



FCC Ag Economics
Canadian Agriculture's
Productivity and Trade

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Farm Credit Canada
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Introduction

2016 has been hard on confidence in globalization and world trade. Widespread political instability has helped underscore the importance of Britain's June vote to exit the European Union (EU). Brexit threw the markets into turmoil and raised questions about European trade flows in a post-Brexit world – questions that matter to Canadian agriculture and agri-food exporters. [Europe is Canada's only major crop export market sensitive to exchange rate fluctuations.](#)

Other developments have already displaced, or threaten the future stability of, Canadian agriculture exports. New players in South America, Asia and the Black Sea region are emerging as producing/exporting competitors to Canada. More regional and bilateral trade agreements have the potential to re-arrange trade flows. The EU proposes to ban imports of lobsters from Canada and the U.S., and Russia's import ban on food products from Western countries continues to disrupt export markets.

Despite the turmoil, the global economic climate in 2016 remains positive for Canadian exporters of agriculture commodities and agri-food products. The Bank of Canada's October Monetary Policy Report projected 2016 global growth of 2.8%, rising to 3.2% in 2017. This will help to spur additional demand. Canada, as one of the world's largest exporters, can capitalize on that growth.

The Canadian dollar is also expected to stay below its five-year average value against the USD in 2017. Strength in the USD generally leads to a better Canadian trade position in

agriculture and agri-food sectors. That is in no small part because virtually all of Canada's livestock (i.e., hogs and cattle) exports and a majority of agri-food exports go to the U.S. A stronger USD also means higher cash receipts from commodities priced in USD.

With new and developing trade patterns, both within Europe and elsewhere, FCC's annual global trade report, *Canadian Agriculture's Productivity and Trade*, examines underlying success factors of several of the world's largest agriculture exporters to determine how Canada can best maintain its exporting performance in the changing landscape.

Historically, gains in productivity have been able to fuel growth in production and exports. Additional productivity gains are needed for Canada to be able to increase exports in response to the world market's growing demand for agriculture commodities and agri-food products. But increases in land use are no longer available and rising commodity price volatility threatens profits. Furthermore, advances in agriculture technology are slowing. This suggests current productivity gains will be unable to sustain momentum in the changing global trade environment.

The health of export-dependent Canadian agriculture will rely on both investments in productivity gains and minimizing costs through efficiency measures. Focusing on producing more while maintaining a competitive position will ensure Canada's continued ability to grow the supply necessary to meet world demand.

Global competitive landscape – agriculture exports¹

Exports are the foundation of Canada's success as an agriculture producer. With a small population and vast arable land, we must export the production we can't consume.

Canada was the world's largest exporter of wheat, canola, lentils and canary seed in 2015. It ranked among the top 10 exporters of 13 different agriculture commodities. Only France shipped more live cattle in 2015, and Canada counted among the top five exporters in no less than six other commodity categories (oilseeds, cereals, soybeans, barley, edible vegetables and live hogs).

In 2015, the top 10 countries exporting agriculture commodities accounted for more than 57% of all exports, for a total of US\$262.7 billion. Canada ranked as the fifth largest agriculture exporter overall, behind the U.S., China, Netherlands and Brazil (Figure 1). Canadian exports amounted to US\$26.1 billion, or 5.7% of world exports.

The U.S. was by far the world's largest single-country agriculture exporter in 2015, with 14.8% of global exports worth US\$118.7 billion.

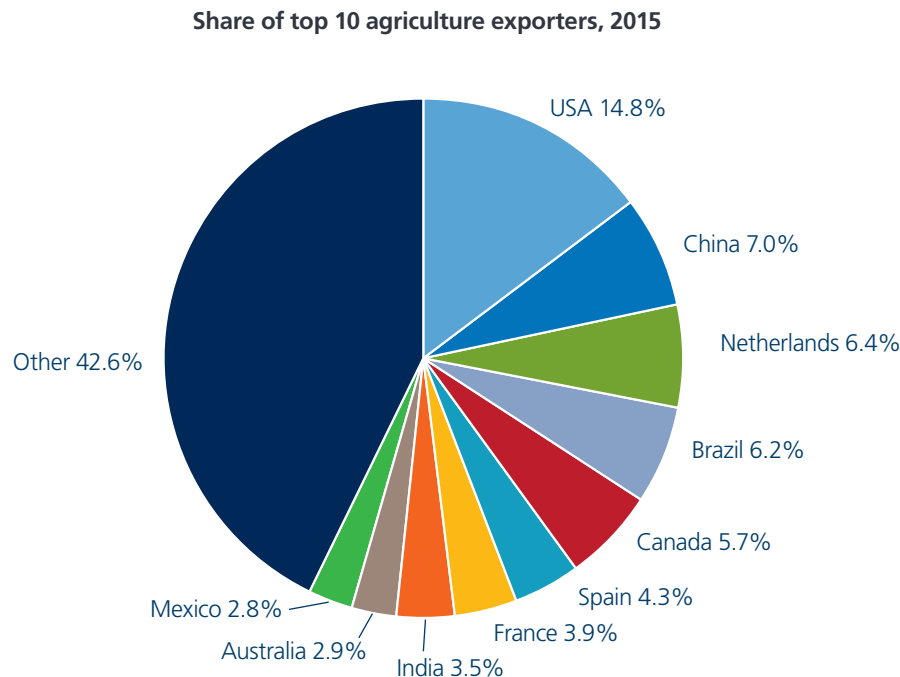
Should the European Union (EU) be considered a single entity when it comes to trade?

Previous editions of FCC's annual trade report (A Look at Global Trade) have focused on the EU as a single trade entity. The Union was created for the purpose of aligning and stabilizing the area politically and economically: a key feature, the open movement of goods, services and labour across borders, promised to provide the unity that was missing prior to the Second World War.

