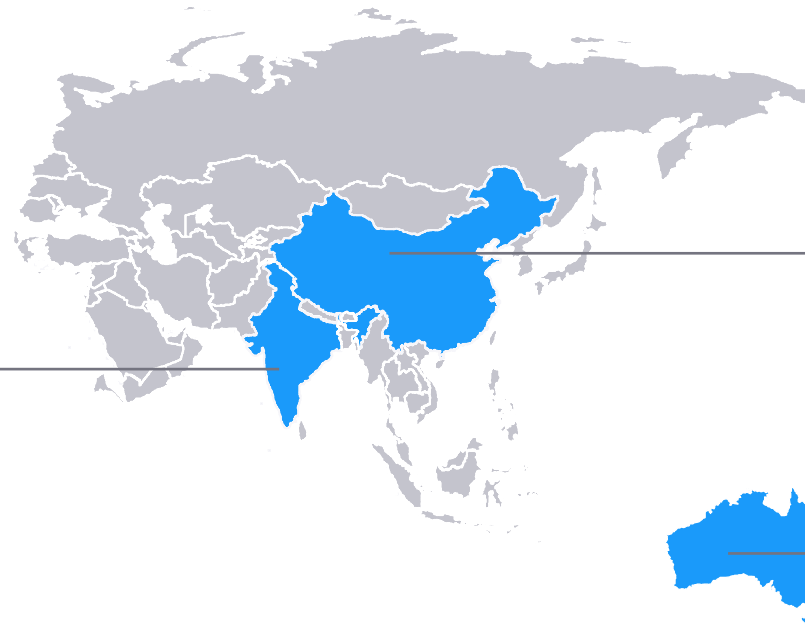
Asia-Pacific

- ▶ Australia
- ▶ China
- ▶ India



The Asia-Pacific agricultural products market was valued at \$1.5t in 2020 with cereals occupying the largest share

- ▶ Asia-Pacific agricultural products market grew by 10.8% y-o-y in 2020 to reach a value of \$1.5t and is expected to grow by 24.3% during 2020–25 to reach \$1.8t
 - Cereals is the largest segment of the agricultural products market in Asia-Pacific, accounting for 27.3% of the market's total value. Asia produces ~90% of the world's total supply of rice, a staple food crop for most Asians.
 - China accounts for 57.3% of the Asia-Pacific agricultural products market value.
- ▶ Market volume grew by 4.3% in 2020 to 3.7b tons and is expected to further grow by 20.8% during 2022–25 to reach 4.5b tons.
- ▶ The region's competitive landscape consists of many independent farming enterprises and smallholders. As the agricultural demand increases with the rise in population, there are many global agribusiness players, including Wilmar International and Cargill, increasing their presence in the region.



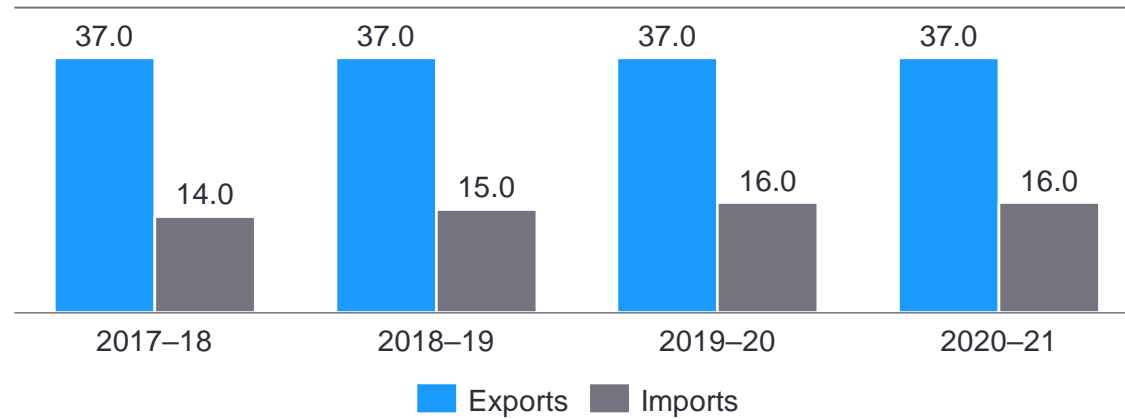
India's agriculture sector is expected to grow in coming years, driven by increased investment in agricultural infrastructure (irrigation facilities, warehousing and cold storage, etc.). As a result, total exports are also expected to increase.

China's dependence on agricultural and food imports will continue growing as domestic demand rises. Escalating ecological problems (shrinking arable land, environmental pollution, etc.) add further pressure on its objective of becoming food self-sufficient.

Australia's agricultural exports are expected to recover in coming years, led by the fading impact of COVID-19 on demand and production. Growing demand, favorable rains and higher prices are expected to increase agricultural production in 2021–22.

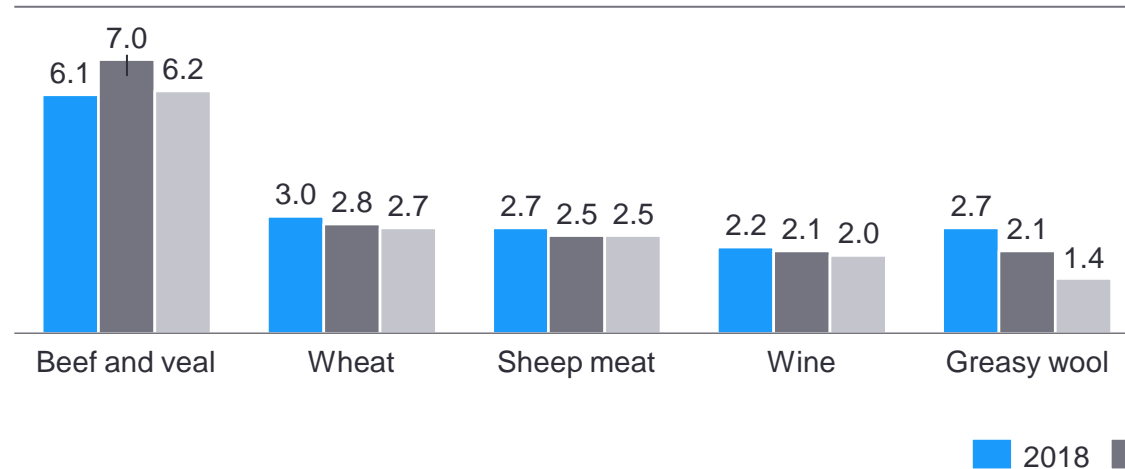
Australia: Expected to recover its agricultural exports, led by post-pandemic production and demand revival

Australia agricultural export and import (\$b¹)

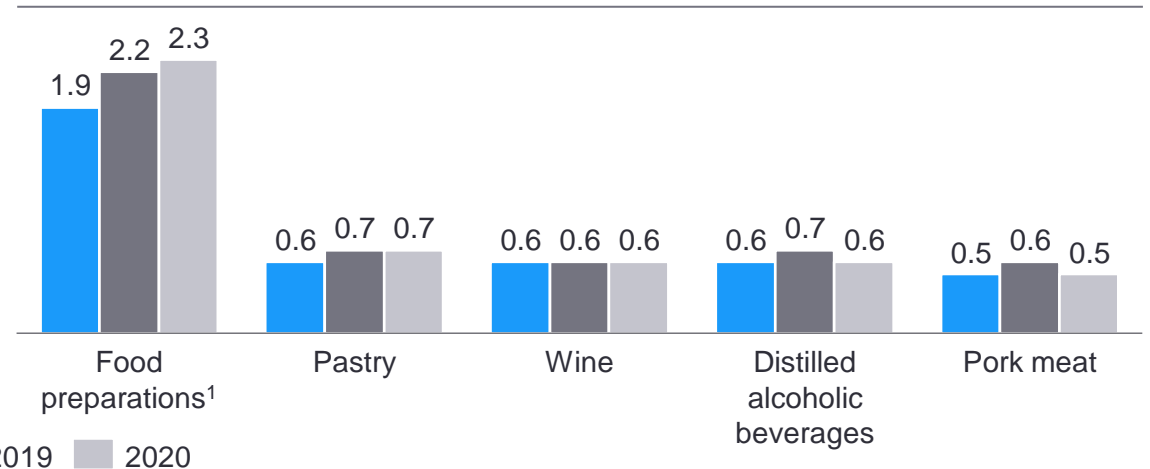


- ▶ **Australian agricultural exports'** value has remained stable in recent years as higher production of other commodities (particularly red meat) was offset by reduced crop production due to dry seasonal conditions.
- ▶ During 2020-21, declines in export prices for many commodities, reduced red meat production, and tightened trade restrictions to China led to declines in export value for all categories (except cropping and dairy).
- ▶ Export value of most commodities is expected to bounce back strongly as production and demand pick up in coming years.
- ▶ China remained Australia's top export market during 2021-22 with 22% share of total exports, despite a y-o-y decline of 26%.

Top five crops and livestock product exports (\$b)

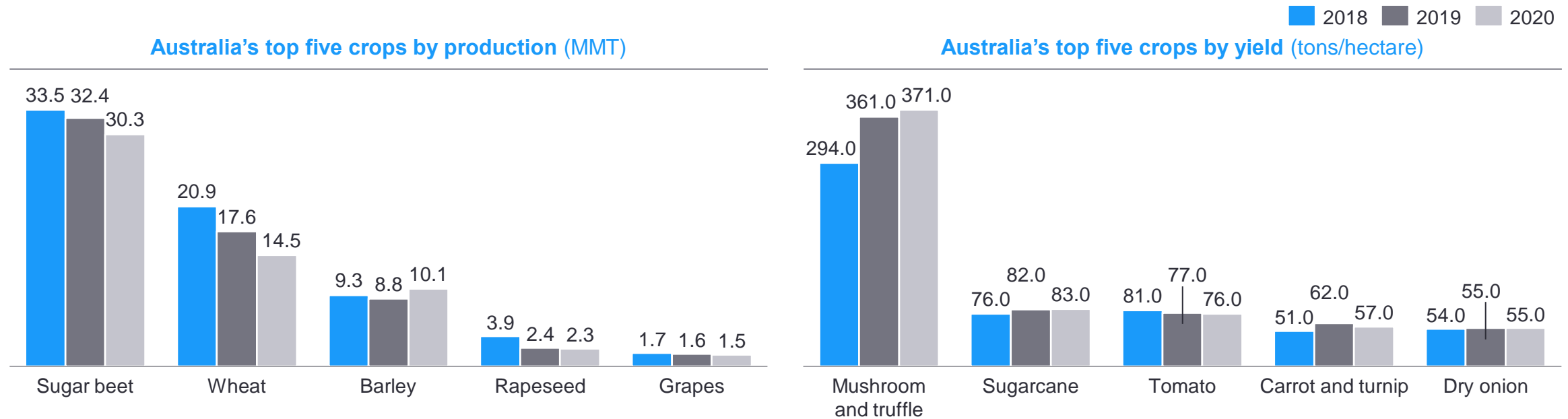


Top five crops and livestock products imports (\$b)



1. Values have been converted to US\$ (as on June 30 of respective financial year); Not elsewhere specified
Source: Rural Bank, FAO website, Oanda, EY Knowledge consumer analysis

Australia: Agricultural production in Australia is expected to reach its highest ever value during 2021–22 before leveling off in 2022–23



- ▶ The gross value of Australia's agricultural production is forecasted to increase by over \$9b¹ to reach \$61b¹ in 2021–22, driven by high crop production and 32-year high prices. However, during 2022–23, the value of production is expected to experience a 6% dip to reach \$57b¹ as production and prices start to normalize and disruption caused by COVID-19 begins to subside.
- ▶ Large farms² increasingly drive improved agricultural output. Accounting for just 15% of the total farm locations, large farms contributed to 72% of the total farm income and 60% of the total value of output during 2019–20.
- ▶ Yield in Australia is currently 3x the normal yield. The production is may help service those countries where supply is restricted due to the war in Ukraine, but existing infrastructure is not well-suited to handle such huge quantities.
- ▶ Expected above average rainfall during October 2021–November 2022 and favorable rainfall can benefit both summer and winter crop yields.
- ▶ The sector remained resilient during COVID-19 uncertainties. Australian farmers have been able to avoid disruption in their activities by adapting to changes in demand from high-value products typically consumed in the hospitality sector to foods consumed at home.

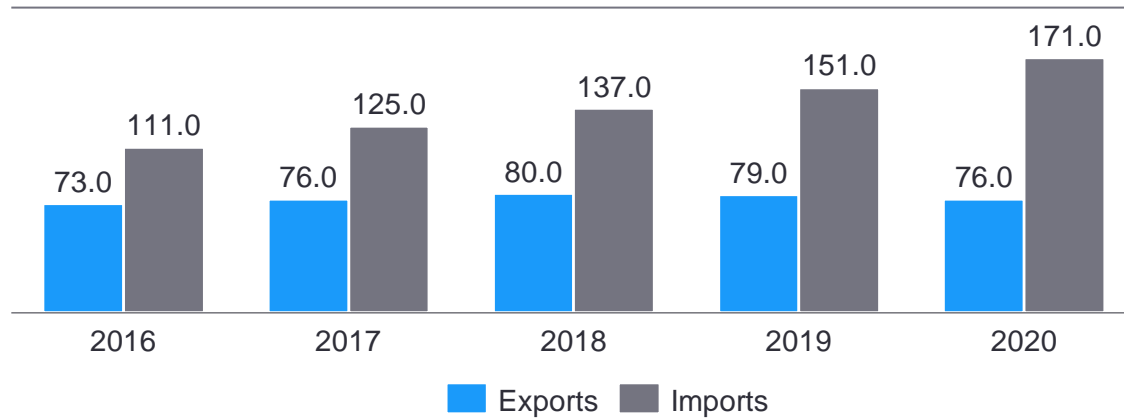
1. Values have been converted to US\$ (conversion as on March 9, 2022);

