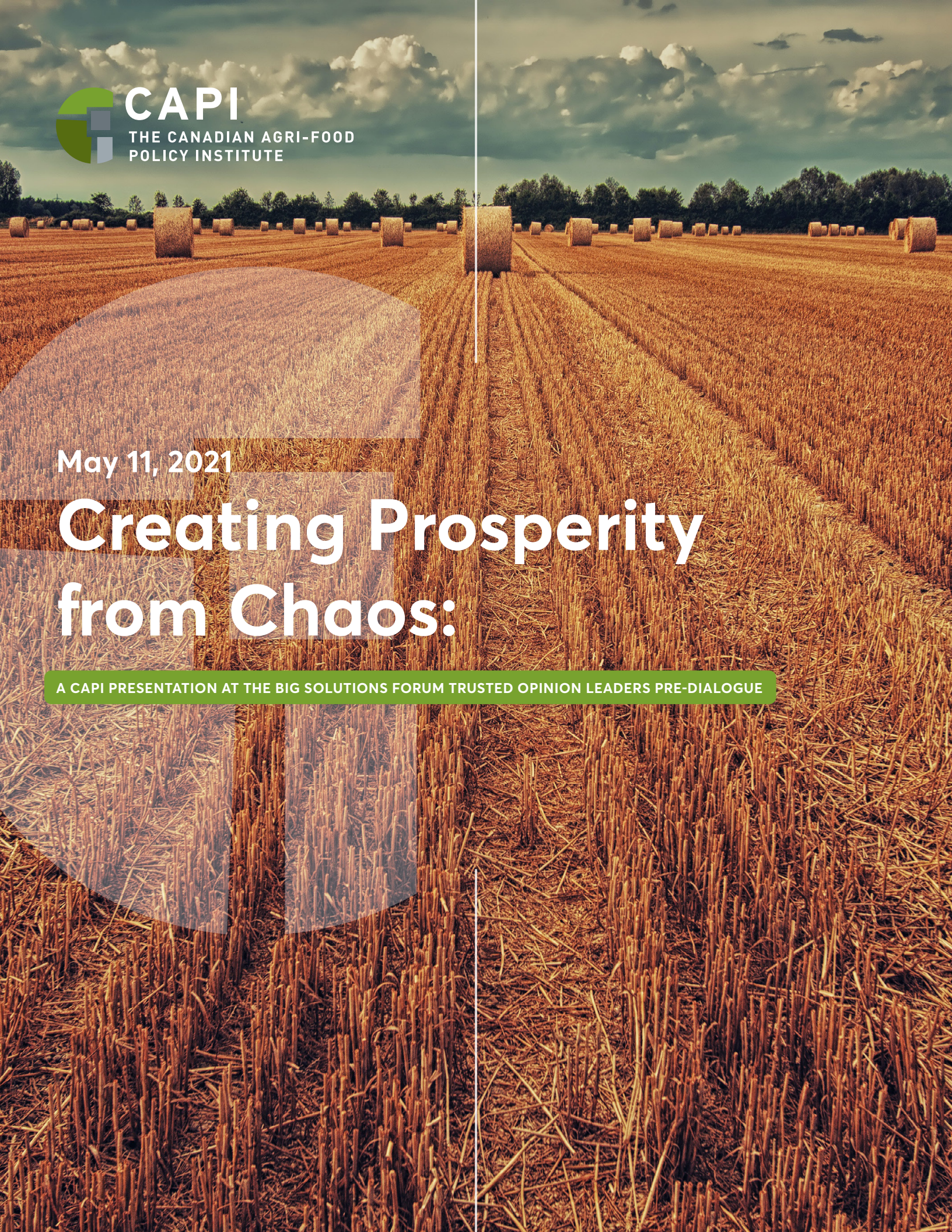


CAPI
THE CANADIAN AGRI-FOOD POLICY INSTITUTE

May 11, 2021

Creating Prosperity from Chaos:

A CAPI PRESENTATION AT THE BIG SOLUTIONS FORUM TRUSTED OPINION LEADERS PRE-DIALOGUE

1. Introduction

CAPI's program of research launched a year and a half ago, **Creating Prosperity from Chaos**, was originally developed in response to the increasing disruptions in global trade and the collateral damage to economic outcomes, sustainability of agri-food systems, natural systems and food security. The COVID-19 pandemic further highlighted the imperative to evaluate the paths to sustainable and resilient agri-food systems and a rules-based trading environment concurrently with global food security and socio-economic well-being. The pandemic has made it clear that the key existential issue of the 21st century is implementing a "One Health" approach that considers interactions between human, animal, and environmental health to produce better socio-economic outcomes. This is because socio-economic health and security depends on human, plant, animal, and environmental health.

The Creating Prosperity from Chaos research program culminated in a Pre-dialogue event with trusted opinion leaders on May 11, 2021, which focused on developing policy options, strategies and a path to sustainable prosperity. At this event, CAPI used the knowledge accumulated through its research, webinars and dialogues over the past year with thought leaders from agri-food supply chains, policy makers, issue experts, NGOs, regulators and law makers to discuss options for Canadian agri-food trade, innovation, investment and regulatory policies that can lead to potential strategies and solutions. The pre-dialogue was centred around a presentation made by Ted Bilyea, Chief Strategy Officer, that presented the key findings from the past year's program of work. The presentation is summarized below.

2. Background

2.1 Presentation on Creating Prosperity from Chaos in a Post Pandemic World

The presentation began with the purpose of the Big Solutions Forum which was to develop strategies and policy options to Create Prosperity from Chaos. The BSF provided a venue to discuss the challenges and opportunities facing the Canadian agri-food sector which would lead to sustainable food production, global food security and climate change solutions while remaining competitive. The presentation brought together key learnings from CAPI's four-pronged policy research program and dialogues, which was centred around:

Prosperity through…

- improved efficiency & conserving natural capital – **sustainable intensification**
- development of **green growth technologies**/ practices
- increased **trade**, and
- **adding value** to products

3. Forces of Change

CAPI's research identified major forces of change that will affect the future sustainability and resilience of the Canadian agri-food sector. The key ones were highlighted in the presentation. The pandemic taught us how intimately connected are animal and human health which ultimately determine socio-economic health. Therefore, there is a need for industry strategies, government policies and regulations that take a **"One Health" approach**. Secondly, Canada's agri-food sector is heavily dependent on trade, and major geo-political conflicts have disrupted our trade flows and investments. The knock-on effect has been increasing global emissions by encouraging tropical deforestation. We also know how Climate change and environmental degradation have had a negative impact on global productive capacity, which combined with the pandemic and geopolitical disruption in **trade** have increased global **food insecurity**. Therefore, it is essential to use a **One Health approach** as we seek to understand the forces affecting strategy and policy at the nexus of **TRADE-CLIMATE CHANGE-FOOD SECURITY.**

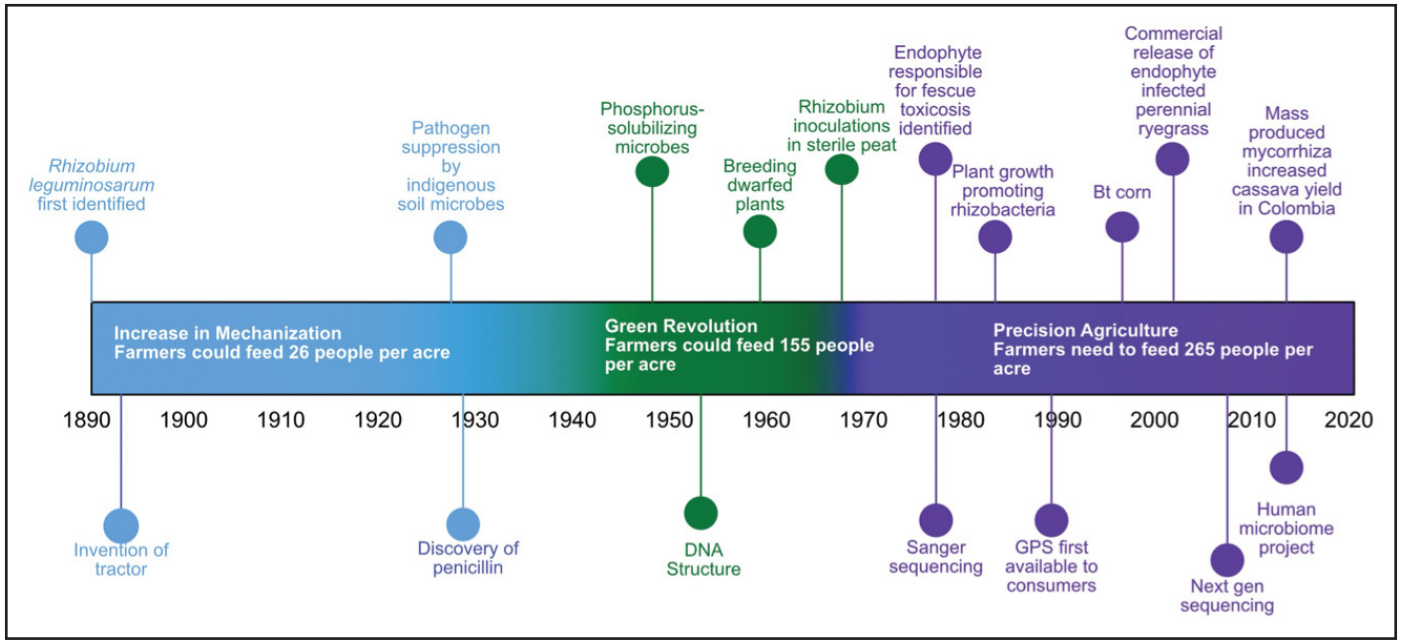
4. The three A's of food security connecting forces of change

Food insecurity, both in Canada and at the global level were highlighted during the pandemic and are expected to become even more of an issue as climate change and trade disruptions impact future food **availability, accessibility and affordability**- the three A's of food security. Even before the pandemic, food insecurity in Canada was largely an income (**affordability**) issue as Canada is known to have an abundance of safe, high quality and nutritious food (**availability**), seeing as it is a massive surplus producer, which makes food readily **accessible** to most Canadians through highly sophisticated retail and distribution networks. The exception is in Northern communities where access to food is limited due to distance from markets and because indigenous food sources are being challenged by climate change, biodiversity loss and the threat of animal disease, such as chronic wasting disease (CWD). So from a Canadian agricultural perspective, food insecurity is primarily a "global food security" issue. However, from a processed food perspective, Canada's value-added capacity is considered underdeveloped, raising concerns about local food availability and supply chain vulnerabilities as well as resilience concerns. This was particularly brought to light during the pandemic. Hence, it appears we are not as resilient as we need to be and more needs to be done.

5. Sustainable Intensification

5.1 Past technological change and trade made it possible to feed increasingly more people

Figure 1



Source: CAST, Agriculture and the Microbiome. August 2020

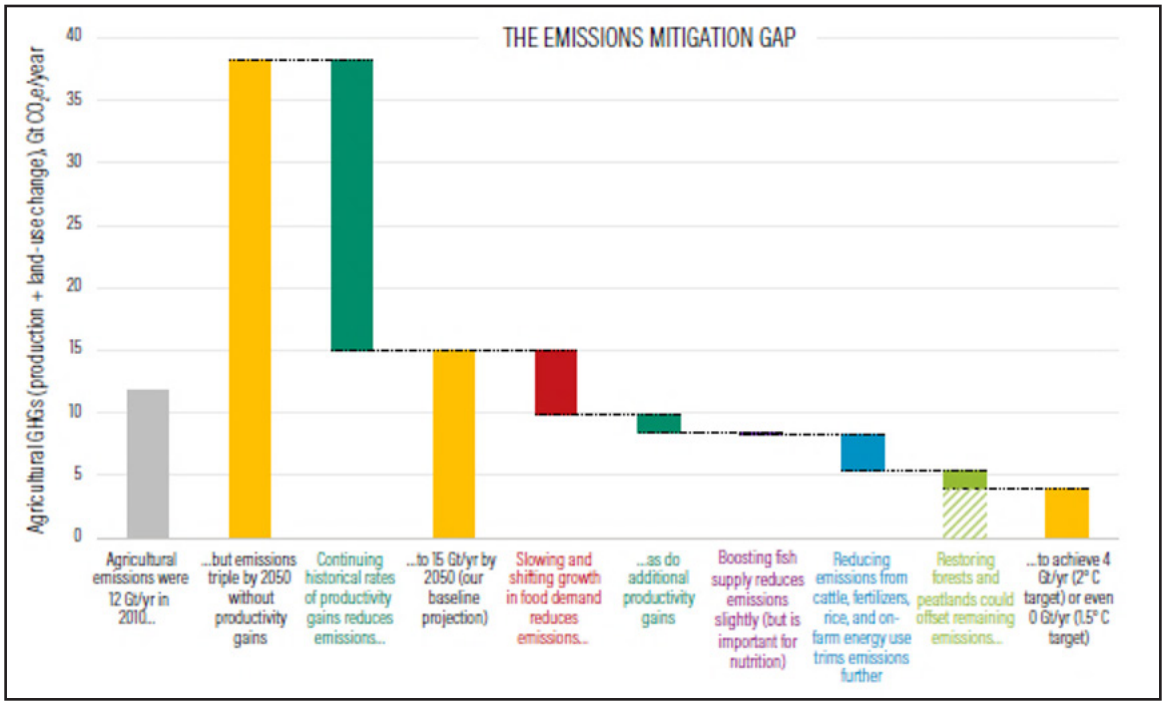
Food security has been a concern for millennia but became particularly important in the post WW II period as Europe rose from the ashes of war and a growing world population living on subsistence diets became a major concern, affecting the political and social stability of many developing countries. Innovation and technological developments have been key to being able to feed an increasing number of people since the mechanization of agriculture in the late 1800s, when an acre of land produced enough food to feed 26 people (Figure 1). With the end of WW II, ammonium nitrate was no longer needed for bombs and the "green revolution" took off with the introduction of chemical fertilizer, pesticides, new plant varieties and hybrid seed as well as irrigation, allowing an acre of farmland to feed 155 people with a world population of 3 billion. With the introduction of precision agriculture in the 1990s each acre could produce enough food to feed 265 people, with a population then of 5.3 billion.

While **innovation and trade** have been instrumental for ensuring the planet can feed increasingly more people, it has also created significant "One Health" problems, due to the environmental impacts of agricultural production growth, including Climate change, pesticide residue, antimicrobial resistance (AMR), eutrophication and groundwater decline. By 2050, farmers will need to produce enough food to feed a world containing 9.7 billion people, which translates into over 450 people per acre of farmland. We must also do this with less land, fewer inputs and 70% less GHGs according to the World Resources Institute (2018). Global success based on further intensification of production will depend on the sustainability of future practices and technologies. So sustainable intensification will be the key.

5.2. Productivity growth remains the key factor in achieving sustainable intensification

The World Resource Institute's report entitled Creating a Sustainable Food Future (2018) identified the role of new technologies and innovation for improving productivity growth and increasing efficiency of natural resource use as key factors for producing 56% more calories to feed 9.7 billion people while lowering emissions by 70%- all essential for feeding the world in 2050 without destroying the planet.

Figure 2



Source: World Resource Institute, Creating a Sustainable Food Future.