While one of the EU's greatest strengths is its relatively open borders, they helped to provoke some of the tensions underlying Britain's vote to leave. Brexit has, perhaps more than anything else, underscored the reality that the EU is comprised of autonomous member states. Canadian exporters negotiate sales in specific countries, each with its own food preferences and culinary traditions.

The three European countries in the top 10 exporters (Netherlands, Spain and France) highlight the scope of the trade levels within the EU. Agriculture trade among these three countries (exports and imports combined) totaled US\$119.2 billion or 13.1% of global agriculture trade in 2015. The Netherlands alone accounted for 6.4% of total trade.

Figure #1: Canada was the world's fifth largest agriculture exporter in 2015



Source: UN Comtrade

¹ 2016 **Canadian Agriculture's Productivity and Trade** defines agriculture trade as HS codes 01 (live animals), 03 (aquaculture), 06 (live plants, etc.), 07 (edible vegetables), 08 (edible fruit), 10 (cereals), 12 (oilseeds), 14 (veg plaiting)

Global competitive landscape – agriculture imports

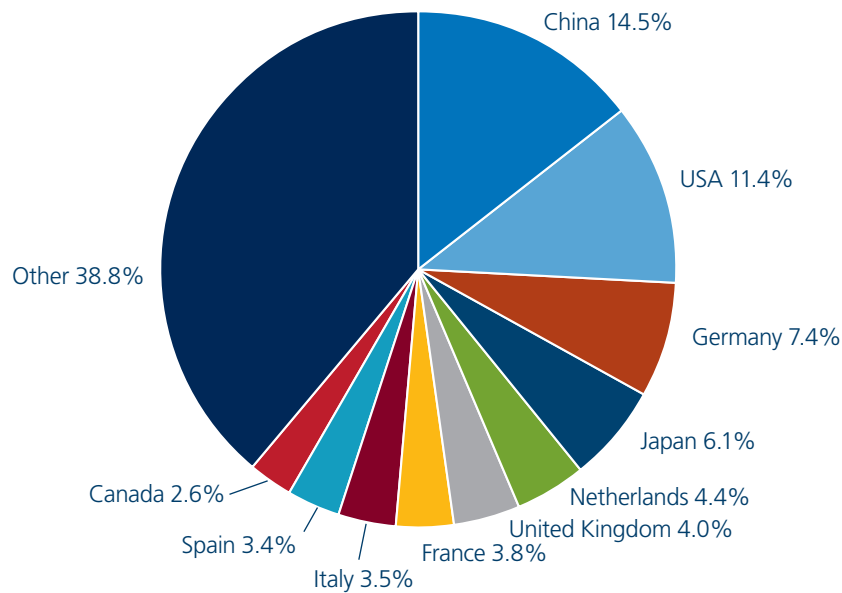
In 2015, the top 10 importers of agriculture commodities accounted for 61% of all imports, for a total of US\$275 billion. Canada was the world's 10th largest importer with 2.6% of global imports worth US\$11.6 billion (Figure 2).

China outranked all importers, with 14.5% of agriculture imports (US\$65.1 billion). Together with U.S. imports of US\$51.1 billion, the two countries accounted for 25.9% of all agriculture imports in 2015.

Germany, Japan, United Kingdom and Italy are not major agriculture exporters, but make up a combined 21.1% (or US\$94.7 billion) of agriculture imports.

Figure #2: Canada was the world's tenth largest agriculture importer in 2015

Share of Top 10 agriculture importers, 2015



Source: UN Comtrade

Agriculture traders: per capita rankings

Figure 3 shows Canada's performance as a per capita trader. In the figure, each country's trade values are weighted by its population (35.1 million for Canada in 2015). Net exporters are countries whose exports exceed their imports (located below the dashed line in Figure 3).

As a net exporter, Canada still imports high values of agriculture commodities. Exports and imports combined to lift Canada into the world's number-two spot among traders of agriculture commodities on a per capita basis, with total agriculture trade worth US\$1,074 per person in 2015.

Canada placed behind Netherlands (US\$2,894 per person in total trade values). Australia, with total trade values of US\$697 per person, was third.