2. Farms with receipts greater than A\$1m

Source: FAO, Oanda, EY Knowledge consumer analysis

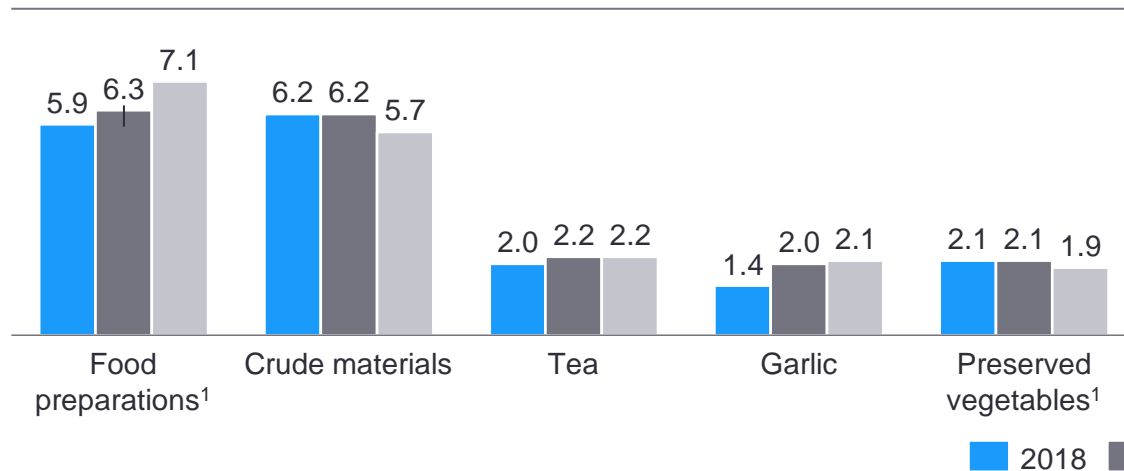
China: Imports of grains and meat are expected to continue to grow as ever-increasing demand puts pressure on limited production capacity

China agricultural products export and import (\$b)

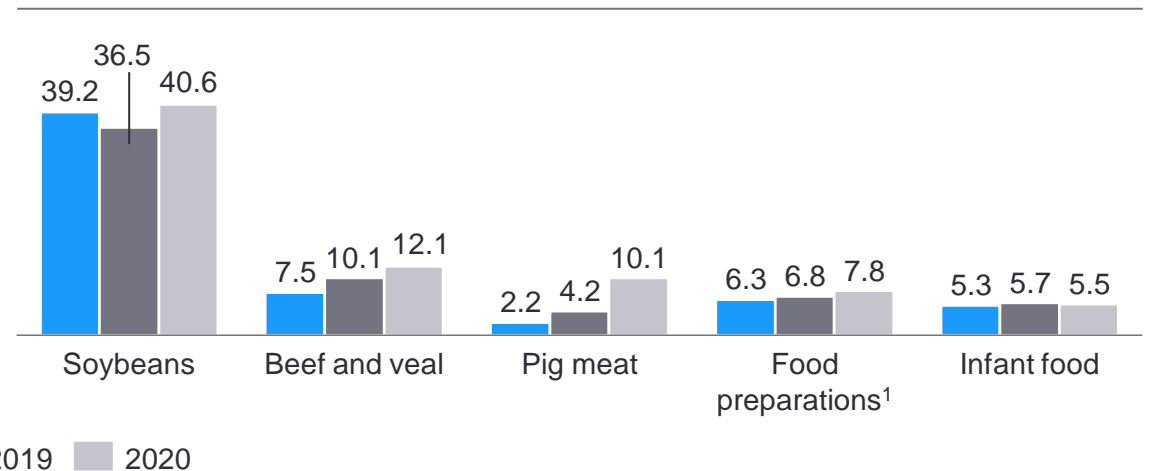


- ▶ In 2020, China recorded its lowest **export value** since 2018, as a result of the pandemic. Barley, wheat and rice exports decreased by 75%, 42%, and 16%, respectively due to rising food security concerns during the pandemic.
- ▶ **Agricultural product imports** grew by 14% y-o-y to reach a record high value in 2020, led by demand surge for grains, sugar, oilseeds and livestock products.
- ▶ Grain imports doubled in 2020, mainly led by significant rise in domestic demand for sorghum (580%), maize (240%), and wheat (240%).
- ▶ As a part of its initiatives to boost economic cooperation with ASEAN nations, China aims to import \$150b worth of agricultural products from ASEAN members over the next five years.
- ▶ Despite having less than 10% of the world's arable land, China is responsible for feeding approximately one fifth of the global population.

Top five crops and livestock product exports (\$b)



Top five crops and livestock products imports (\$b)

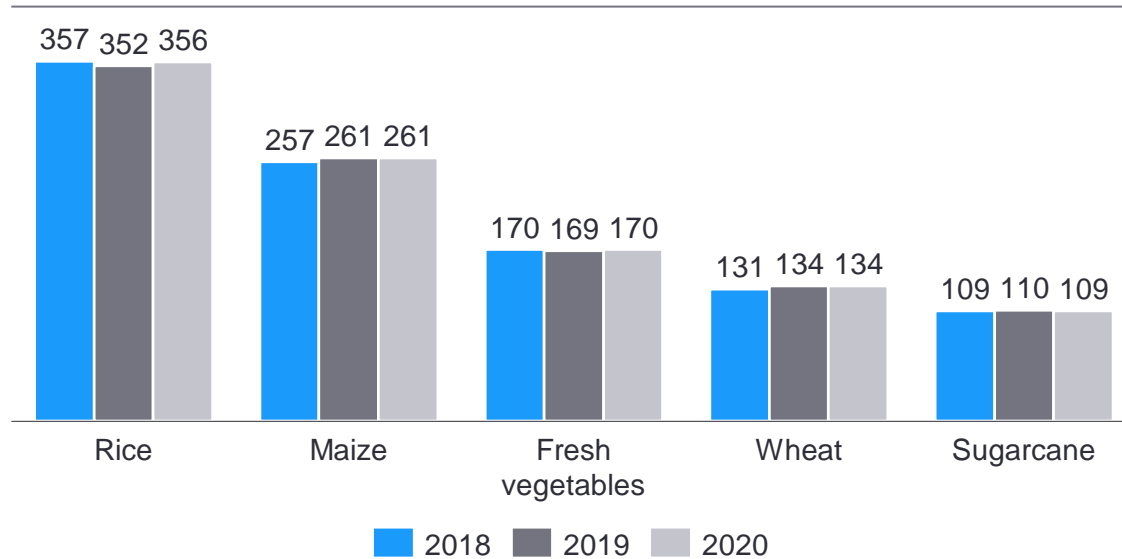


1. Not elsewhere specified

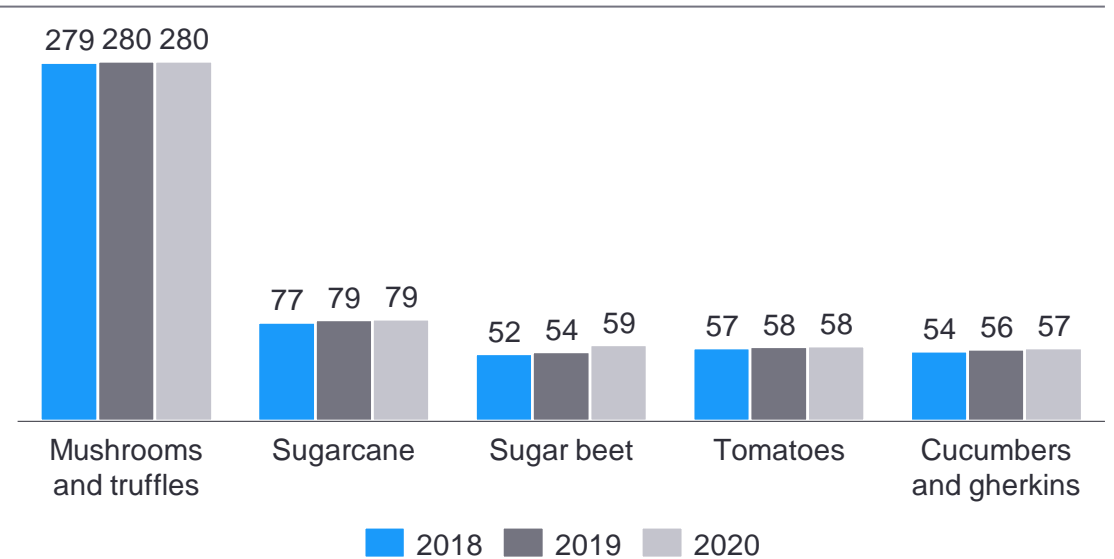
Source: EMIS, FAO, Oanda, EY Knowledge consumer analysis

China: Government focus on enhancing food self-sufficiency faces significant ecological and labor concerns

China's top five crops and livestock products by production (MMT)



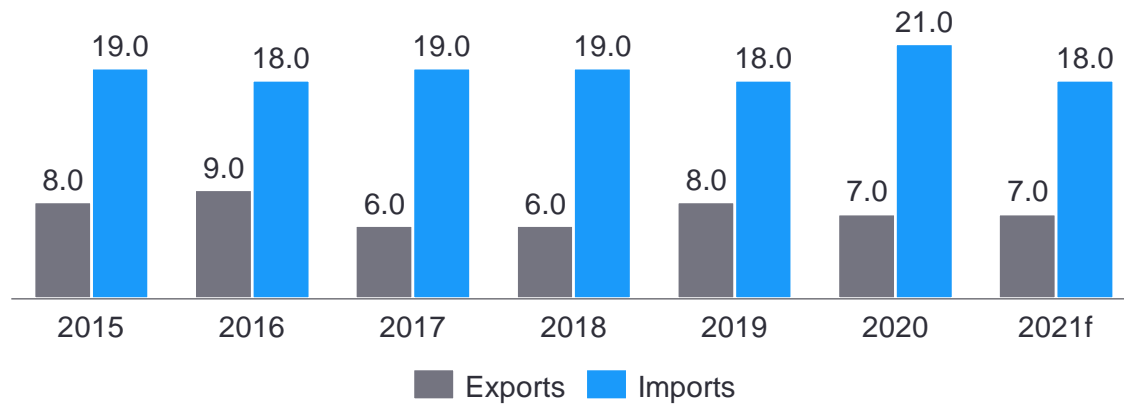
China's top five crops and livestock products by yield (tons/hectare)



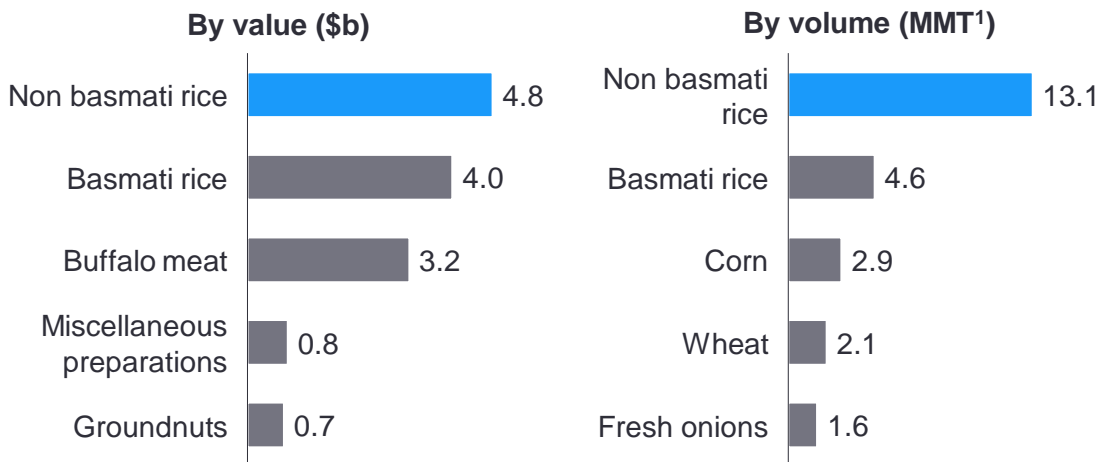
- ▶ Though it has been able to increase its agricultural production over the past two decades with heavy use of fertilizers and pesticides, China now faces serious ecological problems, including land desertification, soil and water loss, and soil salinization.
- ▶ High costs and low profits have led to labor shortages. As a result, the Chinese government has been strongly focused on supporting farmers to ensure sustainable and healthy development of the sector. Some key government initiatives include grain subsidies and subsidies aiming to protect farmland from abandonment.
- ▶ China's latest winter wheat crop suffered as a result of delay in seeding of about a third of the total crop caused by heavy rainfall and flooding in fall 2021.
- ▶ Considering the high demand and usage of soybean, the Government is taking steps to increase production capacity of soybean and other oilseeds, including improving subsidy mechanisms for soybean farmers, guiding farmers to expand soybean cultivation area and promoting advanced soybean-corn intercropping agricultural technology.
- ▶ China recently unveiled its plans for the modernization of agricultural sector and rural areas through 2025, with food self-sufficiency as the top priority.

India: Agricultural and processed food products' net exports grew by 40% in 2020–21

India's export and import of agricultural and processed food products, \$b

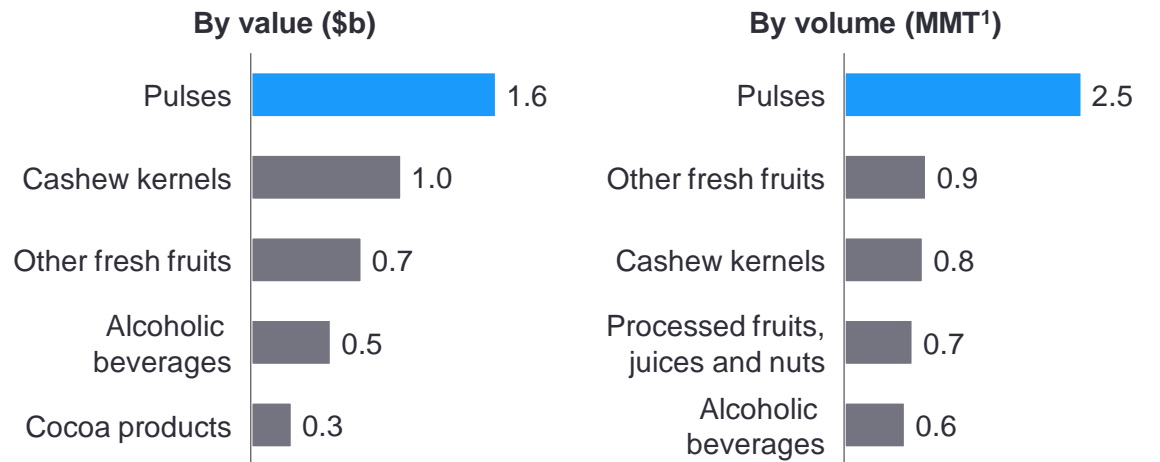


Top five agricultural and processed food products exports, 2020–21



- ▶ **Export of agricultural and processed food products from India** grew by 24% during 2020–21, driven by exceptional growth in casein (2,276%), wheat (789%), corn (345%) and non-basmati rice (138%) exports.
- ▶ Wheat exports have already reached 6.6MMT during 2021–22, in part due to the war in Ukraine. Demand for corn and spices also grew.
 - The increased exports have increased pressure on the local prices.
- ▶ In 2021–22, India's exports are expected to further grow by 15% y-o-y to reach \$24b.
- ▶ **Agricultural imports** declined by ~6% y-o-y mainly due to fall in import of wheat (~100%), sheep/goat meat (93%) and corn (91%).

