OUTLOOK FIESP

PROJECTIONS FOR THE BRAZILIAN AGRIBUSINESS

2028

FIESP
Federação das Indústrias
do Estado de São Paulo

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Table of Contents for Systematic Cataloging

1. Agribusiness: Projections: Economy
2. Economy: Agribusiness: Projections
3. Projections: Economy: Agribusiness

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LETTER FROM THE PRESIDENT

In previous issues, we discussed how challenging it is to estimate medium and long-term indicators for the agribusiness sector, as it is vulnerable to many unpredictable events. In the seven years since we initiated this project, we have witnessed important crop failures, serious international and domestic recessions, sanitary issues in competing countries, and geopolitical conflicts that opened and closed markets, setting up new business dynamics. These were “surprises” that previously flew completely under our radar.

In this issue, in terms of global macroeconomics, we are faced with great uncertainty, as it is not clear how the United States will address the country’s recently attained sharp monetary expansion. The world is also witnessing an unprecedented trade war between two of its largest economies: the United States and China.

On one hand, the conflict could be seen as favorable to the Brazilian agribusiness, particularly to soybean farmers, as this grain has reached premiums prices , compared to those from traded in Chicago. On the other hand, there is currently great uncertainty as to how negotiations to settle the disputes will evolve in the future and, thus, how they will affect Brazil. In either case, the negative effects of a long-lasting conflict could be large enough to offset any bilateral trade gains.

In Brazil, many changes followed the 2018 elections. The president-elect has promised to make significant revisions on the scope of Federal Government intervention at different levels. In terms of economy, the appointed team shows commitment to tax adjustments, grounded in plans to reduce the size of the state and promote much needed reforms, such as social security reform. A major turnover in Congress— 47% in the House of Representatives and 85% of two-thirds in the Senate—suggests that while the political scenario will remain challenging, it will, at the very least, be more welcoming to this new agenda, a crucial factor towards fostering growth and increasing confidence in the country.

Greater confidence is synonymous with greater willingness to invest. From a producer perspective, this translates into better technological packages and greater crop yields, with positive consequences for the farming input industries. From a consumer perspective, confidence comes with rises in food consumption, notably in the consumption of more elaborate products, such as animal proteins and processed foods in general.

Hopefully in the next issue, a year from now, we will be celebrating concrete advances towards a more confident and productive Brazil, with the public accounts under control, for the benefit of the entire society. It is our expectation that these advances launch us towards significant growth, and that future surprises that the industry may bring us be pleasant ones.

Enjoy your reading!

Paulo Skaf
President

TABLE OF CONTENTS

Projections

METHODOLOGICAL CONSIDERATIONS

The international and domestic state of affairs has raised uncertainties concerning the outlook of various agribusiness sectors. Abroad, the trade dispute between the United States and China has led to an escalation of tariffs for various industry products, significantly changing the price of commodities traded between the two nations. Soybean was the most iconic of such cases, as taxes imposed by the Chinese, the world's largest importers, caused the price for the U.S. product to drop and premiums paid for the oilseed from other countries to rise. Brazil, the world's largest soybean exporter, was the main beneficiary of this outcome. Crop failures in Argentina, which reduced the country's soybean exports, also helped improve the competitiveness of the Brazilian product. Other products, such as meats, have also benefited from the situation.

The appreciation of the U.S. currency has impacted the competitiveness of U.S. products. It is yet unclear how the dispute will develop in the future, as a solution does not appear to be in sight. Nevertheless, if the conflict between the two nations is resolved, we will see yet another significant change in the pricing of products hit by the increased taxation.

Brazil's domestic affairs have also contributed to insecurity. The truck drivers' strike and the subsequent establishment of a new minimum rate freight policy that placed freight prices high above market prices induced significant losses for producers and the issue remains unresolved. Questions regarding future freight prices have complicated future sales of agricultural products due to the pricing uncertainty.

From an economic standpoint, our base case predicts that Brazil will experience a slow but consistent growth upturn in 2019, along with the absence of abrupt interruptions in worldwide growth. A slowdown is possible, in comparison to the current levels, but the food demand will continue to grow, even if at rates lower than those of recent years.

As in previous issues of Outlook Fiesp, our goal herein is to fuel discussions about the various agribusiness-related industries in order to help identify potential bottlenecks and form proposals for the future of the sector by anticipating the actions required to ensure the expected growth.

Our model of agribusiness forecasting has been continually improved over the years, and it establishes a global supply and demand balance for consistency between the main food producing and consuming economies in the world. This consistency

is assessed based on stock-to-use ratios that should maintain market stability in the long run.

The projection model for Brazilian production of the commodities considered herein is based on a global food production-to-consumption balance. The demand of each country was set based on population and per capita income growth forecasts, as well as on income elasticities of food demand in each country. The income and population forecasts used in the projections were those published by the International Monetary Fund (IMF) and the United Nations (UN), respectively. The estimates of Brazilian economic growth were prepared by MB Associados, based on their macroeconomic consistency model for the country.

From a supply standpoint, food production is estimated based on yield and land availability trends for each of the main producers. Brazil is a key variable in maintaining the international balance because it is one of the few regions that can also increase yield gains by land expansion. The production growth of countries like the United States, on the contrary, is contingent upon restricted yield gains or on increasing production of a specific commodity at the expense of another, by rearranging a relatively fixed production area.

After calculating the Brazilian production needed to keep the global stock-to-consumption ratio on a level where prices justify an increase in global supply, the area required to achieve this production is estimated according to a projected yield curve for each agriculture commodity in each of the Brazilian regions.

A unique feature of ethanol is that domestic consumption is derived from the growth and depreciation model of the vehicles linked to the GDP, with Flex Fuel vehicles' share in total sales as an exogenous variable.

As for pulp, the demand for planted forest areas comes from the industry's new planned investments in plants that, in the long run, should meet both domestic and international demands for Brazilian pulp.

The input variables used in the Brazilian fertilizer demand model are the expected area and production rates. The relation between fertilizer rates and potential production levels is described in a fertilizer response curve that specifies how much NPK each crop will need per hectare. NPK consumption of each crop is calculated by multiplying the total crop area by the crop's NPK need. Total NPK demand for Brazil until 2028 is the sum of this consumption plus fertilizer consumption for pastures, forestation, and land expansions.

Future domestic supply of fertilizer nutrients is estimated based on investment projects for the expansion of the country's installed capacity for fertilizer production, taking into account historical data on installed capacity use. Based on the regional supply of these nutrients, the balance between supply and demand is calculated to determine how much fertilizer will need to be imported in 2028.

Due to delays or suspension in the implementation of new fertilizer production plants, Brazil should continue to experience significant increase in reliance on foreign supply during the outlook period. In this edition, we have also provided an alternative scenario in which a few additional plants were assumed to become operational along the projected years. Nevertheless, even with the additional production from these new plants, the need to import fertilizers remained basically unchanged.

We highlight that the projections made herein are based on assumptions that may change over the outlook period. Factors such as severe climate events, the opening of new markets, and changes in sanitary regulations and international protectionism are only a few of the variables that may influence projections for a given commodity.

Finally, the production of commodities such as rice, dry beans, wheat, and milk is driven by domestic demand, since Brazil is not a major exporter of these commodities.

Since estimates may require adjustments due to risk factors inherent to the agricultural sector or to changes in the macroeconomic scenario, the projections may be regularly updated throughout the year and when outstanding events impact the commodities analyzed. Updates will be available at: **www.fiesp.com.br/outlook.**

2

THE INTERNATIONAL MACROECONOMIC SCENARIO

The world economic growth landscape started to change in 2018. Although the world is currently experiencing a positive momentum in growth, unemployment, and inflation rates in most areas, there is increased concern as to the sustainability of this current positive scenario. Dark times seem to be on the horizon for the developed world.

The United States is the highlight in terms of worldwide economic growth in the developed world. The last three quarters have shown an annualized performance of nearly 4%, a rather high rate for a high income per capita country such as the United States. President Donald Trump's policies of tax cuts, immigration restrictions, and trade protectionism, in the short-term, have led to a record low 4% unemployment rate, the lowest in five decades. Labor market pressure has raised U.S. workers' income in a relevant way, which translates into greater consumption and economic growth.

While inflation rates went up, they did not rise too much, which would have been expected as a result of labor market tightening. This has raised a relevant debate among leading American economists as to how prices remain relatively well behaved, despite very low unemployment.

The discussion indicates that new information technologies (big data, artificial intelligence, blockchain, etc.) have changed how prices are set and disseminated throughout the economy. These changes in pricing dynamics shed doubts over the development of the United States monetary policy. Lower unemployment would suggest increased interest rates, while a relatively well-adjusted inflation would suggest otherwise.

However, two troubling issues have influenced the higher U.S. interest rate. On one hand, the greater monetary expansion applied by the developed world to address the global economic recession, starting in 2008, raises concerns regarding potential speculative bubbles.