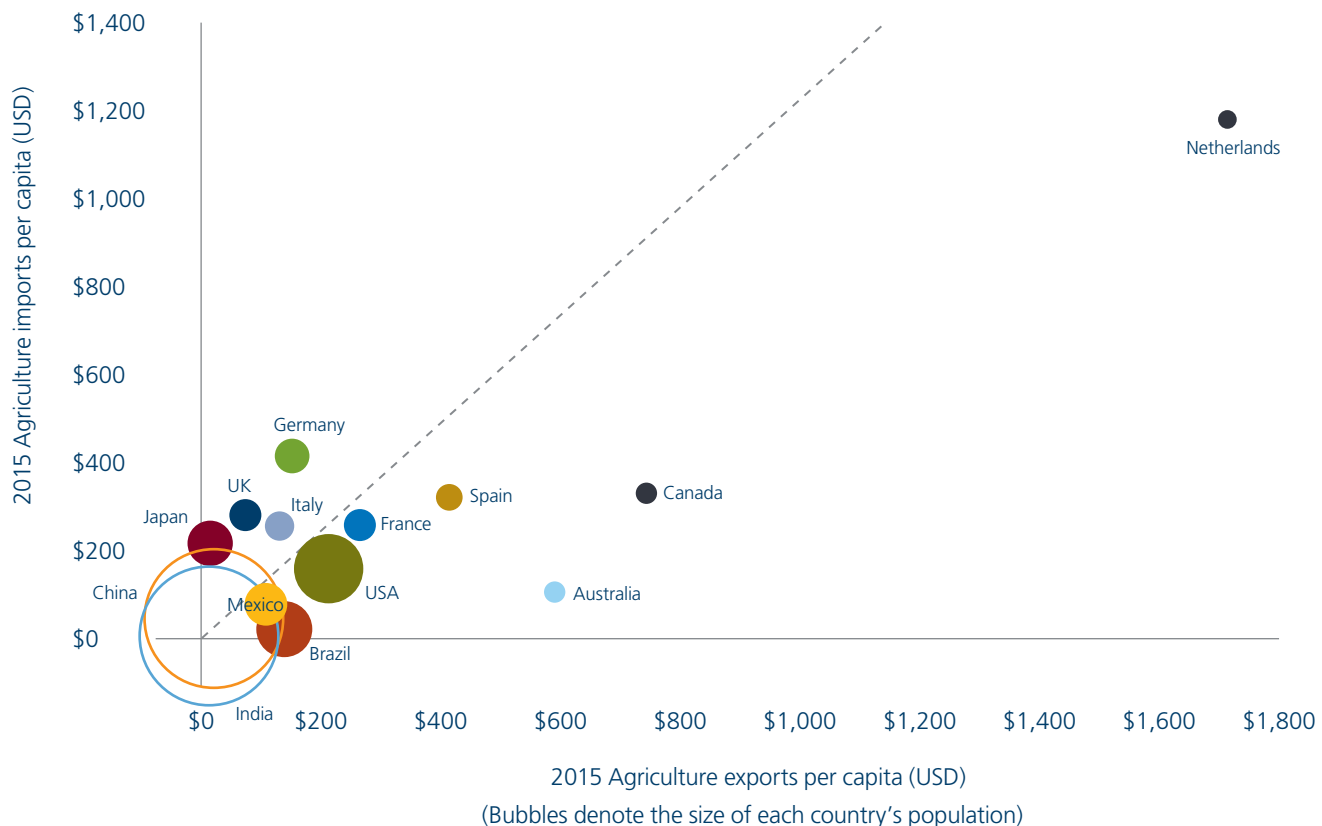
Figure 3 highlights the dominance of individual European exporters in world agriculture markets. It also emphasizes the success of the Netherlands and Australia. With small

populations (under 17 million), each country ranks highly as an exporter among major producers, some with much larger populations.

In 2015, the Netherlands was the world's largest exporter of live hogs and live plants, principally bulbs. It was also the second largest exporter of edible vegetables. Well-integrated into European supply chains, the Netherlands' open economy relies on the country's proximity to a vast and wealthy market. Rotterdam is Europe's largest, and the world's sixth largest, port. There is easy access to the German market, the world's third largest importer of agriculture commodities and the world's second largest importer of agri-food products.

Australia was the world's second largest exporter of canola seed, legumes and barley, and it was the third largest exporter of wheat and live cattle. Underscoring their importance as an exporter to Asia, Australia was also the world's seventh largest exporter of rice, with total sales in 2015 amounting to US\$300 million.

Figure #3: In 2015, Canada was the world's second largest agriculture trader per capita



Source: UN Comtrade, US Census International Database, FCC calculations

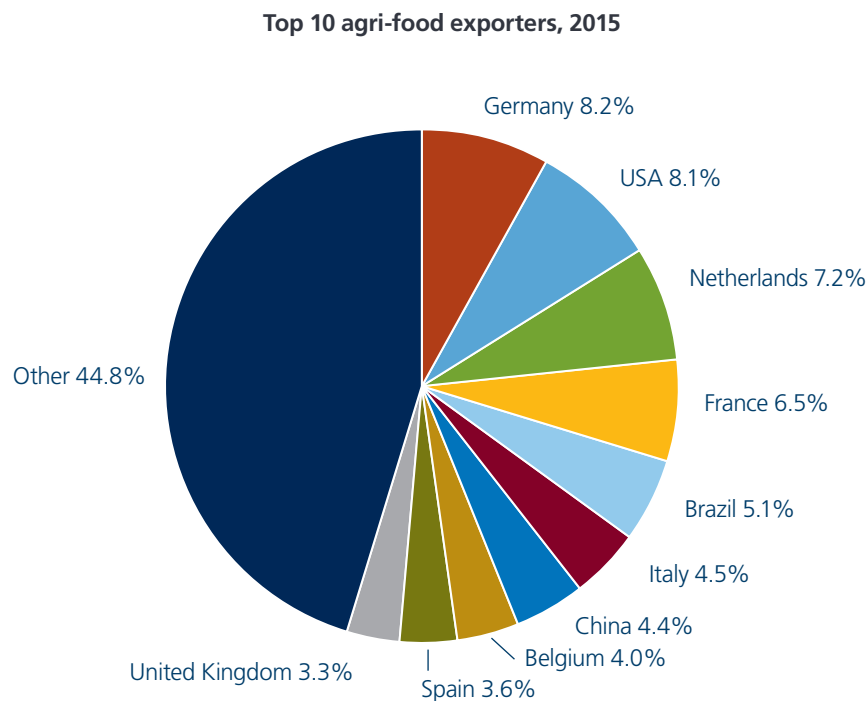
Global competitive landscape – agri-food exports²

In 2015, the top 10 countries exporting agri-food products accounted for more than 55% of the world's exports, for a total of US\$380.9 billion (Figure 4).

Canada is also a prominent agri-food trader, ranked the 11th largest agri-food exporter with exports of US\$19.1 billion, or 2.8% of total global exports in 2015.

The origins of exports are less concentrated for agri-food products than for primary agriculture commodities. Germany and the United States vied for top spot in 2015, with a combined total of US\$113.1 billion (16.3% of total agri-food exports). The Netherlands was the third largest agri-food exporter.