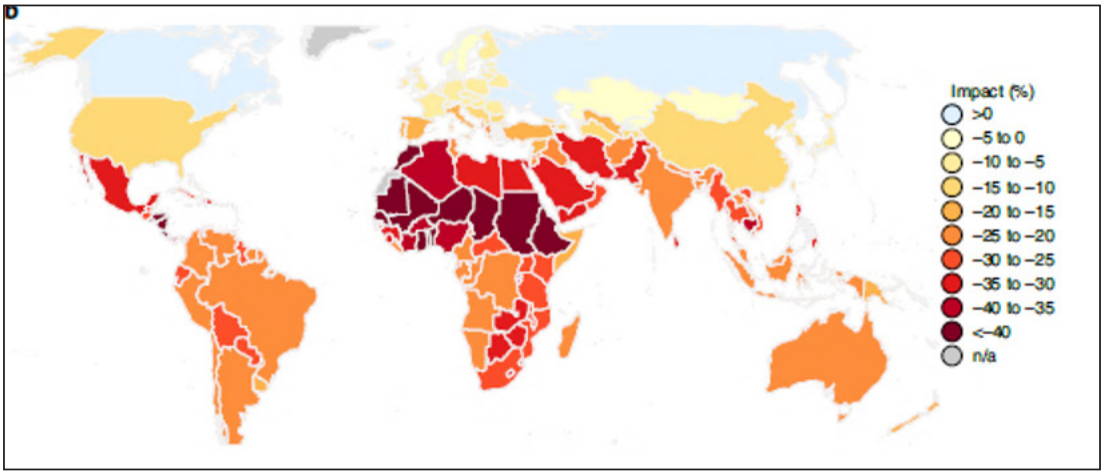
As shown in Figure 2 above, the first column in grey reflects actual global agriculture GHG emissions of 12 Gt/year in 2010. The second column in yellow reflects the global emissions from agriculture with no further productivity gains between now and 2050. Global emissions will rise to 38 Gt/year and will represent a larger share of the total by 2050. However, if we can maintain historical rates of productivity growth, agricultural emissions will only rise to 15 Gt/year, a reduction by the amount of the third column in green of 22 Gt/year in 2050. However, there is still a substantial gap between the 15 Gt/year assuming current productivity growth rates and the targeted 4 Gt/year, which is required to maintain agriculture's share of the total and to prevent further heating of the planet. The remaining columns demonstrate other ways to reduce the gap, including by reducing food demand, food waste, on-farm energy use and other efficiency gains from livestock, rice production, fertilizer use and by restoring peatlands and reforestation. Not only is maintaining the current rate of productivity gains critical, but further innovations that can raise productivity growth are essential. CAPI has coined this "producing more and better with less," also known as "sustainable intensification". The issue is whether we can maintain or increase the pace of productivity gains by developing and adopting breakthrough technologies.

5.3. Climate change is one of the biggest risks to sustainable intensification

Unfortunately, climate change continues to loom large as a risk factor for future productivity gains. According to a recent study by Ortiz-Bobea et al (2021), for much of the world climate change is already cancelling out years of productivity gains, as indicated in Figures 3 and 4. Research shows that a 1oC increase in global temperature wiped out the productivity gains of the past 7 years. This is particularly the case for developing countries, especially in tropical and semi tropical areas, which shows them faring the worst (in red). Canadian agriculture, on the other hand, has not been negatively affected by climate change due to its northerly climate, and has thus far maintained its productivity gains. Russia is also an exception.

Other studies, such as Fuglie et al. (2018), indicate that agriculture productivity is slowing due to lower public and private investments in R&D in agriculture. This is despite the fact that the World Bank (2018) reports that $600 billion in global domestic agricultural subsidies are being provided by governments annually. Unfortunately, these subsidies generally encourage unsustainable production practices and negative environmental externalities.

Figure 3



Source: Ortiz- Bobea, A. et al. Nature Climate Change | VOL 11 | April 2021 | 306–312

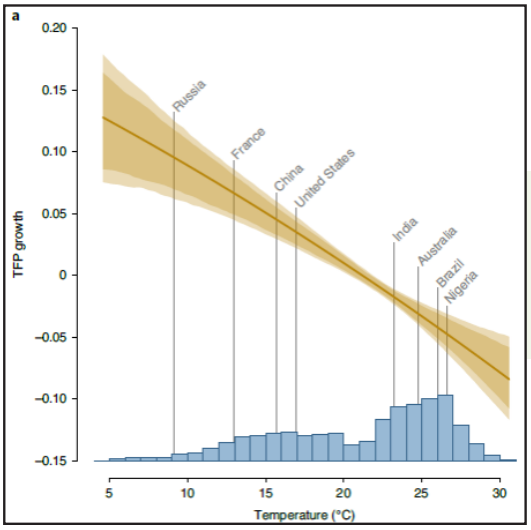


Figure 4

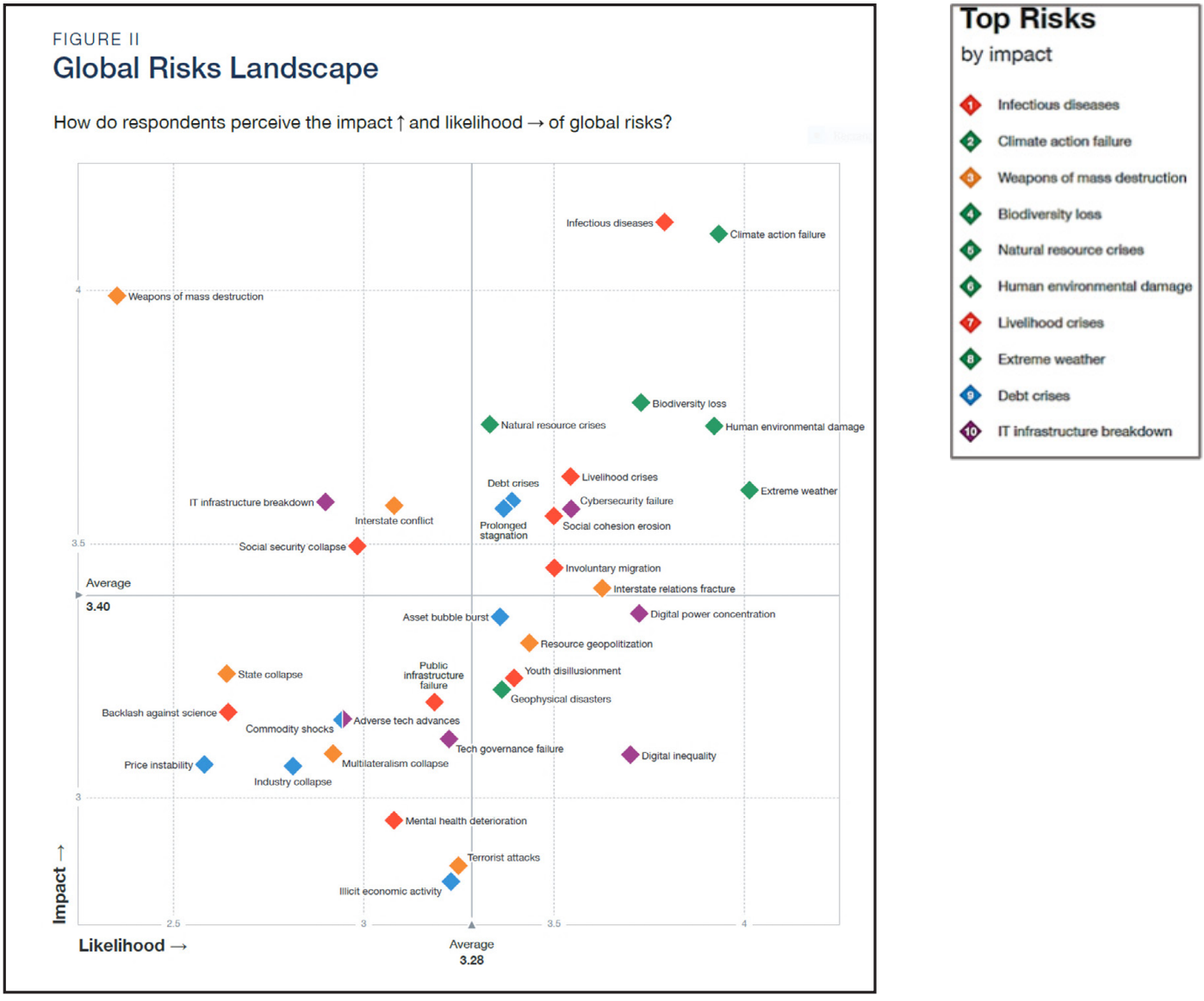
Source: Ortiz-Bobea, A. et al. Nature Climate Change | VOL 11 | April 2021 | 306–312

5.4. World Economic Forum Global Risk Landscape-2021

Climate change is one of many risk factors affecting agricultural production and future food availability and affordability. Other related risks include limits to arable land and fresh water. The World Economic Forum's most recent annual Global Risk Survey shows that many of the risks with the greatest impact and the greatest likelihood directly affect agriculture production. Some of these risks, shown in the extreme upper right quadrant of Figure 5 below which have the greatest impact and likelihood include:

- Infectious disease
- Climate action failure
- Biodiversity loss
- Natural resource crisis (including soil and water)
- Extreme weather

Figure 5 Global Risks Landscape 2021

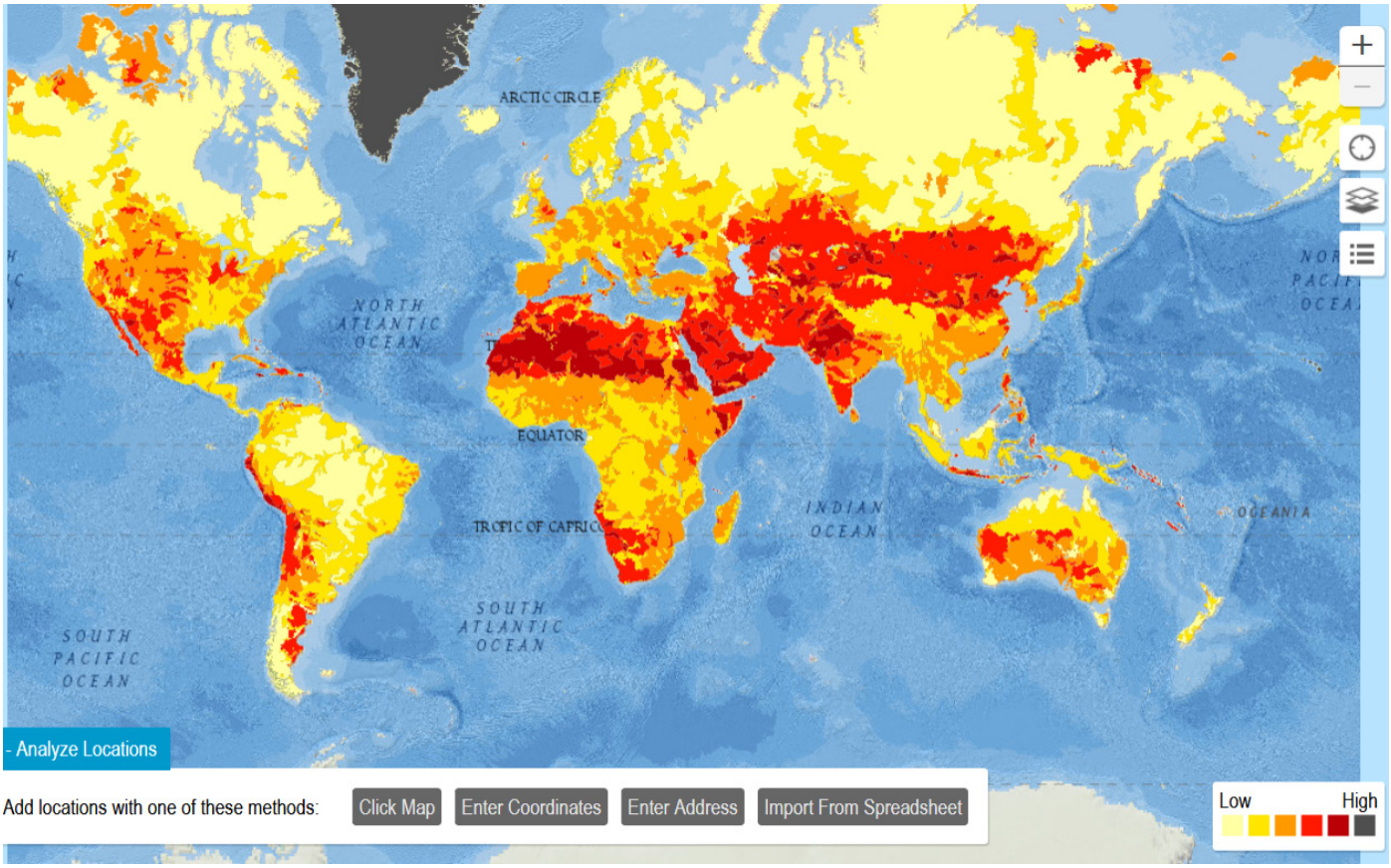


Source: WEF, Global Risks Report, 2021

5.5. Water risk is a serious threat to food security and world peace

The depletion of soil and water is a significant direct local threat to countries, particularly those facing the "double resource challenge" of having a biocapacity deficit and low income (Wackernagel et al. 2021). In many cases these are also the regions which will be affected more drastically by climate change. Figure 6 indicates the countries with the greatest risk of growing water stress, which is becoming an increasing food security problem as well. On average, agriculture accounts for 70 percent of global freshwater withdrawals. With the additional demand for food projected by 2050, the FAO projects water demand could increase by 50 percent, but that would severely short other societal demands for water in a growing list of countries. Loss of agricultural soil and biodiversity are also problems that need solutions in order for agriculture to be sustainable. And then there is disease.

Figure 6 Overall Water Risk



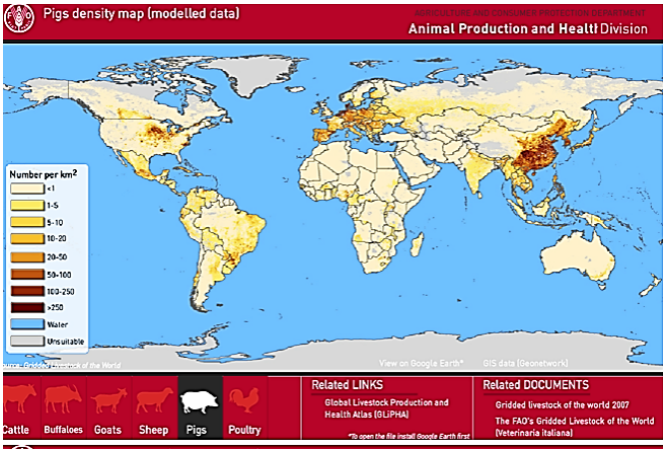
Source: World Resources Institute: Aqueduct Water Risk Atlas.

5.6 Intensification without sustainability is no longer an option

The recent pandemic has underscored the fact that infectious disease, including zoonotic diseases, are not only a threat to human health but also a serious socio-economic threat. Research shows that there is a clear correlation between farm animal density, as shown in Figures 7 to 10, and recent animal disease outbreaks, such as African Swine Fever (ASF) (Figures 7 and 9) and Avian Influenza (Figures 8 and 10). Where there are more hogs and chickens per km2, there have been more disease outbreaks. Intensification of agricultural production without innovation therefore increases the risk of many negative externalities, including animal and plant disease. As an example, 75% of emerging infectious diseases are zoonotic and we have increases in mortality from infectious disease for the first time since the 19th century. Antimicrobial resistance is also important and in some parts of the world it is out of control. The World Bank estimates that antimicrobial resistance (AMR) may reduce world GDP by upwards of 3.5% annually by 2050.

