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Regional Corn Competitiveness Outlook Through 2030

Production and Trade Rises, and Brazil Will Take the Lead

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Summary

Global corn consumption is forecast to rise 25% in the coming ten years, from 1.144bn metric tons in 2021 to 1.430bn metric tons in 2030 – slightly less than the 259m metric tons of growth seen over the past decade. Global corn trade will likely show an even stronger growth of 100m metric tons compared to the previous decade's 87m metric tons, boosted by animal protein production growth, geopolitical tensions, and corn shortages resulting from adverse weather and constraints on acreage and yield gains. Based on this, exported volumes from the main corn producers are expected to increase. Brazil, Argentina, Ukraine, and the US will benefit the most from this increase in global growth as all have further production potential, and Brazil is well-positioned to take the lead.

- Brazil benefits from double use of farmgate infrastructure, as soybeans and 'safrinha' corn are sowed and handled at different periods and move through the same facilities. Soybeans will require new investments and additional capacity, which will also benefit safrinha. Brazil's expansion of Northern Arc capacity in past years will benefit corn export growth through 2030. Risks include currency depreciation, which could impact fertilizer costs as the country heavily depends on imports.
- Argentina is favored by a highly competitive cost of production and lower fertilizer use due to high soil fertility and low pest and disease pressures. Area expansion is expected in the north, which will necessitate infrastructure investments due to the region's distance from traditional agricultural areas and river and ocean ports. Risks include farm margins suffering from currency devaluation, as well as export taxes and export restrictions.
- In Ukraine, corn benefits from stronger yields compared to alternative crops, but with much of the sector professionalized, the next decade offers less production growth potential than the past 15 years. Ukraine's exports benefit from the country's proximity to destination markets in Asia, Europe, and North and Sub-Saharan Africa. Port capacities were improved in the last decade, although Ukraine needs to improve inland transport infrastructure.
- Compared to the other regions, the US is better positioned in terms of infrastructure and logistical efficiency, but production growth will require investments and greater inland transport efficiency. The US will boost production through continued yield growth, while acreage expansion will be limited. Strongly rising vegetable oil demand for renewable diesel may drive an increase in soybean area at the expense of corn. On the other hand, ethanol policies in the US might change and free up more corn for the export market, which likely would also have a negative impact on corn prices and production levels.

In all four countries, production growth needs to be managed in a sustainable, environmentally conscious way, as GHG emissions from farming will be under scrutiny and may impact production.

Past and Future Production

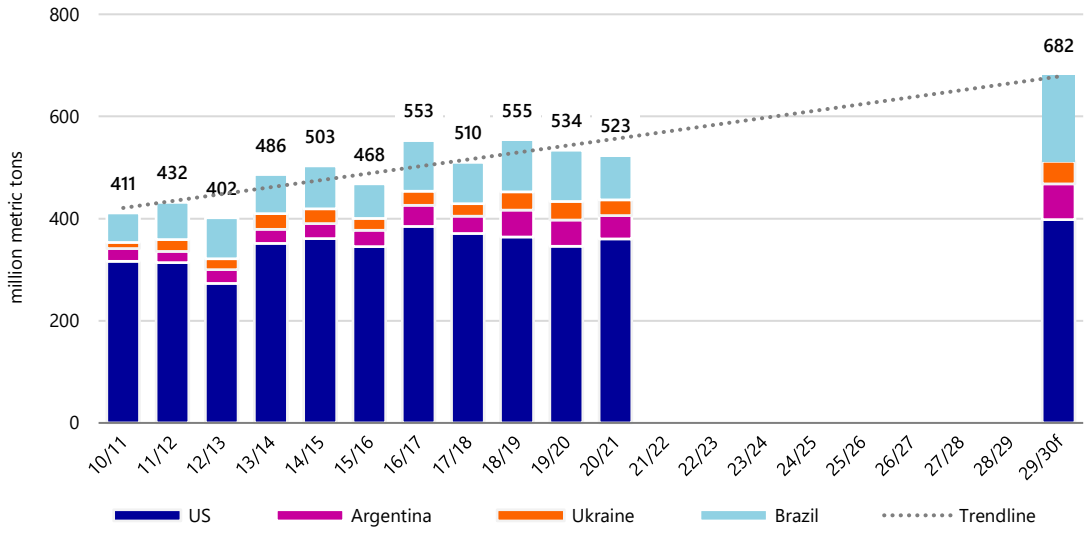
Global Corn Production's Steady Growth to Continue