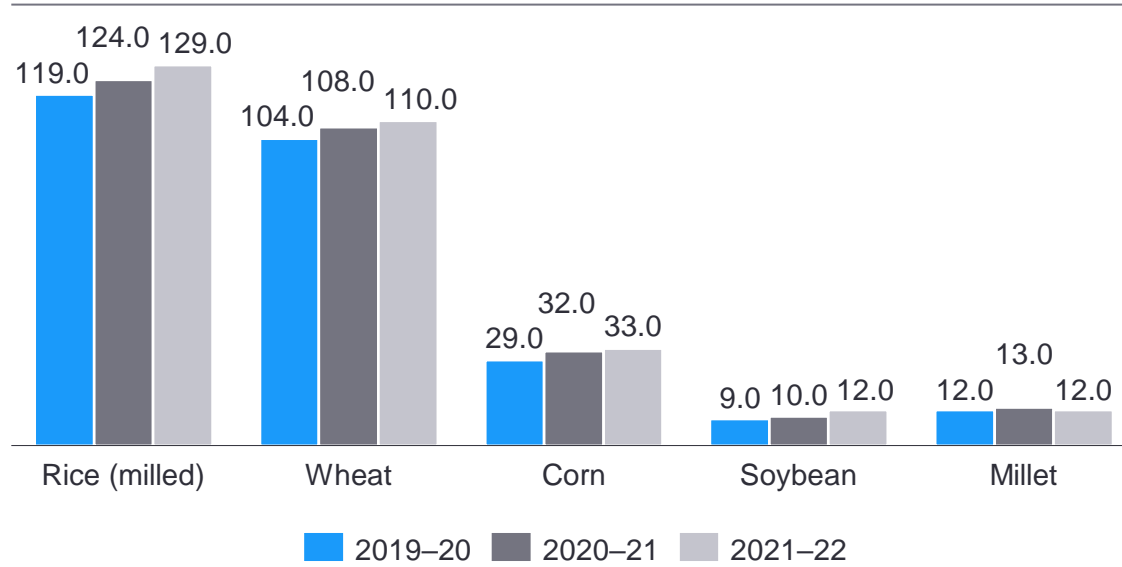
Top five agricultural and processed food products imports, 2020–21



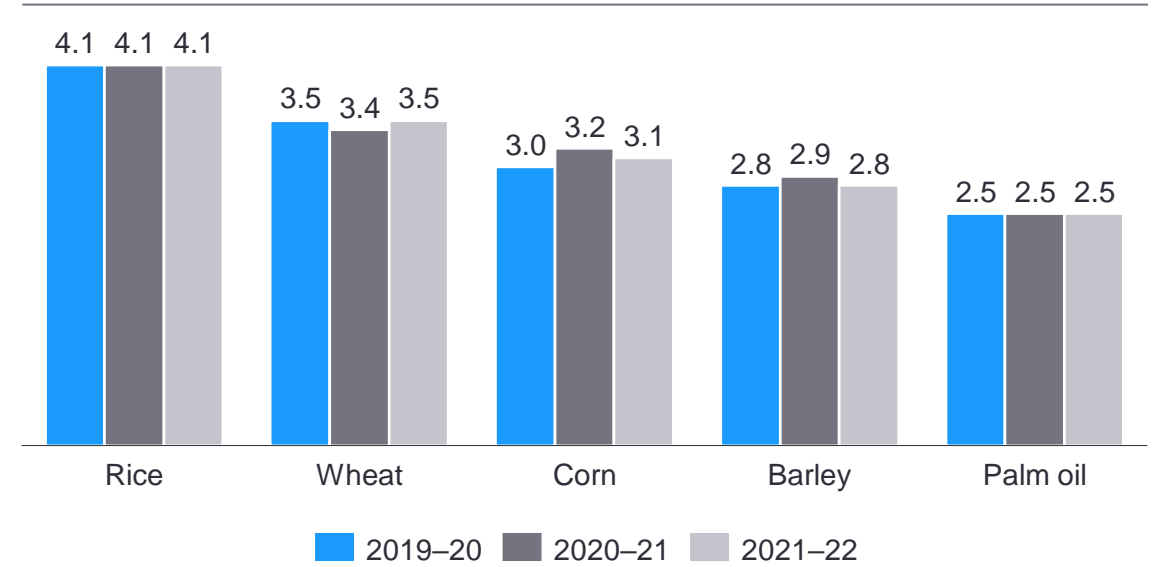
1.MMT – Million Metric Tons
Source: APEDA, EY Knowledge consumer analysis

India: Most food crops in India are expected to reach record high production during 2021–22, led by increased efforts from farmers, scientists and the government

India's top five crops by production (MMT)



India's top five crops by yield (tons/hectare)



- ▶ Increased investment in agricultural infrastructure such as irrigation facilities, warehousing and cold storage, and growing use of genetically modified (GM) crops are expected to improve the yield and generate better momentum for the sector.
- ▶ Wheat and corn, which were already expected to reach record high production, may experience increased demand resulting from impacts of the war in Ukraine.
- ▶ However, according to the "Climate Change 2022: Impacts, Adaptation and Vulnerability" report released by IPCC Working Group II, climate change will have a significant negative impact on India's rice and corn yields.
 - Rice and corn production are expected to decline by 10%–30% and 25%–70% respectively if the temperature increases by 1°–4° Celsius.
- ▶ Growers are significantly increasing the production of rapeseed and mustard to reap the benefits of rising edible oil prices in the nation. The average retail prices of six edible oils (groundnut oil, mustard oil, vanaspati, soya oil, sunflower oil and palm oil) increased by 10.2%–30.5% during 2020–21.

08

Africa

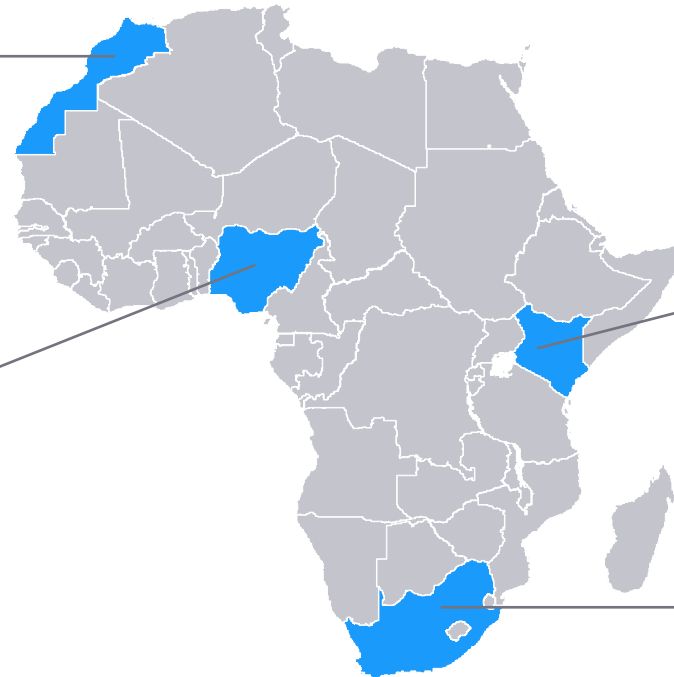
- ▶ Kenya
- ▶ Morocco
- ▶ Nigeria
- ▶ South Africa

Africa's agricultural production is highly susceptible to climate change; stringent barriers are impeding many countries from reaping the benefits of intra-African agricultural trade

- ▶ Africa is largely dependent on imports of agricultural commodities such as cereals, meat, dairy products, fats, oils and sugar. It imports ~\$80b worth of agricultural and food products annually.
- ▶ Africa exports 70% of global unprocessed cashew nuts, cocoa beans, cocoa shells and husks, kola nuts and vanilla. Key export commodities include cocoa, coffee, cotton, tobacco and spices.
- ▶ Intra-African agricultural trade accounts for less than 20% of Africa's total agricultural trade, which is one of the lowest in any region. High tariff and non-tariff measures act as a barrier to trade growth within Africa.
- ▶ Climate change is a key threat to the region's agriculture sector — estimated to have caused a 34% decline in Africa's agricultural productivity since 1961.

Morocco's agriculture industry experiences high volatility due to high frequency and intensity of droughts. After experiencing one of the worst droughts in decades in 2021, the country is expected to bounce back in 2022 led by better-than-average rainfall at the start of the season.

Nigeria's domestic crop production is insufficient to meet the local demand, mainly due to factors such as sporadic flooding, rise in criminal activities and diminishing crop health. These factors more than offset the nation's abundance of arable land and labor, thereby creating reliance on imports.

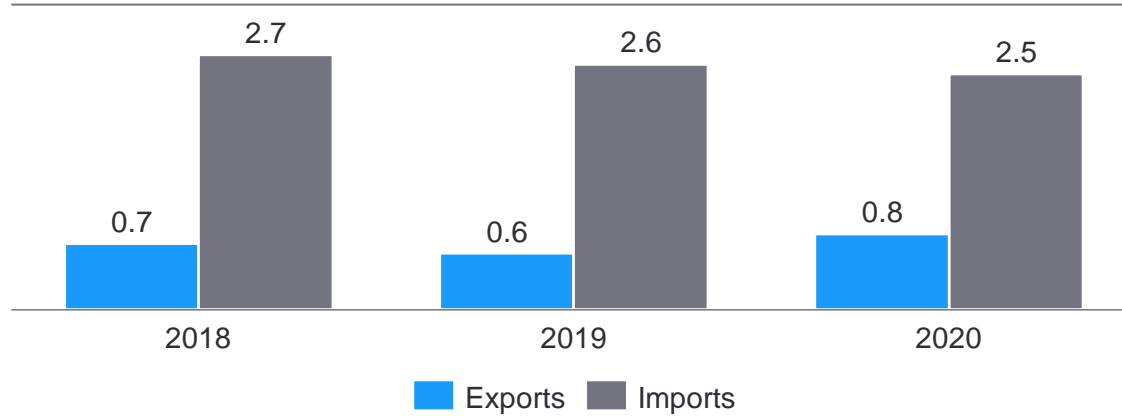


Recovering from three consecutive below-average rainy seasons, **Kenya** is expected to produce a steady amount of grain in 2021–22 season.

South Africa experienced a strong harvest during 2020–21 season, resulting in record high exports of agricultural products. Rising input costs and changing climatic conditions are expected to dampen this growth in the 2021–22 season.

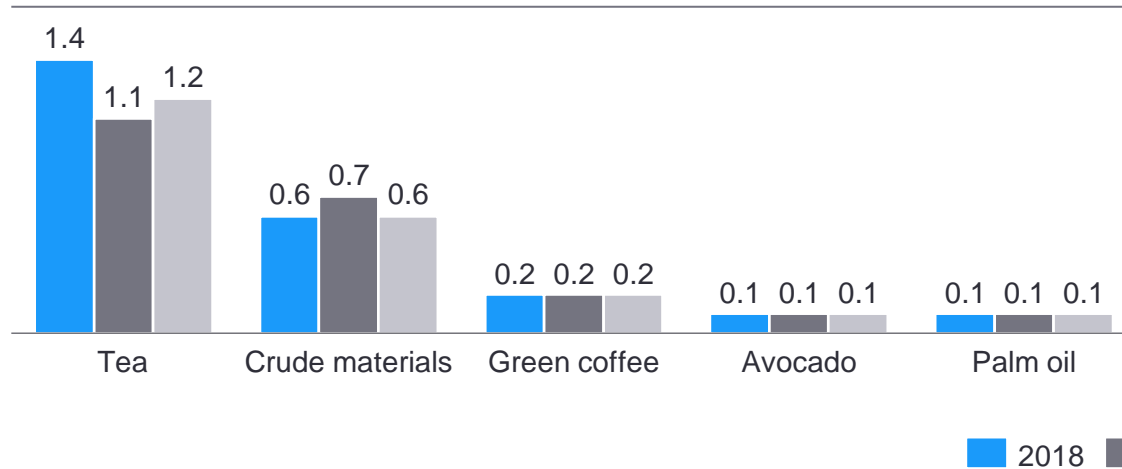
Kenya: Historically, a net importer of key agricultural crops but is now focusing on enhancing its food safety to boost exports

Kenya core crops and livestock items export and import (MMT)

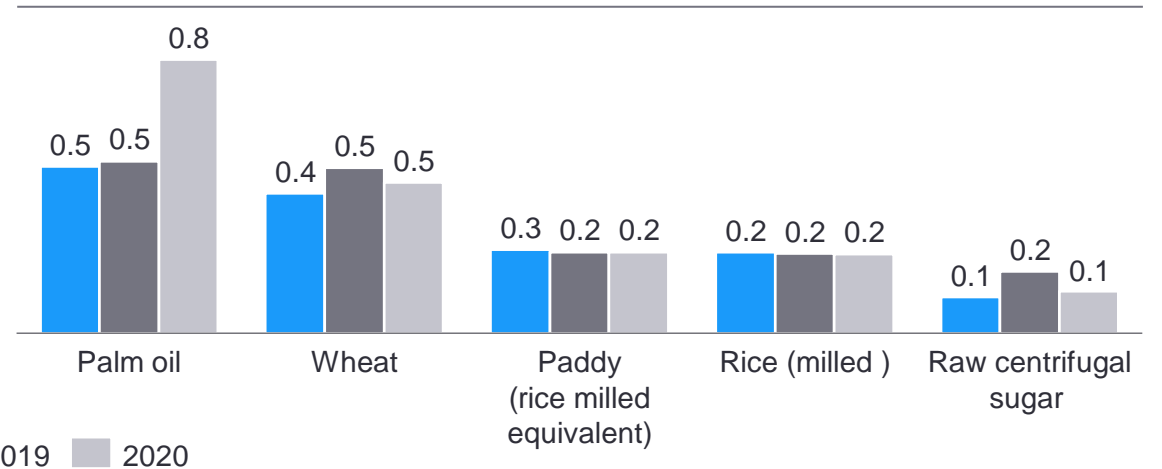


- ▶ Kenya's agricultural trade relies heavily on imports. It is a net importer of maize, wheat and rice.
- ▶ According to USDA estimates, maize imports are expected to increase by 25% y-o-y to reach 0.5MMT during 2021–22. Grain imports are expected to grow slightly to 0.6MMT and wheat imports are forecasted to reach 2.4MMT.
- ▶ The value of agricultural exports in Kenya started to grow during 1H21 led by better prices and increased shipments to global markets.
- ▶ Kenya is working to strengthen food safety by aligning to international food safety standards, thereby creating opportunity to boost agricultural exports.