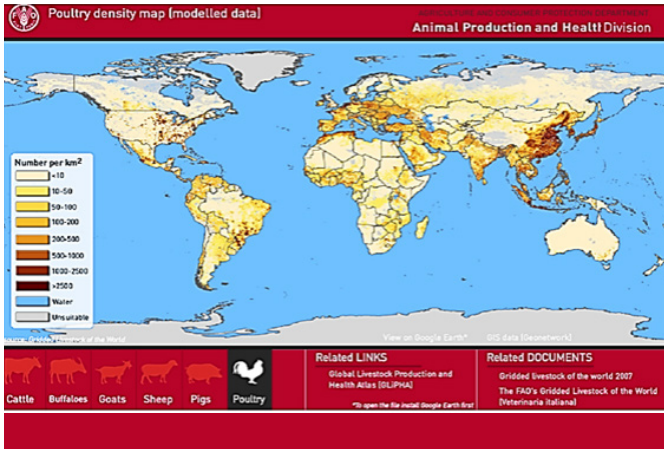
So the risks of plant and animal disease need to be evaluated through a lens that considers their impacts on human health, food security, trade and socio-economic wellbeing. Therefore, innovation systems need to adopt a One Health approach. The Deans of Canadian Faculties of Agriculture and Veterinary Medicine (CFAV) have put together some compelling recommendations around a "**One Health" approach**" in this regard in their recent report" Reinvigorating Canada's Economy by Investing in Agri-food and Animal Health Innovation" (2021).

Figure 7 Hog Density



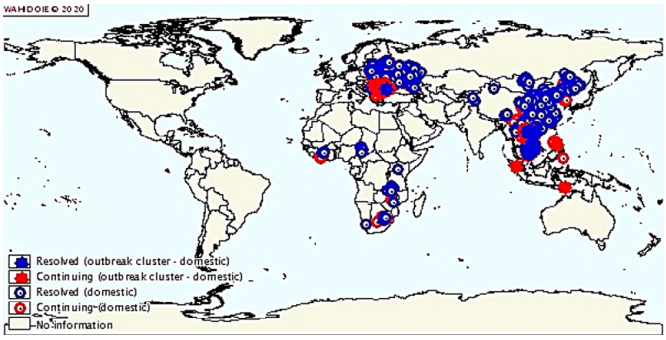
Source: FAO, Gridded Livestock of the World

Figure 9 Poultry Density



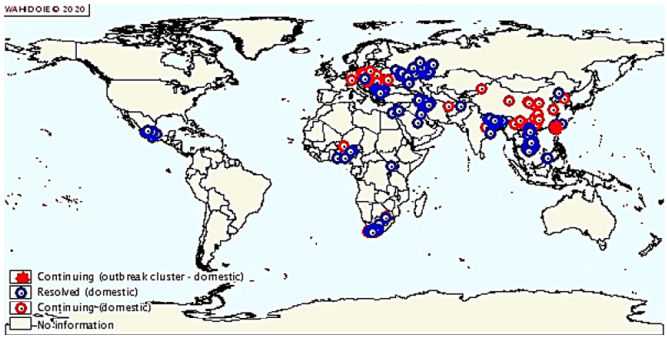
Source: FAO, Gridded Livestock of the World

Figure 8 African Swine Fever (2018-20)



Source: FAO, Gridded Livestock of the World

Figure 10 Avian Influenza (2018-20)

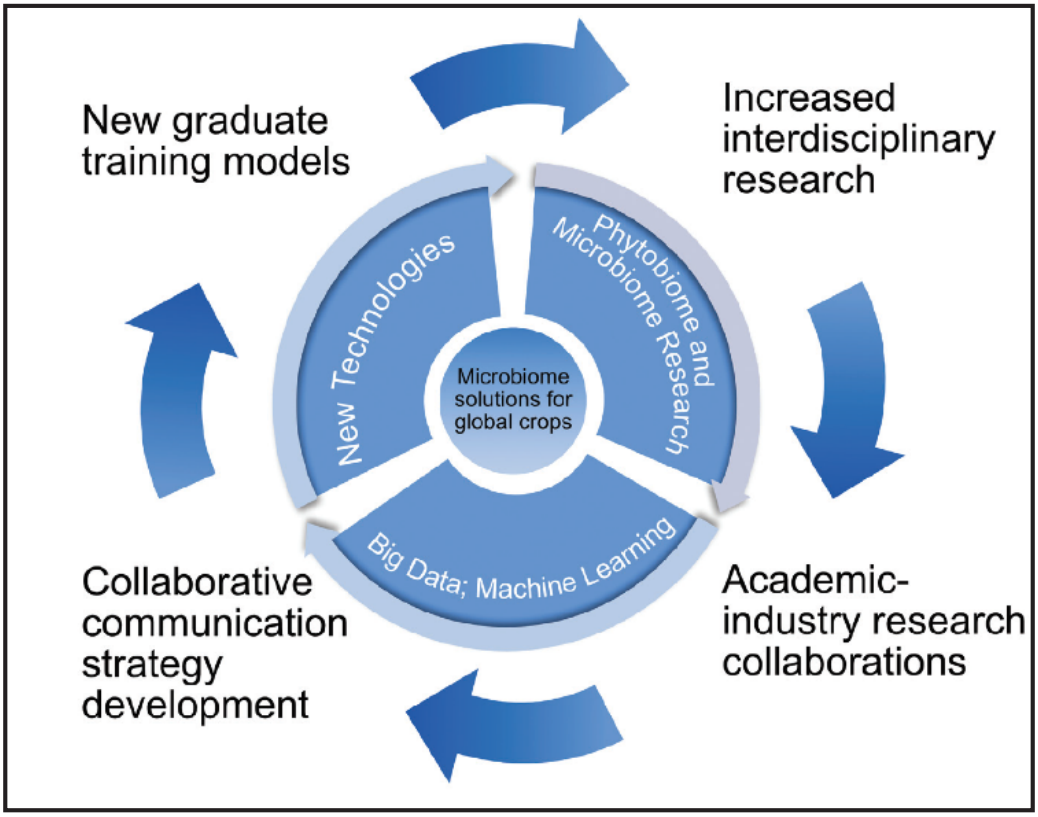


Source: World Organization for Animal Health (OIE)

5.7 The 4th Industrial revolution and microbiome solutions will be key to feeding more people with less land and fewer inputs

As per the Deans' suggestions, in order to feed an increasing population better and more sustainably, we will need to rapidly adopt innovation around the phytobiome, microbiome, robotics, mRNA vaccines, big data and Artificial Intelligence (AI), and more, all of which flow from the 4th industrial revolution. Clearly, the key to success will be an integrated approach that encompasses training and education, interdisciplinary research and collaborative communication, according to the Council for Agricultural Science and Technology (CAST) (2020) (Figure 11). Each of these components drives and improves the others and ensures faster uptake and wide consumer acceptance. This is particularly important because sustainable intensification will be very knowledge and data intensive.

Figure 11 Integrated Approach for Microbiome Solutions

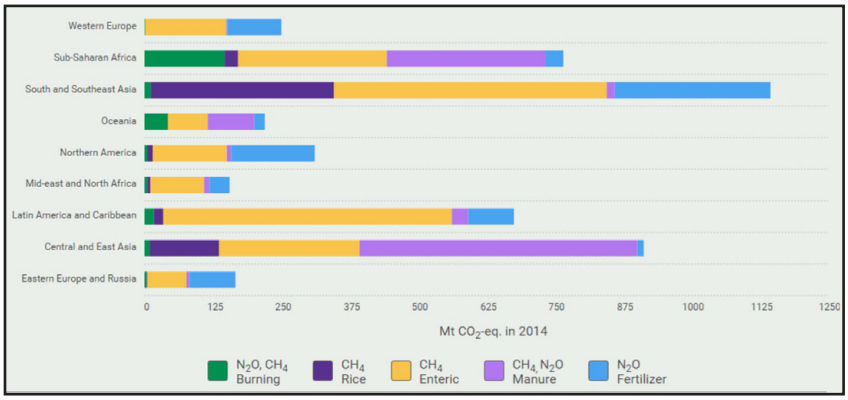


Source: CAST. Agriculture and the Microbiome. August 2020

5.8 Innovations have reduced GHG emission intensity in agriculture production in North America and Europe by improving resource efficiency

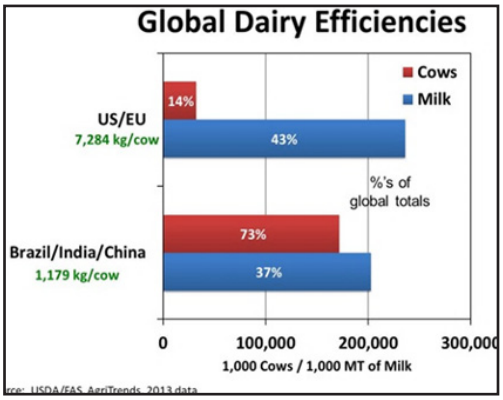
As shown in Figure 12, GHG emissions from agriculture vary significantly by region. In North America, GHG emissions from agriculture are a quarter of emissions from South and Southeast Asia, and more than half of emissions from SubSaharan Africa. According to Blandford (2018), 92% of global GHGs related to agriculture arise in developing countries, including China and India. This is caused on the one hand by a lag in technology, knowledge, and investment, and on the other hand, by the negative effect of land use change and increased deforestation on emissions. North American agriculture has made substantial efficiency gains in production by improving resource efficiency.

Figure 12 GHG Emissions from Agriculture, by Region, 2014



Source: FAO

Figure 13 Global Dairy Efficiencies 2013



Source: USDA/FAS, Agritrends 2013 data

As an example, as Figure 13 shows, dairy production in the U.S. and the EU is significantly more efficient than in Brazil, India and China, since with only 14% of the global dairy herd, the U.S. and the EU produce 43% of global milk production. This compares with Brazil, India and China, which have 73% of the global dairy herd, but only 37% of production. Imagine the change if the developing world had fewer cows but more milk and less need for feed and far fewer emissions? For the benefit of the global commons, it will not be sufficient for the U.S., the EU and Canada to just be an early adopter of agriculture innovation. We must also lead in standards development and innovation dissemination globally.

5.9 Through science and innovation, Canada has become one of the most GHG efficient producers of agri-food products

Innovations have also widened the gap in GHG emission intensity across countries. The value of Canadian agricultural production has more than doubled since 2007 (in constant 2007 prices) while GHG emissions from agricultural activity remained stable (Figure 14). This resulted in a decline in **GHG emission intensity**, mostly due to reduced tillage, cover crops, the introduction of 4Rs and vast improvements in the efficiency of meat and milk production. Reductions in emissions intensity in Canadian animal protein production have been particularly dramatic, falling by 36% since 1981 (AAFC). This has made Canada one of the most GHG efficient producers of animal protein in the world (Figure 15). It makes sense that as the world demands more meat, it would be best to produce it where GHG intensity is lowest.

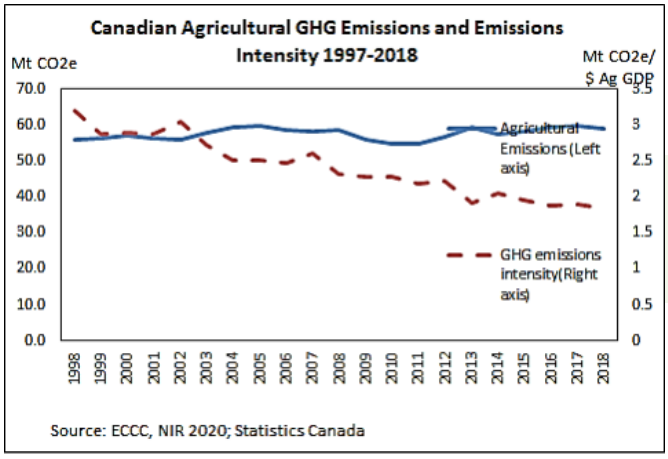


Figure 14

Source: ECCC,NIR 2020; Statistics Canada

Future investments in R&D and faster adoption of better management practices and new technologies will be needed to continue to see emissions reductions and efficiencies in agriculture. In terms of carbon sequestration in soils, primary agriculture is well set to supply emission credits and to participate in public-private partnerships developing trusted carbon accounting and certification systems as the key to broadly successful emission trading systems.

Processors are also doing their part moving towards carbon neutrality by adopting new technologies and practices, by reporting their ESG performance and by participating in supply chain initiatives to source and sell sustainable products. They are also ready to buy credits.

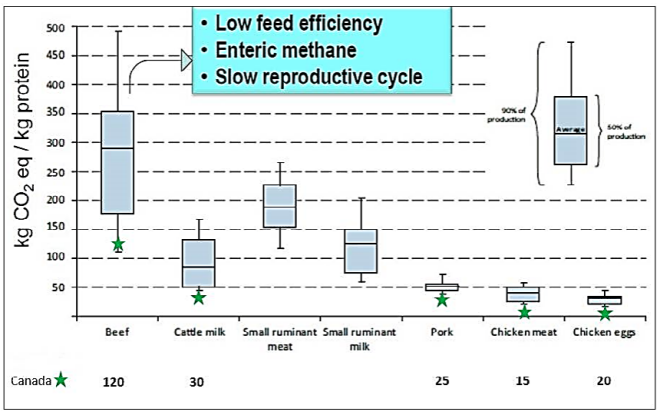


Figure 15 Canada's Relative Performance in GHG emissions intensity for Protein

Source: FAO and AAFC

5.10 Agriculture accounts for 8.1% of total GHG emissions in Canada

To put green growth into perspective, Canadian agriculture accounted for 8.1% of total GHG emissions in 2019, not including on-farm energy use. This is lower than at the global level where agriculture GHGs were estimated at 10-12% of the total in 2019. When net emissions from forestry and land use changes are included, the share of total emissions from agriculture, forestry and land use changes (AFOLU) globally accounted for 23% of the total (IPCC, 2020). This is because for many countries, deforestation is resulting in adding to emissions rather than offsetting them when carbon is stored as a sink, which is the case in many developed countries such as the U.S. and the EU.

In Canada, forestry and land use changes produce negative emissions, bringing Canada's AFOLU to 7.8% of total. Canada performs **much better** than the global average when forestry and land use changes are included in the calculation as this is where the IPCC counts gains or losses in carbon sequestration. The fact that 50% of Canada's agricultural production is exported indicates Canadian agriculture is not just contributing to global food security by producing and exporting food, but it is providing global climate change solutions with its low GHG intensity products.

6. Trade

6.1 Disruptions in trade can negate these global gains by shifting trade to sub-optimal locations

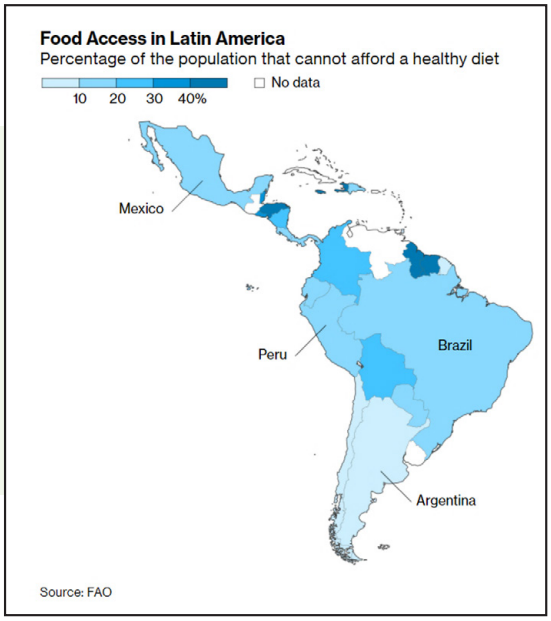
However, it is easy to destroy progress on climate change and food security when countries disrupt global food trade for political gain with predatory trade policies, as exemplified during recent geopolitical manoeuvring between the US and China that resulted in China diverting its soybean imports from the US to Brazil in 2019. This led to a rapid increase in food exports to China from South America, with resulting social and environmental costs related to food price hikes, food insecurity, civil unrest and deforestation (Figure 16).