Since 2011, global corn production has experienced a steady growth, driven by increasing demand for corn for feed and ethanol. From 2011 to 2021, global production increased at a compound annual growth rate (CAGR) of 2.8%, from 849m metric tons in 2011 to 1.119bn metric tons in 2021. The top four corn exporters produced 42% of all additional corn during the period analyzed, an increase of 115m metric tons. During the last ten years, Ukraine's corn production experienced the largest rise, with an enormous increase of 200%, followed by Argentina, which doubled its production. Brazil's corn production grew 75%, based on safrinha area and yield gains. Although the US had the most significant corn volumes, production only grew a comparatively light 9%.

During the next decade, South America will take the lead in corn area growth, while yields will play a major role in US and Ukraine corn production growth up to 2030. Rabobank expects the US to produce 398m metric tons in 2030 (vs. 360m metric tons in 2020/21). In Brazil and Argentina, production will rise from 2021 production levels by 83m and 20m metric tons, respectively, to reach 170m and 70m metric tons in 2030. Ukraine's corn production will reach 44m metric tons, a 14m metric ton gain vs. 2021 levels.

Area availability, yield potential, financial margins, and infrastructure to deliver corn to importing countries will be the key drivers for corn growth among these players. Rabobank estimates that corn production in the top four exporting countries will increase by 159m metric tons to reach 682m metric tons by 2030.

Figure 1: Production growth of the top 4 corn producers, 2010/11-2029/30f



Source: USDA, OECD, Conab, Rabobank 2021

Area Growth Expected in South America, Whereas Yield Growth Will Be Key in the US and Ukraine

During the last decade, planted corn area in most of the top four exporting countries had more substantial growth than corn yield. Ukraine had the highest relative growth in area from 2011 to 2021, with the average harvested area more than doubling, reaching 5.4m ha in 2021. However, future corn production growth will be provided by better yields, due to limited opportunity for acreage expansion. The Black Sea Region's great soil fertility provides good yields despite lower fertilizer use, which also impacts the cost of production.

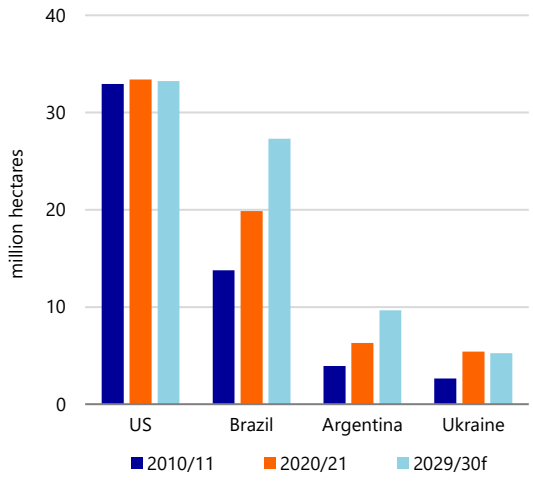
The second-largest corn area growth was in Argentina, where changes in export tax structure favored corn and wheat area expansion over soybeans. Argentine corn area has grown 61% since 2011. Rabobank estimates it will continue to expand, albeit at a slightly slower pace, and will achieve 53% growth up to 2030.

Brazil had the third-largest growth, although it had the highest increment in terms of absolute corn area growth compared to the other countries. From 2011 to 2021, Brazil added more than 6.0m ha. Brazil's corn area is expected to reach 27.3m ha by 2030, a 7.4m ha gain compared to 2021 levels. Brazil holds an acreage expansion advantage, as safrinha will grow not only on already established soybean area but also on underutilized pastureland that is expected to be switched to soybeans during the next decade, which will potentially increase double cropping in Brazil. Safrinha area and production will continue to gain relevance in total corn production in Brazil, while summer corn area will practically remain unchanged up to 2030.