Top five crops and livestock product exports (\$b)

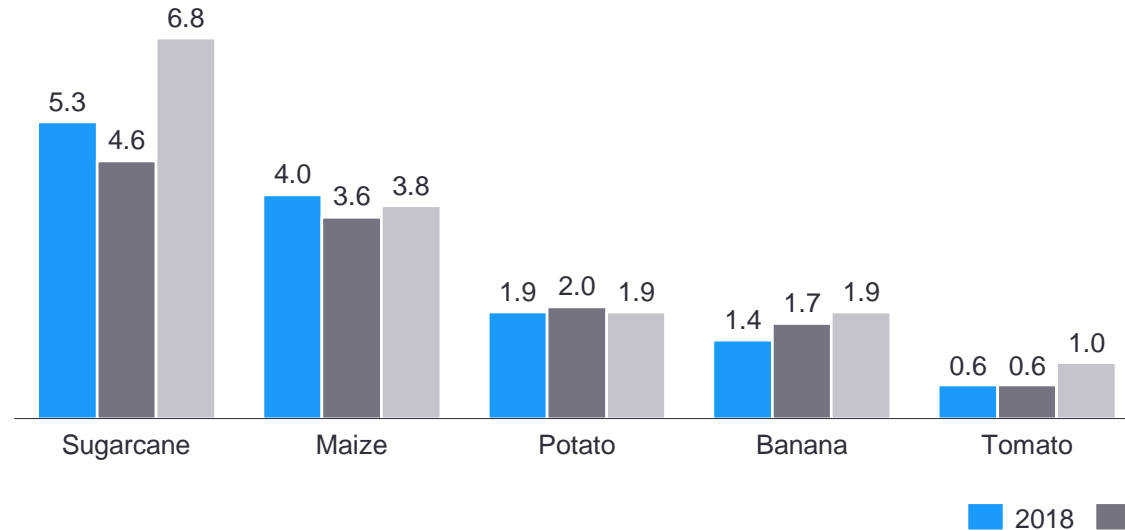


Top five crops and livestock products imports (\$b)

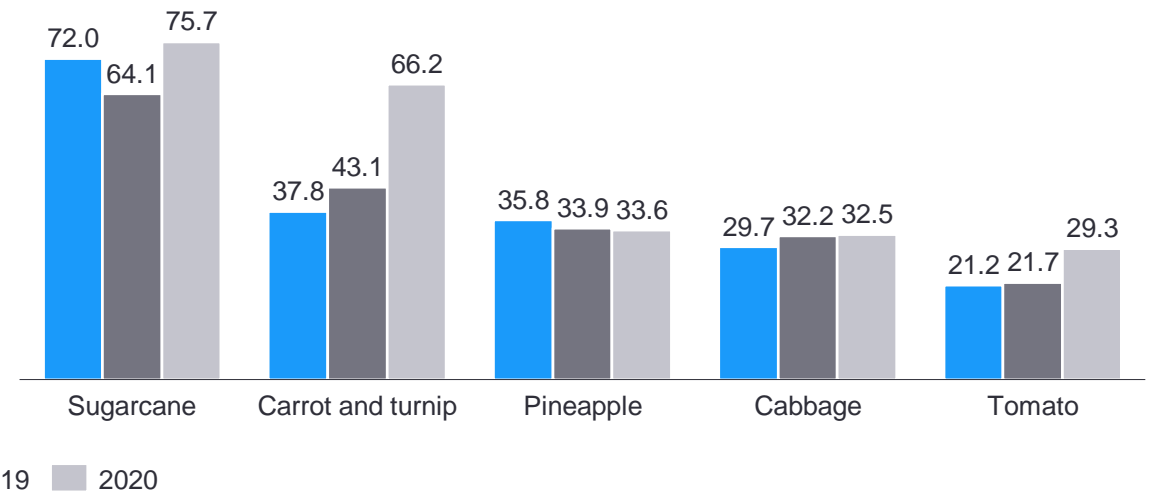


Kenya: Expected to return to stable production of grain in 2021–22 season, led by favorable weather and stable prices and demand

Kenya's top five crops and livestock products by production (MMT)



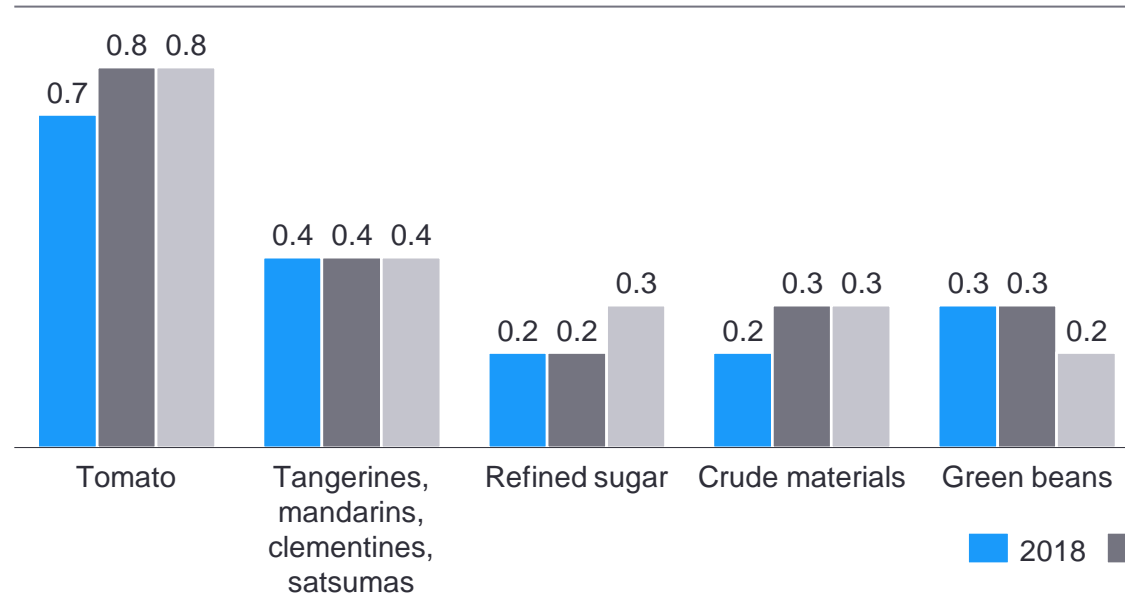
Kenya's top five crops and livestock products by yield (tons/hectare)



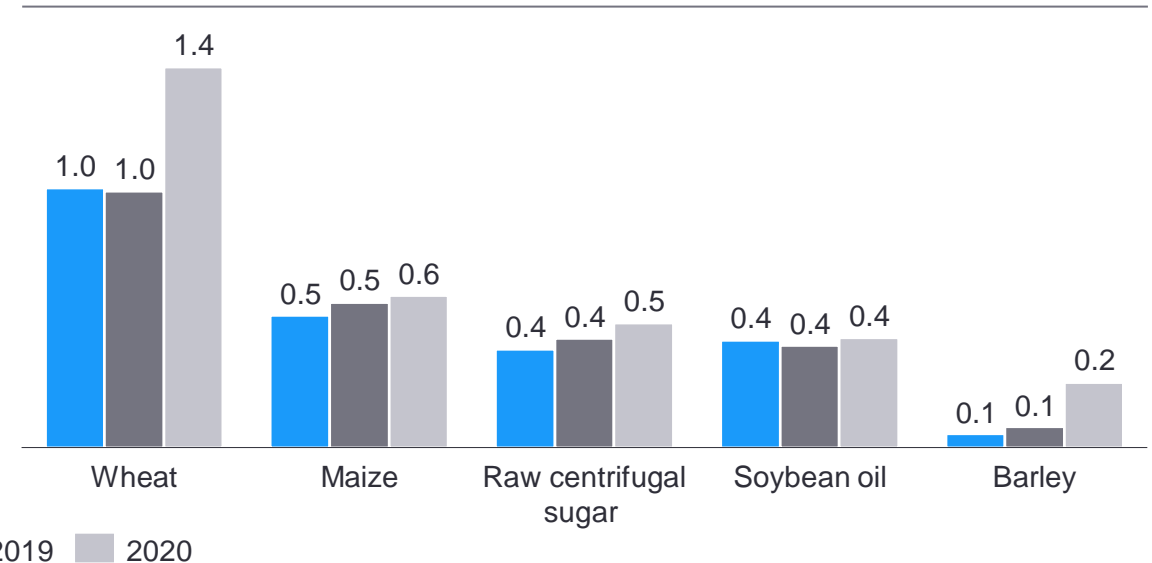
- ▶ As per the latest report from USDA, Kenya is expected to produce a steady amount of grain in 2021–22 season. Maize and rice production will remain stable at 4MMT and 0.1MMT, respectively, and wheat will record an increase of 17% to reach 0.4MMT, due to favorable prices.
- ▶ The third consecutive below-average rainy season significantly affected crop production in marginal agricultural areas in Kenya in 2021.
 - As per the Kenya Food Security Steering Group (KFSSG), the maize production in marginal agricultural areas was only 45%–50% of the five-year average.
 - Crop failure in Kilifi, Kwale, Taita Taveta, and Tharaka Nithi areas resulted in a maize harvest that was just 1%–7% of the five-year average.
- ▶ In 2020, Kenya's sugarcane production boosted ~50%, while yield increased by 20%, mainly driven by favorable weather conditions and increased efforts from private millers.
- ▶ Farmers were also motivated to increase sugarcane production as they received higher returns from private millers, after years of struggling to get paid by state millers.
- ▶ Yield for carrot and turnip recorded a growth of over 50% to record 66 tons/hectare during 2020.

Morocco: Grain imports are expected to normalize during 2022 season driven by higher output as a result of favorable weather conditions

Top five crops and livestock product exports (\$b)



Top five crops and livestock products imports (\$b)

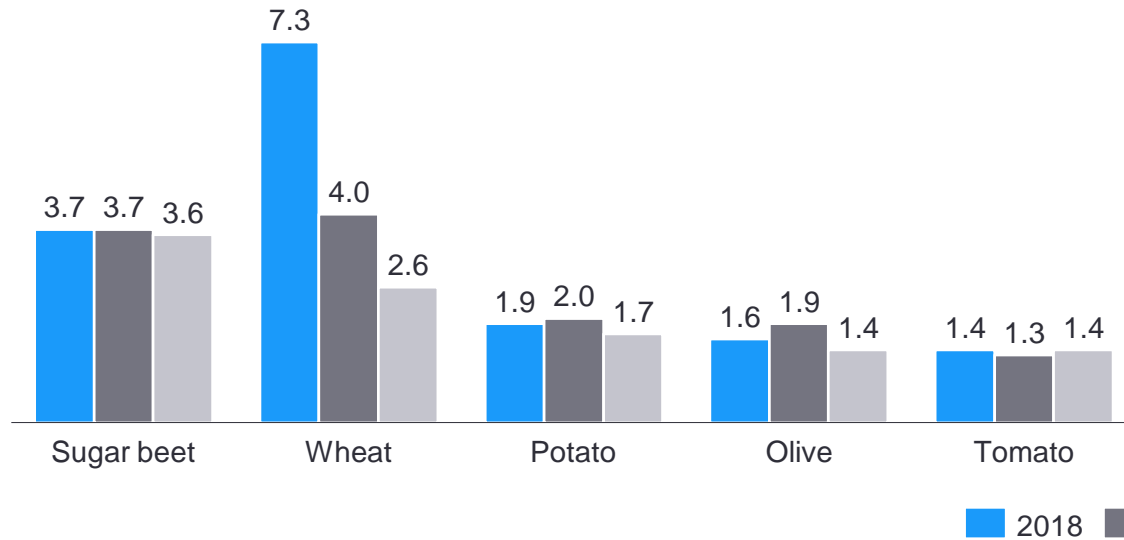


- ▶ Morocco is a net importer of agricultural and related products. It imports bulk commodities such as wheat and maize, and exports consumer-oriented products such as fruits and vegetables.
- ▶ Total grain imports in Morocco are expected to fall from 8.4MMT in 2020–21 to 7MMT during 2021–22 season due to higher expected production in coming year.
 - Wheat imports are forecasted to return to normalcy at 4.5MMT, down from 5.1MMT in the previous year; maize imports are expected to drop to 2.3MMT from 2.9MMT and barley imports are forecasted to reduce by ~0.1MMT to 0.5MMT.
- ▶ Total vegetable exports from Morocco increased 18% y-o-y to 0.8MMT during 2020–21 season.¹ Citrus exports grew 37% to reach 0.6MMT during the same period.