No Meat, No Milk, No Bread: Hunger Crisis Rocks Latin America

Millions are getting pushed into poverty, moving from relatively comfortable lives to not knowing where their next meal is coming from.

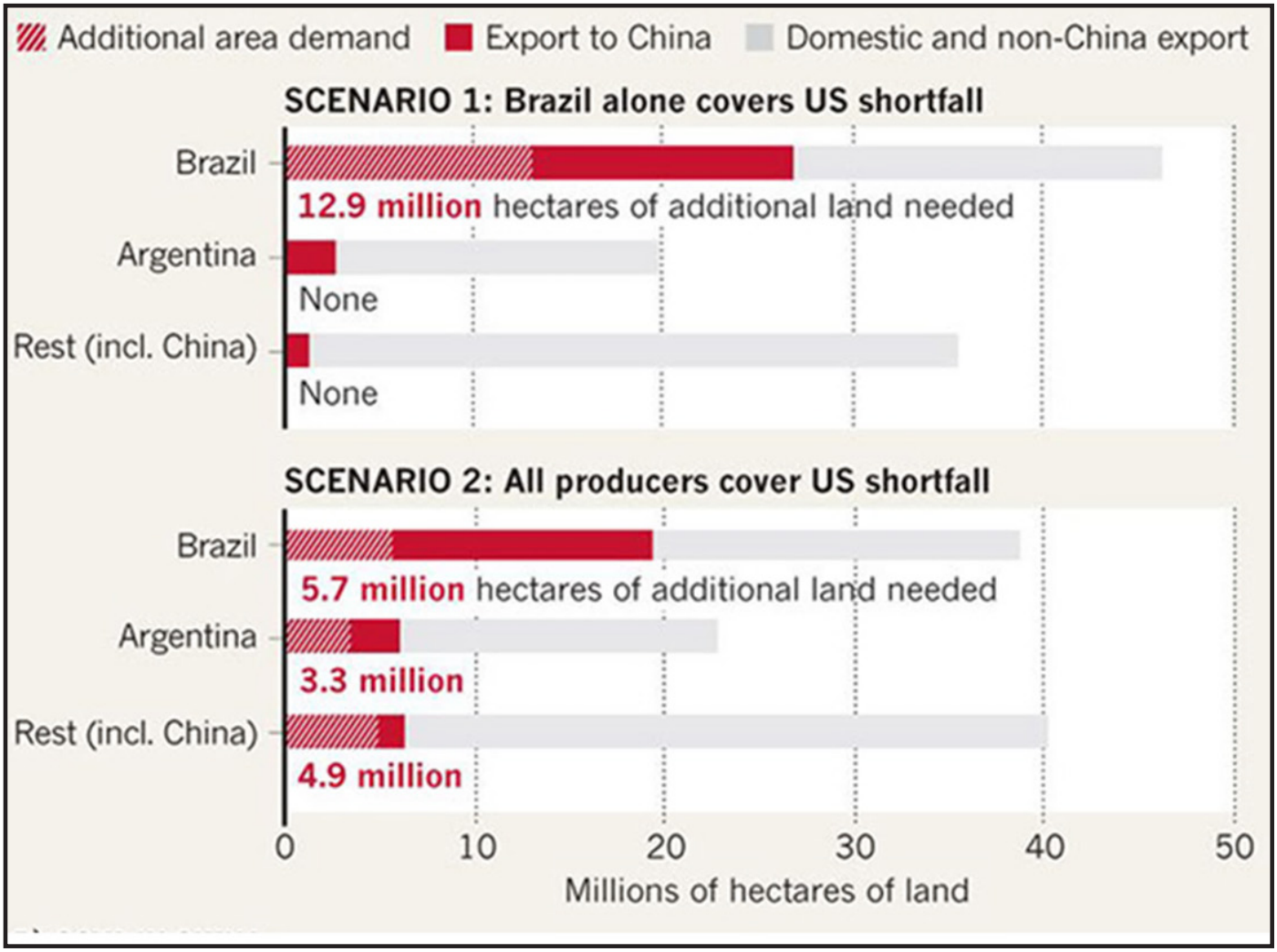
September 28, 2020

Figure 16



The outcome of this trade diversion is still being felt in several ways. First, it is having environmental impacts as would require an additional 12.9 million hectares of land in Brazil in order for Brazil to replace the U.S. soybeans that would have been exported to China (Figure 17). If more land is brought into production by Brazil to meet that Chinese import demand, this will result in an increase in global carbon emissions from land conversion and deforestation. Second, it is having a socio-economic impact as food prices in Latin America have risen dramatically given the excess demand, leading to increased poverty and food insecurity.

Figure 17 Impact of Trade Diversion on South American Land Use



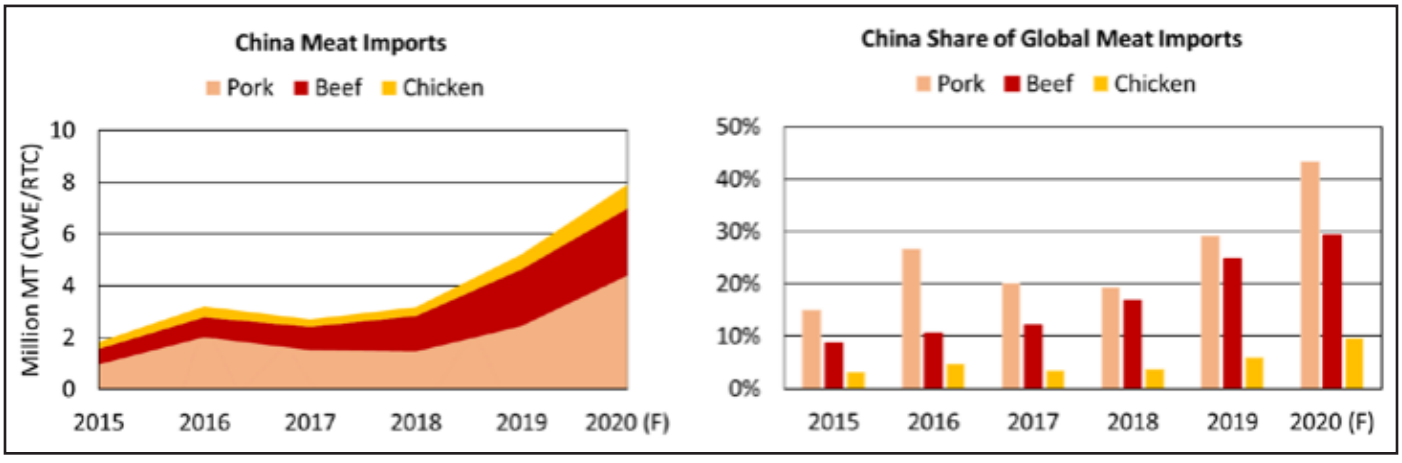
Source: Richard Fuchs et. al., "Why the US-China trade war spells disaster for the Amazon" Nature, March 28, 2019, https://www.nature.com/articles/d41586-019-00896-2

This example highlights how closely trade, environmental sustainability, food security and profitability are connected. Environmental disaster will unfold if China's trade diversion drives land use change in Brazil to more deforestation and to lower dependency on low carbon intensive producers of soybeans and other food.

6.2. Another example is the jump in Chinese meat imports which resulted in shortages and high prices in the exporting countries, with grave implications for food security

In the case of meat protein, production is so skewed to China which has about half the hogs in the world, that any large shortfall cannot be readily filled by trade. Since African Swine Fever emerged in 2018, China has been importing about a third of global meat exports with world meat exporters becoming increasingly reliant on the Chinese market (Figure 18). Meanwhile, 80% of Canadian meat plants and some Australian plants are under political suspension by China causing significant trade diversion. China is uncompetitive in cattle and hog raising and has a relatively high CO2e footprint, making the decision to increase their meat self-sufficiency and increase sourcing from certain parts of South America incompatible with the goal of global carbon neutrality. Unfortunately, this is an example of the rules-based multilateral system being replaced by power-based bi-lateral arrangements creating investment and food security uncertainty.

Figure 17 Impact of Trade Diversion on South American Land Use

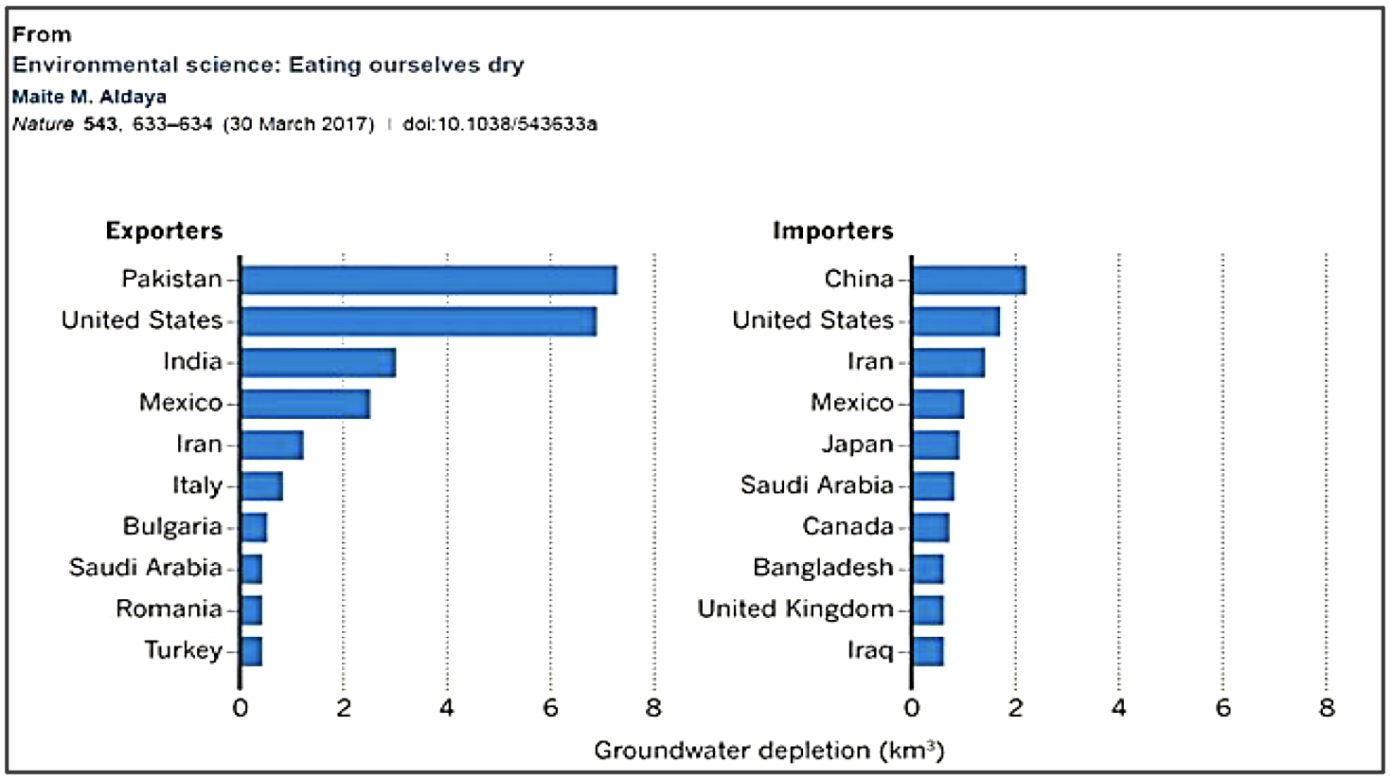


Source: Meat and Livestock Australia

6.3. Trade without accounting for externalities could worsen all environmental outcomes

Sticking with the trade theme, a great deal of global food trade ignores the significant negative externalities associated with production, which will ultimately lead to future food security crises. The World Bank estimates that more than a third of the world's food is produced on irrigated agricultural land and that the source of approximately 40% of the water used for irrigation globally is groundwater. Alarmingly, satellite data and other monitoring tools show that groundwater supplies in many of the world's key agricultural regions are shrinking at a time when global food needs are increasing. In fact, over 11% of global agricultural exports are entirely dependent on groundwater depletion embedded in the food traded. The countries with significant groundwater depletion and food exports at risk are shown on the left of Figure 19, and the largest importers of virtual water on the right includes Canada. When the wells run dry those food sources will be gone. But well-intentioned efforts to reduce agricultural emissions can also have unintended consequences.

Figure 19

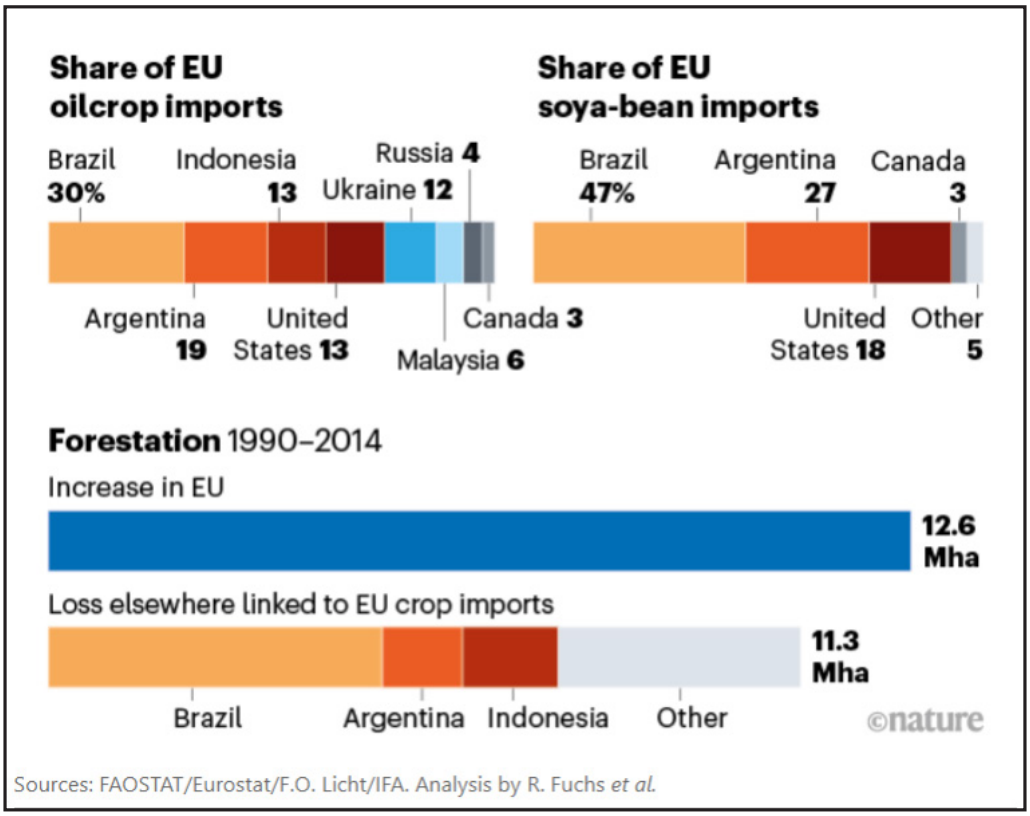


Source: Aldaya, M. Eating Ourselves Dry. Nature. 2017

6.4. Policies, such as EU's Green Deal, aim to reduce domestic GHG emissions but may inadvertently worsen global environmental outcomes

Various policy initiatives have been introduced to address climate change. The European Union's Green Deal includes reductions in the use of land, antimicrobials, fertilizers and pesticides which unless offset by a large jump in productivity will result in lower output. Studies suggest this will lead to offshoring of the environmental damage and increased GHGs from importing millions of tons of crops and meat produced elsewhere, possibly with higher carbon intensity and with resulting tropical forest destruction offshore.