Brazil, Argentina, and Ukraine have mostly based their corn production growth on area increases. In contrast, US corn area growth was marginal, and higher production levels were mainly based on higher yields driven by higher plant population. Rabobank estimates that US corn area will be nearly unchanged in 2030, based on limited opportunities for acreage expansion, although production will be favored by higher yields.

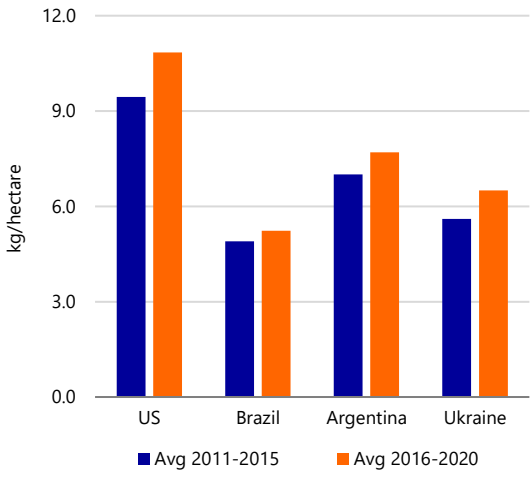
Soil conditions in each of these countries is one of the drivers for corn yields, but this will also be a key factor when comparing costs of production and competitiveness among the four players.

Figure 2: Corn area growth for the US, Brazil, Argentina, and Ukraine



Source: USDA, OECD, Conab, Rabobank 2021

Figure 3: Corn yield growth for the US, Brazil, Argentina, and Ukraine



Source: USDA, OECD, Conab, Rabobank 2021

Drivers of Growth

Farming Margins Support Growth in South America

Cost of production and operational margins are the financial drivers that will encourage farmers to increase corn planted area or to switch to other crops. Soil fertility and access to farm inputs will impact cost of production by reducing farm input needs but also yields, which could boost farmers' revenues. Argentina, the second-largest exporter, has the most competitive cost of production due to good soil fertility. On the other hand, government policies reduce Argentina's competitiveness. A 12% tax on corn exports squeezes farmer margins. However, export taxes on the soybean complex are at 33%, which penalizes soybean planting. So, although its main competitors are free of export taxes, Argentina holds the most competitive position by combining good farmer margins, good yields, and competitive operational costs due to farms' close proximity to ports, which reduces freight costs.

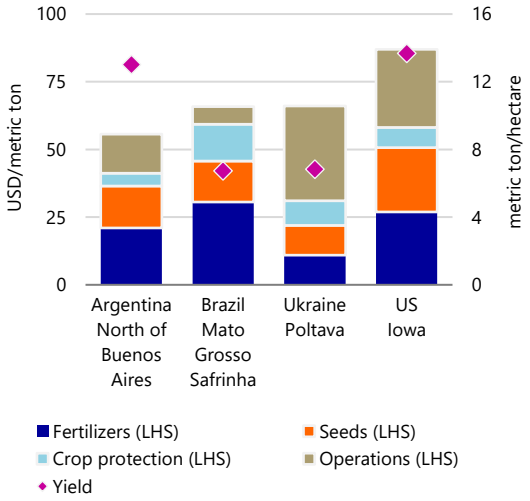
Brazil has the highest crop input costs, as weather and poor soil conditions require a higher use of fertilizers and crop protection. Brazilian agriculture is a net fertilizer importer, highlighting the country's dependence on the external market for fertilizers. However, currency depreciation plays a key role in corn pricing, and farmers' margins are mostly favored by depreciation of the Brazilian real. Furthermore, recent investments in ports, rails, and better road conditions have diminished internal transport and port costs, positively impacting farmer margins.

In the US, despite being the major corn producer, farmers face the highest cost of production and also the lowest margins (in USD/metric ton), although the higher yields partially offset the weight of production costs.

Ukraine's cost of production is low, although corn yields are limited as most corn is non-GMO. On the other hand, Ukraine's soil fertility enables lower use of chemical inputs. However, corn faces competition from other profitable grains, such as rapeseed and sunflower seed, which will ultimately limit corn expansion in the long term.