Excess liquidity raises asset prices to levels that are not compatible with their returns. This enhances the risk of abrupt turns in the economic cycle, which was exactly what happened in 2008. Therefore, an attempt is being made now to avoid repeating these recent events.

The second reason for the higher interest rate is tied to the U.S. tax policy. Reduction of U.S. government revenue resulting from tax cuts, coupled with continued high spending, has raised the fiscal deficit in recent years. If this situation continues over the next few years, the U.S. Government will probably have to increase its demand for market financing, which will raise debt cost and reinforce the high interest rate cycle. The resulting trend would be a slowdown cycle in the U.S. economy and, consequently, in the world's economy.

An analysis of current interest rates for 2-year and 4-year U.S. Treasury securities reveals that the tax differential has dropped to nearly zero, which the market interprets as an upcoming slowdown in growth. During 2019, a relatively positive global growth can be expected; however, since Outlook FIESP covers a 10-year cycle, it is always good to keep in mind that the forecast for the next five years is a worldwide reduction in some of the excellent growth cycles observed in the past three years.

President Trump's economic policies have elements that complicate global growth. The "trade war" fostered by the U.S. government could potentially compromise the performance of the key global economies. Everyone knows how trade wars start; however, no one really knows how they will end. There could be great imbalances if the bilateral negotiations lack in common sense.

Higher import tariffs will lead to similar retaliations. New barriers lead to unbalanced domestic market prices, which affect returns for different sectors of the economy. Economic losses lead to discomfort and to complaints and pressure on political leaders. Sometimes these dissatisfactions are offset by subsidies, which, in turn, complicate the framework of international negotiations. Therefore, it is difficult to measure the risks associated with the effects of a trade war on the global economy.

However, distortions in international trade caused by abrupt increases on import tariffs, non-tariff barriers, subsidies, etc. will end up affecting the economic performance of the entire global economy.

China, nevertheless, continues to grow around 6.5% per year, with signs of a slight slowdown over time, despite the Chinese trade balance's significant growth in agricultural product imports. The country's agricultural trade deficit is already at US$80 billion per year and it will continue to grow over the next decade. The main food suppliers for this market are the United States and Brazil.

The US-China trade war and the Brazilian agribusiness

Donald Trump administration's trade war has caused a significant redirection of Chinese purchases from U.S. to Brazilian products. The events of 2018 were impressive. When the United States increased import tariffs on all of its key agricultural products by 25%, it strongly redirected the purchasing of these goods from Brazil.

This was particularly true for soybean products. Chinese relevance in the soybean global market is such that the trading shift caused a 20% plunge in the product's quote in Chicago while raising Brazilian soybean premiums by about 30% over U.S. prices, an unprecedented event.

Chinese purchases of Brazilian beef indicate that domestic agricultural exports have the potential to expand substantially if the U.S.-China trade disputes continue.

Consequently, there are several relevant elements of uncertainty in Outlook FIESP's current ten-year forecast for Brazilian agriculture contingent on the development of U.S.-China negotiations. Continuity of trade barriers in the next decade could result in important opportunities for Brazil in the Chinese market.

However, it is worth stating that the widespread damaging effects of a trade war on global growth could be severe enough to counteract any benefits gained in the bilateral trade.

Russia, India, Indonesia, Pakistan, Turkey, and many other countries have already begun developing protectionist policies for their agricultural sectors. Furthermore, a stronger focus on Brazilian exports to China could lead to loss of opportunities for domestic products in other important consumer markets.

The scenario built into Outlook FIESP 2028 assumes that the trade war will subside in the coming years, and trade patterns observed in the last decade will resume. However, the wave of agricultural support in "state capitalism" countries, such as Russia, should continue.

3

THE BRAZILIAN MACROECONOMIC SCENARIO: NEW GOVERNMENT, OLD ISSUES, DIFFERENT SCENARIOS

Brazil is experiencing a rare economic moment. From a macroeconomic perspective, the country is in a unique position with lots of elements in place for the first time in a long time. Brazil has moved from a situation of high inflation and high interest rates to one of (currently) low inflation and reduced interest rates. Unfortunately, it took a recession of epic proportions for this to happen. The GDP per capita in Brazil dropped by 10% between 2015 and 2016.

In spite of this, and thanks to the agribusiness sector, Brazil has accumulated reserves that amount to US$ 380 billion. The country's current account is very close to zero, thanks to a good trade surplus. Foreign direct investments dropped, but they are still around US$ 50 billion. The current Brazilian total foreign debt is US$ 330 billion. Compared to the rest of the world, the country is a creditor. This keeps the exchange rate relatively balanced, containing inflation and keeping interest rates low, which is the positive side of the economy, as mentioned earlier.

On the other hand, Brazil faces a very serious and complex problem that must be fixed: the public accounts. If these accounts remain out of control, they will require a lot of resolution from the new government.

The primary status of public accounts has been largely negative since 2014. Due to the high 2014 and 2015 inflation rates, Bacen increased interest rates to 14.25%. Consequently, debt skyrocketed. The country came out of a 55% debt-to-GDP ratio (the equivalent to a debt-to-income ratio in corporate terms) to current numbers leading to an 80% debt-to-GDP ratio. If Brazil remains on this path, the government will find it increasingly difficulty to finance its debt, and the ensuing consequences are well known. If the government is unable to finance its debt, it will seek help from the Central Bank to issue debt securities and sell them on the market, which, in turn, will bring back inflation.

Recent events in Argentina and Venezuela should be a cautionary tale as to what may happen if Brazil does not address its fiscal problems with orthodox policies. By continuing on this path, the problem will become more complex, as loss of confidence in public finances will lead to currency devaluation, which will bring back inflation. With inflation comes higher

interest that will create additional difficulties to the adjustment of public accounts, whether as a result of lower revenues due to reduced economic growth or as a result of increasing spending with interest levied on the total debt.

Matters are further worsened by the current and increasingly negative Social Security account. The demographic pyramid in Brazil is changing. A smaller number of young people will have to financially support an increasing number of elderly. By adding the Social Security deficit to the country's current fiscal situation, Brazil finds itself faced with an enormous challenge that will have to be addressed in the future. In order to overcome this situation, Brazil needs to promote reforms and control expenses. The one thing Brazil does not need is populist policies.

Exchange rates, inflation, interest rates, economic growth, and employment will all be contingent on how Brazil addresses its tax issue. If the new government decides to fix the public accounts by means that include Pension Reform, it is possible that Brazil will continue to have a scenario of low interest rates, controlled inflation, recovery of economic activity, and reduced unemployment. However, if the fiscal matter is not addressed, the most likely scenario is one of currency depreciation and increased inflation, which may lead to higher interest rates and, subsequently, to reduced economic growth and higher unemployment.

Fiscal adjustment and agribusiness

If the Brazilian economy reaches a tax balance, animal protein chains and greater elasticity products, such as red meat and dairy products as well as fruits and vegetables, would show a better relative performance. Higher economic growth and lower unemployment rates would lead to greater dynamics in the trade of these products, which are more prevalent in the domestic market. Concomitantly, exchange rate stability should keep production costs under control.

For animal protein chains, this scenario could keep the price of corn and soybean meal, among other products, more stable due to a stronger currency (Real) trend. This would be particularly true if the U.S.-China trade war subsides.

Within a scenario of tax balance and continued economic reforms, the Brazilian agricultural policy, based on the current state of affairs and current interest rates (Selic rate at 6.5% per year), could be changed if the government were to prioritize rural insurance as a policy to guarantee the producer's income.

Yet another issue should be taken into account in the projections for the Brazilian agricultural landscape over the next decade. It is a matter that has deeply crippled agricultural prices, a Brazilian idiosyncrasy. The minimum freight rate policy established by the federal government in 2018 gave rise to great distortions in domestic prices that varied geographically.

Two trends have emerged since minimum shipping prices were fixed. Although losses were felt throughout the entire production chain, there is no question that these were far greater for growers that are farther away from the ports and, also, for lower value products.

Moreover, since the minimum freight rate policy created by the National Agency for Terrestrial Transportation (ANTT) did not take into account return freight costs, the cost of agricultural inputs transport has increased substantially, significantly affecting production costs. Again, this effect increases in direct correlation with the production operations' distance from the ports. Grower losses, whether due to lower revenue or to increased costs, will certainly have an impact on future crops if the minimum freight policy remains in effect. Outlook FIESP 2028 assumes that this policy will not remain in force throughout the outlook period.

4

COTTON

Despite increased competition from synthetic fibers made from oil and other raw materials, cotton continues to be extremely relevant to the manufacturing of clothing and other textile products. In addition to supplying a key natural fiber, other parts of the cotton plant also have important uses, including cottonseed, which is a source of oil for the industry, and cotton bran, which is used mainly as animal feed.

In the last three global seasons, after a period of intense stockpiling, demand has outpaced supply, lowering the product's stock-to-use ratio. The reduction was observed mainly in China. The country's adjustments to its agricultural regulatory programs decreased production and favored the use of its enormous stockpiles.