Figure 20



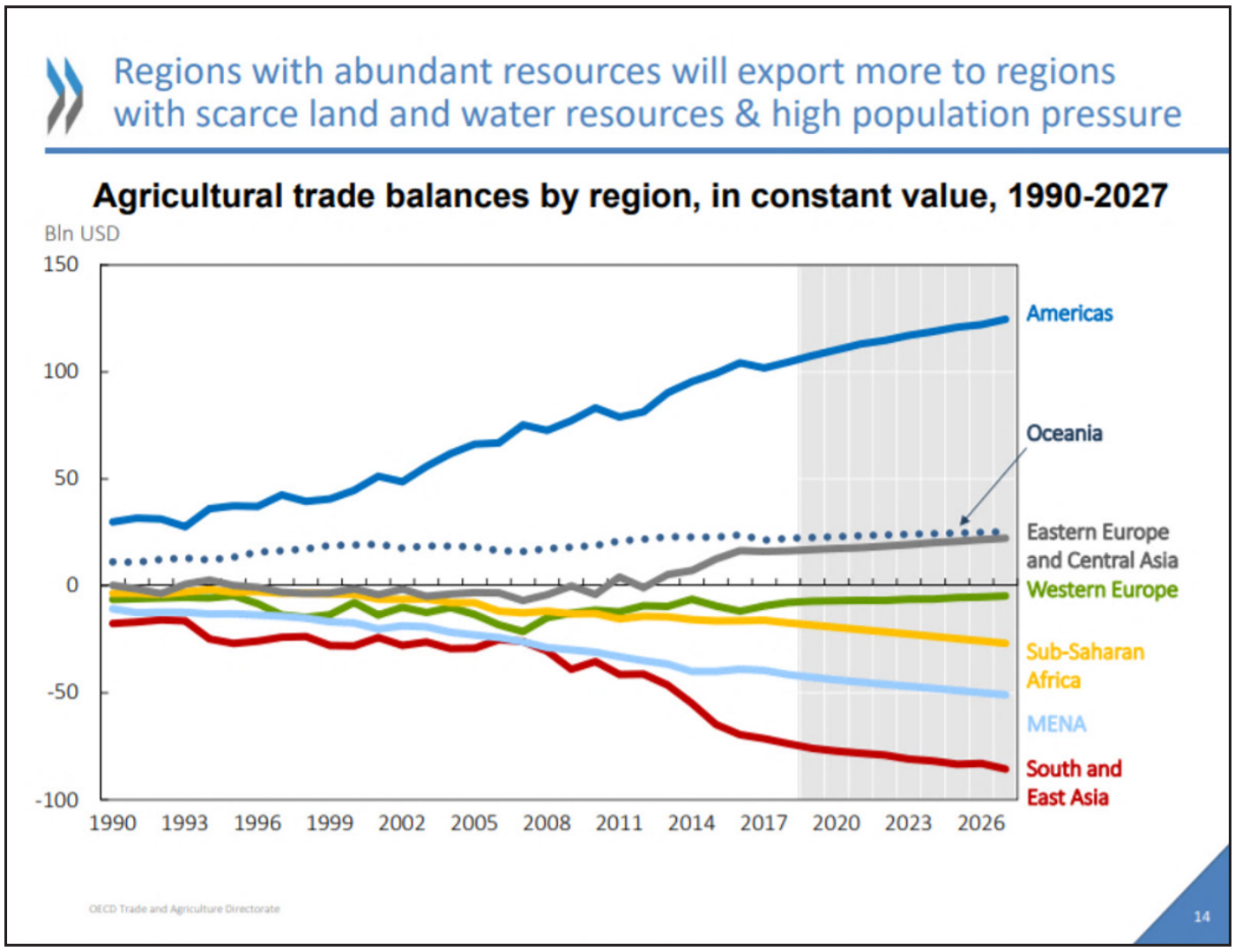
Source: Fuchs et al. 2020.

Fuchs et al (2020) calls into question the logic of the EU biofuel industry which incents land use change with tropical oil crop imports, driving climate change and threatening food security (Figure 20). In another report by the USDA-ERS (2020) which model the impacts of the EU policy also finds similar results, including global food price increases and worsening global food security. In addition to this, the EU is considering a carbon border adjustment mechanism in an attempt to level the playing field with imports from countries with less rigorous climate change policies, in order to keep from being overrun with lower cost imports.

6.5 When the dust settles, surplus production will come from areas with production capacity: The Americas will remain the major agri-food surplus suppliers to the world

According to the OECD (2019) presentation to a WTO meeting, the future of global food trade will be characterized by "Regions with abundant resources exporting more to regions with scarce land and water and high population pressure". Asia, Africa and the Middle East, as major food deficit countries will continue to be more food deficit and the Americas will be the strategic food resource (Figure 21).

Figure 21 Projected Agricultural Trade Balances by Region, 1990 to 2027



Source: OECD 2019

7. Adding Value

7.1 Canada needs export markets as much as the world needs Canada's surplus to feed a growing population

Figure 22 shows how Canada is one of the most agriculture and food export dependent countries in the world, with much of our exports being raw commodities or primary production (Figure 23). As the world's 5th largest exporter and importer of agri-food products, Canada's agri-food exports (including seafood) almost reached $74 B in 2020. Canada needs to leverage its strengths and boost its value-added processing capacity to be able to benefit from the opportunity to meet the growing global demand for food expected in the future. But this will require investments.

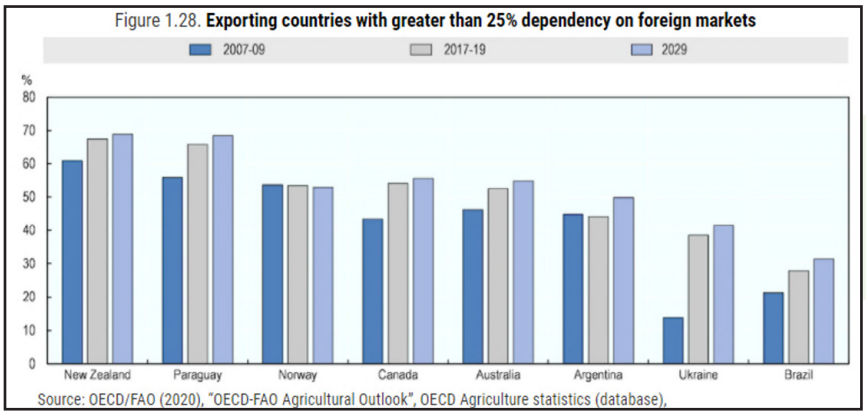


Figure 22 Trade Dependent Exporting Countries

Source: OECD/FAO (2020)

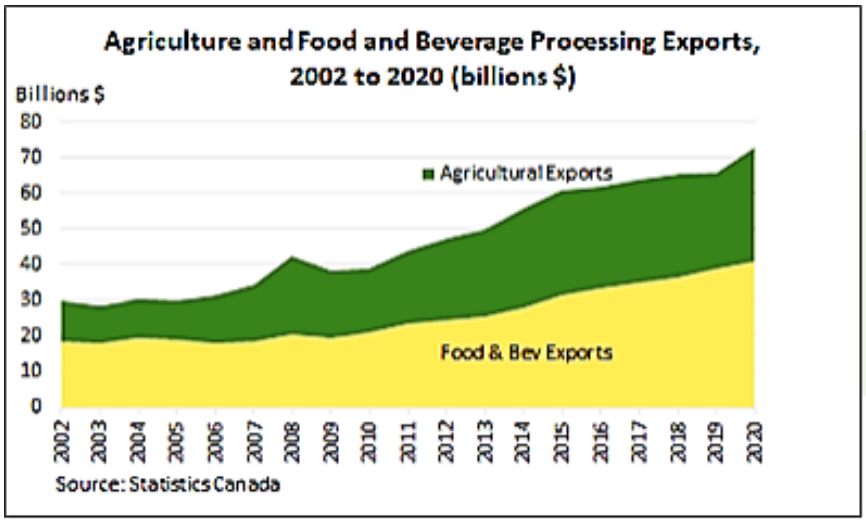


Figure 23 Canadian Primary and Food and Beverage Processing Exports, 2002 to 2020

Source: Statistics Canada

7.2 Demand will continue to grow in the food deficit regions particularly for higher valued food products

Figure 24 shows regions of the world with food surplus or deficit (share of net food imports in the domestic food supply), measured in calories. Food security was top of mind for many countries even before African Swine Fever and COVID arrived. But as the economic power of the E7 countries (emerging economies of China, India, Indonesia, Brazil, Russia, Mexico and Turkey) are projected to grow to double the size of the G7 countries by 2040, the map will grow more red. Household income in many Asian countries will grow far faster than in the western world, driving the demand for value added processed foods (Figure 25).

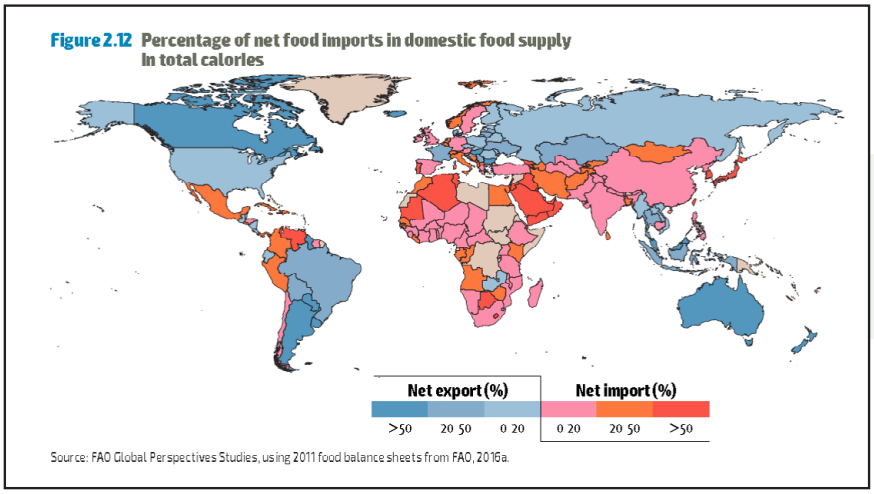


Figure 24 Food Surplus and Deficit Countries

Source: FAO

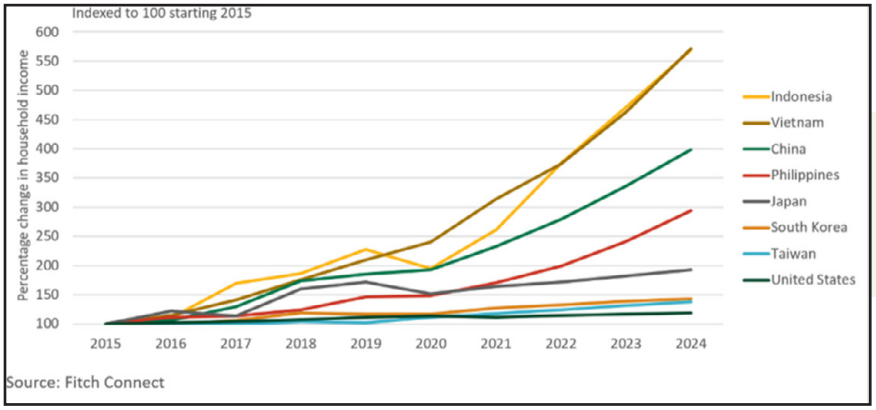


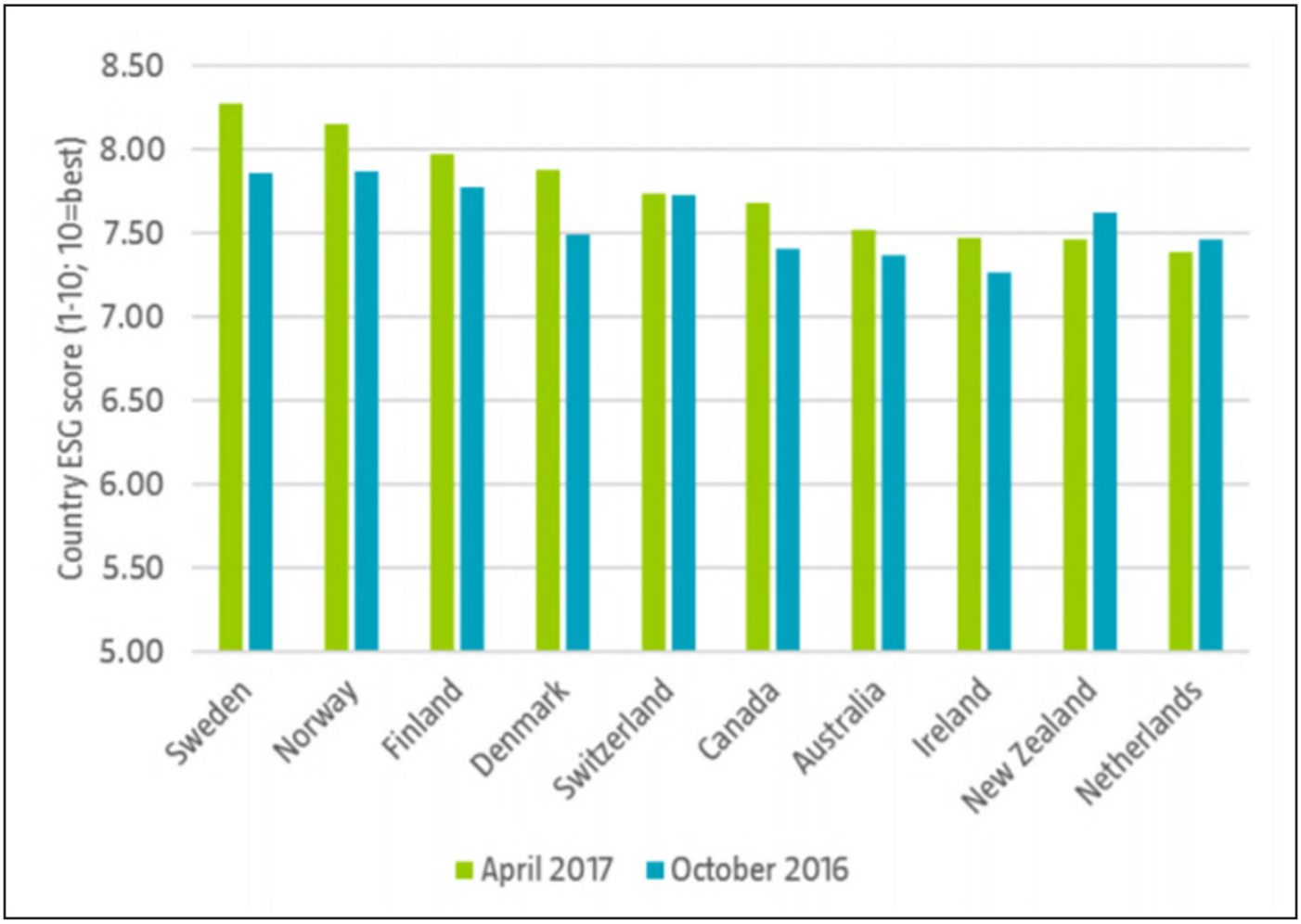
Figure 25 Growth in household income by country (2015 = 100)

Source: Fitch Connect

7.3 Canada has a good reputation internationally, but can we convert this into sustainable investments in high value products?