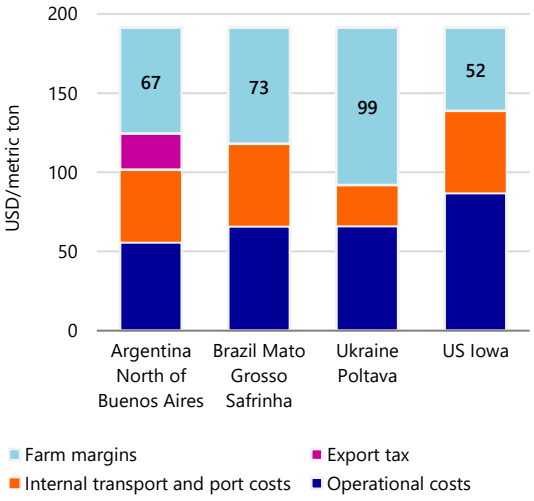
A comparative analysis of costs and margins reveals that South American players hold a good combination of variables that will be primary factors in additional investments that will permit corn growth. Argentina holds the best combination of lower cost of production per metric ton and good yields (comparable to US yields). Soil fertility allows for lower use of chemicals and supports good production levels. Argentina's corn production costs have a USD 13/metric ton advantage compared to Ukraine, which has the second most competitive cost of production. Brazil is slightly costlier than Ukraine, with a USD 3/metric ton difference, while the US carries the highest cost of production among the players analyzed. US farmers also have the lowest farm margins, impacted mainly by high operational costs and transportation costs.

Figure 4: Corn cost of production per metric ton



Source: Márgenes Agropecuarios, IMEA, Ukr Agro Consult, Iowa State University, Rabobank 2021

Figure 5: Operational margins of corn priced at USD 200/mt



Source: Márgenes Agropecuarios, IMEA, Ukr Agro Consult, Iowa State University, Rabobank 2021

Infrastructure Investments Will Be a Driver in the Top-four Corn Origins

Brazil has recently invested in the Northern Arc and currently has a diversified corridor profile, although area and crop increases will evidence the necessity of new investments in warehouses and inland logistics. Double cropping implies more efficient land use, but it also requires increased storage capacity. The prospect of soybean and safrinha production growth, reinforces the need for greater inland storage capacity. Brazilian farmers miss market opportunities, such as arbitrage positions, as the pressure of a new crop's harvest compels farmers to sell the previous crop before beginning the new harvest. Beyond that, attractive prices and margins allow farmers

to invest in machinery, and that will add even more pressure to logistics as harvest will happen in a shorter time span.

Investments are on track at Brazilian ports in the main export corridors. Currently, new investment in infrastructure is primarily driven by the soybean crop, as it is more relevant than corn in terms of production as well as export volumes, but both crops will be key drivers for the installation of additional capacity in the coming years. We expect Brazil to deliver 53% of the total corn production growth forecast for the top four exporters through 2030. Assuming that safrinha area will grow more vigorously in the center-north of Brazil, a region where pastureland availability is higher and where soybean crops have outstanding potential to gain area, the region will need infrastructure investments in storage, handling, and internal logistics.

The northern region of Argentina also has great expansion potential, but it is more distant from the traditional agricultural area and still needs some infrastructure investments, such as warehouses, roads, rails, etc. Meanwhile, the traditional agricultural area is, on average, 500km from Argentine ports. Given the greater distance from export corridors, the northern region will demand investments in internal logistics. In terms of port capacity, Argentina has idle port capacity that could absorb corn export growth during the next ten years.