A global balance analysis that excludes China indicates that stockpile volumes in other countries are relatively stable. Nevertheless, lower supplies have incentivized price recovery, an effect that should be felt again in 2019. It is suggested that the price of cotton fiber in the international market may stay above US$c80/lb. A combination of favorable prices, exchange rate depreciation, and good crop yields achieved in recent seasons has brought excellent economic outcomes to Brazilian cotton growers, helping the sector recover from the critical financial situation it previously experienced.

The impact of the U.S.-China trade war on cotton is still unknown as the dispute between one of the world's largest agricultural product exporters and one of the world's largest importers of these products has imparted great instability to the agribusiness sector.

At the moment, the dispute involves the Chinese imposition of very high tariff barriers on U.S. imports, with cotton as one of the commodities impacted. Although cotton's share in the import tariff disputes is not as significant as soybeans, it nevertheless has important consequences on global trade.

The expected decline in U.S. exports has caused a reduction in U.S. market prices. In contrast, other cotton suppliers, like Brazil, have found in the conflict a great opportunity to increase product shipments at premium prices to the Asian country, a situation lasting until the two largest global economies find a satisfactory resolution to their dispute. How long that will take is unpredictable and is contingent on how the negotiations evolve, which may bring in new elements that could affect the forecasts made herein.

In the domestic market, the 2017/2018 season should end with an uptake in demand, following a significant decline caused by the severe economic recession that devastated the country. Assuming that the Brazilian economy continues to recover, based on continuity of the reform agenda, our forecast is that consumption will continue to grow in the next season.

We also expect exports to remain strong in 2019, with shipments surpassing the 1 million ton mark observed in 2018, a substantial amount for the sector.

Increased consumption and exports will result from greater supply. The 2017/2018 crop season was the largest ever recorded and, coupled with favorable prices, it should encourage continued investments in the industry. We expect to see another expansion of planted areas and significant application of crop technologies. These factors, together with favorable weather conditions, will be essential for a higher crop yield and higher-quality fiber outcome.

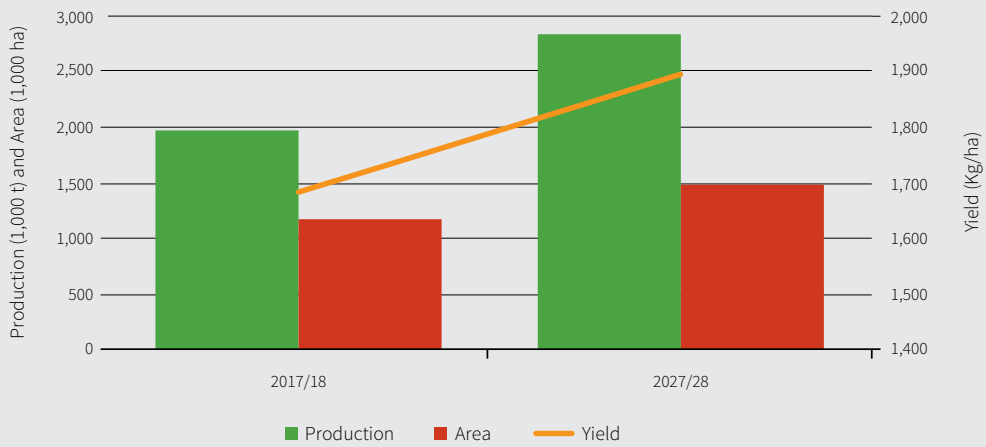
Variation from 2017/18 to 2027/28

Brazilian Cotton Production, Area, and Yield

Production
44%

Planted Area
28%

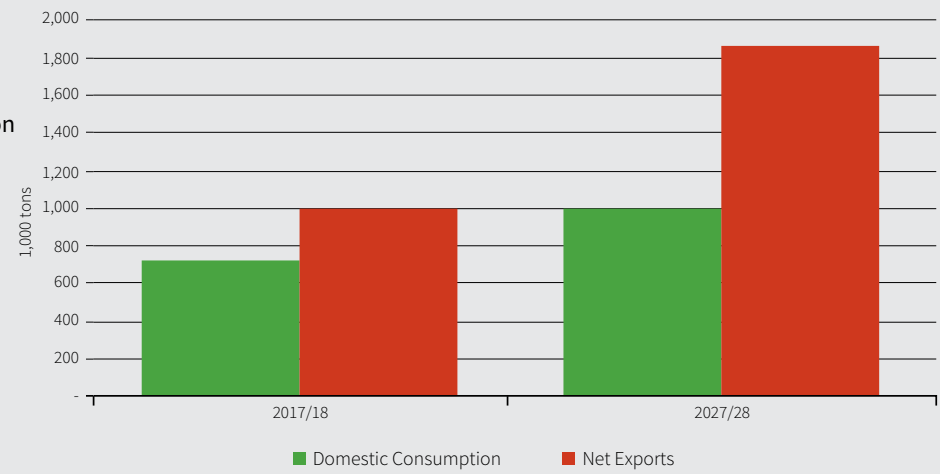
Yield
13%



Cotton Domestic Consumption and Net Exports

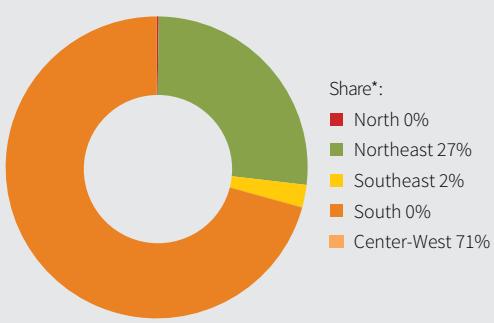
Domestic Consumption
38%

Net Exports
87%

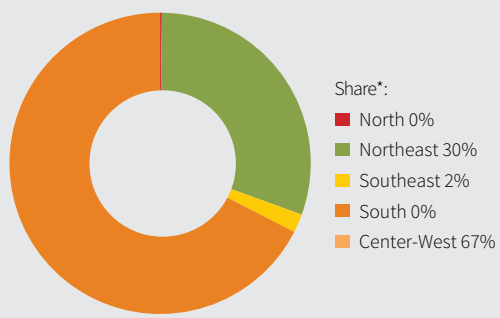


Regional Share in Cotton Production

2017/18
Total Production: 2.0 Million Tons



2027/28
Total Production: 2.8 Million Tons



Note:* Share sums higher or lower than 100% are an effect of rounding. **Source:** Outlook Fiesp **Prepared by:** FIESP/DEAGRO and MBAGRO

COTTON
(GINNED)

in 2027/2028*

1.5 MILLION
hectares planted

28% growth relative to 2017/2018

2.8 MILLION
tons produced

44% growth relative to 2017/2018

13%
projected yield growth (t/ha)

1.7
2017/2018

1.9
2027/2028

1.9 MILLION
net tons exported

87% growth relative to 2017/2018

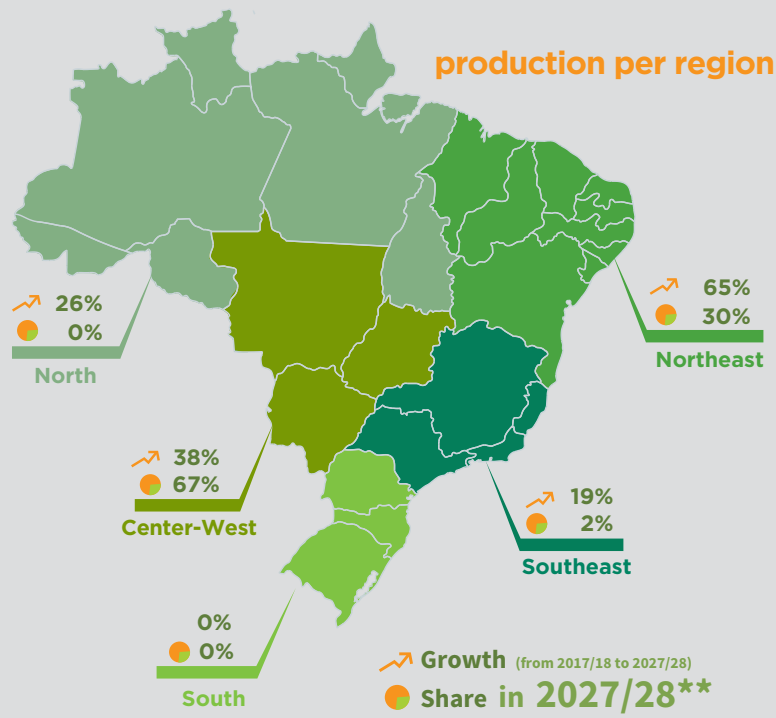
domestic consumption

0.7
million t
2017/18

1.0
million t
2027/28

38% growth

production per region



Notes: *Comparison between the 2017/2018 and 2027/2028 seasons -- Ten-year projection **Share sums higher or lower than 100% are an effect of rounding.

