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# Food Security in the Wake of the Ukrainian Crisis: How Canada Can Play a Role

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Research  
Report



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## A Note from CAPI

The Russian invasion of Ukraine, and the corresponding disruption in food exports, has put an intense focus on agriculture and global food security. On March 9, 2022, the Canadian Agri-Food Policy Institute (CAPI) held a webinar to explore what the invasion means for farmers in Ukraine, Canada, and the global food system they both feed into.

This *Research Report* provides more context on the state of global food supply and demand, the role that Ukraine and Russia play supplying food for human consumption, feed for livestock industries in Europe and China and fertilizer to farmers around the world.

The report offers additional insight into the role Canada can play as the world shifts from the challenge of excess agriculture production keeping prices and profitability low, to a challenge of scarcity driving prices higher.

Finally, the report offers recommendations and considerations to inform the policy dialogue in Canada as the agri-food value chain considers how to respond to the unfolding food security crisis.

## Key Takeaways

- While Canada does not hold reserves of grain or land that can be put into immediate service to respond to the Russian invasion of Ukraine, there are short- and long-term actions Canada can take.
- Canada should develop a strategy to increase self-reliance for nitrogen fertilizers and continue to develop domestic sources of phosphate while advancing phosphate recovery from wastewater. The nitrogen fertilizer emission reduction target should focus on improving efficiency and addressing import dependency.
- A co-ordinated multinational effort will be needed to provide ongoing relief of wheat and other feedstuff supplies to countries most sensitive to the loss of Ukraine as a supplier.
- Canada needs to improve rail and port infrastructure and supply chain resiliency to be a more efficient and reliable supplier of food, feed, and fertilizer.
- Livestock producers in Europe who rely on feed grains imported from Ukraine are at risk, which may create opportunities for Canada. However, segments of livestock production in Canada are under significant economic stress today. Strategies should be put in place to support these industries during a possible transition.
- Canada must work with countries where food represents a relatively large share of household incomes to reduce the fallout of the Ukrainian invasion.



## Introduction

The Russian invasion of Ukraine has captured the attention of the world, sparking commentaries on humanitarianism, politics, and trade. Important aspects of the existing world order are suddenly shifting, giving rise to a crisis of death, destruction, and casualties in Ukraine. Secondary suffering, and the potential for additional conflict exists, related to food security as Ukraine is sidelined as an agri-food exporter and economic sanctions against Russia expand. This Research Report analyzes the implications of the Russo-Ukrainian conflict on agri-food trade, specifically Ukraine's production and export outlook for 2022 and beyond, and frames the issues facing Canada.

At the time of writing, Ukraine's grain and oilseed exports have ground to a halt, with terminals shut and ships fleeing the Ukraine Black Sea waters. At the same time embargos on Russia and Belarus have tightened an already short global supply of nitrogenous and potash fertilizer.

If the conflict endures or expands, surely agricultural production in Ukraine and the region will decline under hostile occupation. Moreover, Russia announced arrangements with China in early February 2022 to facilitate expanded exports of Russian wheat, which could ultimately redirect Russian wheat away from previous trading partners. Together, lower Ukrainian production and rerouted Russian exports could conspire to undermine the food security of countries most dependent upon Black Sea origin products.

The effects are already evident in sharp price spikes in cereals for human consumption, feed grains, and in the oilseed complex – with the volatility greatly stretching the financing demands of traders. However, the impacts will be most dramatic in the regional and local markets served by Black Sea origin product that will face much higher prices and limited access/availability. For many of these countries dependent upon imported grains and oilseeds, availability and affordability threatens the food

supply and raises concern of social and political unrest. It presents the spectre of secondary conflicts arising from food security in countries particularly dependent upon imports from the Black Sea.

Moreover, many purchasers of Ukrainian feed grains are livestock producers, and in some cases major meat exporters. With feed grain supplies from the Ukraine cut off, and feed prices in an upward spiral, livestock production in these feed grain importing countries could quickly become uneconomic, with a resulting decrease in supply and much higher prices for livestock and meat products assuming the rising meat prices do not seriously reduce demand.

In addition to the terrible human suffering in Ukraine, we must also try to keep the conflict from spreading and becoming a global food security crisis. Countries with an exportable surplus have both a moral and geo-political interest in understanding what role they can best play, and how policy could or should be adjusted accordingly.



For Canada, this means considering the following salient points:

- In the short term, for the Northern hemisphere, the acreage of winter wheat for this year is fixed; the acreage of spring wheat is not. Canada has the capacity to help supply countries most heavily reliant on lost Ukrainian supplies for 2022, and perhaps longer. Market signals are surely part of the solution and increasing wheat prices should support increased wheat acreage; however, a co-ordinated multinational effort may be required if there is a need to provide ongoing relief of wheat and other feed-stuff supplies to countries most sensitive to the loss of Ukraine as a supplier.
- Canada needs to invest in rail and port infrastructure to improve supply chain resiliency and its ability to be a more efficient and reliable supplier of food, feed, and fertilizer. This is not a new problem, but in a world more characterized by scarcity and strong demand pull, it is even more of a priority.
- Livestock industries that have grown dependent on feed grains imported from Ukraine are under stress. There may develop an opportunity for countries with comparative advantages and the security of domestic feed grain access, like Canada, to increase exports of livestock products.
- Canada finds itself in a position of importing Russian fertilizers—especially nitrogen—despite its extensive supplies of natural gas. But if fertilizers are inputs with strategic value in this environment, greater self-reliance is warranted. In nitrogen fertilizers greater manufacturing capacity can be built. We also need to lessen our strategic dependence on imported phosphate by encouraging the development of domestic mines and recovery of phosphate from wastewater.
- The risks engaged in global food security in this crisis may not be entirely captured by markets, as hunger in less developed countries readily leads to social unrest and, potentially, violence. The Ukrainian invasion and the apparent loss of staple supplies could spark secondary conflicts in the Middle East, North Africa, and elsewhere. There is a need for Canada and others to work with countries with food security risks related to the Ukraine war in order to help secure peace and prevent further conflict.

<sup>1</sup>As of mid-February 2022, Russian forces are massed at the Ukrainian border, and Russian troops have entered the Donbas region. A Russian invasion of Ukraine appears imminent.

# Ukraine as an Agri-Food Supplier

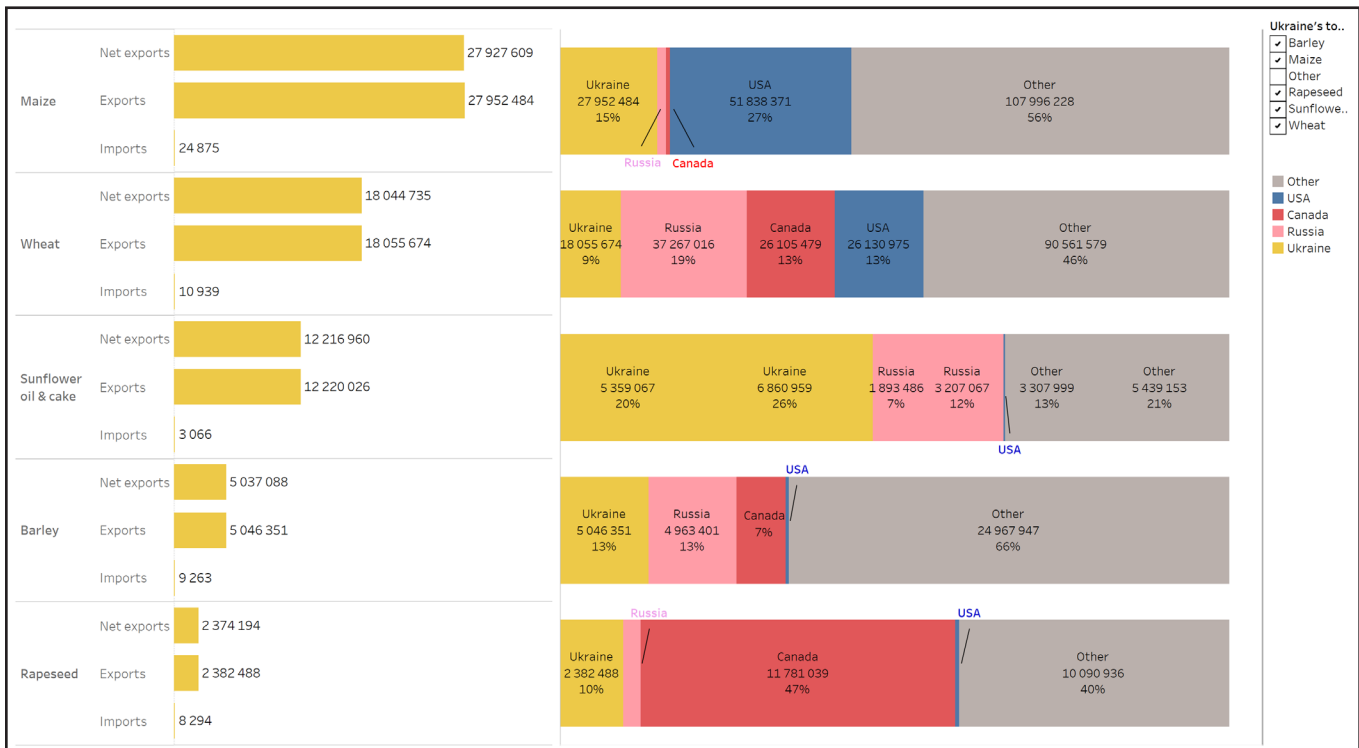
The top five agri-food exports by Ukraine are corn (maize), wheat, sunflower (as sunflower oil and sunflower oilcake), barley, and rapeseed. This is illustrated in Figure 1 using 2020 data from the United Nations Food and Agriculture Organization’s statistical database, FAOSTAT. Ukraine exported about 28 million tonnes of corn in 2020, or almost 15 percent of global corn exports. Wheat exports in 2020 were about 18 million tonnes, or

10 percent of global wheat export. When exports of sunflower oil and cake are combined, Ukraine represented about 46 percent of total global exports. Barley exports were 5 million tonnes, or about 13 percent of global exports. Ukrainian exports of rapeseed were 2.4 million tonnes, or 10 percent share of total exports.