Figure #4: Agri-food exports less concentrated than other trade categories



Source: UN Comtrade

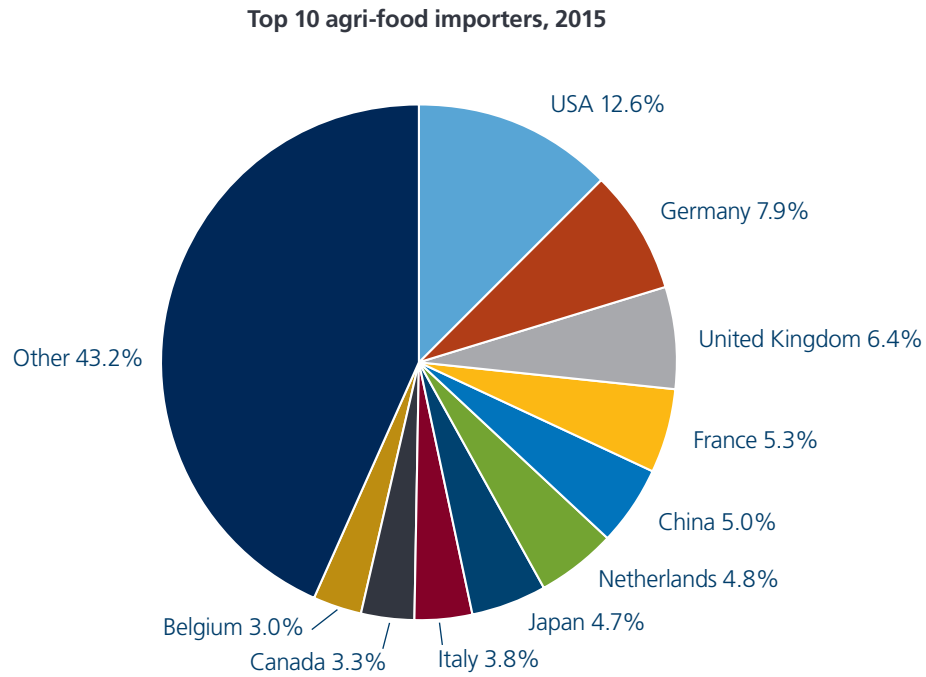
² 2016 **Canadian Agriculture's Productivity and Trade** defines agri-food trade as HS codes 02 (meat), 04 (dairy), 09 (coffee), 11 (milled products), 13 (lac, gums and resins), 15 (fats), 16 (preparations of meat), 17 (sugars), 18 (cocoa), 19 (preparations of cereals), 20 (preparations of vegetables), 21 (miscellaneous edible products), 22 (beverages)

Global competitive landscape – agri-food imports

In 2015, the top 10 agri-food importers accounted for 56.8% of all imports, or US\$380 billion. Canada captured 3.3% of global imports of agri-food products worth US\$22.3 billion (Figure 5).

The United States outranked all other importers, with 12.6% of global imports worth US\$84.4 billion. Six European countries accounted for 31.1% of global agri-food imports in 2015.

Figure #5: The U.S. and Europe dominate imports of agri-food products



Source: UN Comtrade

Agri-food traders: per capita rankings

As in its trade of agriculture commodities, the Netherlands was the world's largest per capita agri-food trader in 2015 (Figure 6).

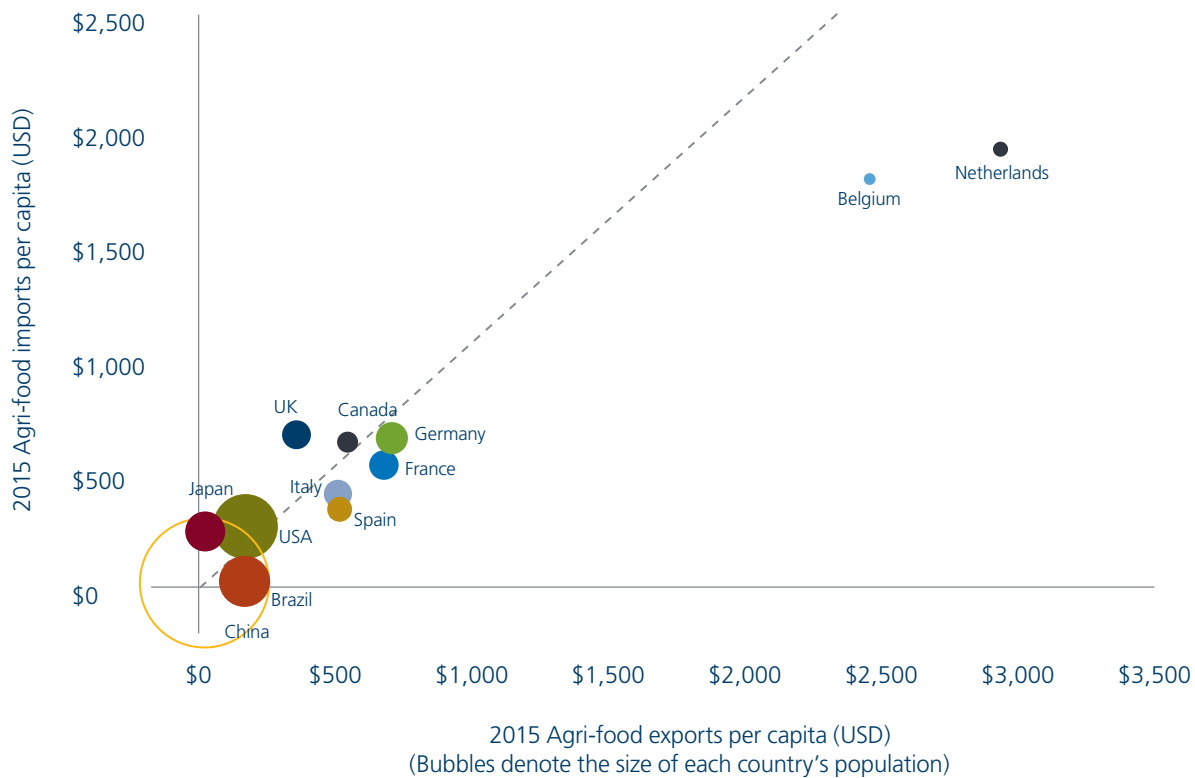
The Netherlands had total agri-food trade values of US\$4,850 per person in 2015. About one-third of the Netherlands' trade within Europe goes to Germany. Another 40% of Dutch agri-food trade occurs in Belgium, Luxembourg, France and the U.K.