According to a number of studies, Canada has a strong positive reputation internationally but needs to turn that into more investment in value added agriculture and food products (Figure 26). Reaching the target set by the Advisory Committee on Economic Growth (2016) of 5.2% of world market share for Canadian agri-food exports by 2027, would require Food and Beverage processing exports to grow by 13.7% per year, a very unlikely possibility.

Figure 26 Top Country ESG Scores, 2016 and 2017



Source: RobecoSAM

7.4 Scale remains a key issue for Canadian Food Processing

Clearly if we are to compete globally, Canadian food processers will need to increase scale. With barely 1% of our food processing companies considered large, with over 500 people, Canada has a problem (Figure 27). We need to become great at scaling niche businesses. One example that stands out is chilled pork. We were the first outside Asia to market it and have simply kept on getting better, to the point where we have a greater market share in the most valuable market- Japan, than the Americans who have over 5 times more hogs to draw on. Creating hard-to-copy desired niche products and developing sustainability as a competitive advantage differentiator will be increasingly important.

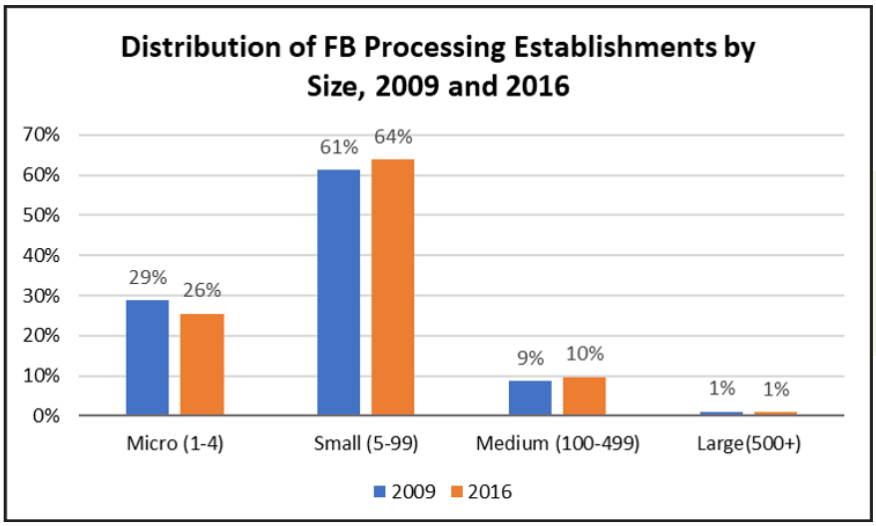


Figure 27

Source: Statistics Canada and Thompson et. al. 2020

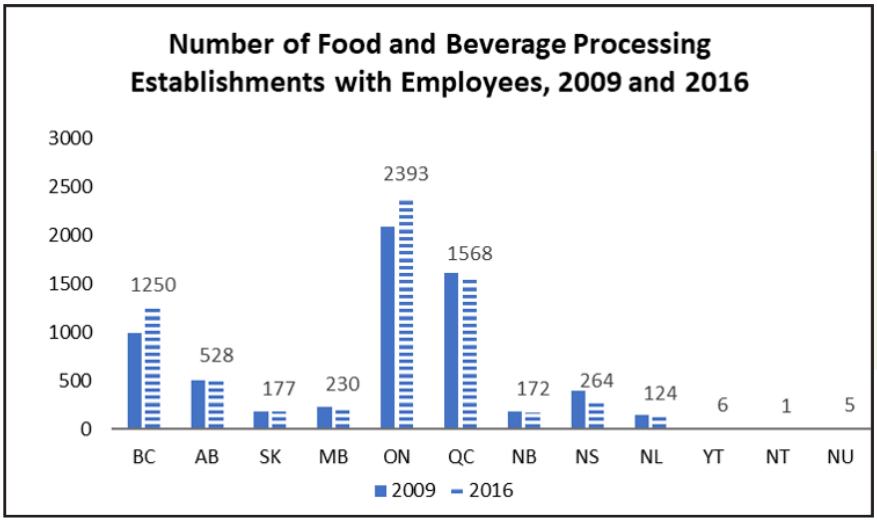


Figure 28 Number of FB Processing Establishments

Source: Statistics Canada and Thompson et. al. 2020

7.5 Adding value is critical for the resilience of Canada's agri-food system and contributes to the well being of Canadians

Finally, Canada's capacity to produce its own processed food products has deteriorated over time. The number of FB processing establishments in most provinces has declined since 2009, except for Ontario and British Columbia (Figure 28). Canadians have become more dependent on imports with the share of processed food imports in Canada's food consumption more than doubling from 15% in 1992 to 30% in 2020 (Figure 29). This is an economic issue and the pandemic reminded us this can rapidly become a food security issue for Canada. Trade follows the money and as we have shown, wealth is shifting. As we discovered with the pandemic, by boosting higher value processing capacity here at home, we could reduce our dependence on imported food, ensuring more secured domestic food supplies while also providing an alternative to commodity exports with the inherent economic benefits of value added.

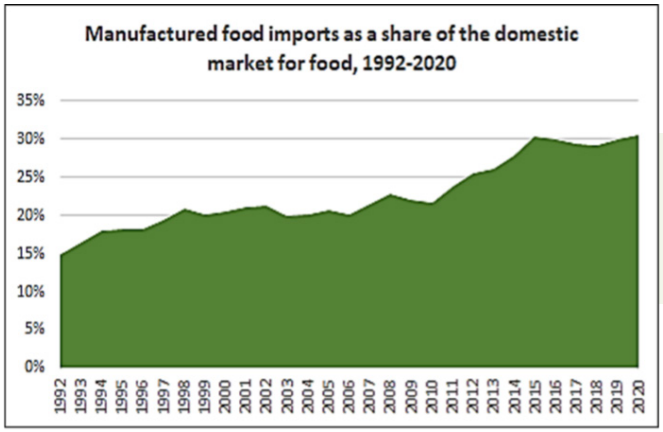


Figure 29

Source: Statistics Canada, AAFC Calculations

8. Conclusions

As a result of the research, analysis, webinars and dialogues CAPI has conducted over the past year and half, both on its own and with partners the Canadian agriculture and agri-food system is competitive economically and environmentally (low GHG intensive) and has proven to be relatively resilient during the pandemic. However, in the face of climate change, a growing world population with shifting wealth and the need to feed the world and Canadians while preserving Canada's natural capital and environmental and socio-economic health, it is essential that the agri-food system (AFS):

- accelerate productivity gains, improve environmental outcomes and provide solutions to climate change through increasing **sustainable intensification;**
- take a "**One-Health**" approach to strategy, policies, innovation and regulation since climate, animal and plant disease risks loom large for productivity, food security, human health and socio-economic health.
- work with like-minded countries to ensure global sustainability and food security by repairing **rules-based trade;** and
- boost **value-added** output of the Canadian AFS to reduce trade risk, increase resilience and improve domestic food security.

This formed the basis of the discussions at the Pre-dialogue event that was held on May 11, 2021 with Trusted Opinion leaders, which led to a Synthesis Report and Executive Summary which highlights the key findings. This Synthesis report was then used as the foundation of the discussion at the **Big Solutions Forum** held on May 20, 2021, where several Deputy Ministers and Industry thought leaders provided their perspectives on CAPI's findings. This is summarized in a What We Heard Report with Recommendations for Future Actions.

ANNEX: Background Factsheet on the Canadian Agriculture and Agri-food System

The Canadian agriculture and agri-food system is an engine of growth for Canada's economy

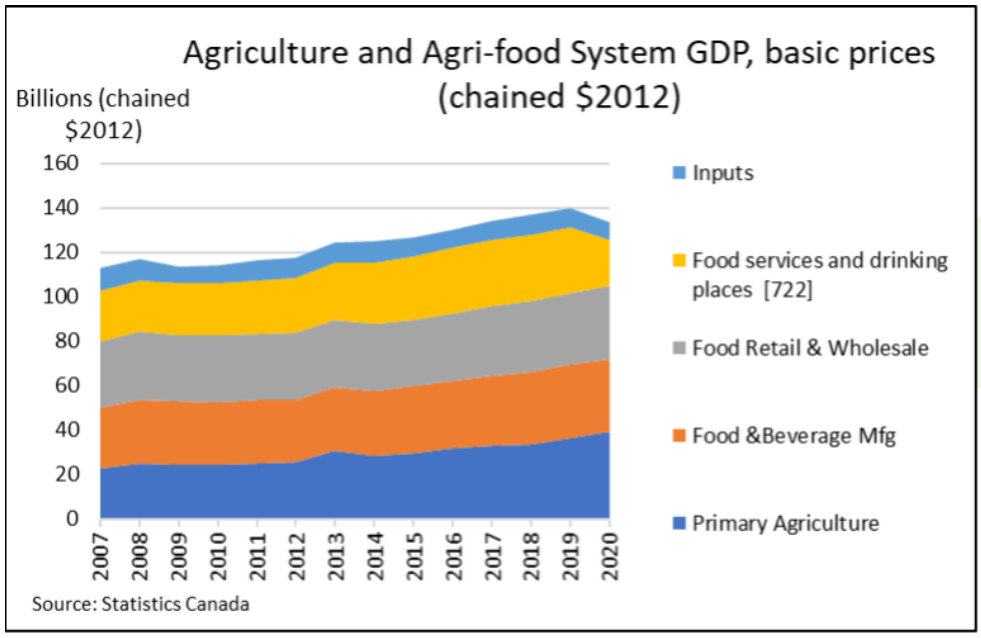


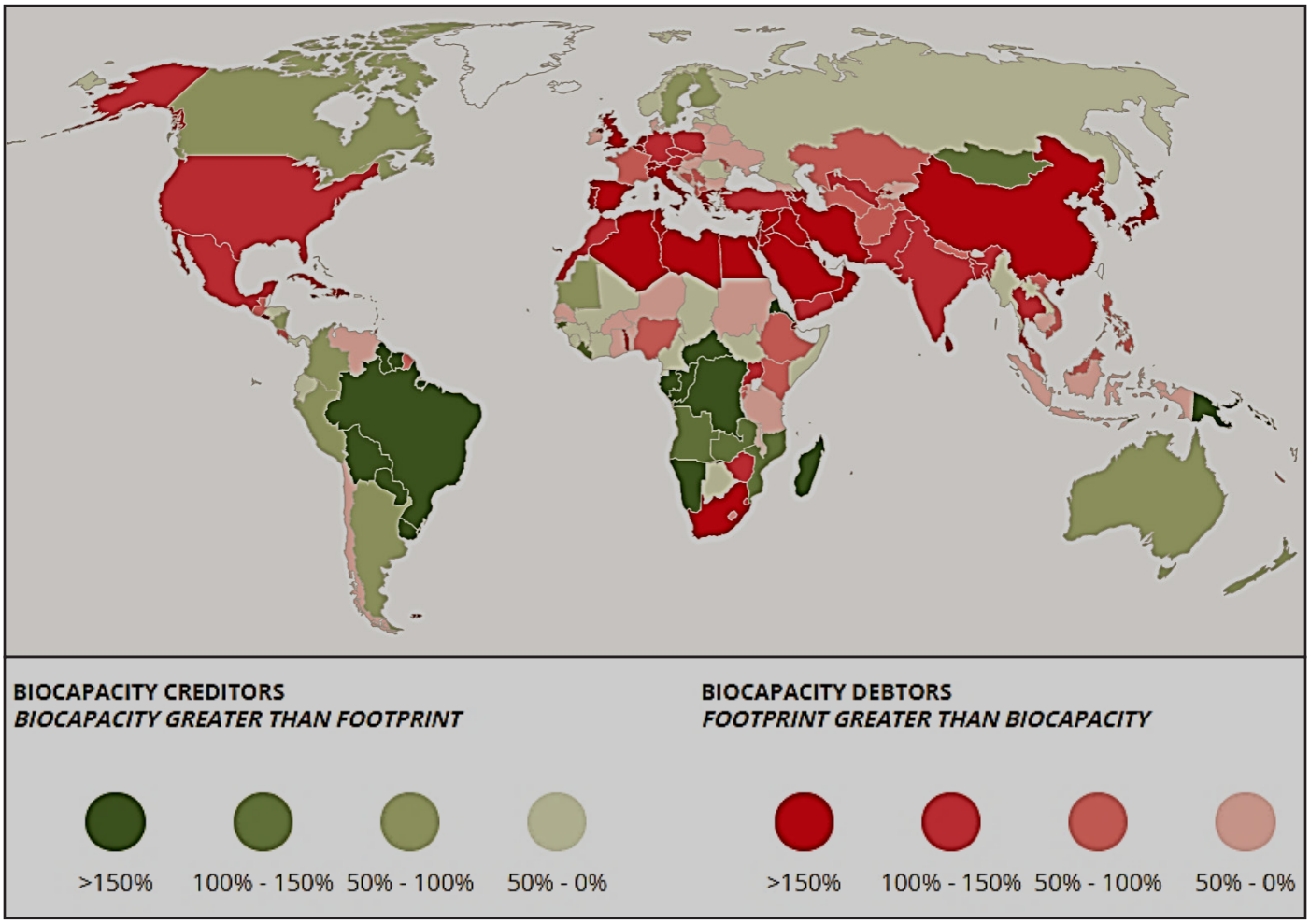
Figure 1

Source: Statistics Canada

- In 2020, the Canadian agriculture and agri-food system generated $133 billion in GDP, accounting for 7.1 % of Canada's total.
- The system employed 2.3 million people, accounting for 12.3% of Canada's total employment picture.
- Primary agriculture is the foundation of this system, accounting for $39.2 billion or 2% of the Canadian total.
- The food and beverage processing industry represents 1.7% of the total or $32.7 billion GDP.
- This was followed by the food retail and wholesale industry with GDP of $32.8 billion (1.7% of the total) and foodservice with $21 billion (1.1%).