Ukraine is thus a highly material exporter of staple food products – especially wheat and sunflower

oil – and also feed grains (corn and barley). Moreover, the product exported by Ukraine is overwhelmingly Ukrainian-origin; this can be seen by comparing exports and net exports of each commodity, which are nearly identical. The implication is that, in general for these products, there is little importing by Ukraine for the purpose of re-exporting, and Ukrainian exports are manifest from the Ukrainian agricultural production system.

Figure 1. Ukraine’s Top 5 Exports by Volume (2020)



Source: Created by CAPI using Tableau and FAOSTAT data







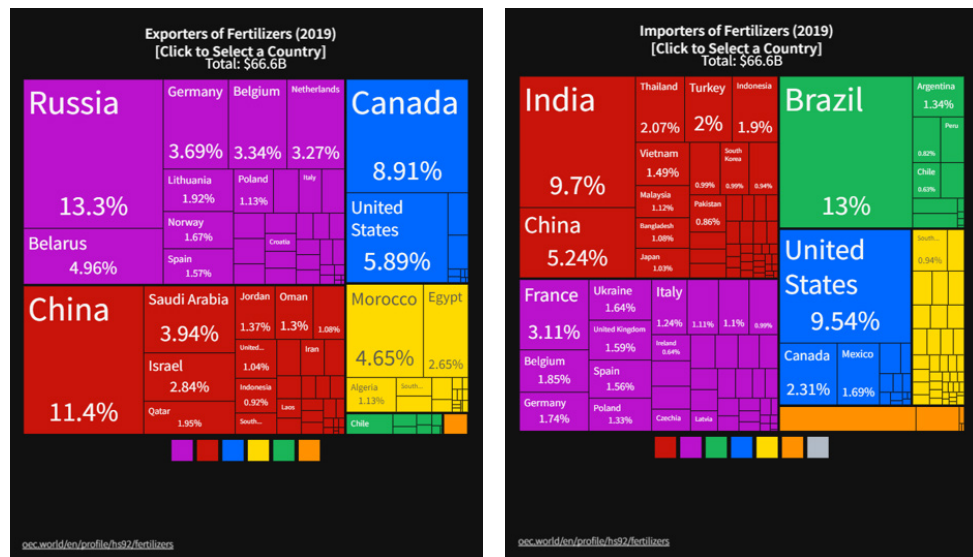
### d) Fertilizer as a Spillover Effect

Many of the major exporters of grains and oilseeds rely heavily on imported fertilizers; Russia is a world leader in fertilizer exports, followed by Canada, China, and the United States (see Figure 5 below). An impact of the conflict in Ukraine has been to interrupt the logistics of major suppliers Russia and Belarus through the Black Sea and elsewhere. Moreover, as many countries have revoked Most Favoured Nation (MFN) status from Russia in retaliation for the invasion, new duties or other restrictions apply to Russian exports. This is significant as Russia is the largest exporter of fertilizers, and the major importers of fertilizers include the largest producers and exporters of grain.

Figure 5 provides an overview, based on 2019 data. Russia was the largest exporter followed by China and Canada. Brazil, India, the US and France were the largest importers. Figure 5 presents fertilizer trade as an amalgam of products; this is fragmented in Figure 6. Figure 6 shows that, in 2019, trade in urea and potash (potassium chloride) were the largest components of trade in fertilizer and were approximately the same size in value terms (\$14B and \$14.5B). Russia is a major exporter in both of these products; therefore, the Russo-Ukrainian conflict will threaten urea and potash exports, and in turn, 2022 crop yields in India, Brazil, the US, and elsewhere.

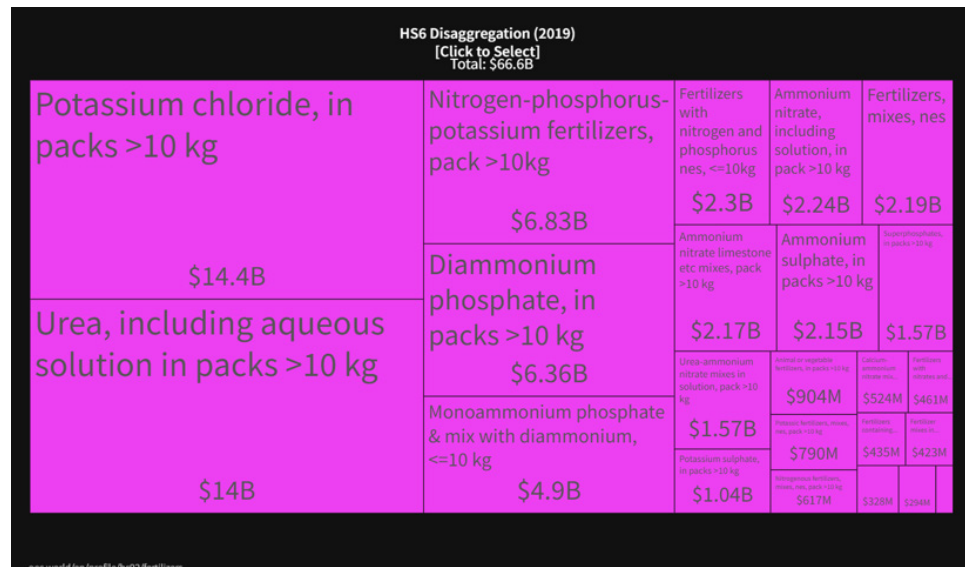
**Figure 5. Overview of Fertilizer Importers and Exporters, 2019**