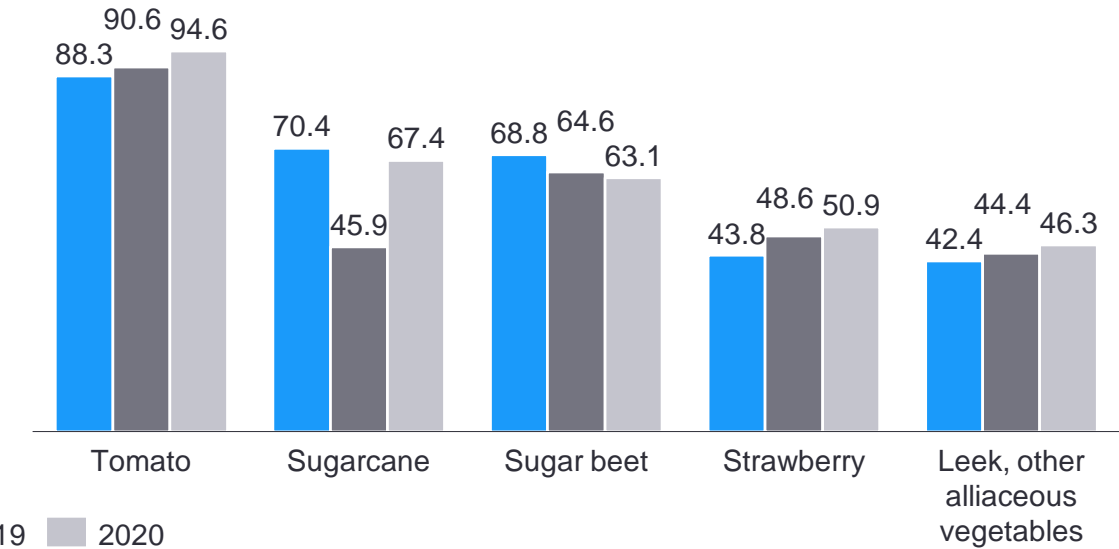
1. Period from September 2021 till end-February 2022
Source: Press articles, FAO website, EY Knowledge consumer analysis

Morocco: While crop production has been impacted by droughts for decades, recent heavy rains are expected to improve production levels in 2022 market season

Morocco's top five crops and livestock products by production (MMT)



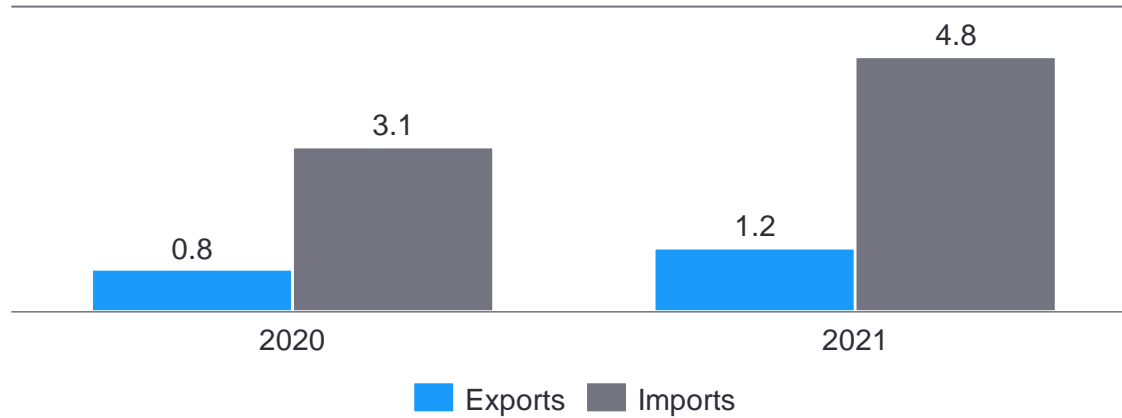
Morocco's top five crops and livestock products by yield (tons/hectare)



- ▶ Morocco's agriculture industry has been hit hard by drought in past couple of years. Drought frequency has ramped up to "once in two years" instead of "once a decade" as happened until the 1990s.
 - During the 2020–21 market season, it faced the worst drought in decades, which resulted in further emptying of already suffering reservoirs.
 - In February 2022, the Royal Palace announced \$1b drought mitigation program to animal feed subsidies, more efficient irrigation techniques and financial support to farmers.
- ▶ However, during the 2021–22 sowing season, the region experienced unusually abundant rainfall (witnessed 32% higher rainfall compared to previous year).
 - According to the International Grains Council (IGC), Morocco's grain production is forecasted to grow by over 3X from 2020–21 to 2021–22 to reach 11MMT. The sector is expected to witness higher output of wheat (from 2.6MMT to 8.1MMT) and barley (from 0.6MMT to 2.8MMT). Rice production is expected to grow by 7% to reach 45,200MT.
 - Apart from rains, the higher output would also be a result of higher yield in some regions (Chaouia, Abda, Haouz, Tadla, and Sais regions recorded 44% higher yield compared to the 10-year average).

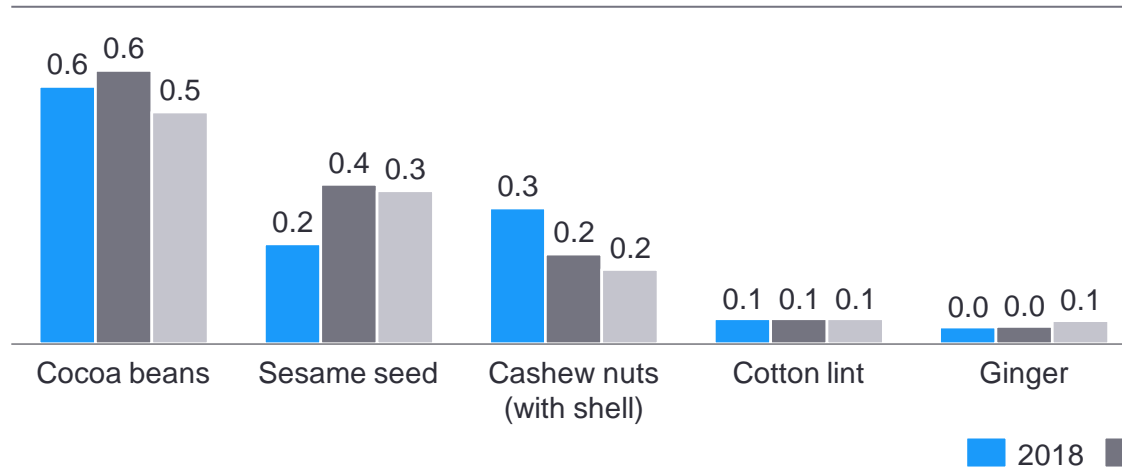
Nigeria: Relies heavily on food and agricultural imports to meet production shortfalls, despite having rich land and labor resources

Nigeria agricultural products exports and imports (\$b¹)

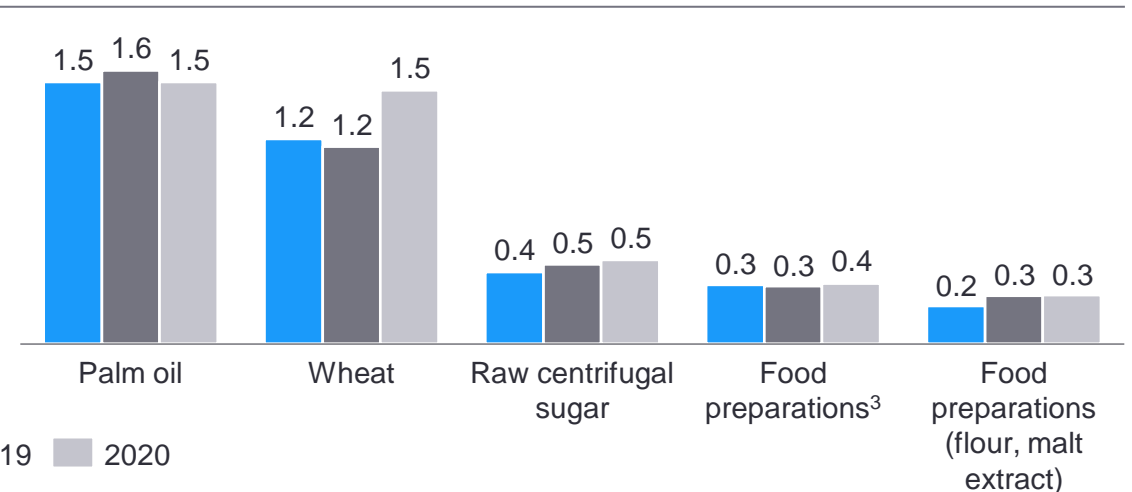


- ▶ Nigeria's **agricultural items export** grew by 54% y-o-y in 2021, to reach \$1.2b, its highest ever value.
- ▶ Despite having robust land resources and a majority of its workforce employed in the agriculture sector, **imports increased by 46%** y-o-y during the same period, indicating a trade deficit of \$3.6b.
- ▶ Through September 2021, Nigeria imported ~7% of its total wheat imports from Russia, which may lead to food security concerns in coming years due to the war in Ukraine.
 - To ensure timely availability of wheat going forward, the country can either invest heavily in enhancement of wheat production capacity or seek alternative import opportunities outside Russia and Ukraine.

Top five crops and livestock product exports² (\$b)



Top five crops and livestock products imports² (\$b)



1. Values have been converted to US\$ (as on December 31, 2020 and 2021)

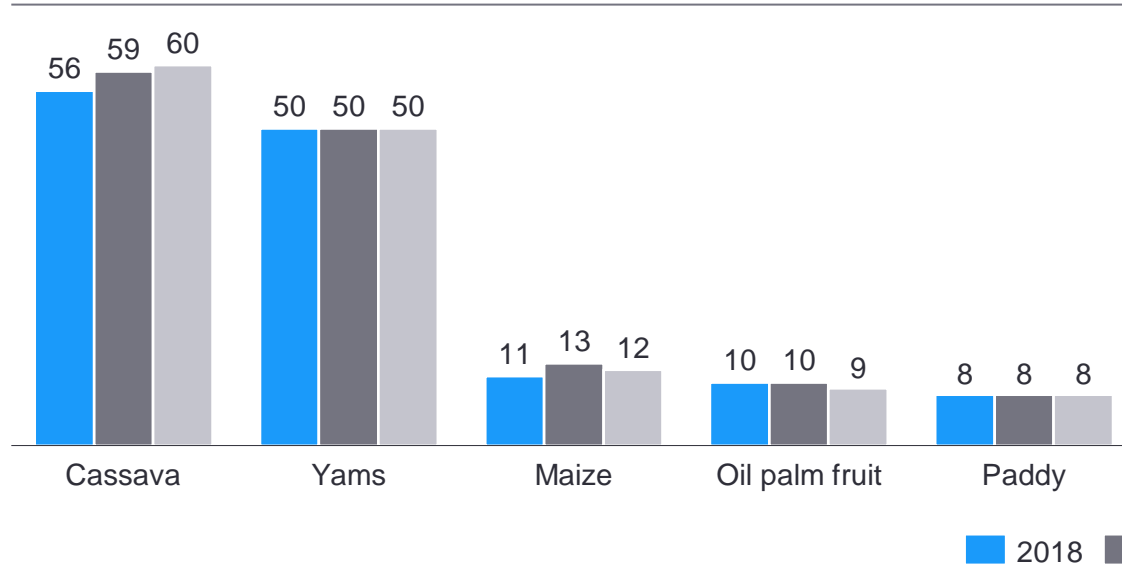
2. Based on latest available data through September 2021

3. Not elsewhere specified

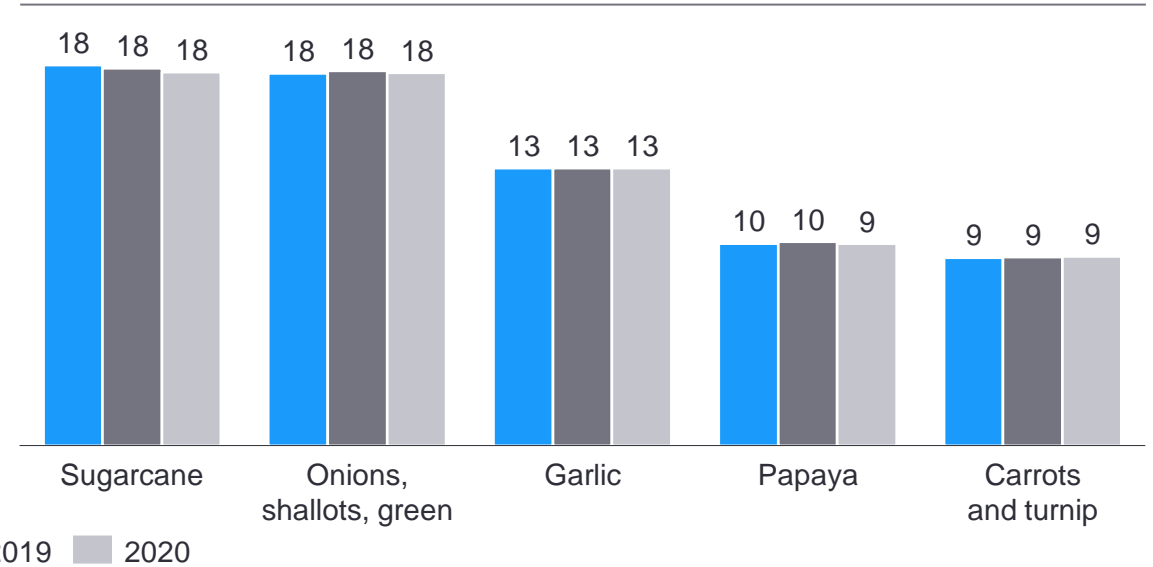
Source: Press articles, FAO website, Oanda, EY Knowledge consumer analysis

Nigeria: Crop production is plagued by flooding, criminal activity, and plant health-related concerns

Nigeria's top five crops and livestock products by production (MMT)



Nigeria's top five crops and livestock products by yield (tons/hectare)



- ▶ Nigeria's agriculture sector grew by 3.6% in 4Q21. Crop production, one of the four sub-activities¹ in this sector, accounted for 91% of this growth.
- ▶ The sector benefits from large amounts of arable land and access to two of Africa's largest rivers but struggles to create food self-sufficiency due to a lack of proper financing and infrastructure. Sporadic flooding, Boko Haram insurgencies, and conflicts between herdsmen and local farmers have negatively impacted the sector in recent years.
- ▶ Another key concern area is declining plant health due to pests — according to FMARD,² ~50% of Nigeria's annual crop production is damaged by pests.
 - The government has recognized safeguarding plant health as a national priority and has established Nigeria Agricultural Quarantine Service (NAQS) to ensure plant, animal and fish health meet international standards.
- ▶ Nigeria is the largest global producer of cassava (accounts for ~20% of the global output); however, it is still not sufficient to meet domestic demand for cassava starch and flour.