Source: Outlook Fiesp **Prepared by:** FIESP/DEAGRO and MBAGRO

5

RICE

In reflection of favorable global demand, rice prices increased in the international market for the first few months of 2018. The upward trend was driven by crop failures in the U.S. and by increased demand from countries where poor weather conditions forced them to seek replacement for their domestic supply.

However, there was a change in the trend when Asian producers started to place their new harvest in the market in the middle of the year. The rise in supply significantly lowered prices. Since then, global stocks have been replenished, increasing the stock-to-use ratio and pulling rice prices to levels below the historical average.

Estimates for the 2018/2019 season suggest a decline compared to the previous cycle. This reflects expectations of a reduction in Chinese production, following the largest global rice producer and exporter's plans to shrink rice acreage. India, another relevant country in this market, has also contributed to this scenario of decreased production, as rainfalls in the country were below normal in the past monsoon season. Shortage of rainfalls at the ideal time can severely compromise rice planting. Prices correlated with this scenario and are expected to remain at current levels in the international market through the end of 2018.

In Brazil, the industry ended 2017 with a reasonable carryover stock. The 2018 production met expectations due to favorable weather conditions. The record yields from the previous crop cycle were not matched, but the new crop yields were, nonetheless, the second largest in history, securing a good domestic supply.

However, depreciation of the Brazilian currency and decreased U.S. supply in the global market created a good opportunity for Brazilian rice exports, lowering domestic product availability and carryover stocks at the end of the harvest.

Currency depreciation also raised the price of products from Brazilian suppliers, such as Uruguay or Paraguay, an illustration of how the domestic price of rice is impacted by shifts in currency exchange, regardless of whether they are due to export or import conditions. These events have set bag prices in an upward trend that should last through the next harvest, in 2019.

Contrary to soybean and corn, domestic consumption of rice is very close to production totals, thus Brazilian rice is not traditionally exported. Notwithstanding, in the past few years, we have seen an increasing trend in shipments of the grain that has added greater dynamics to the sector.

Despite this greater integration in international trade, rice should remain a product that is mainly directed towards the domestic market and, consequently, no major structural changes are expected in the production in the coming years.

As far as domestic crop distribution, most of the production is concentrated in the Southern region of the country, notably in the state of Rio Grande do Sul, where the grain is planted in floodplains and soil systematization enables the use of large irrigation beds and reduced competition with other crops.

Dryland rice crops, however, are concentrated in the country's Center-West region, where they are in direct competition with soybean and corn crops. Often, when these two crops show increased profitability, soybean and corn replace rice production, which is likely to happen in the next season.

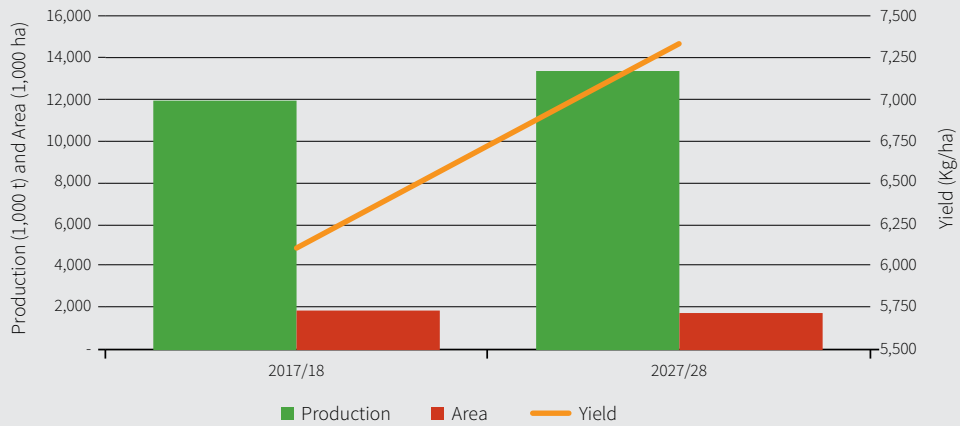
Variation from 2017/18 to 2027/28

Brazilian Rice Production, Area, and Yield

Production
12%

Planted Area
-7%

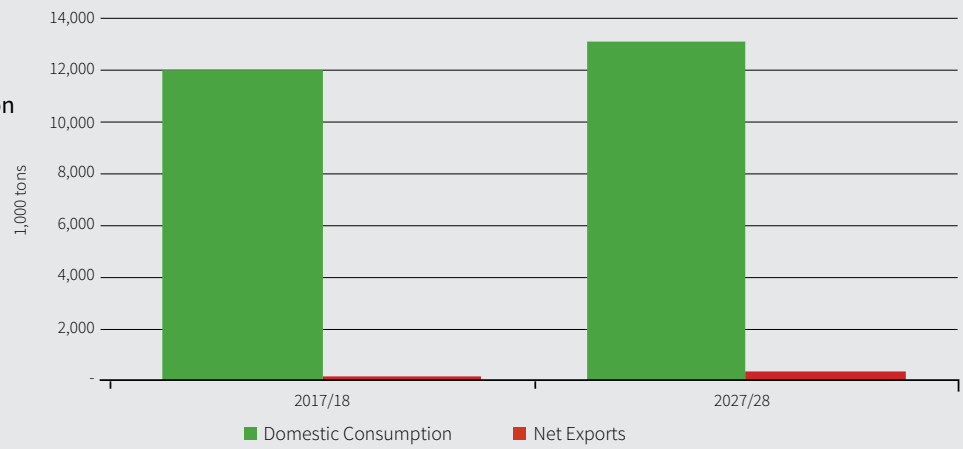
Yield
20%



Rice Domestic Consumption and Net Exports

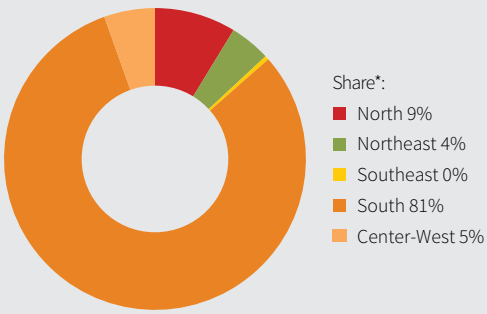
Domestic Consumption
9%

Net Exports
152%

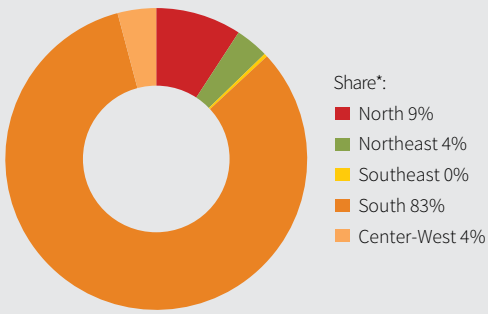


Regional Share in Rice Production

2017/18
Total Production: 12.0 Million Tons



2027/28
Total Production: 13.4 Million Tons



Note: * Share sums higher or lower than 100% are an effect of rounding. **Source:** Outlook Fiesp **Prepared by:** FIESP/DEAGRO and MBAGRO

RICE

in 2027/2018*

1.8 MILLION
hectares planted

-7% drop relative to 2017/2018

13.4 MILLION
tons produced

12% growth relative to 2017/2018

378 THOUSAND
net tons exported

152% growth relative to 2017/2018

20%
projected yield growth (t/ha)

6.1
2017/2018

7.3
2027/2028

consumption per capita
(kg/person/year)

56.9
(2017/18)

58.3
(2027/28)

2% growth

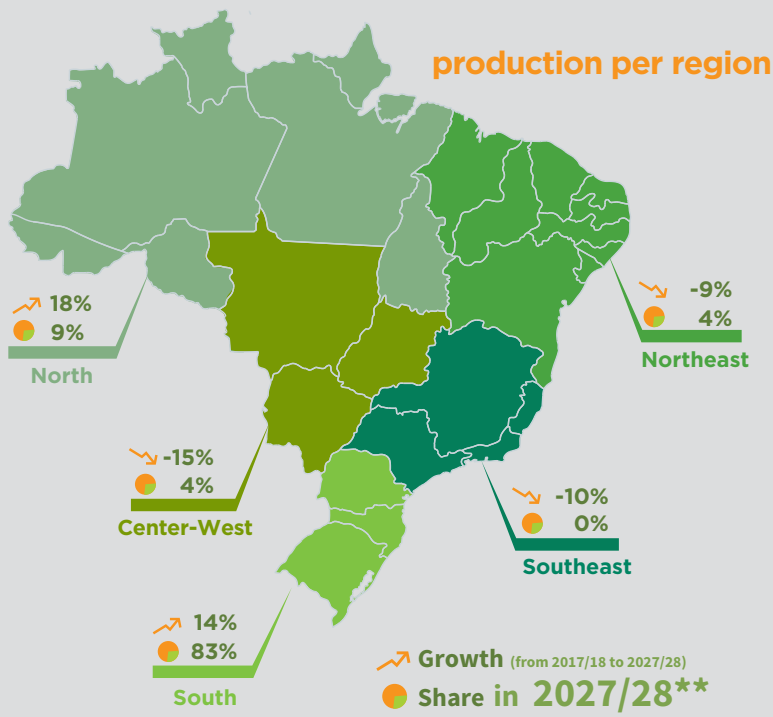
domestic consumption

12.0
million t
(2017/18)

13.0
million t
(2027/28)

9% growth

production per region



Notes: *Comparison between the 2017/2018 and 2027/2028 seasons -- Ten-year projection **Share sums higher or lower than 100% are an effect of rounding.