Source: Observatory of Economic Complexity (OEC)



**Figure 6. Trade in Fertilizers by Product Type, 2019**

Source: Observatory of Economic Complexity (OEC)



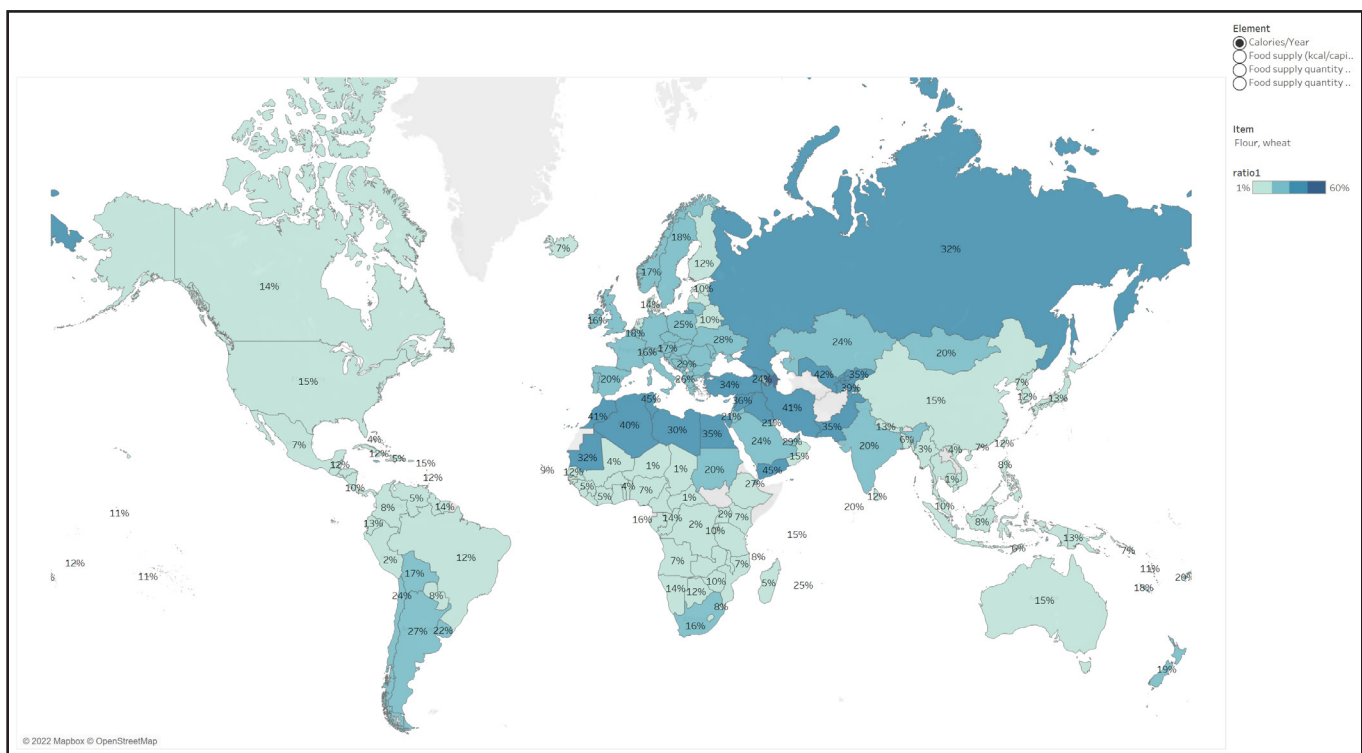
# Food Security

The information presented above helps to frame an understanding of the effects of the war, and whose food supply may be at risk most immediately. The disruption from the Russian invasion will impact core staple food products – notably wheat and sunflower oil. Because Ukraine is such a large exporter of these products this would

be serious enough; however, the situation is actually more serious because the countries most dependent upon Ukraine as a source of imports for foodstuffs – notably wheat – are also among the most highly dependent on wheat as a source of dietary calories. This can be seen in Figure 7 below. North Africa and the Middle East have a

relatively high proportion of total calories available for human consumption: commonly 35–40 percent, obtained from wheat flour. This compares with North American and Western European countries, with a share of calories from wheat flour of mostly 15–20 percent.