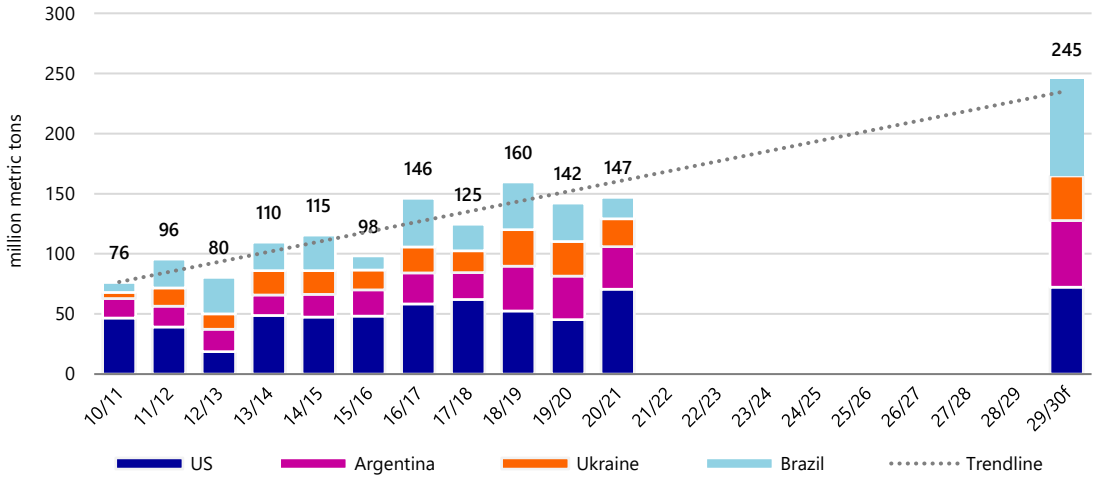
During the last decade, Ukraine expanded logistical capacity in ports, reducing the need for future investments. However, improving inland transport infrastructure will be key in order to facilitate the movement of grains & oilseeds from fields to ports. At 60% of grain & oilseed transport, rail still dominates, followed by roads at 35% and rivers for the rest. Improving the quality of the roads and dredging the rivers will be key to bolstering logistics efficiency.

In the US, infrastructure (grain handling and transportation) has always been one of the country´s clear competitive advantages. Recent investments in grain handling infrastructure have been primarily for upgrading facilities. However, there have also been investments in new grain facilities: the new G3 export elevator in the Pacific Northwest, and a recent announcement by Greenfield Louisiana of plans to build a new export facility near New Orleans. As evidenced by these two facilities, the investment has not been made by the ABCD companies (i.e. Archer Daniels Midland, Bunge, Cargill, and Louis Dreyfus), but by new players and investment monies coming together with the goal of building larger, more efficient facilities.

Other infrastructure investments have been in on-farm and off-farm grain storage. Over the past ten years, on-farm and off-farm storage facilities have decreased by 8.1%, or 728 facilities, which implies that grain companies have shut down old facilities and made investments to expand capacity in remaining facilities.

Finally, good US transportation infrastructure (roads, rail, and water) has been an advantage in terms of cost competitiveness, efficiency, and timeliness to move grains to domestic and foreign markets. However, the lack of investment in maintaining and improving this infrastructure has added to costs and reduced its cost advantage in moving grain. For example, the lock and dam system on the Mississippi River was built in the 1930s, with an estimated lifespan of 50 years. The river system has not kept up with the demands of increased shipment volumes or larger barges and tows. The US Congress has approved legislation to invest over USD 1bn in US roads, bridges, and waterways to improve the country's competitiveness. This investment will be crucial to maintaining and improving the US´s long-held competitive advantage in moving grains.

Figure 6: Corn export growth of top 4 exporting countries



Source: USDA, OECD, Rabobank 2021

Brazil Will Dominate Future Corn Production and Export Growth

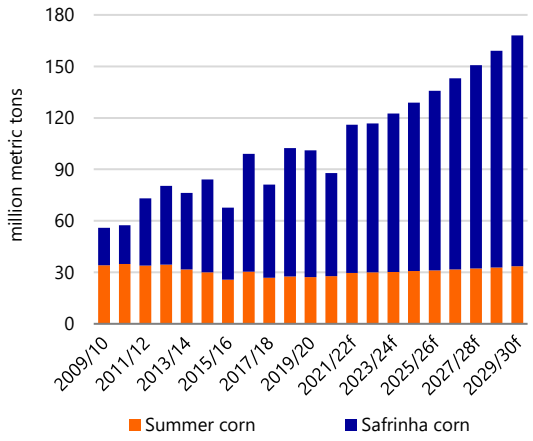
Over the next decade, Brazil will take the lead in corn production and export growth. Double use of the land, with soybean planting followed by safrinha corn, allows safrinha area to increase on the back of established soybean area, without necessitating expansion exclusively for sowing corn. This gives Brazilian corn production good financial margins and a uniquely sustainable value. Double planting allows land to be 70% productive over the course of a year in Brazil, assuming an average crop cycle of 240 days for both soybean and safrinha corn. In addition, fixed costs are amortized by two crops, reducing the impact of machinery depreciation and labor costs shared by both crops. Double cropping also benefits the soil by reducing the need for traditional fertilizer for the safrinha crop and breaking up the pest cycle.