Source: Outlook Fiesp **Prepared by:** FIESP/DEAGRO and MBAGRO

6

COFFEE

In 2018, Brazil produced its largest coffee crop in history, an estimated 60 million bags, according to Conab, which is a 33% growth compared to the previous crop year. Although there might be an adjustment to the final numbers, the general perception is that a significant volume was produced and that the quality of the product was also higher given the prevailing dry weather during the harvest.

Record numbers were obtained for both varieties of coffee planted in the country. Arabica coffee production hit an estimated 46 million bags, while Conilon coffee production reached 14 million bags. For the Arabica bean, the output resulted from a combination of the variety's naturally higher yielding half of a two-year cycle, good husbandry, and the recent investments made in upgrading coffee plantations. The second consecutive year of increased Conilon coffee production reflected the recovery of Espírito Santo, the variety's key producing state, from the deep drought it suffered two years ago. The weather was also a key factor in the favorable results.

Renovation of coffee plantations in recent years, with increasingly productive varieties, has led to record yields, despite reductions in planted area.

Now that the warehouses are full, we expect a recovery in Brazilian coffee exports. In the past couple of years, weather conditions were one of the main reasons for the country's lower export volumes. This year's production, therefore, should allow the country to meet domestic demand and to recover its international market share in 2019.

It should be noted that Brazil's main competitors in coffee production, Vietnam and Colombia in particular, had good yields in the last couple of years and show good prospects for the current cycle as well. Since global demand remained unchanged, the gap left by Brazil's lower exports was filled by production from the other countries and carryover stocks, preventing a coffee shortage in consumer markets.

Now that Brazilian production is again abundant, concerns have shifted towards declining premiums being paid to growers. Prices have reached the lowest levels seen in many years. Although the current setting is one of relative comfort from a supply standpoint, the general trend of many growers, not exclusively Brazilian growers, will be to reduce husbandry costs, which could lead to lower yields in the coming years.

However, since Brazil is one of the most competitive countries production-wise, relative to other countries, it may not be as strongly impacted by this situation.

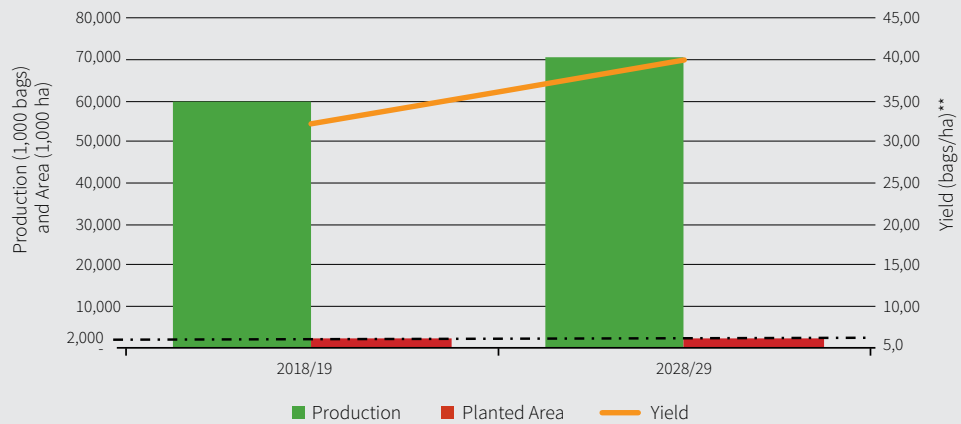
Variation from 2018/19 to 2028/29

Brazilian Coffee Production, Area, and Yield

Production
18%

Planted Area
-5%

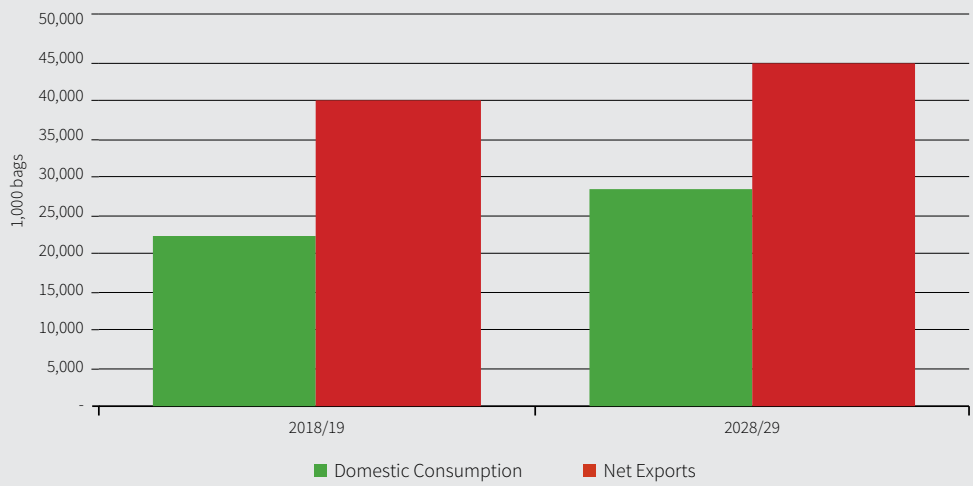
Yield
24%



Coffee Domestic Consumption and Net Exports

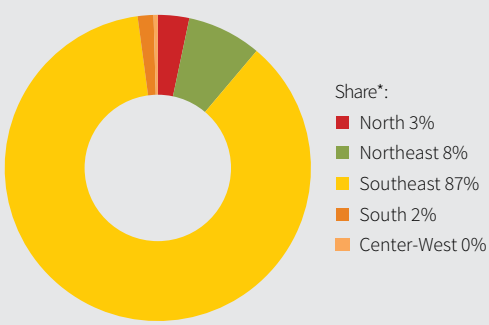
Domestic Consumption
28%

Net Exports
13%

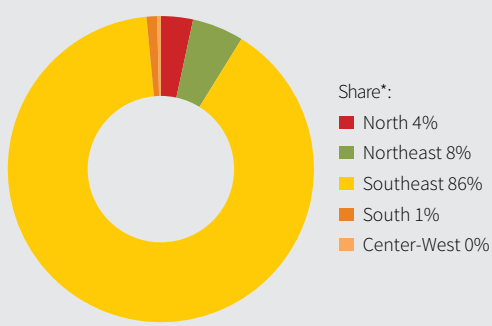


Regional Share in Coffee Production

2018/19
Total Production: 59.9 Million Bags



2028/29
Total Production: 70.8 Million Bags



Notes: * Share sums higher or lower than 100% are an effect of rounding **Source:** Outlook Fiesp **Prepared by:** FIESP/DEAGRO and MBAGRO
**Yield based on production aria.

COFFEE

in 2028/2029*

2.1 MILLION
hectares planted

-5% drop relative to 2018/2019

70.8 MILLION
bags produced

18% growth relative to 2018/2019

45.0 MILLION
bags exported

13% growth relative to 2018/2019

24%
projected yield growth*** (bags/ha)

32.2
2018/2019

39.9
2028/2029

per capita consumption
(kg/person/year)

6.4
(2018/19)

7.7
(2028/29)

21% growth

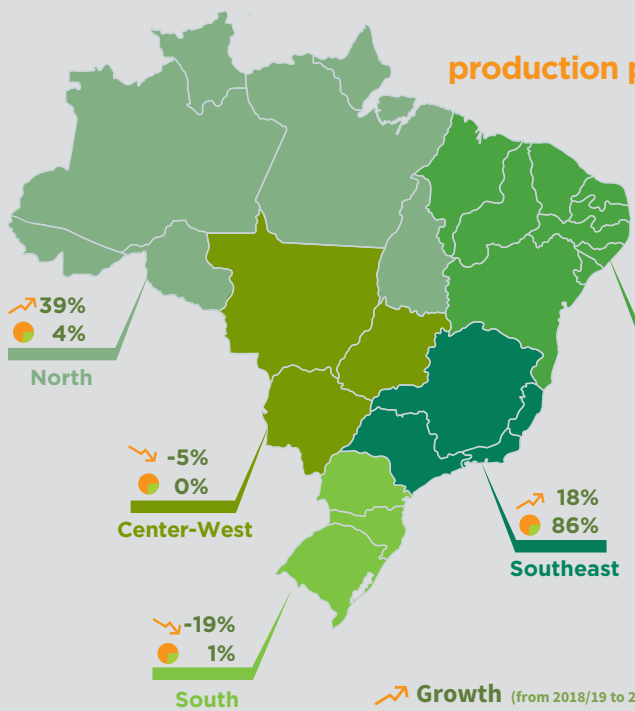
domestic donsumption

22.3
million bags
(2018/19)

28.6
million bags
(2028/29)

28% growth

production per region



Growth (from 2018/19 to 2028/29)
Share in 2028/29**

Notes: *Comparison between the 2018/2019 and 2028/2029 seasons -- Ten-year projection **Share sums higher or lower than 100% are an effect of rounding.
Source: Outlook Fiesp **Prepared by:** FIESP/DEAGRO and MBAGRO

7

SUGARCANE, SUGAR AND ETHANOL

The global 2017/2018 season registered a record surplus in the sugar market. Despite the reduced Brazilian supply, the end of the production quota system in Europe, along with more favorable weather for sugarcane production in Asia and the greater yields of India's new cultivars have worked together to push global production to a historic 192 million-ton record. Concomitantly, world consumption dropped by almost 17 million tons, according to data published by the USDA.

