

Long-term world soya bean outlook

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Doane's economists recently updated the *International Agriculture Outlook* report, which includes ten-year forecasts of harvested area, yield, production, utilisation, per capita consumption and net trade of coarse grains, maize, soya beans, wheat, cotton and rice for 17 countries or major global regions. The report distils and conveys big-picture trends found in the global data on a semi-annual basis, and the following is focused on the world soya bean market.

In general, the international forecast is based on United Nations-sourced estimates of past yearly global censuses of populations, combined with long-term trends for per capita consumption, to estimate world demand growth.

Over the long term, world production lines up with world consumption and world net imports approximate world net exports. In addition, the supply side (production plus net imports) of any country or region eventually lines up

with the demand side (consumption plus net exports). The projections are designed to provide a plausible scenario for the sectors covered, but not the actual outcomes in any particular year.

China is handled differently because Chinese government officials are balancing domestic farmer needs, very large ending stocks, tariff rate quotas, and other political concerns. The baseline assumption is that China's rising consumption levels will allow it to simultaneously increase imports while reducing ending stocks or returning to a more normal stock level.

Population growth and consumption

Resting in the background of the analysis are the past estimates of global population growth. As a starting point, world population is projected to increase with 9% over the next decade, which will drive consumption increases.

The Asian growth centre (AGC), comprising China, India, Other Asia and East Asia, is experiencing great growth in

food consumption, but has limited acreage available for cultivation. The current situation presents two key challenges: The first is how to meet the increase in food consumption, and the second how to deliver the food to the people.

The AGC accounts for 52% of the world's population. Although known for extreme poverty, the area is enjoying economic growth, which is vital for commodity consumption, especially in terms of food products. As income increases, a wealthy person responds by switching to high-end food products, eating at restaurants and maybe even hiring a chef. Although they are spending more money on eating, the volume of coarse grains, wheat, and protein meals consumed might not increase.

By comparison, as income increases a poor person responds by adding ingredients to a basic diet. Eating tastier food often requires vegetable oil, meat, fruit, and vegetables. Meat production requires feed rations of grains and

protein meals that are converted into weight gain. For example, if 1,6 pounds (0,72kg) of feed is required to add one pound (0,45kg) of chicken, switching or just adding chicken to the dish results in an increase in per capita consumption of grains and protein meals.

As meat consumption increases, backyard operations naturally evolve into commercial operations to gain economies of scale. African swine fever (ASF) is accelerating the trend towards commercial pork production, which will increase the use of commercial feed rations. Commercial operations are more efficient at converting feed rations into meat due to feed rations that are more scientific and precise in nature. Over the long term, ASF ought to benefit grain and vegetable meal consumption, as world-class operations feeding precise diets will increase consumption of these types of meals.

Adding additional acreage

Meeting the AGC's increasing demand for food requires a world effort. Yields have continued to increase as the quality of machinery, seeds, and irrigation improves. Yields are expected to continue to increase, but additional acreage will have to be added. However, the yields of marginal land will be lower than the average, which will pull the average yield gain down.

Total crop acreage in Asia, Australia and Europe is expected to replace some hay and fallow land. South America and Africa have the most land available for crop production, but South America is best suited to add the area required to meet the world's growing food consumption.

With food consumption increasing faster than production in the AGC, the area will continue to show a grain and soya bean deficit. As consumption increases over time, trade also increases. From 2009 to 2018, soya bean imports into the AGC increased by 72%, while imports are set to increase by 48% over the next ten years.

Investment in infrastructure

A tremendous amount of infrastructure investment has occurred in the AGC and Brazil. Examples of supply chain investment include new ports, deeper

ports that can handle larger vessels, railroad tracks that service the ports, more sophisticated grain storage systems, and commercial animal operations.

For example, according to the National Association of Grain

Exporters, the amount of grain exported out of Brazil's northern arc of ports were set to reach 35 million tons in 2019. Over the last five years, the amount of grain exported from Brazil's traditional southern ports increased 16%, while exports out of Brazil's northern ports increased more than 300%. With all the investments made, the northern arc of ports could in theory ship over 70 million tons.