Meat and dairy were the Netherlands' largest agri-food exports to EU trade partners. These contributed to export values of US\$2,936 per person in 2015. Import values of US\$1,914 per person were based on imports of dairy, meat, and grain preparations; much of these were used in value-add industries.

Belgium is another trade stand-out. Its population of just over 11.3 million traded agri-food products valued at US\$4,240 per person.

Canada was the world's fifth largest per capita trader, with total trade values of US\$1,181 per person.

Figure #6: The Netherlands and Belgium: powerhouse traders of agri-food products



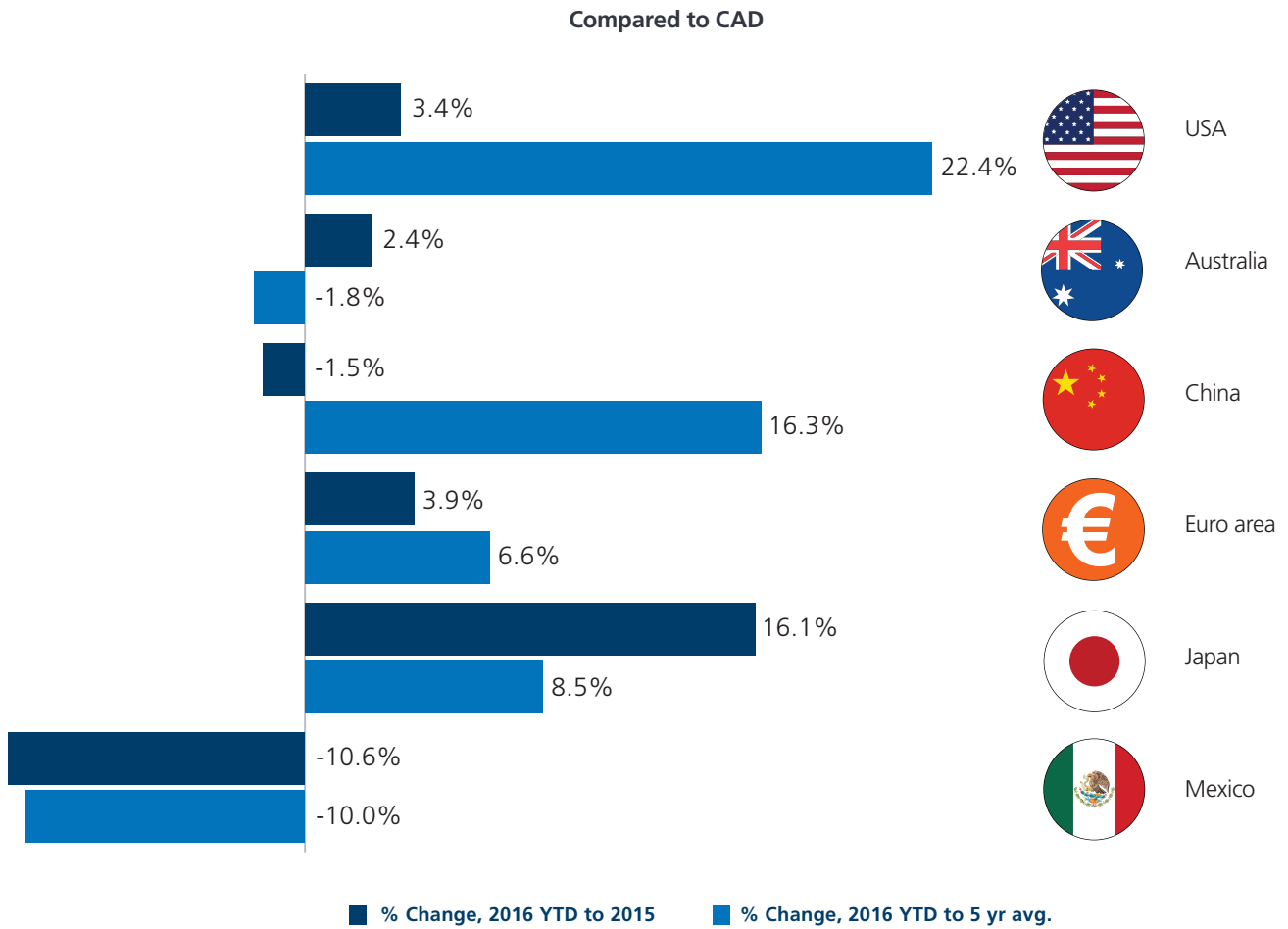
Source: UN Comtrade, US Census International Database, FCC calculations

Accounting for the success of top agriculture traders

What explains export performance?

The relative value of currencies usually impacts performance. A drop in the value of the exporter's currency relative to the value of the importer's currency can make that exporter's goods more attractive to a buyer.

Figure #7: The Canadian dollar remains competitive against currencies of major agriculture traders



Source: Bank of Canada and FCC Ag Economics calculations (accessed Nov. 2, 2016)

The Canadian dollar is currently more competitive in agriculture markets relative to some of the world's largest exporters (Figure 7). Throughout 2016, both the Australian and U.S. dollars have appreciated relative to the loonie, as has the euro. However, the Chinese renminbi and the Mexican peso have depreciated more against the USD than against the CAD, making each of these exporters more competitive than Canada in global export markets.

Exchange rates matter to Canadian competitiveness, but as [A 2015 Look at Global Trade](#) pointed out, currency fluctuations don't explain long-term performance.