**Figure 7. Share of Total Calories Obtained from Wheat Flour**



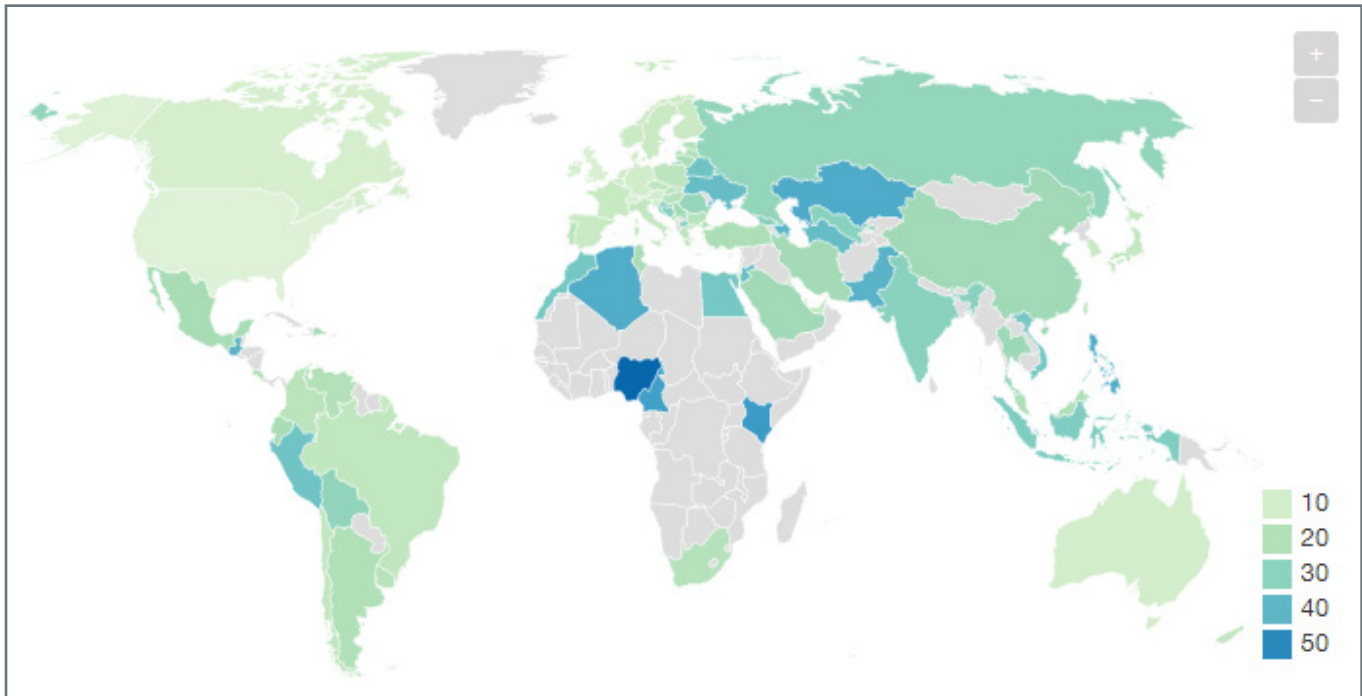
Source: Created by CAPI using Tableau and FAOSTAT data

Moreover, households in many of these same countries spend a relatively high proportion of income on food. Figure 8 provides an indication. The figure shows that, in key national markets previously

served by Ukraine, consumers have been spending up to 30–40 percent of household income on food. This underscores the sensitivity to food price inflation in these countries. The dependence upon Ukraine for

feed grains – corn and barley – is more extensive, with China and several European countries dependent upon Ukraine as an import supplier.

**Figure 8. Percentage of consumer expenditure spent on food that was consumed at home by selected countries, 2015**



Source: <https://www.weforum.org/agenda/2016/12/this-map-shows-how-much-each-country-spends-on-food/>

Imports of feed grains support livestock and meat production in some countries; the sudden loss of access to imports from Ukraine could weaken the base for production and exports. In turn, this could pressure a realignment in global meat production and export. For example, two of the countries most dependent upon Ukraine as a source of feed grain imports are Spain and the Netherlands. In 2020, Spain was the third largest net exporter of pork (by tonnes), just ahead of Canada. The Netherlands was the fourth largest net exporter (tonnes) of poultry in 2020. Both countries are grain and oilseed deficit but have grown their meat industries shielded from non-EU competition. To the extent that large imports of Ukrainian corn and barley are no longer available the

surging feed prices could render these industries uneconomic, and it creates an eventual spill over into meat markets, favouring regions that have abundant feed for animal production potentially, and also driving up meat prices once the initial herd downsizing response is complete. This creates an indirect food security problem attributable to the conflict.

The impact on trade in fertilizers will impair production capacity. There are clear logistical challenges and risks from the Black Sea, even if Russian ports remain open. Elsewhere NATO allies have barred use of some ports for exports of Belarussian potash<sup>1</sup> which will need to be rerouted through Russian ports, increasing congestion and cost and reducing access for importing countries. Moreover, as countries

revoke MFN status for Russia, imported Russian fertilizers could become much more expensive, cause trade diversion through rerouting of product, and limit economic use.<sup>2</sup> This would undermine crop yields in parts of the world in this critical growing season; in a span of only a few months it will impact major Southern Hemisphere agricultural exporters as well.

As this war in Ukraine intensifies the risks to global food security increase. Many countries are monitoring or outright prohibiting export of grains or vegetable oil. Countries under most immediate threat of shortages are trying to nail down physical stock. Others such as Kenya are learning from the crisis and planning to build increased capacity for grain storage.