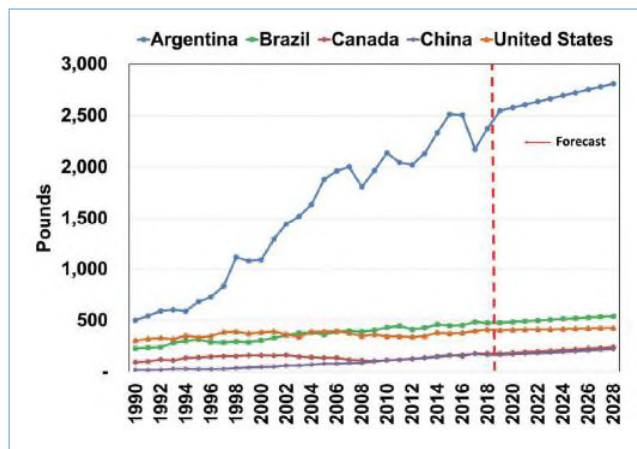
However, one area of the supply chain that is often ignored is the route from the marketplace to the consumer's home. The expansion of commercial animal operations increases the amount of product flowing from one location, which requires more cold storage capacity and improved transportation that can maintain the cold chain.

In developed countries, the cold chain is fully developed but is often taken for granted. In contrast, marketplaces in developing and poor countries have wet markets – a wet market is when frozen meat is taken to a venue and left to thaw over the course of the day. All over Asia, marketplaces are moving away from wet markets to refrigerated storage. Homeowners are also increasingly investing in refrigeration, which allows them to buy more meat and produce on each trip to the market.

Consumption of soya beans

Global per capita consumption of soya beans averaged 43 pounds (19,5kg) in 1990. By 2000, this figure had increased to 62 pounds (28,1kg),

Figure 1: Soya bean per capita consumption. (Source: United States Department of Agriculture [USDA] and Doane)



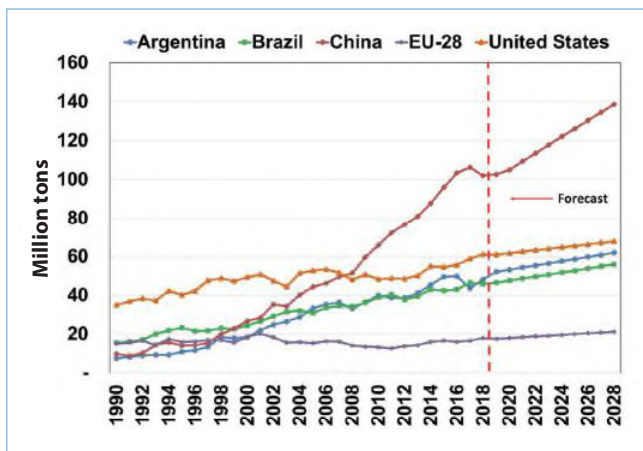
up 42%. China's consumption grew strongly during that decade before the country began its massive soya bean import programme. However, China's per capita consumption was only 19 pounds (8,6kg) in 1990, compared to the 304 pounds (137,9kg) of the United States (US). By 2000, China was at 47 pounds (21,3kg), whereas the US was at 383 pounds (173,7kg).

Argentina and Brazil also saw outstanding growth in the 1990s. Argentina increased their consumption from 502 (227,7kg) to 1 091 pounds (494,9kg), while Brazil grew from 226 (102,5kg) to 310 pounds (140,6kg).

From 2000 to 2010 global per capita consumption increased from 62 (28kg) to 81 pounds (36,7kg), while the US's consumption decreased from 383 (173,7kg) to 344 pounds (156kg). The decline in US per capita consumption is linked with dried distillers' grains that competed on price with soya bean meal. Argentina's consumption jumped from 1 091 (494,8kg) to 2 135 pounds (968,4kg), while Brazil went from 310 (140,6kg) to 436 pounds (197,7kg). China advanced to 110 pounds (49,9kg) from 47 pounds (21,3kg) in 2000.

World per capita use from 2019 to 2028 is forecast to increase from 102 (46,2kg) to 120 pounds (54,4kg), or an 18% increase. For the same period, Argentina's forecast advances 10%, Brazil 14%, China 33%, and the US 5%. After decades of increases China's 2019 consumption declined due to the trade war and ASF, but is expected to bounce back quickly.