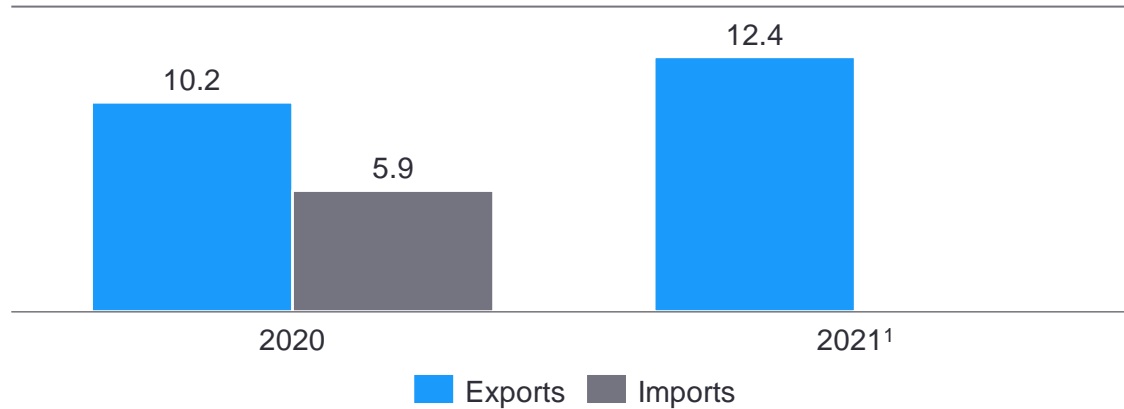
1. Other three sub-activities include livestock, forestry and fishing

2. FMARD — Federal Ministry of Agriculture and Rural Development

Source: Press articles, FAO website, EY Knowledge consumer analysis

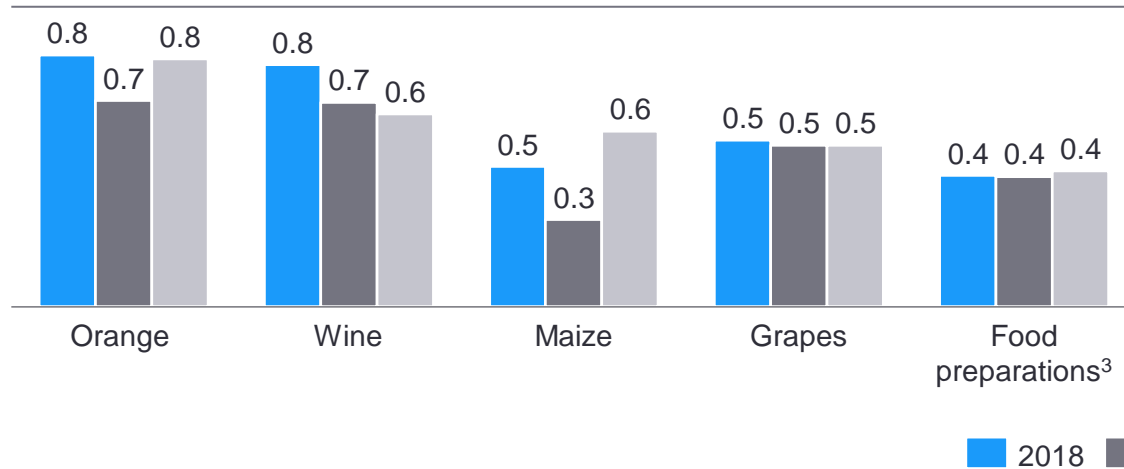
South Africa: Experienced record high exports of agricultural products in 2021, led by strong public and private sector collaborations

South Africa agricultural products export and import (\$b)

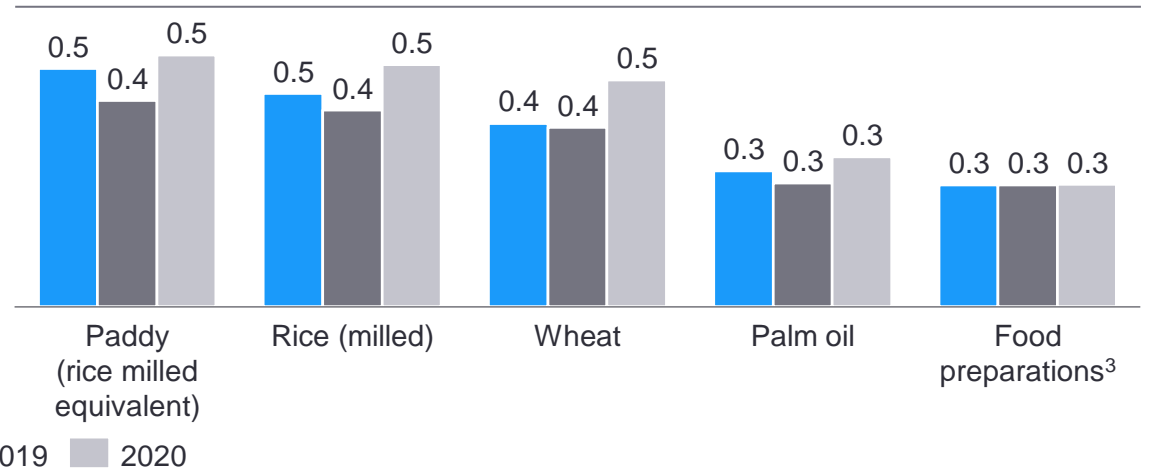


- ▶ In 2021, **South Africa's agricultural exports** grew by ~22% y-o-y to reach its highest-ever value of \$12.4b, led primarily by sizeable production output, strong global demand and higher commodity prices.
- ▶ South Africa's largest export markets in 4Q21 were other nations in Africa and Asia, accounting for 45% and 23% of total exports (in value terms) respectively.
- ▶ The agribusiness sector enhanced its **collaboration with Transnet²** to improve port efficiency to improve exports.
- ▶ **~7% of citrus and ~12% of apples and pears are exported to Russia.** Due to the ongoing war in Ukraine, the nation needs to divert these volumes to domestic market or other export markets which may impact prices and export value.

Top five crops and livestock product exports (\$b)



Top five crops and livestock products imports (\$b)



1. Value of imports not available for 2021

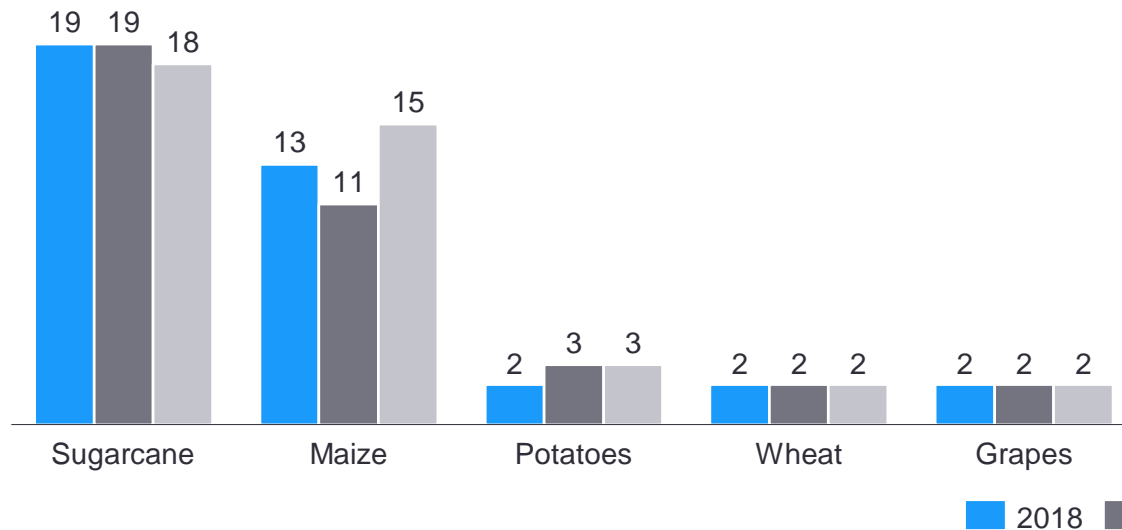
2. State-owned rail, port and pipeline company in South Africa

3. Not elsewhere specified

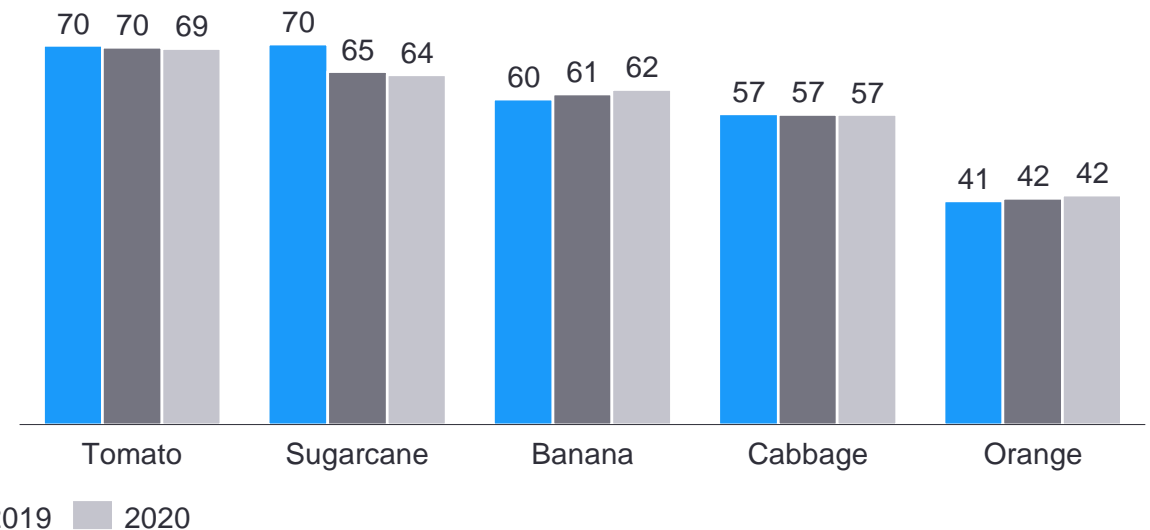
Source: Press articles, Agbiz reports, FAO website, EY Knowledge consumer analysis

South Africa: 2022 harvest is expected to be impacted by unfavorable rainfall and rising input costs following two years of strong growth

South Africa's top five crops and livestock products by production (MMT)



South Africa's top five crops and livestock products by yield (tons/hectare)



- ▶ Excessive rains at the start of 2021–22 season resulted in crop damage and delayed planting — a **9% reduction is expected for the summer crop harvest**.
- ▶ **Increases in input costs by more than 50%** will add further pressure on the sector, especially for areas that had to replant following crop damages by excessive rains.
- ▶ South Africa fulfills **70%–80% of its fertilizer need through imports**, and 11% of it came from Russia in 2020. The length and severity of the war in Ukraine will therefore have significant impact on its input costs. Prices have already increased significantly given that Russia is the world's leading exporter of fertilizer materials.
- ▶ The primary focus for country's agriculture sector in 2022 is the implementation of **Agriculture and Agro-processing Master Plan**, a social program which aims to expand agricultural production, broaden the inclusion of black farmers and boost the sector's competitiveness.
- ▶ Local municipalities have become increasingly dysfunctional as they fail to provide basic services (e.g., water, sanitation, electricity, infrastructure) to their communities and businesses. The Land and Agricultural Development Bank of South Africa (Land Bank), a specialist agricultural bank established in 1912, is also facing liquidity concerns as a result of rising impairments, liabilities and losses in its loan book. Improvement of these institutions is a key to provide necessary support to the agriculture sector.



09

Middle East

- ▶ Israel
- ▶ Saudi Arabia
- ▶ UAE

Middle East: Challenging growing conditions in the region cause countries to put significant focus on the use of new technology to increase agricultural output

- ▶ Technological developments in agriculture have been influential in driving changes in the farm sector. Innovations in animal and crop genetics, chemicals, equipment, and farm organization have enabled continuing output growth without adding much to inputs. Vertical farming is expected to play an important role in the future of agriculture during 2020–25.
- ▶ Middle East agricultural products market grew by 6% y-o-y in 2020 (10% during 2016–20) to \$33b and is expected to grow by 7% during 2020–25 to \$46b.
 - Fruit is the largest segment of the agricultural products market in Middle East, accounting for 38% of the market's total value. Vegetables and cereals segments contributed \$8b (25% of the market's aggregate value) and \$7b (21%) in 2020, respectively.
 - In terms of geography, Saudi Arabia accounted for 31% of agricultural products market value in 2020, followed by Israel (15%) and the UAE (2%).
- ▶ Agricultural products market volume grew by 3% y-o-y in 2020 to 102MT and is expected to further grow by 4% during 2020–25 to reach 125MT.

Due to poor availability of land and water resources, **Israel** depends heavily on technological innovation in agriculture sector to drive growth. It is a leading producer of fruits.

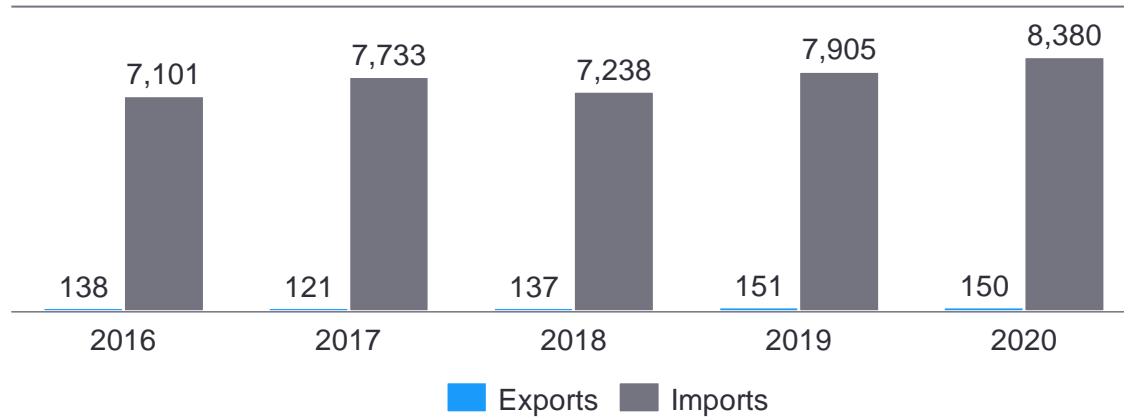
Saudi Arabia accounts for the highest share in the region's agricultural products market value. It is highly dependent on imports of agri-food products to meet local market demand.



UAE is among the 10 most arid regions globally. It imports ~90% of its food requirements mainly due to unsuitable growing conditions including lack of water resources. Strong growth is expected to continue as it continues to increase its food independence and reduce its reliance on imported agricultural products.