<sup>1</sup> <https://www.bloomberg.com/news/articles/2022-01-12/belarus-loses-key-potash-transit-route-through-lithuania?sref=ZcpONEpZ>

<sup>2</sup> Canada revoked MFN status for Russia and Belarus in early March, resulting in a general 35 percent tariff on products of those countries, in addition to existing tariffs <https://www.reuters.com/world/what-revoking-russias-most-favoured-nation-status-means-2022-03-11/>

Even prior to the war, the world was looking to 2022 to provide a plentiful harvest that could reverse the trend of increasing global food prices and declining stocks. However, there were already sobering

headwinds — fertilizer pricing and availability were already a concern, and there were worries about short South American crops and a poor Chinese wheat crop, and the Canadian prairies and Northern US

plains experienced a disappointing harvest in 2020. The global food security situation is now more complicated and urgent.

## Interpretation

The above provides some background in the developing situation in which there are many unknowns and many shoes left to drop. However, some of the knowns can be placed in sharper focus:

- The exports from Ukraine are almost entirely of Ukraine origin products, and not imported product that is subsequently exported. So the prospect of agri-food exports from Ukraine going forward depends almost exclusively on Ukrainian agricultural output.
- Ukrainian ports are closed; other ports on the Black Sea are not. Exports of product from Russia, Moldova, Romania, and Bulgaria can continue to move through the Black Sea ports of these countries. The risks of marine transport in a zone of conflict may limit the export from non-Ukrainian Black Sea ports, but these are not prohibited.
- A growing number of countries have introduced sanctions against Russia that effectively prohibit imports from Russia. These include barring Russia from using the Society for Worldwide Interbank Financial Telecommunications (SWIFT) system.
- In retaliation, Russia has banned (or is considering banning) exports of some of its own products to the rest of the world. Most notably, Russian wheat, rye, barley, and corn may be withheld inside Russian borders until June 30, 2022.<sup>3</sup>
- Meanwhile, countries are hoarding their own foodstuffs and feedstuffs: Moldova, Hungary, and Serbia have banned their own grain exports; Indonesia is slowing its exports of palm oil<sup>4</sup>; and Argentina has stopped exporting its most recent crop of soybean meal and oil.<sup>5</sup>
- The overwhelming proportion of the Ukrainian wheat crop is winter wheat, which has already been sowed. The availability/access to fertilizer and pest management inputs to tend to these crops, and what conditions will be like to harvest and market the 2022 crop in an active conflict situation is unknown. This serves to undermine wheat yields, but not the acreage. Ukraine is very close to its planting season for corn, sunflower, rapeseed and other spring-sown crops. It is entirely unclear the extent to which spring crops will be planted, tended, etc.
- It is unknown the extent of damage sustained by processing plants and grain handling facilities (including port terminals) and the various aspects of infrastructure used in agricultural marketing — roads, railways, etc.
- There remains significant volumes of crops harvested in 2021 in store in Ukraine. Figure 9 below provides an estimate. It appears that, as of the time of the invasion, there remained about 6 million tonnes of wheat yet to ship for export, and about 14.5 million tonnes of corn.

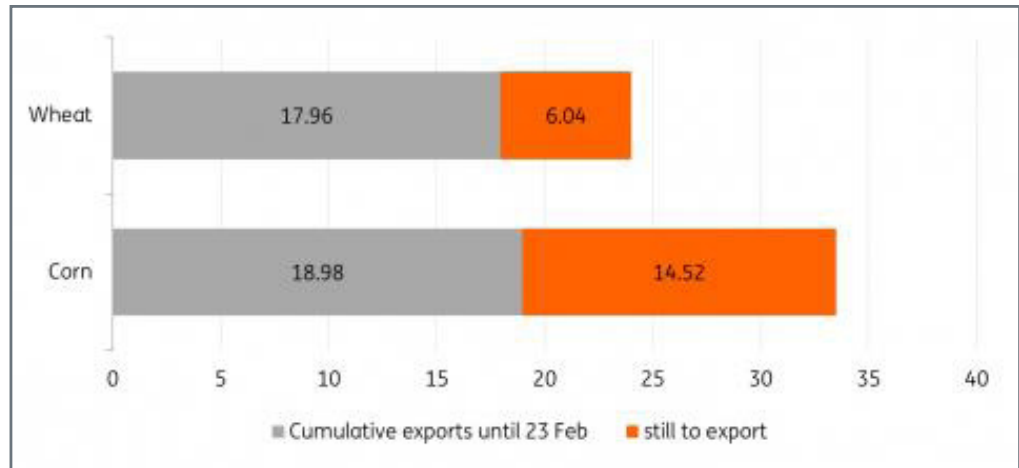
<sup>3</sup> <https://www.agri-pulse.com/articles/17359-russia-mulls-temporary-ban-on-wheat-rye-barley-corn-exports>

<sup>4</sup> *Supply Chain Latest: Food Protectionism Threat to Crop Trading* — Bloomberg

<sup>5</sup> <https://www.reuters.com/article/us-grains-argentina/argentina-halts-export-registration-for-soy-oil-meal-idUSKCN2LB01Q>

**Figure 9. Estimated Year to date Exports of Ukrainian Corn and Wheat, Volumes Remaining to Export (tonnes)**

Source: The Middle East North Africa Financial Network, Inc. (based on Ukraine Government, USDA, and ING Research)



For now, the prospect exists of significant volumes of grain stranded in Ukraine; the likelihood of lower wheat yield and production in 2022 given that the crop is planted and growing; the likelihood of dramatically lower acreage, production, and yield of corn, sunflower, barley and rapeseed (not yet planted); and zero exports of the new crop, pending resolution of the conflict and the damage done to handling facilities and infrastructure in Ukraine.