This is because Canada is blessed with an abundance of natural resources

Figure 2

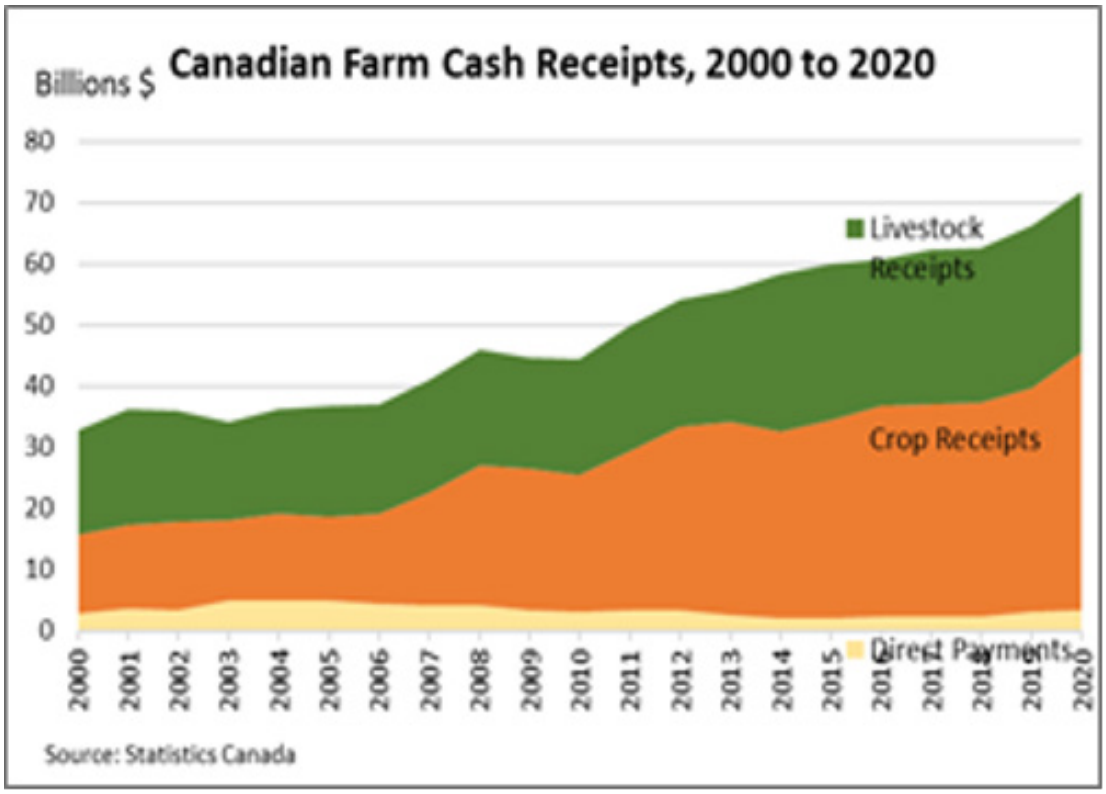


Source: FAO, Global Perspectives Studies

- Canada is one of a select group of countries that has a biocapacity surplus in terms of natural capital relative to population needs.
- In terms of arable land per capita, Canada ranks second in the world after Australia, despite the fact that arable land only accounts for 5% of the total.
- In terms of freshwater, Canada has the third largest renewable freshwater supply worldwide and the second largest amount per capita among developed countries, at 103,899 m^3 per person. Canada withdraws only a small percentage (0.18%) for agriculture for irrigation.

This allows Canada to be a major agricultural producer that can help feed the world and Canadians

Figure 3

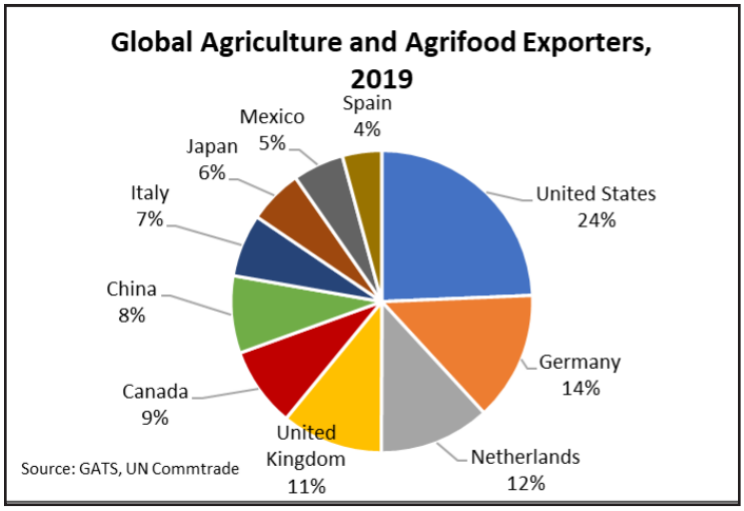


Source: Statistics Canada

- Canada reported 193,000 farms made up of all sizes and specialization with most farms producing grains and oilseeds, followed by beef in 2016.
- The average area per farm rose to 820 acres in 2016 as farms continued to get larger. The average age of farm operators continued to edge up to 55 years in 2016.
- Agricultural production is spread across the country with Manitoba, Saskatchewan and Alberta producing most grains and oilseeds, Alberta most cattle and beef, Quebec, Ontario and B.C. most dairy and horticulture concentrated in B.C., Ontario, Quebec and Nova Scotia.
- In 2020, farm cash receipts rose to $72 billion, up 8% over 2019 and 15% over the past 5-year average. This was due to higher crop receipts in 2020, up 14%, while livestock receipts were 1% lower.

Canada is one of the world's top agriculture and food exporters

Figure 4

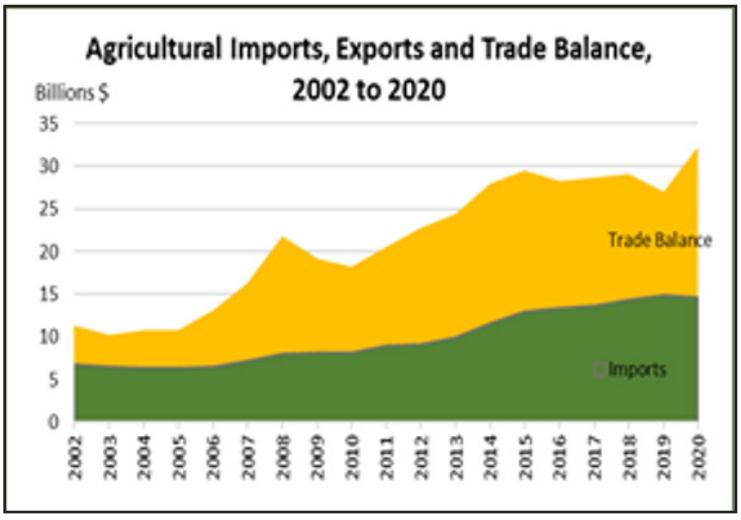


Source: GATS, UN Commtrade

- Canada as a major trading country is the fifth largest exporter of agriculture and agri-food products but also the fifth largest importer.
- Canada ranks in the top five in terms of global exports of canola, wheat, pulses and the top ten for beef and pork.
- The U.S. is the major export destination for most Canadian agriculture and agri-food products, at 52% of Canada's total exports in 2017. The U.S. is also an important source of agri-food imports as the two economies are highly integrated.

Canada exports more agricultural products than it imports

Figure 5

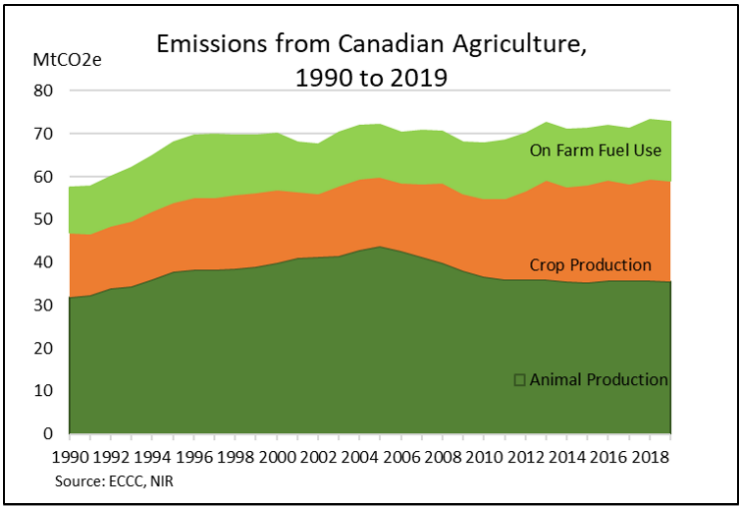


Source: Statistics Canada

- In 2020, despite the pandemic, Canada exported a record $32 billion value of agricultural commodities to markets overseas
- This followed a decline in 2019, due to trade restrictions on canola exports to China
- Most grain and oilseed exports were up in 2020, along with those of greenhouse vegetables and potatoes.

Despite this growth in Canadian agricultural production, emissions from agriculture were down slightly in 2019

Figure 6

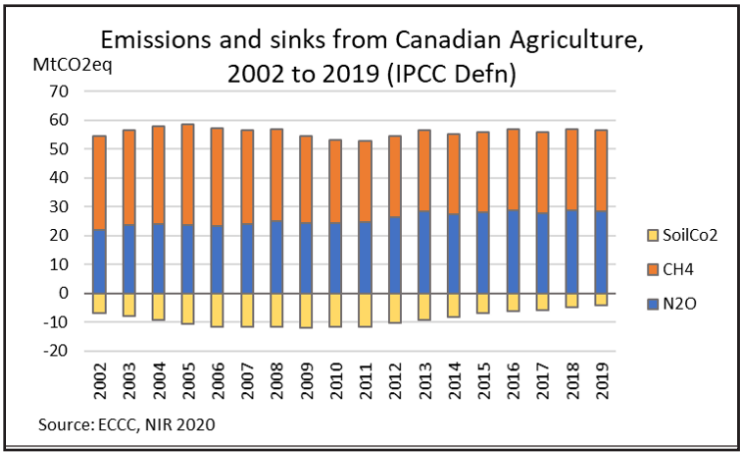


Source: ECCC, NIR

- Total GHG emissions from agriculture (including on-farm energy use) were 72 Mt CO2e, down slightly from 2018.
- Emissions for both crop and animal production were down from 2018, but emissions from crop production were up compared to the past five-year average.
- On-farm energy use was also up compared over the past five-year average.
- Emissions from animal production are below the 2005 peak due to reduced livestock numbers and improvements in livestock efficiency.

Canada exports more agricultural products than it imports

Figure 7

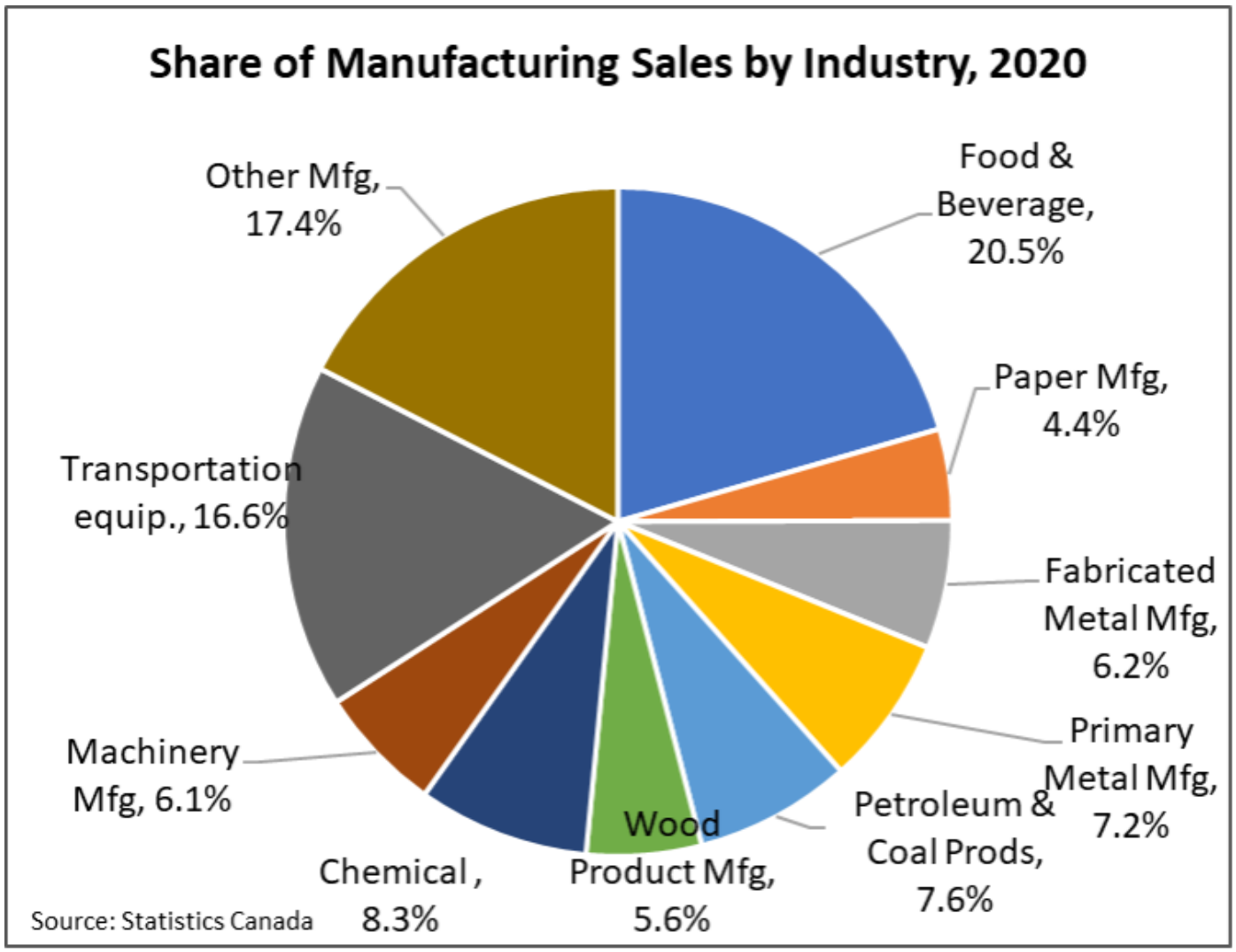


Source: ECCC,NIR 2020

- Agricultural emissions (IPCC definition excluding on-farm energy use) stabilized around 59 Mt CO2eq in 2019, up 5% since 2002.
- However, carbon captured in soils has been decreasing due to increased crop production.
- CH4 emissions from livestock continue to decline while N2O emissions from crop production increased 29% since 2002.
- Adoption of new technologies and practices will be needed to reduce emissions in the future.

Canada's food and beverage processing industry is the largest manufacturing industry

Figure 8

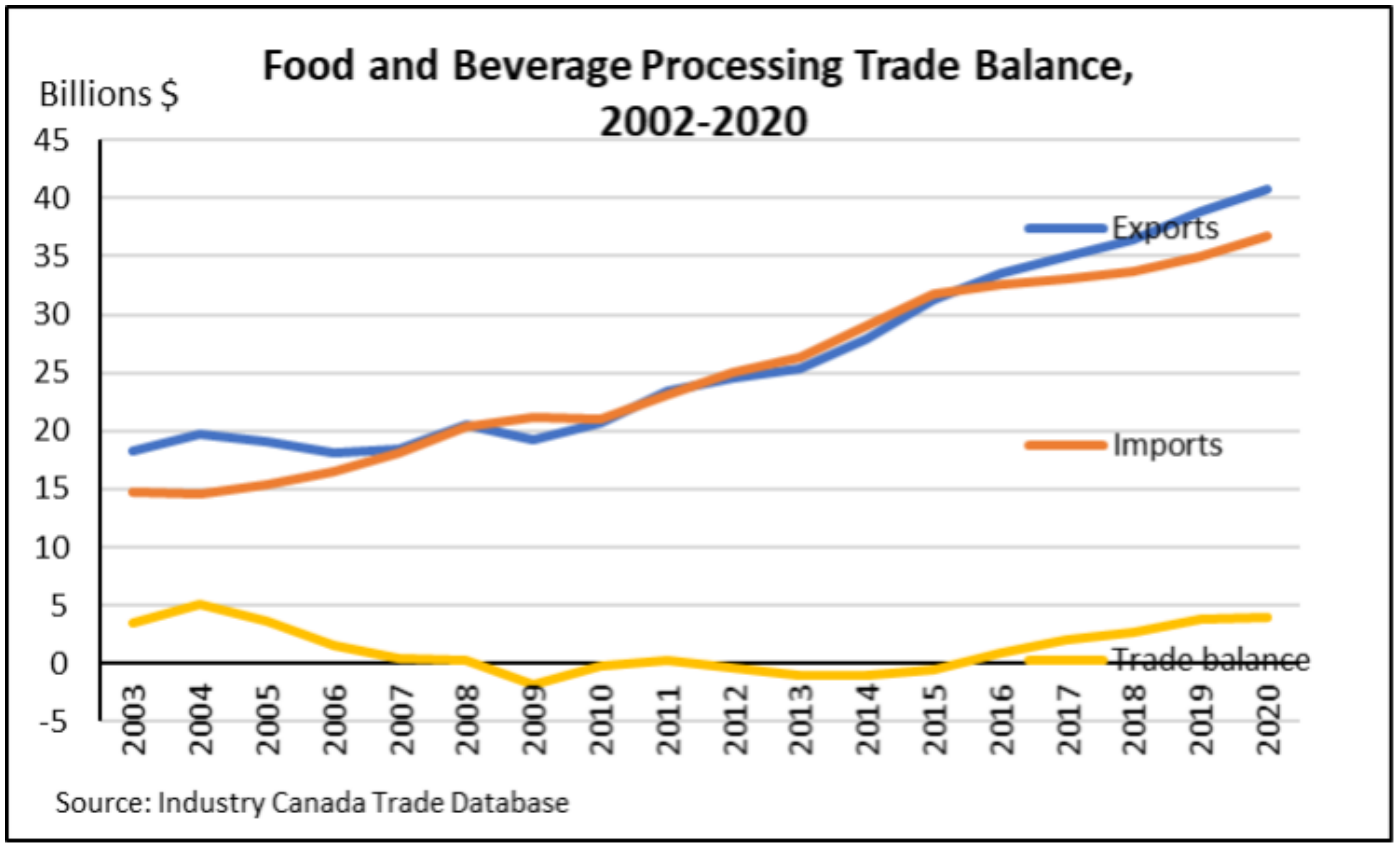


Source: Statistics Canada

- Food and beverage processing was the largest manufacturing industry in Canada in 2020 in terms of sales and GDP.
- Most food and beverage processing establishments are small with fewer than 100 employees (90%) while only 1% have more than 500 employees.
- While these processing establishments are spread across the country, the bulk are concentrated in Quebec, Ontario and B.C.
- Meat processing is the most important subsector, followed by dairy, beverages, grain and oilseed products and bakeries and tortillas.