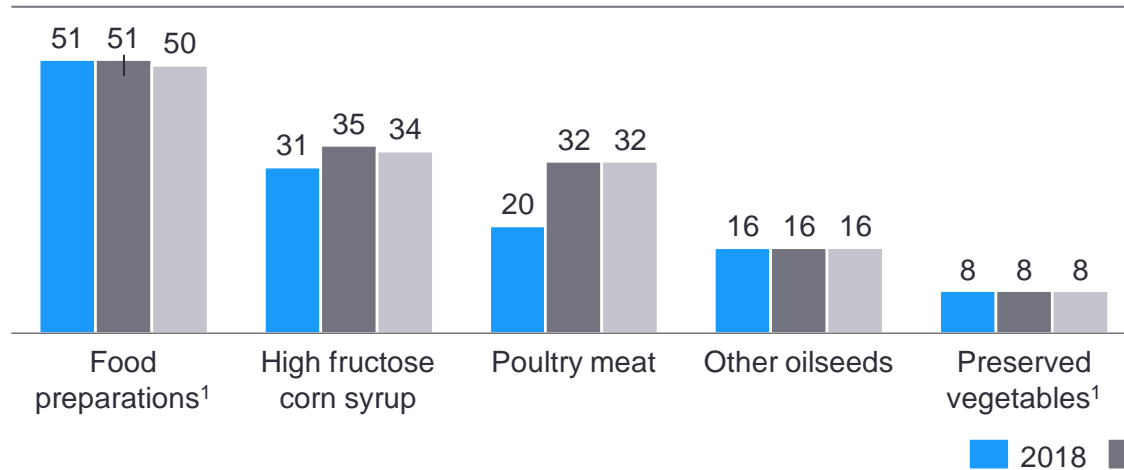
Israel: The nation is a net importer of agricultural products, but through the use of advanced technologies, exports are rising

Israel agricultural export and import ('000 tons)

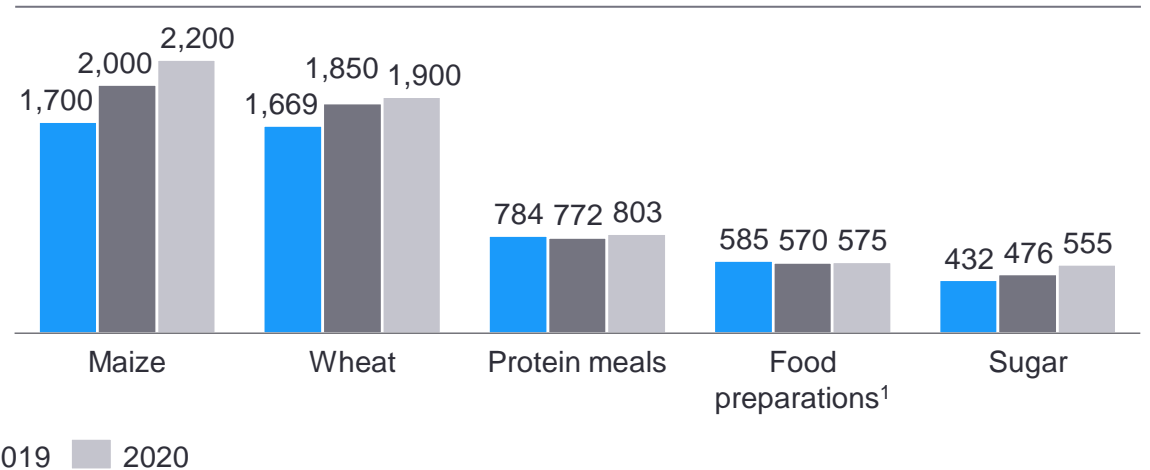


- ▶ Israel is a technologically advanced, market-oriented economy. But its limited land and water resources preclude agricultural self-sufficiency, affecting local production costs and consumer prices. It is a net importer of agricultural products.
- ▶ Demand for organic, healthy or natural foods is increasing. Niche products that target a specific health issue like diabetes or celiac disease (gluten-free food) are experiencing growth in demand, as well as vegetarian and vegan products.
- ▶ Israel is a leading producer of fruit and citrus fruits. In 2020–21, it planted citrus fruits over an area of 18,260 hectares, up 3.7% y-o-y.
- ▶ As per USDA, food and agricultural products exports and imports reached \$2.2b and \$7.1b in 2020. The US imported (to Israel) 20% of the products (the highest) in 2020 while it accounted for Israel's 11% of the exports share.

Top five agricultural product exports ('000 tons)



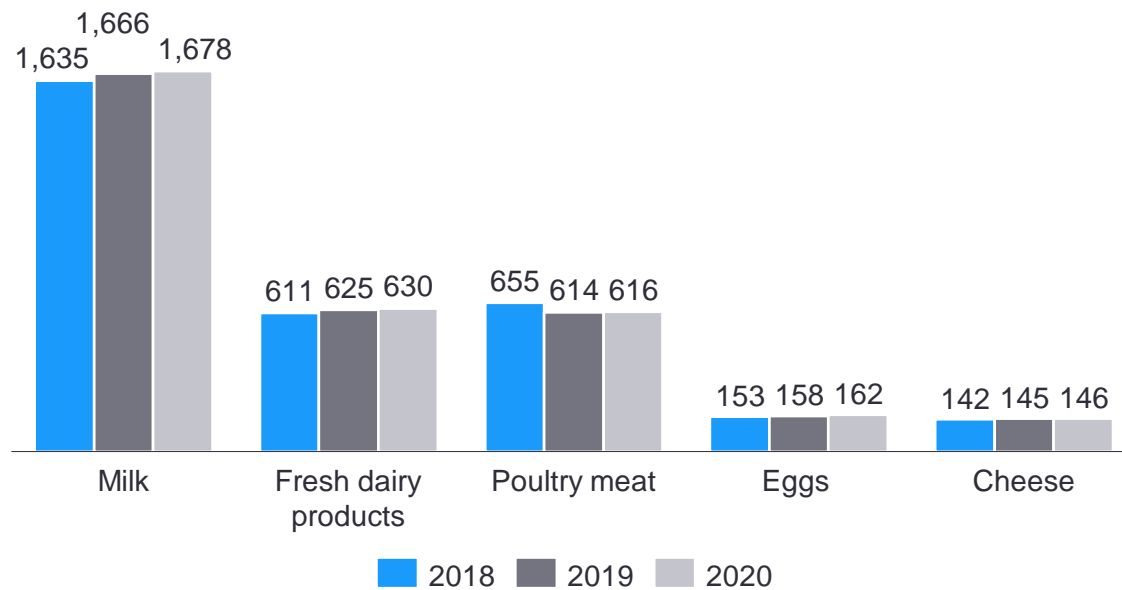
Top five agricultural product imports ('000 tons)



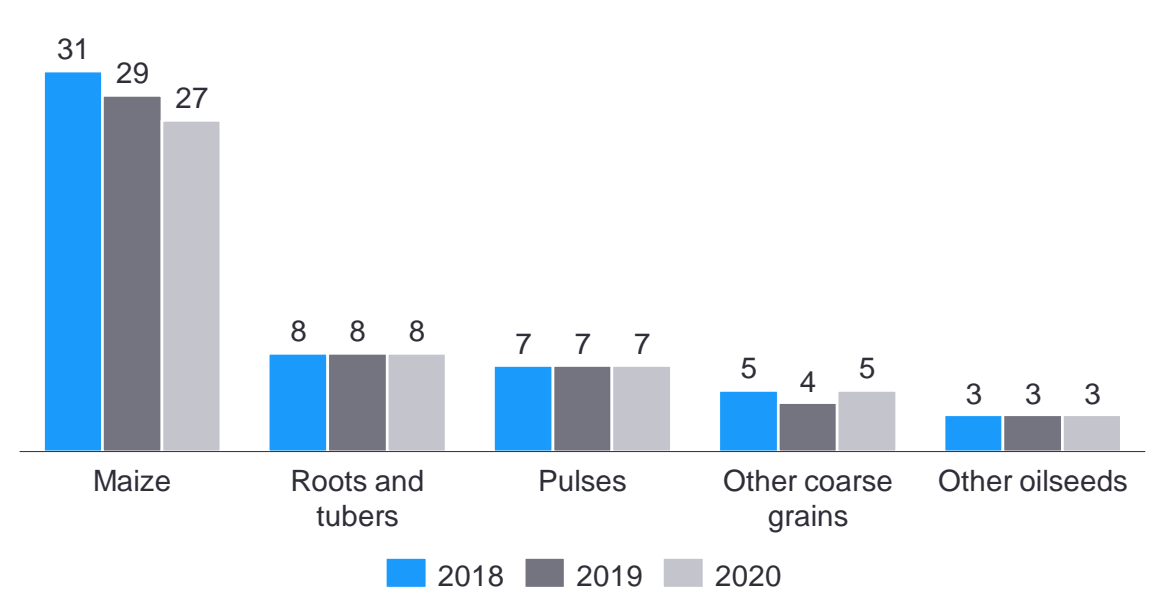
1. As per a report by the Foreign Agricultural Service of the US Department of Agriculture (USDA)
Source: OECD-FAO Agricultural Outlook 2021–2030 data, press articles, USDA, EY Knowledge consumer analysis

Israel: The nation has developed technological solutions like new irrigation techniques and innovative agro-mechanical equipment to cater to domestic food requirements

Israel's top five crops by production ('000 tons)



Israel's top five crops by yield (tons/hectare)

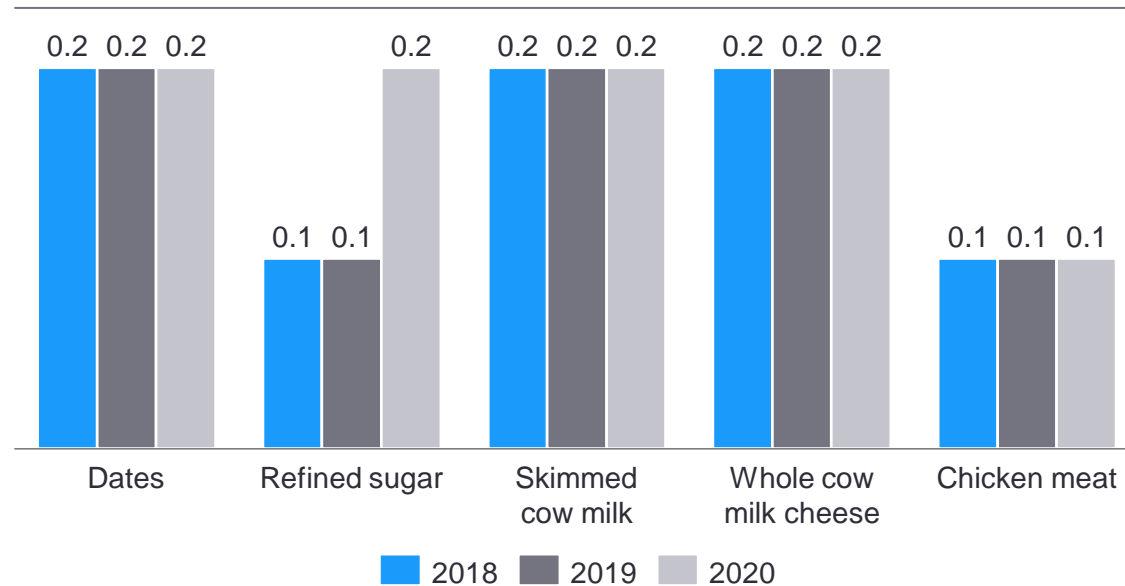


- ▶ Israeli agriculture has been forced to develop solutions to the country's hostile conditions for growing crops. Saline soil and a natural water supply below the UN's definition of water poverty make the production of agricultural products a difficult task.
 - Despite this, it produces 95% of its own food requirements by developing new irrigation techniques and innovative agro-mechanical equipment. New products are able to increase yields, resist pesticides and diseases, and produce greater vitamin and mineral content.
 - In 2020, Israel represented 15.2% of the Middle East agricultural products market. It is a leading producer of fruit and citrus fruits and a leading supplier of hybrid tomato and onion seeds. It is occupied by many innovative seed breeding organizations offering solutions to agricultural businesses, both domestically and internationally.

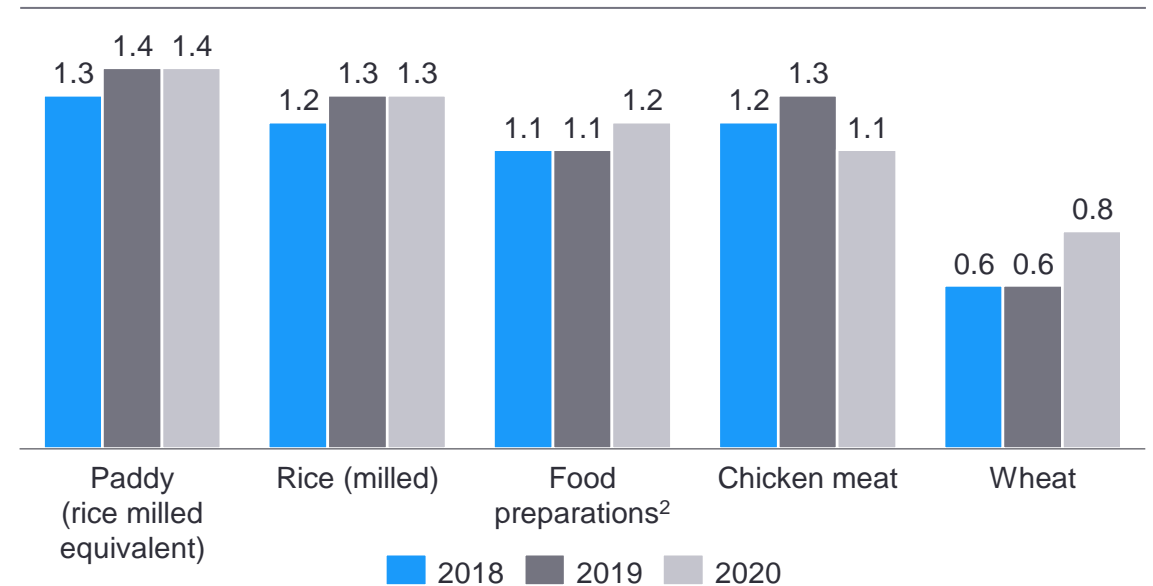
Saudi Arabia: Exports remain low as the country is forced to depend heavily on imports for its local food requirements

- ▶ With only 1.5% of its overall land area classified as arable, Saudi Arabia is highly **dependent on imports** of agri-food products to meet local market demand.
- ▶ The kingdom imports over 80% of its food requirements from other countries, including Brazil, UAE, India, the US and France which combine to account for 40% of its total agricultural imports.
- ▶ Imports of cereals and dairy products amounted to \$4.3b and \$1.9b respectively, in 2020. Rice was the most imported cereal.
- ▶ Com imports during 2019–20 season reached a record high value mainly because some feed millers gained prior knowledge of government’s plan to end import subsidies on feed corn.
- ▶ Exotic fruits and fresh vegetables saw a rise in imports during the 2019–20 season.
- ▶ **Export** of dates increased by 31% y-o-y in 2021 to reach \$324m. It represents a 110% rise in exports since 2016.