Thus, for the past export customers of Ukraine for these crops, 2022 looks bleak. Moreover, it is not a stretch to think that the existing volumes in store and 2022 production may be needed in Ukraine to feed the remaining domestic population. Alternatively, if surpluses are available from the 2022 crop, in the parts of Ukraine that remain occupied by Russia the likelihood exists that

under the enhanced terms of trade with China, surplus product would be exported to China rather than Ukraine’s Middle East and North African regional export customers.

While Russian ports remain open to exports of fertilizer logistics will surely be hampered and trade actions taken by western countries will limit actual exports of Russia and Belarus. This stands to impact crop production in many parts of the world, including major exporters.

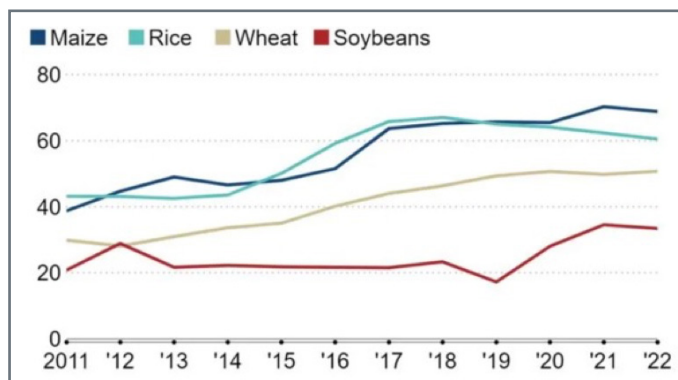
In fact, the situation looks bleak for the world, as evident in stocks available to cushion the lost export supplies from Ukraine. The FAO data show that, since 2017/18, world cereal stocks have been unable to increase (despite material increases in global production). However, the share of global stocks held in exporting countries – and easily

redistributed to offset scarcity – has fallen to a decreasing proportion of stocks. China – a large producer of cereals but also a large net importer – holds an increasing proportion of global stocks.

Figure 10 provides the evidence. China has long held large public stocks of major grains, but this has recently increased, notably for wheat and corn, such that China holds about 50 percent of global wheat stocks, and over 70 percent of global corn stocks. It must be assumed that these stocks are held by China for China, and will not be redistributed elsewhere. This then leaves us in a situation of declining global cereal stocks and with only 50 percent of the wheat stocks and about 30 percent of the corn stocks available to fill in the gaps of desperate need and hunger.

**Figure 10. China’s share of global grain stocks (in percent; crop year)**

Source: Nikkei analysis based on USDA data



# Canada's Situation

Canada occupies the role of a middle power in agri-food, with significant capacity for export of certain products — especially canola, pork, wheat, and pulse crops. Importantly, the overwhelming majority of Canada's crops are spring-seeded, meaning that the acreage for 2022 is not yet determined (although this is only weeks away).

However, by itself Canada cannot fill the chasm in agri-food trade and food security opened up by the conflict in Ukraine. The largest exports of Ukraine, in terms of both volume and relative significance, are corn and sunflower product. Canada is largely trade balanced in corn, and certainly cannot be counted upon as a major exporter of corn. Canada is not a major

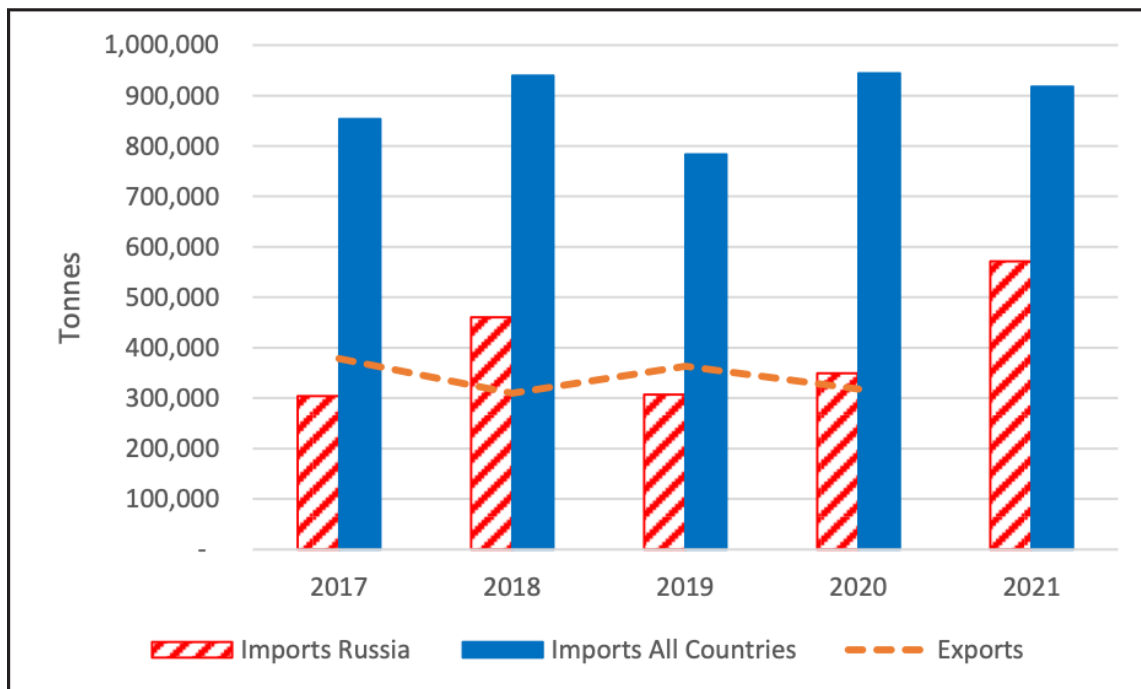
producer nor exporter of sunflower products.