Food and beverage processing exports and imports have been growing steadily over the past three years

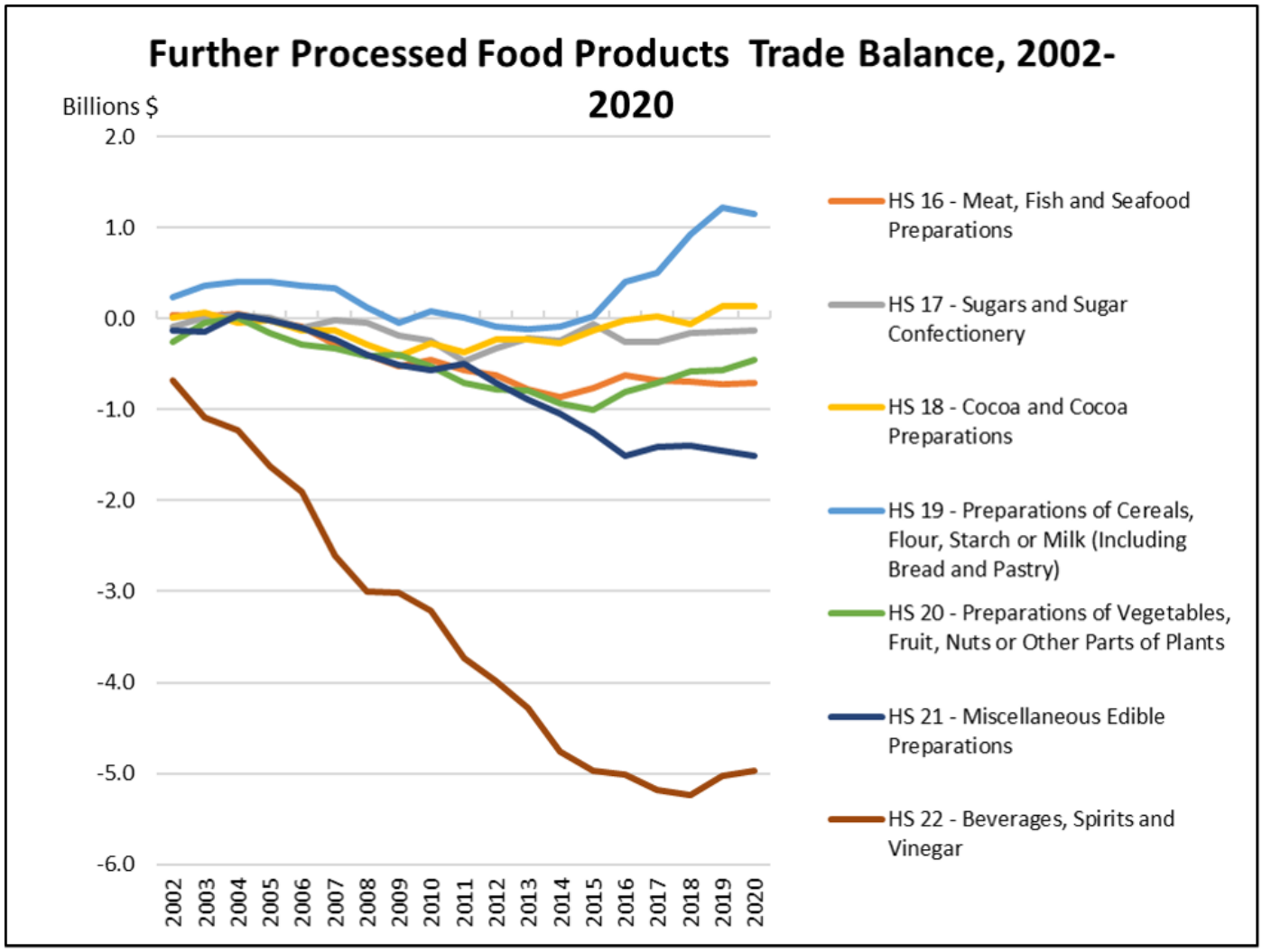
Figure 9



- Canada is the fifth largest exporter of processed food in the world.
- Exports rose to $41 billion in 2020, up significantly from $39 billion in 2019.
- Imports also increased, to $37 billion, up from $35 billion in 2019.
- The bulk of Canada's processed food exports were destined for the U.S.
- Canada's trade balance in primary and further processed food products remained positive at $ 4 billion in 2020.

The trade balance for further processed food products still remains negative despite some improvement recently

Figure 10

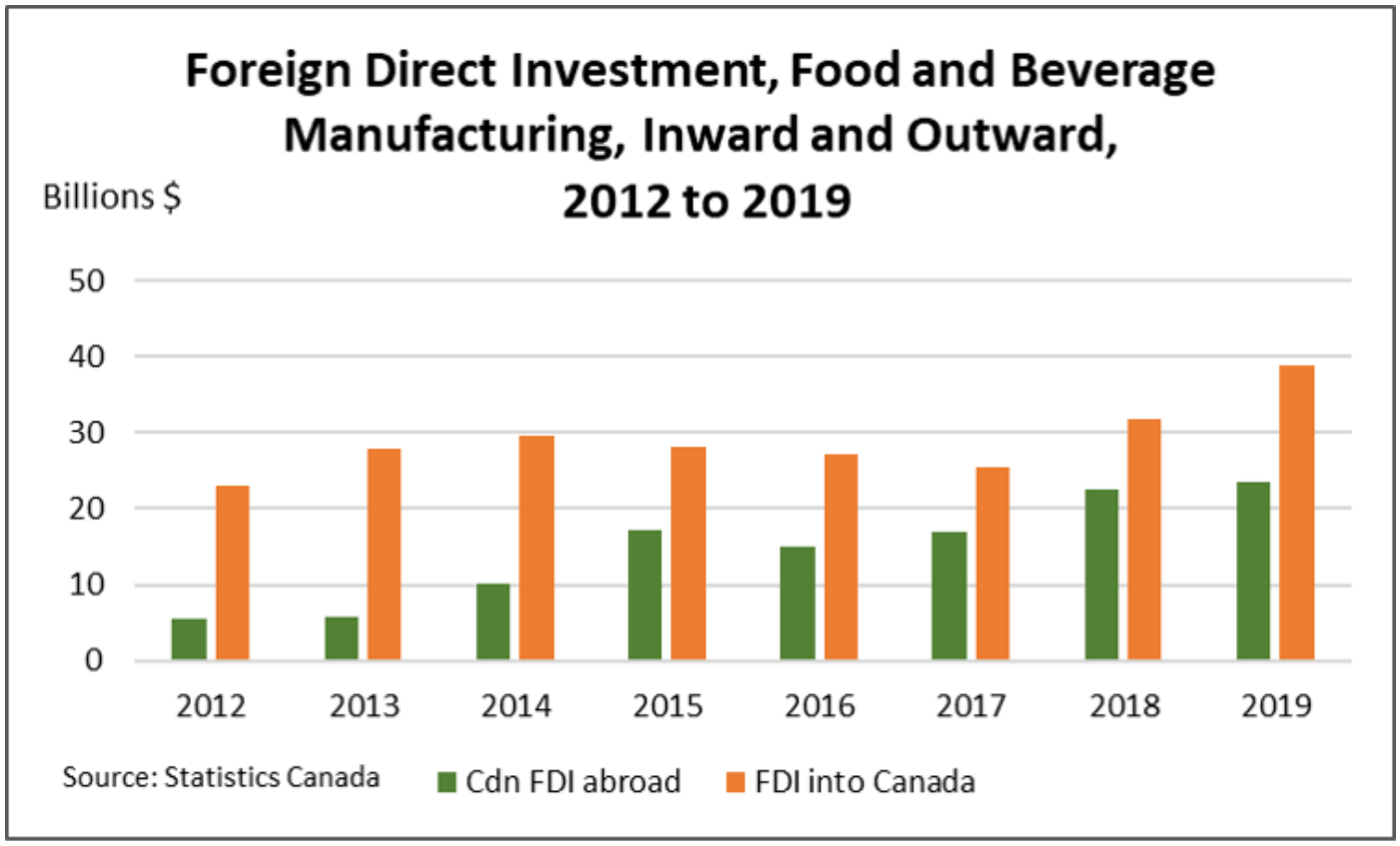


Source: Statistics Canada

- Canada's trade balance in higher value-added food products has improved over the past few years but still remains in deficit at -$6.5 billion.
- Two categories have shown particular improvement – cereal preparations and cocoa preparations, with trade surpluses of $1.1 billion and $0.1 billion respectively in 2020.
- While beverages and spirits has shown some improvement, the trade deficit for miscellaneous food preparations continues to worsen.
- COVID brought light to the need for stronger domestic value-added capacity in Canada and this will require more investment.

The Canadian food and beverage processing sector continues to attract inward FDI, but registers net outflows

Figure 11

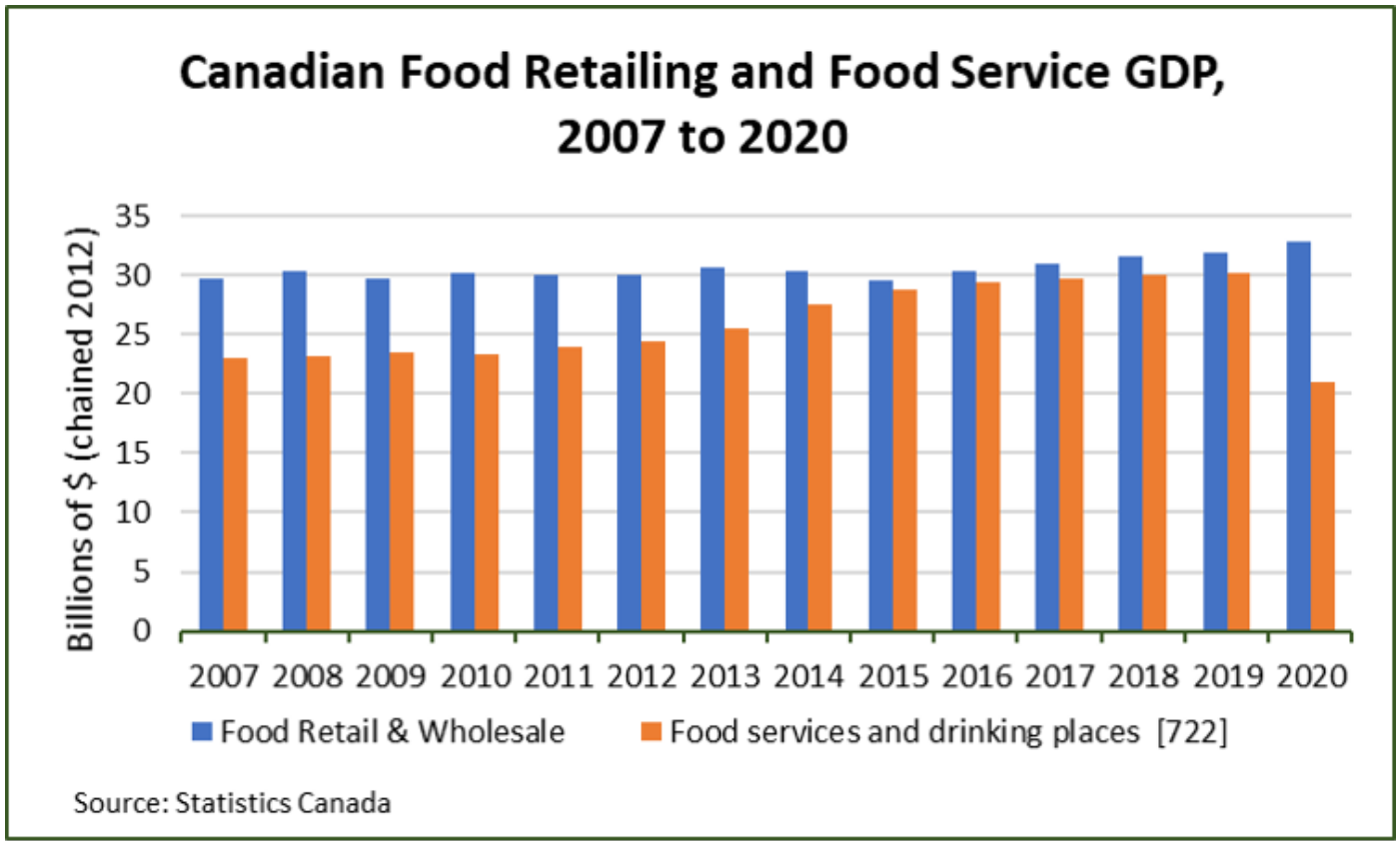


Source: Statistics Canada

- Foreign Direct Investment into Canadian food and beverage processing rose to $39 billion in 2019, up 22% over 2018.
- Increasingly, FDI into Canada originates from Europe, growing by 18% over 2018
- Canadian FDI abroad also rose in 2019 to $23 billion with most still destined for the U.S.
- Investments are needed to expand domestic value-added capacity in Canada.

The Canadian food service sector was adversely impacted by the pandemic while food retailing performed well in 2020

Figure 12



Source: Statistics Canada

- Foodservice GDP declined 30% in 2020 as the lockdowns forced restaurants to close in-house dining.
- Canadians turned to more grocery purchases while restaurants resorted to take-out, which was not enough to maintain sales.
- However, as costs rose to lure grocery store workers, cover the costs of extra Covid measures, margins thinned and retailers boosted fees to suppliers
- Strategies to introduce a retail code of conduct were discussed by industry and government

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