While sugar production has increased at an average rate of 1.9% per year in the past 20 years, variations in demand were recorded to be around 1.7% per year in that same period. The average global per capita consumption reached its peak in the 2012/2013 cycle, at 23.2 kilograms per person. Since then, demand has remained below that level.

The 2018/2019 season could have led to a better balance between supply and demand, however, this was hindered by India, which continued to promote increases in planted areas, despite low international prices, by fixing minimum premiums paid to farmers at levels high above the market's. The country has developed one of the most interventionist policies in the industry, setting minimum prices for sugarcane and, more recently, for sugar. They have also set sales quotas for manufacturing plants, stock control, and subsidized storage and exports at critical times.

Thailand, another major sugar exporter, should slowdown its production in the 2018/2019-crop year. The country is beginning to rethink its policy for the sector. The current policy grants subsidies to sugarcane producers, controls domestic prices, regulates the volume intended for the domestic market, and, consequently, for exports. Plans for a new policy started after Brazil raised the issue of Thailand's market control system before the WTO in 2016.

Europe has been experiencing very adverse weather conditions, such as rainfall shortages and historically high temperatures. This could be a problem for its beet production, which may see a substantial decline in the 2018/2019 cycle, after reaching an impressive 21 million tons harvested in the 2017/2018 crop year, the first following the end of the quota system.

In Brazil, the unfavorable weather, coupled with years of poor husbandry, brought losses to the 2018/2019 crop season. Production diversion to ethanol, due to low sugar prices in the international market and better biofuel prices, will lead to a sharp decline in sugar production, taking more than 7 million tons of the Brazilian sugar supply from the foreign market.

In spite of these lower supply levels, the increased production in India, coupled with full stocks and lower demand worldwide, have held international sugar prices low, below production cost for most of the major producers. In this setting, a surplus is forecasted for 2018/2019, albeit less significant.

In response to the global sugar surplus, many of the major sugar producers have diverted their production to ethanol. In Brazil, the hydrous ethanol market has become rather attractive, incentivized by a new policy that ties gas prices to the international market. The search for a balance in the sugar and ethanol market, both domestic and international, will continue for the present.

In Brazil, the "Renovabio" program should work as a tool to encourage investment in renewable fuels in the country. The program strives to promote energy efficiency in the entire production system, including cuts in biofuel production cost.

At its core, the program rewards those who show greater productivity and lower CO2 emissions. The emission mitigation equation is based on the issuance of tradable Carbon Saving Credits (CBio) that will be assigned to the manufacturing plants. The number of credits assigned to a plant will reflect the life-cycle carbon emissions savings associated with the plant's ethanol production, that is, the lower the plant's carbon generation, the higher the number of CBios it will receive per liter of ethanol sold. This mechanism will award the most efficient producers with premium prices, which, as previously stated, should incentivize new investment in the sector.