Top five crops and livestock product exports (\$b)



Top five crops and livestock products imports (\$b)



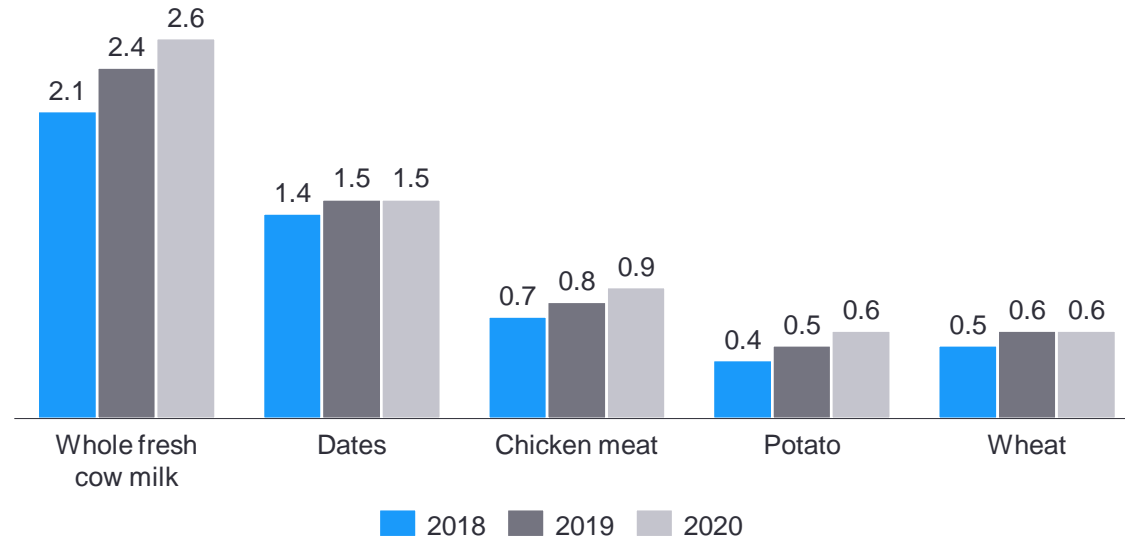
1. Values have been converted to US\$ (conversion as on December 31, 2017, 2018 and 2019);

2. Not elsewhere specified

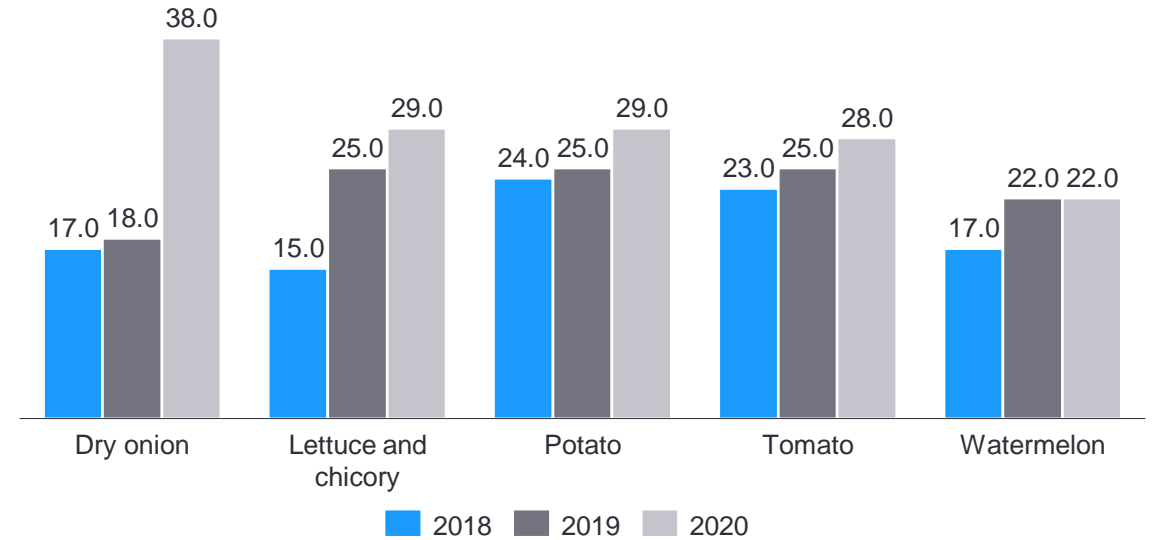
Source: General Authority for statistics, FAO, EY Knowledge consumer analysis

Saudi Arabia: The nation is prioritizing efficient use of its scarce resources in achieving food security and self-sufficiency

Saudi Arabia's top five crops and livestock products by production (MMT)



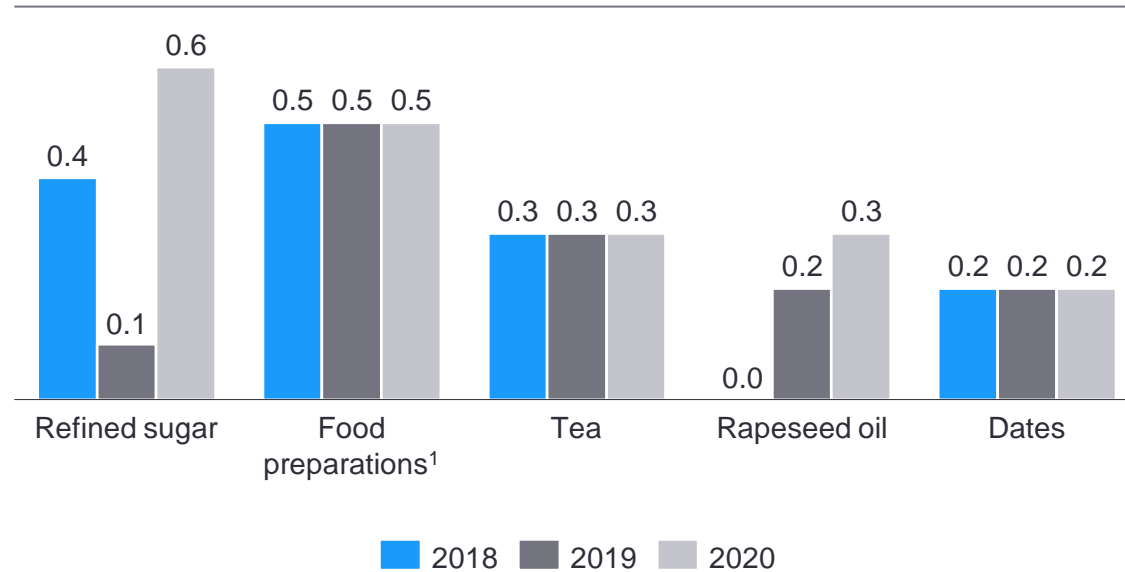
Saudi Arabia's top five crops and livestock products by yield (tons/hectare)



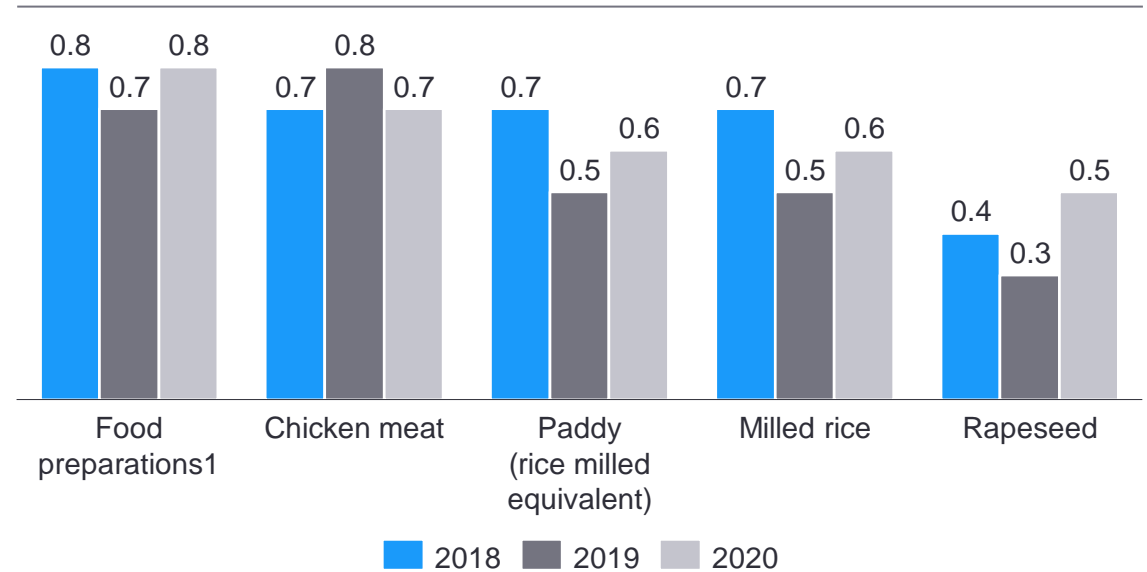
- ▶ Compared to other Middle East nations, Saudi Arabia is much more water rich as it possesses huge underground water reserves and is the world leader in desalination of seawater through its 27 desalination plants. This, in addition to significant government efforts, is helping the kingdom on its way to achieve a considerable measure of food security.
- ▶ Change in profitability and transfer of barley imports and distribution back to the private sector is causing a shift in commodity production of grain sector in Saudi Arabia.
 - Wheat production in the kingdom fell down to 0.4MMT in 2021–22 marketing year as many farmers adopted a more profitable commodity, alfalfa.
 - Considering high water requirement to produce the crop, barley production will be limited to 10,000MT during the year, for human consumption only.
 - Corn production will remain flat at 15,000MT, as the government continues to discourage the production of water-intensive crops.
- ▶ Achieving food security and self-sufficiency is the top priority for Saudi Arabia's government. Policies are being implemented to promote smart agriculture, which is essentially shifting to crops that require relatively less water and finding alternatives to water-intensive farming. Farmers are encouraged to take up processing of raw materials if it adds value to the produce.

UAE: Imports ~90% of its food requirements, but a focus on new and innovative technology is giving hope for increased agricultural output in the future

Top five crops and livestock product exports (\$b)



Top five crops and livestock products imports (\$b)

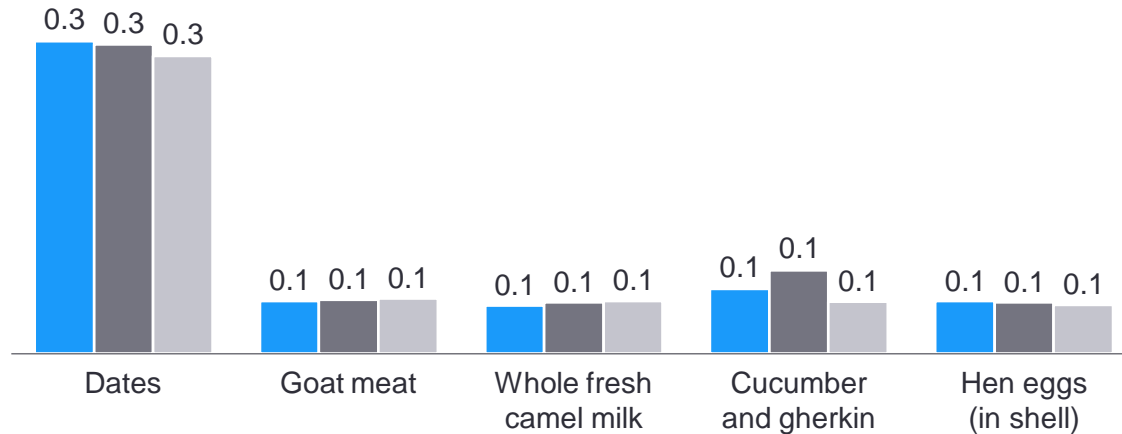


- ▶ Majority of the UAE's land is covered with deserts (water is scarce and highly saline), and the climate is increasingly becoming unpredictable. Due to these factors, agricultural activities are very limited.
- ▶ UAE's total food trade value, including imports, exports, and re-exports, stood at \$25b in 2019. The country relies on imports to meet 80%–90% of its food requirements.
- ▶ Top five countries for food imports in 2019 included the US, UK, France, Brazil and Saudi Arabia.
- ▶ UAE's rolled tobacco exports and imports amounted for \$3.4b and \$0.5b in 2020, making it the second largest exporter and 15th largest importer of rolled tobacco globally.
- ▶ Its total cereal imports increased from \$1.1b in 2019 to \$1.2b in 2020 mainly due to high local consumption and decrease in government grain stocks. It relies heavily on imports to fulfil its rice demands, because the rice crop requires abundant water to grow, which is already scarce in the UAE.

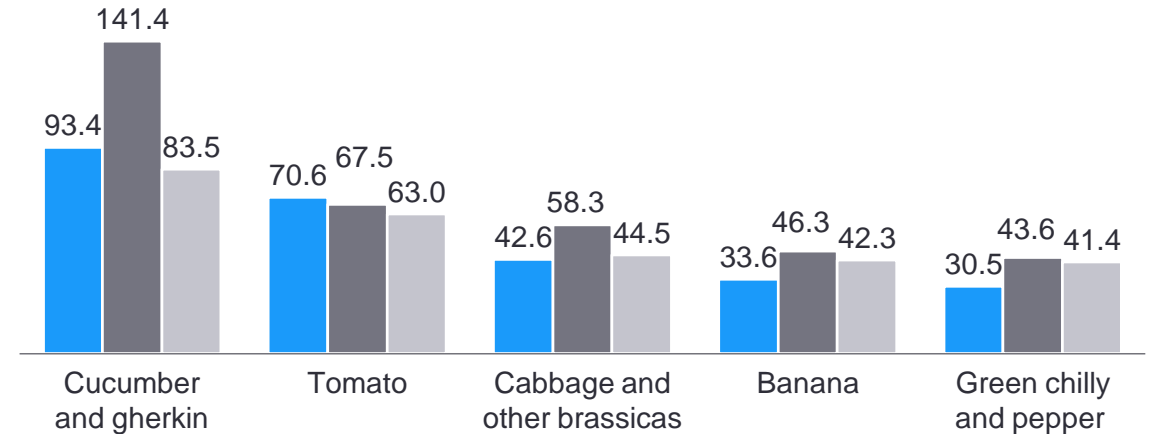
UAE: Government incentives are helping farmers to increase agricultural production despite scarcity of land and water resources

2018 2019 2020

UAE's top five crops and livestock products by production (MMT)



UAE's top five crops and livestock products by yield (tons/hectare)



- ▶ Despite unfavorable weather and land factors, the government is providing incentives for production of various crops enabling farmers to boost agricultural productivity through the use of the latest chemicals and equipment. Some of these government incentives include 50% subsidy on seeds, fertilisers and pesticides and special loans to buy machinery and equipment and veterinary services.
- ▶ Hydroponic technology has been encouraged by the UAE to solve problems including water scarcity and the lack of arable land. It also protects crops from intense heat in climate-controlled greenhouses. Hydroponic growers have helped to reduce reliance on agricultural imports in recent years by boosting domestic production, resulting in an increase in value.
- ▶ Date production takes up most of the 160,000 hectares of cultivable land available in the country. ~6% of the world's date total is produced in the UAE.
- ▶ The Ministry of Climate Change and Environment is aiming to establish UAE as the hub of innovation-driven food security in the next 30 years.
- ▶ Abu Dhabi's agricultural production increased 12% in 2020 to reach \$3.7b. In volume terms, the total agricultural production reached 707,774MT, out of which crop production accounted for ~60% (421,524MT) and animal production accounted for ~40% (286,250MT).
 - Dates held 61% share in total crop production in 2020.

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