Figure 2: Domestic consumption of soya beans.
(Source: USDA and Doane)



Expanding local operations

The much slower growth for Brazil can be attributed in part to the current trade conflict with China – Brazil has been sending most of its exportable beans to China to the relative detriment of its own crush. Meanwhile, the US crush is enhanced by soya bean meal export demand to partially offset the beans being diverted by Brazil to China.

In 2019, Ag Processing Inc opened a 60 million bushel per year soya bean crushing plant in Aberdeen, South Dakota and CHS Inc announced that it is expanding its facility in Fairmont, Minnesota, which is why per capita consumption continues to increase. As the US maize belt keeps expanding, more crushing plants will emerge. The northern and western maize belt expansion has resulted in farmers located in the areas receiving deeply

bean meal should lower the cost of animal feed and encourage an increase in animal production.

Soya bean utilisation

The domestic utilisation forecast is derived from population and per capita forecasts. As noted, the population is projected to increase by 9%. Africa’s ten-year, 23% rate of expansion will make feeding its general population a challenge.

The increase in world meat consumption is the primary driver of the increased consumption of coarse grains and soya beans. As meat consumption increases, commercial operations become more advanced and efficient at converting feed rations into meat; top-quality feed rations typically require quality grains and soya bean meal. Currently, there is no reason to doubt

that this trend will continue.

Global soya bean utilisation was estimated at 353 million tons in 2019. It should come as no surprise that China was the largest constituent of the total at 103 million tons. The US came in second at 61 million tons.

Argentina and Brazil were nearly identical at 52 million tons and 47 million tons, respectively. These four countries made up three-quarters (263 million tons) of global utilisation. The world outlook for 2028 totals 453 million tons, which represents an increase of 28%.

With soya bean crushing plants providing local consumption, soya bean prices should improve and encourage more local soya bean production. Likewise, the availability of local soya

Global soya bean production

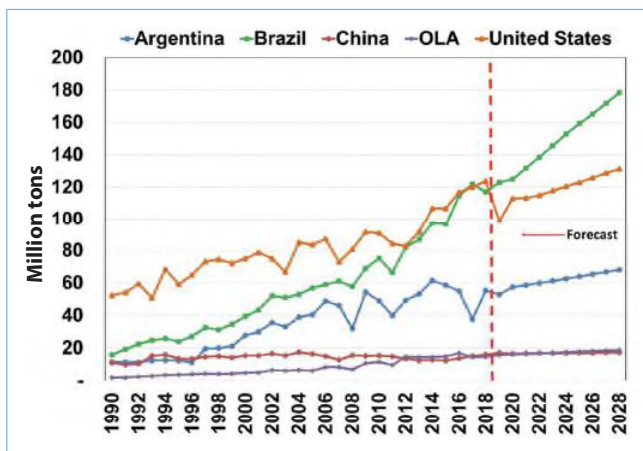
The global soya bean yield averaged 1,9 tons/ha in 1991. By 2001, the yield was 2,3 tons/ha or an increase of 19% in the decade. As of 2018, the decade-to-decade comparison of the rolling three-year averages was up 17%. Global soya bean yields are projected to trend higher, with gains between the extremes of the past two decades – yields are set to reach around 3 tons/ha in 2028. The additional acreage from countries with lower soya bean yields than those of the US will moderate global soya bean yield gains. In addition, new land entering production generally has a lower yield, which is limiting Brazil’s soya bean yield growth.

It is anticipated that this leading protein meal will continue to experience strong gains. The area forecast for 2019 was 123 million hectares. By 2028, the area forecast is expected to be 151 million, a gain of 23%. The increase in soya bean acreage between 2009 and 2018 was 22%. Brazil continues to expand its soya bean acreage at an aggressive rate.

From 2009 to 2018, world soya bean production increased to 362 million tons, or an increase of 38%. The projection between 2019 and 2028 is for production to top 455 million tons, or an increase of 35%.

The global soya bean trade is projected to reach 205 million tons in 2028 compared to 150 million tons in 2019.

Figure 3: Soya bean production. (Source: USDA and Doane)



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