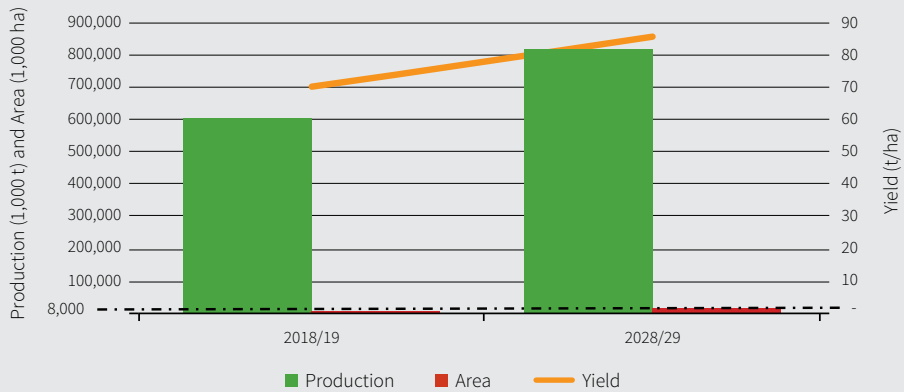
Variation from 2018/19 to 2028/29

Brazilian Sugarcane Production, Area, and Yield

Production
36%

Planted Area
11%

Yield
23%

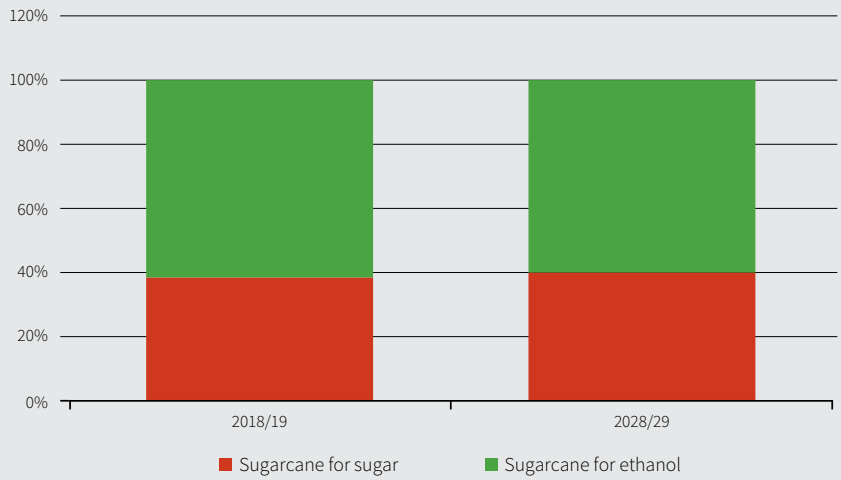


Brazilian Sugarcane Uses

Mix
2028/29

Sugar
40%

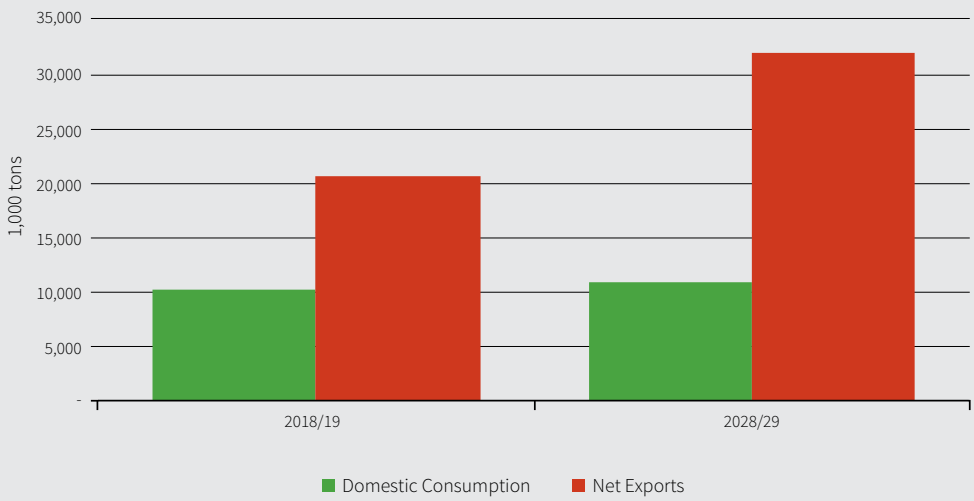
Ethanol
60%



Sugar Domestic Consumption and Net Exports

Domestic Consumption
6%

Net Exports
56%

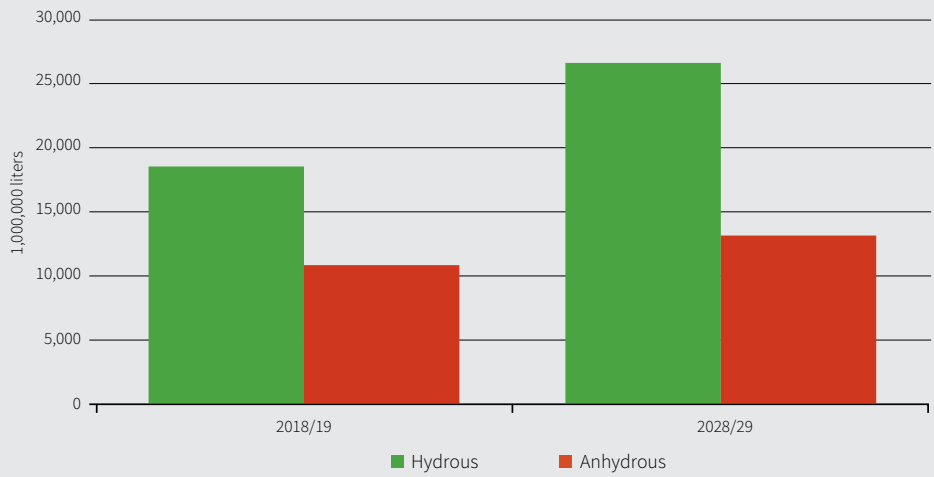


Variation from 2018/19 to 2028/29

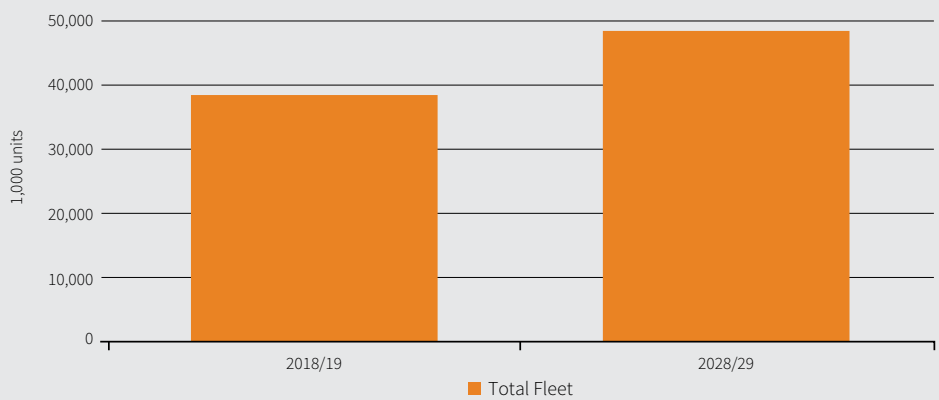
Domestic Consumption of Hydrous and Anhydrous Ethanol

Hydrous Ethanol Consumption
45%

Anhydrous Ethanol Consumption
21%

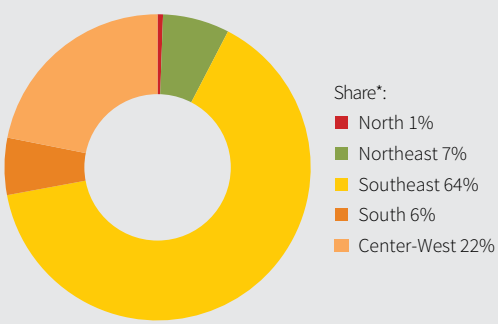


Evolution of the Brazilian Vehicle Fleet

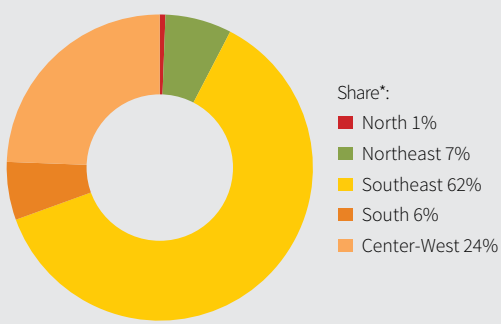


Regional Share in Sugarcane Production

2018/19
Total Production: 600.7 Million Tons



2028/29
Total Production: 817.6 Million Tons



Note: * Share sums higher or lower than 100% are an effect of rounding **Source:** Outlook Fiesp **Prepared by:** FIESP/DEAGRO and MBAGRO

SUGARCANE, SUGAR, AND ETHANOL

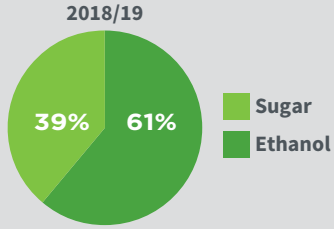
in 2028/2029*

Sugarcane

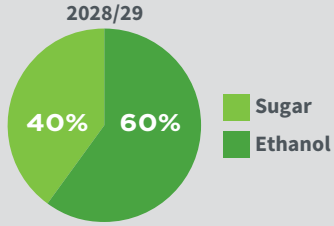
Planted Area (hectares)	Production (tons)	Yield (t/ha)
9.6 MM	817.6 MM	86
11% growth	36% growth	23% growth

Production Mix

2018/19



2028/29



Sugar

Production (t)	Net Exports (t)	Domestic Consumption (t)
42.8 MM	32.0 MM	10.9 MM
39% growth	56% growth	6% growth

Ethanol

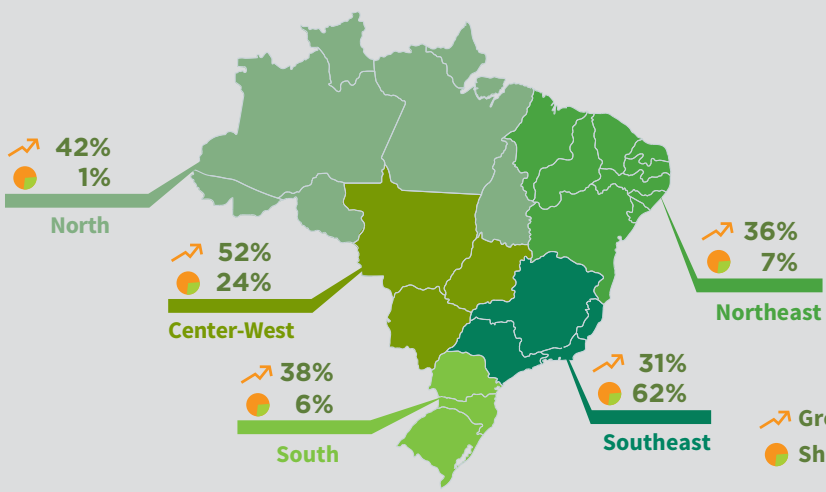
Production (l)	Net Exports (l)	Domestic Consumption (l)
41.9 B	1.9 B	39.9 B
43% growth	350% growth	36% growth

Brazilian light weight vehicle fleet

48.5 million units

31% hydrated flex fuel (2028/29)

sugarcane production per region



Growth (from 2018/19 to 2028/29)
Share in 2028/29**

Notes: *Comparison between the 2018/2019 and 2028/2029 seasons -- Ten-year projection **Share sums higher or lower than 100% are an effect of rounding.

Source: Outlook Fiesp **Prepared by:** FIESP/DEAGRO and MBAGRO

8

PULP

Total Brazilian pulp production in 2017 reached 19.5 million tons, a growth of 4% relative to the 2016 record yield. Performance in the first half of 2018 was 7.8% greater than in the same period in the previous year, suggesting a potentially new domestic production record.

Brazilian exports in 2018 are 13.3% above the prior year. China has been the key destination market, but exports to Europe have also been significant. Additionally, appreciation of the U.S. dollar has positively contributed to revenues.

Pulp demand increased in every region of the globe in 2017 and we expect to see the same phenomenon in 2018. World pulp consumption rose from a rate of 1.5 to 2 million tons per year. The rise positively impacted pricing in the first half of 2018. A similar upward trend is expected for the second half of the year.

As a consequence, the Brazilian Tree Industry (IBA) has revised its forecast for investments in Brazilian pulp, paper, and wooden panels. The original forecast was readjusted from R$14 billion to R$24 billion for the period between 2017 and 2020, a R$10 billion increase.

The bulk of the investment, R$22 billion, will go to pulp production, R$7.5 billion of which will be spent in the expansion of Fibria's factory in Três Lagoas (MS). Another expansion project at Klabin will take R$7.5 billion in investments. Two other investments have been made in the production of the soluble pulp used by the textile, pharmaceutical, and food industries.

The Austrian company Lenzing, one of the five largest soluble pulp producers, is coming to Brazil through a joint venture with Duratex. Their plan includes building the world's largest single line of soluble pulp production in Minas Gerais. The plant should have a 450 thousand tons per year capacity and it will require an initial investment of over R$4 billion.

The Indonesian Royal Golden Eagle (RGE) may be heading another, although yet unconfirmed, project. In May 2018, the company acquired Lwarcel and it intends to carry on with the expansion of the Lençóis Paulista (SP) plant, adding 750 thousand tons to the plant's current 250 thousand ton capacity, with the flexibility to process both short fiber and soluble pulp. This would require an investment of R$3.5 billion.

These recent investments, combined, should put an additional 4 million tons of pulp into the market.