Other factors underlying export success include:

- Canada's economic climate and stability that is conducive to investments and trade flows. Some of Canada's largest competitors in agriculture and agri-food markets, including Russia and Brazil, have less predictable economic and political environments.
- Canada's lucrative two-way trade with the United States. These two highly integrated economies boast well-developed infrastructure that facilitates faster,

cheaper north-south trade. U.S. markets are in many cases both closer and larger to Canadian producers and processors than are Canada's major markets.

- Trade agreements facilitating favourable access conditions in key export markets.
- Production factors specific to agriculture such as endowments of land, a highly skilled labour force, access to capital (e.g. for technology), and access to inputs (seed, fertilizer, herbicide, machinery, etc.).

Producers can increase their output by increasing any of these agriculture production factors (for example, by planting more acres, hiring more labour, changing feed rations, etc.). Each of these options means higher expenditures, which can be warranted when output grows at a faster pace than input. This is the very definition of "productivity" growth.

Productivity and export growth: 3 case studies

Gains in productivity have helped boost export performance in Canada, Australia and the Netherlands since 1961. It's not entirely straightforward however: periods of export growth have not corresponded exactly to periods of productivity growth. During these times, export performance may be less related to gains in productivity, and more related to other success factors such as efficiency, or simply the result of the competitive position of an exporter.

Productivity and efficiency: what's the difference?

"Productivity" and "efficiency" measure different concepts. Efficiency improves profits by minimizing costs – finding the right combination of inputs to achieve a specified production target.

Productivity, on the other hand, does not target a specific production goal. It often requires investing in assets to improve yields and increase production. These investments are not always consistent with decisions related to goals of profit maximization or cost minimization.

However, it is the one means by which operations can raise their real income. Growth in productivity also ensures that new sources of demand for agriculture food, feed and other non-food uses can be met without stressing the world's natural capital, or the resources (e.g., fresh water, land) we rely on to grow our food.

A methodological note

The U.S. Department of Agriculture (USDA) measures productivity using "total factor productivity" (TFP). TFP is reported in an international data set that provides agriculture TFP growth indices between 1961 and 2012 for 65 individual countries. It compares the total amount of crop and livestock output to all of the land, labor, capital, and material resources used in producing that output.

TFP increases when total output grows faster than the total inputs (or factors) used.

Canada's TFP

Canada's growth in productivity has not followed a stable path. Between 1961 and 1970, Canadian TFP increased marginally, then declined throughout the 1970s (Figure 8). During this period, Canadian producers used more inputs, including land, to produce more output.

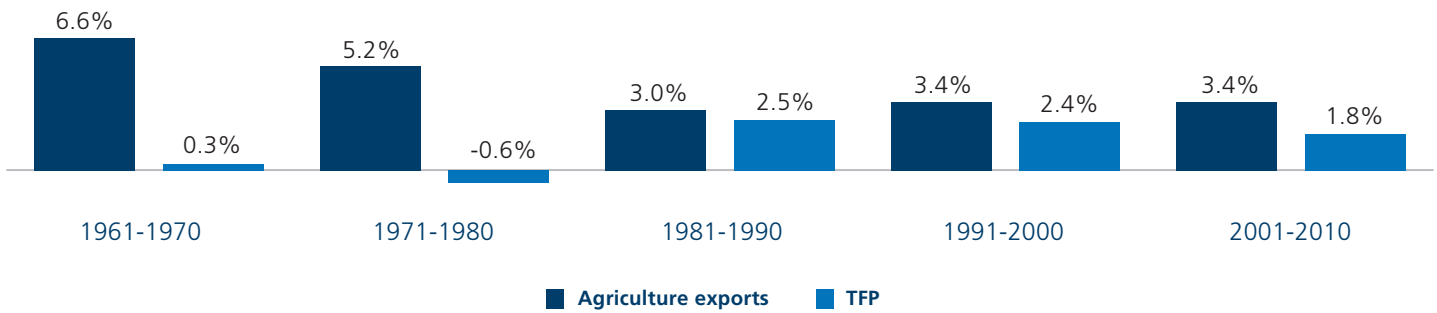
Producers were also able to exploit technological advances. In the 1970s, widespread fertilizer application and the adoption of different modes of herbicide use including glyphosate, helped to increase productivity gains during the 1980s, the decade with the strongest TFP growth.

Agriculture and Agri-Food Canada notes that Canada's real annual output growth of 2.3% between 1961 and 2006 reflects average annual TFP growth of 1.6%. That means by 2006, Canada could use half the inputs to produce as much food as we produced in 1961.

Canada's current annual TFP growth seems to have stabilized at about 1.6%, after having declined since 1990. Canadian productivity growth is lower than reported for other Organization for Economic Cooperation and Development (OECD) countries, although Canadian field crop farms and beef farms performed about the same based on a number of different indicators as farms in other OECD countries, most notably Australia and the U.S.

Figure #8: Canada's annual productivity gains peaked in 1980s

Canada (average annual growth rates)



Source: USDA- ERS, FAOSTAT

Canada's exports

Between 1961 and 1980, Canadian agriculture exports grew by more than 6.6% each year. The farm crisis in the 1980s resulted in slower growth in exports, even as gains in productivity were reaching their peak. Canadian exports grew by more than 3.0% per year between 1991 and 2010.