Canada has been a major exporter of wheat, and western Canada overwhelmingly produces spring wheat, so the acreage is not yet determined. However, spring wheat is not a perfect substitute for winter wheat, and between 2019 and 2022 wheat acreage in Canada declined 6.5% while canola acreage increased 8.2%.<sup>6</sup> With prices of both canola and wheat exceptionally high, it is unclear that producers in the west would shift large acreages to wheat and away from canola.

Canada also faces risks. While Canada is a major exporter of fertilizers, and the largest exporter of potash, it is an importer of Russian

nitrogen fertilizers, especially into eastern Canada. The situation is illustrated in Figure 11 below for urea. Canadian imports of urea have ranged around 800,000–900,000 tonnes, with exports of around 350,000 tonnes. However, of Canadian urea imports, imports from Russia are material, most recently 571,000 tonnes. Restriction of access to Russian urea could thus be problematic, especially in Eastern Canada, and the imposition of a 35 percent duty from the revoking of MFN status for Russia will make this product very expensive, and/or create some risk of reduced access to urea due to re-routing of cargoes — unless alternative arrangements can be made.<sup>7</sup>

Figure 11. Canadian Imports and Exports of Urea



Source: Statistics Canada CIMT 3102.10.00.00 — Urea, whether or not in aqueous solution, in packages weighing more than 10 kg

<sup>6</sup> <https://www150.statcan.gc.ca/n1/daily-quotidien/210629/dq210629b-eng.pdf>

<sup>7</sup> A complication is that Canada has also banned Russian-owned cargo ships and fishing vessels from Canadian waters <https://www.canada.ca/en/transport-canada/news/2022/03/government-of-canada-prohibits-russian-ships-and-fishing-vessels-from-entering-canadian-ports-and-internal-waters.html>

# Conclusion

Canada will not solve the problems of the Ukraine crisis, and will experience challenging food inflation and disruption. However, there are some actions that Canada can take. It is remarkable that with its reserves of natural gas, Canada finds itself in a position of importing Russian fertilizer. In a high energy cost, more geo-politically unstable world fertilizers are emerging as commodities with high strategic value. Canada is already the largest exporter of potash, surely greater self-reliance in nitrogen fertilizers could be built, and a strategy to source imported phosphates developed. The nitrogen fertilizer emission reduction target announced by the federal government is an opportunity to focus on improving fertilizer efficiency – with import dependency an aspect.

For 2022, the northern hemisphere acreage of winter wheat is fixed; the acreage of spring wheat is not. As a jurisdiction with material capacity to supply wheat exports, there may be an opportunity for Canada to help supply countries most heavily reliant on lost Ukrainian supplies for 2022, and perhaps longer. However, this is

not at all straightforward. Markets are surely part of the solution and increasing wheat prices should support increased wheat acreage; however, many of the same forces are pressuring canola prices higher, potentially frustrating or confusing a supply response. A co-ordinated multinational effort may be required if there is a need to provide ongoing relief of wheat and other feedstuff supplies to countries most sensitive to the loss of Ukraine as a supplier.

Canada needs to invest in rail and port infrastructure to improve supply chain resiliency and its ability to be a more efficient and reliable supplier of food, feed, and fertilizer. This is not a new problem, but in a world more characterized by scarcity and strong demand pull, it is even more of a priority.

There are important risks facing European livestock industries that have been based on feed grains imported from Ukraine. If these go into decline, there may develop an opportunity (and indeed a global demand) for countries with comparative advantages and the security of domestic feed grain access

to increase livestock production. Yet, segments of livestock production in Canada are under significant economic stress today, and governments need to be looking at how to support these industries during a possible transition. In a global shift toward more market oriented and competitive livestock production systems, Canada could be well positioned – recognizing the need for both renewal and new investment, and mechanisms of risk mitigation to support investment.

Ultimately, the risks engaged in this effort – food security – may not be entirely captured by markets. Hunger in less developed countries readily leads to social unrest, bread riots, and revolutions. The terrible irony is that the food security issues – already in existence but further sparked by the Ukrainian invasion – could spark further secondary conflicts in the Middle East, North Africa, and elsewhere. Thus there is a need for Canada and others to work with countries where food represents a relatively large share of household incomes to reduce the fallout of the Ukrainian invasion.