From 2011 to 2021, safrinha area expanded 130% and production grew 168%. In contrast, summer corn area reduced 24% and production declined 20%. Rabobank expects that summer corn area has reached a ceiling and potential growth will happen mainly through safrinha. Rabobank estimates Brazil will produce 170m metric tons in 2030 (vs. 86m metric tons in 2020/21), based on gains in acreage (+37%) and yield (+17% compared to the five-year average). Safrinha acreage will achieve 54% growth by 2030.

Despite the strong increase expected in corn production, Rabobank projects a smaller increase in Brazilian domestic consumption. The main feed consumers are the poultry and swine sectors, while cattle are mostly raised on pastureland (only 15% to 20% are raised on an intensive grain-fed system). In the long term, Rabobank expects that in some regions, such as the center-north, the productivity of underutilized pastureland could be improved by increasing animal numbers per hectare and/or converting land into soybean and safrinha planting area. According to the Brazilian Beef Exporters Association (ABIEC), Brazilian pastureland area decreased by 13.6% from 1990 to 2020; part of the 26.1m hectare reduction of pastureland was converted into soybean area growth during the last 30 years.

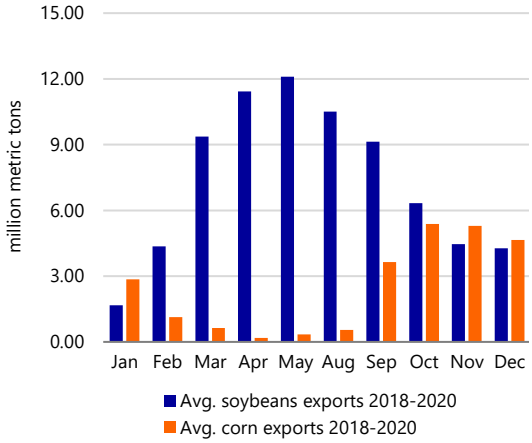
The use of corn to produce ethanol will likely increase due to new crushing plants and other expansion plans expected during the next five years. However, exports are expected to gain greater relevance in Brazilian corn supply and demand during the next ten years, despite the increase in corn crush capacity. Looking at the five-year average, 35% of all Brazilian corn production went to the external market. Double use applies not only for land but also for infrastructure on and off the farm. Between soybean and safrinha harvests, there is a gap of nearly 120 days. This allows Brazil to load most of the harvested soybeans during February and July, which means that second-crop corn does not compete with soybeans during most of the corn export window. The absence of direct competition between soybeans and safrinha will enable Brazil to dominate corn production and export growth during the next decade.

Figure 7: Corn production growth in Brazil, 2009/10-2029/30f



Source: Conab, Rabobank 2021

Figure 8: Brazil's average monthly soybean and corn exports, 2018-2020



Source: Secex Stat, Rabobank 2021

Sustainable Production Will Be Key

Area availability, yield growth, and financial results will be key drivers to assure that corn production in Brazil, Argentina, the US, and Ukraine will reach 682m metric tons through 2030, a gain of 159m metric tons compared to 2020/21. However, sustainability will be a key topic for the main corn destinations, which will demand changes in practices on farms and in the supply chain and impact corn's competitiveness in the next decade.

Sustainable production will be followed closely by important destinations and even by some private companies that have committed to not source grains or oilseeds from recently deforested areas in order to ensure more sustainable corn production. Double use of land in Brazil to produce soybeans and safrinha corn, lower fertilizer use in Argentina, non-GMO production in Ukraine, and even higher yields in the US are all linked to sustainability values, but it is still uncertain which of these factors will be more valued by more critical destinations. New practices and even certifications (e.g. Round Table on Responsible Soy Association certification for soybeans) that could be replicated for corn will be demanded by destinations, and farmers and the corn supply chain will be pressured to quickly adopt new practices that could change corn market dynamics and competitiveness in the future. Traceability and guarantees that a product has been sustainably produced could even change pricing dynamics in commodities in the coming years.

Imprint

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