Canola: A Canadian productivity success story

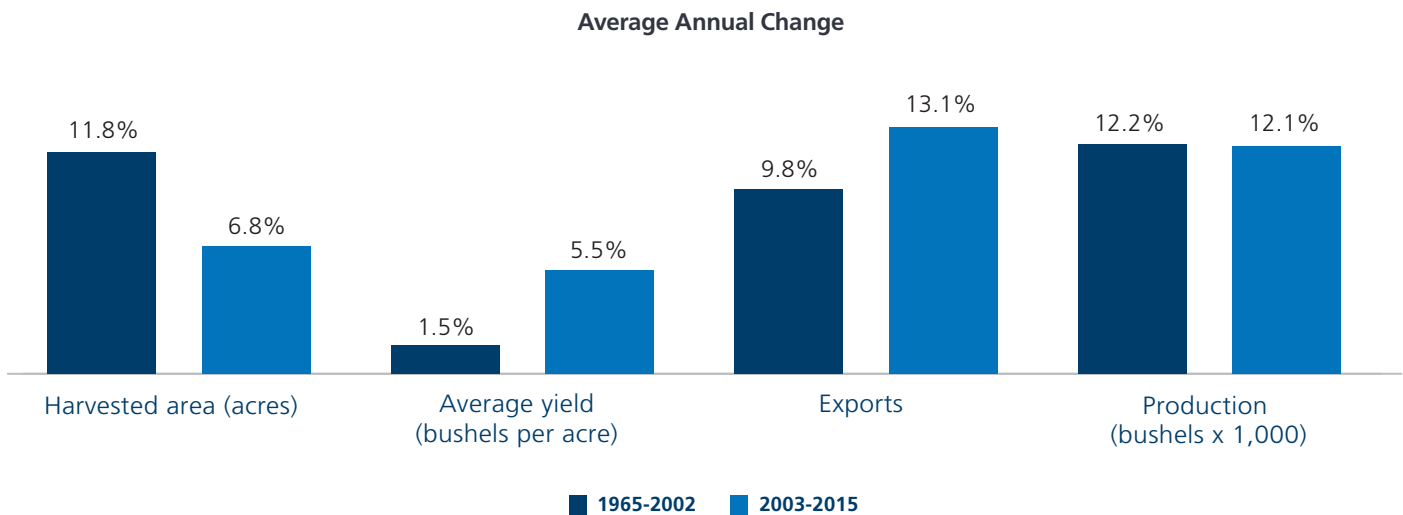
Canola production in Canada increased rapidly from 1965 to 2015, thanks to yield improvements and acreage increases. In 1965 the country produced 22.6 million bushels of rapeseed (which would become canola in 1974). By 2015 that had risen to 810.3 million bushels. Harvested acres expanded from 1,435,000 in 1965 to 20.6 million in 2015. From 1965 to 2015, yields grew 151% (an annual average of 2.7%).

Canola was developed from rapeseed in the early 1970s specifically as a crop for the Canadian prairies. The introduction of canola allowed for the development of new markets to offset periods of declining wheat prices. Now a major export for Canada, canola is the country's second largest crop by volume.

Between 2003 and 2015, canola exports increased 189.6%, driven by high demand in China. The exponential growth in yields supported that export growth (Figure 9).

From 1965 to 2002, yields grew on average by 0.18 bushels per acre per year. From 2003-2015, average yield growth jumped to 1.3 bushels per acre per year. At the same time, the rate of growth in canola acres slowed. Had yields continued to grow at the 1965-2002 pace, Canada would have produced 1.8 billion fewer bushels of canola. That's 24% of total canola production over that time period – and 253 million bushels in 2015 alone.

Figure #9: Canola yield growth leads to #1 export status



Source: CANSIM 001-0017 and FCC Ag Economics calculations

Australia

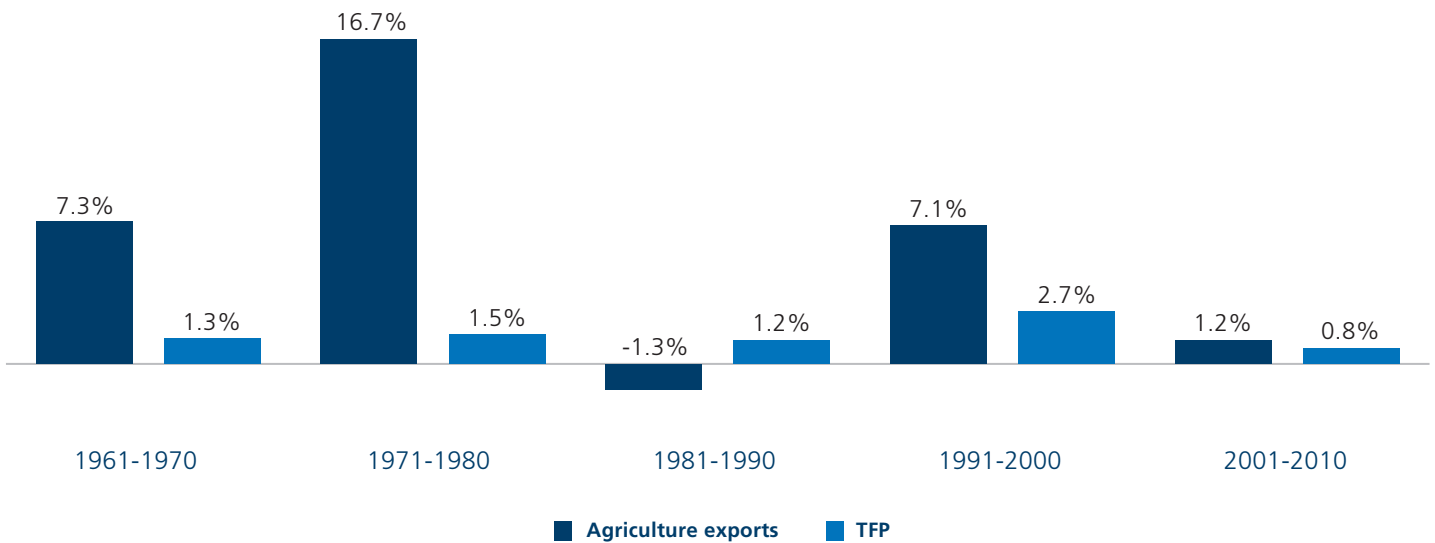
Australia's TFP growth remained stable throughout virtually the whole 50-year period, with a bump in the last decade of the 20th century. The rate at which it's grown has declined since (Figure 10).

Australia's average annual growth in exports shows greater volatility than Canadian export growth. Weather-related events such as the drought in 2008 and record-breaking prices of wheat in the mid-1990s and soybeans in the 1970s explain some of the volatility.

Australia's proximity to, and prior trade relationships with Asia, and most notably China, will continue to provide opportunities to Australian producers and agri-businesses. The challenge for the country will be to sustain export growth while managing rising risks in global agriculture markets. Working toward improving productivity at rates seen during the 1990s is at least part of the solution needed to address weather volatility and the changing trade landscape.

Figure #10: 50 years of TFP gains can't overcome volatility in Australia's agriculture exports

Australia (average annual growth rates)



Source: USDA-ERS, FAOSTAT

The Netherlands

The Netherlands has the largest gains in positive growth in both exports and TFP over the last 50 years. Its pattern of agriculture productivity growth stands out: both Australia's and Canada's annual average productivity gains fell below 1.0% at least once; the lowest recorded gains for the Netherlands was 1.24%.

Its agriculture sector has exploited numerous natural advantages such as flat, fertile land, favourable climate and proximity to major infrastructure development. The Dutch have enhanced these advantages by developing intensive

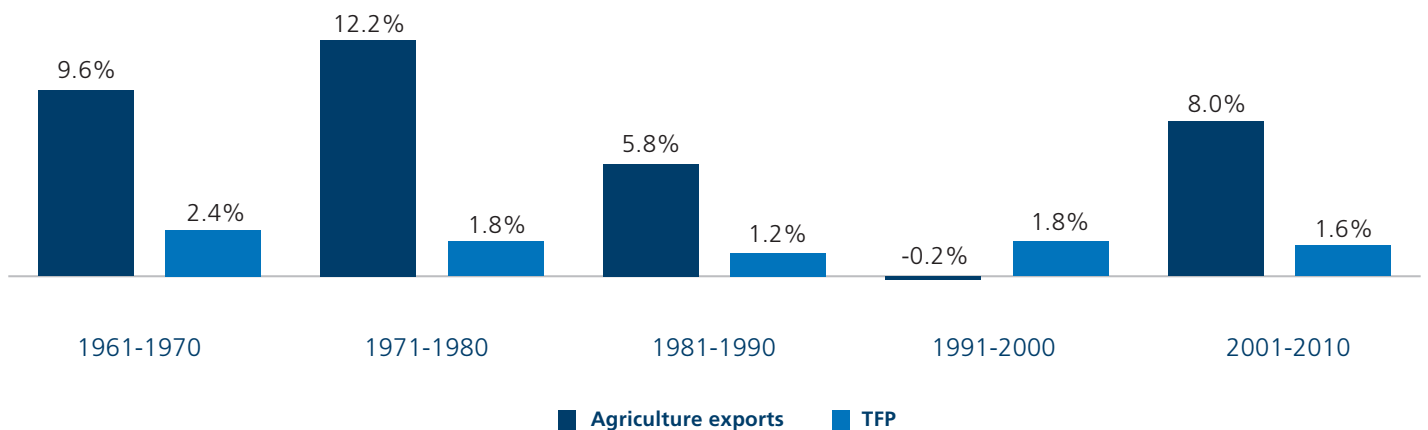
agriculture facilities (e.g., greenhouses). A strong commitment to R&D and a skilled, educated workforce add to an environment conducive to growth in productivity and exports.

The emphasis on productivity has resulted in years of exceptionally strong export growth: in the 1970s, Dutch exports grew at an annual average rate of 12.2%. In the first decade of the 2000s, exports grew 8.0% per year.

Businesses have also been able to capitalize on export opportunities outside Europe. Exports to the United States and the U.K. increased in 2015 in part as a result of oil prices facilitating cheaper transportation.

Figure #11: The tiny giant

Netherlands (average annual growth rates)



Source: USDA- ERS, FAOSTAT

What you can take away

The world's trade landscape continues to evolve.

We're in an era of heightened geopolitical turmoil, increasing volatility due to weather events and commodity prices, new regional alliances and trade partnerships among established and emerging traders. In this climate, Canadian investments to ensure productivity gains will require careful scrutiny in order to maintain our status as a world leader in exports of agriculture and agri-food. There will be periods during which cost management and an emphasis on efficiency will do more to ensure the long-term viability of operations.

The relationship between Canada's overall growth in agriculture productivity and overall export growth isn't straightforward, yet important.

Investments made by agriculture producers sometimes serve to improve efficiency, and do not necessarily lead to higher production. Even still, there is an important connection between productivity and exports, which becomes clearer when looking at growth in specific sectors. Further, the productivity gains achieved over the last 50 years across sectors have led to the diversity of Canadian agriculture which underpins its overall and long-term health.

The bottom line? Canada needs to increase productivity.

The global demand for food, feed and non-food uses of agriculture commodities is growing. Canada, as one of the world's largest agriculture and agri-food producing countries is well positioned to capture this growth. But, to grow exports, we need to grow production.

Neither Canada nor the rest of the world can continue to increase agriculture output by relying on additional land. All major exporters except Brazil, Mexico, India and China lost agriculture land as a proportion of total land area between 1961 and 2013. There's also the growing need to preserve the world's natural resources in the face of environmental pressures. Growth in land use simply cannot sustain growing demands for production.

To protect our environmental assets while maintaining a competitive position supplying food to the world, Canada must ensure the greatest productivity gains are derived from technology advances and innovation. These will help mitigate unanticipated shocks from a rapidly changing trade environment, and lead to opportunities from the growing global food demand. Such investments will protect the sector's sustained performance.

Learn more about the economic events that could impact our industry and your bottom line. Our team of economists and researchers share their unique perspectives in the reports, videos, blogs and articles available on our website.

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