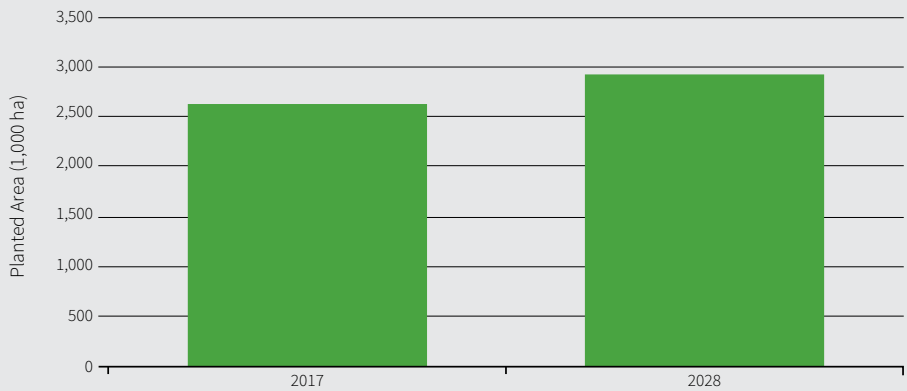
There have been no announcements about new investments in pulp plants abroad until at least 2021. The last announcement made was regarding the Asian Pulp and Paper plant in Indonesia in 2017, with a 2.8 million ton production capacity, but it still is not yet fully operational.

Brazil, therefore, seems to be well-positioned in the long-term pulp market. Strong demand from the Asian and European markets, coupled with the comparative advantage of domestic producers in terms of production cost, continues to suggest a promising outlook for a more prevalent market share of Brazilian exports.

Variation from 2017 to 2028

Brazilian Forest Planted Area for Pulp Production

Planted Area
12%

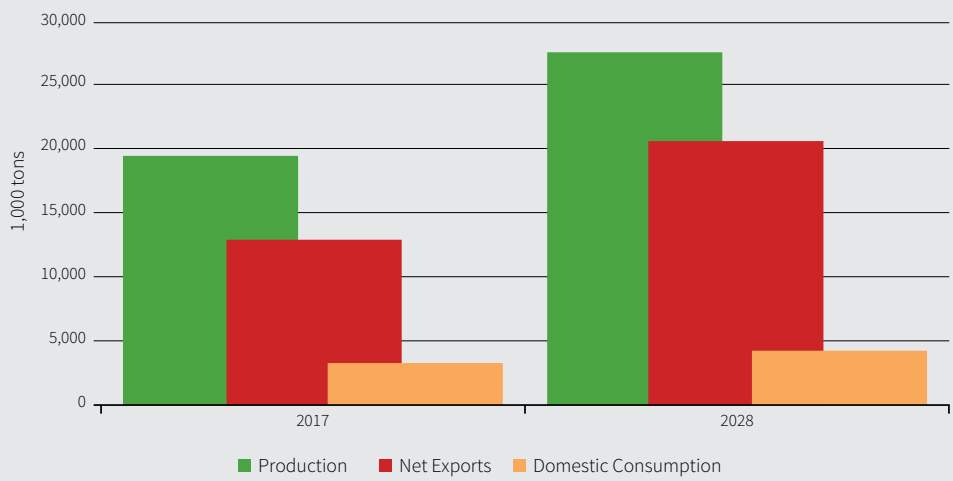


Brazilian Pulp Supply and Demand

Production
42%

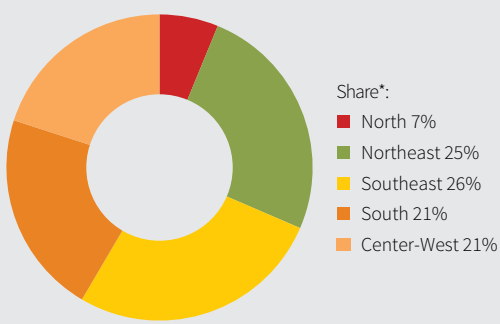
Domestic Consumption
24%

Net Exports
60%

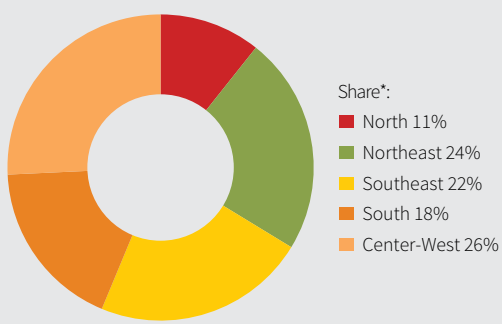


Regional Share in Eucalyptus Planted Area for Pulp Production

2017
Total: 2.6 Million Hectares



2028
Total: 2.9 Million Hectares



Note: * Share sums higher or lower than 100% are an effect of rounding. **Source:** Outlook Fiesp **Prepared by:** FIESP/DEAGRO and MBAGRO

PULP

in 2028*

2.9 MILLION
hectares of eucalyptus planted

12% growth relative to 2017

27.5 MILLION
tons of pulp produced

42% growth relative to 2017

20.7 MILLION
net tons exported

60% growth relative to 2017

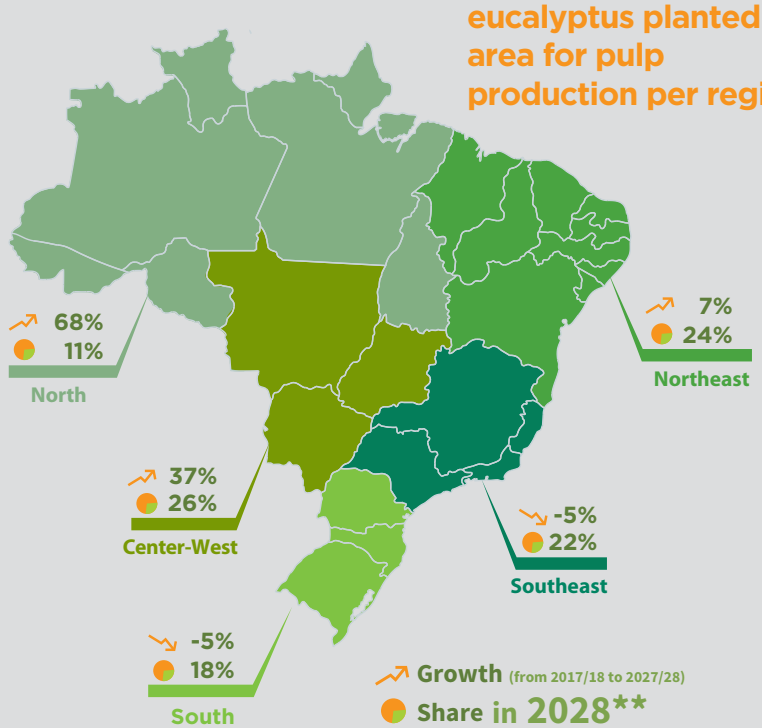
domestic consumption

3.4 million t 2017

4.2 million t 2028

24% growth

eucalyptus planted area for pulp production per region



Notes: *Comparison between the 2017 and 2018 seasons -- Eleven-year projection **Share sums higher or lower than 100% are an effect of rounding.

Source: Outlook Fiesp **Prepared by:** FIESP/DEAGRO and MBAGRO

9

DRY BEANS

Beans are a peculiar consumer product because their trade is contingent on a population's specific eating habits. The multiple bean uses, varieties, and forms of preparation vary widely across groups. Consequently, their desired attributes will vary with each market, limiting the product's world trade. This means that the key bean producers are also the key consumers, with very little exportable surplus.

Brazil is not an exception in this scenario and most of the domestic production is directed towards domestic demand. Some supplemental imports are restricted specifically to black beans, a variety that is also commonly consumed in China and Argentina.

Beans are also very susceptible to adverse weather events. The fact that the annual three bean crops are planted at three distinct times throughout the year results in significant area and yield variations.

In low profitability years, such as 2018, low prices cause producers to limit investment in crops and crop technology. A common strategy often adopted by farmers is to cut production costs by using stored grains from the previous season as seeds instead of certified seed, which results in lower yields.

Bean prices stayed low for most of 2018. Up until August, they remained as such despite the decline in domestic supply, reflecting a drop in domestic demand. If the market does not improve by the end of the year, crop area reductions are expected for the first 2018/2019 bean crop, which is in competition with soybean and corn crops.

The second bean crop, which competes with the second corn crop, and the third bean crop, which is planted in irrigated areas, could also be affected by market conditions and by competition from other crops.

Beans are a staple in the Brazilian diet and, as such, bean consumption is not strongly influenced by the country's economic situation or pricing. Based on the product's low elasticity, we do not forecast a rise in demand, as higher incomes are forecast for next year. Any changes in domestic supply tend to significantly affect bean prices due to low variability in demand and limited import opportunities. Therefore, short-term forecasting for this market is particularly challenging. Despite temporary variations, the long-term trend expected is one of relative stability in the *per capita* consumption of beans.

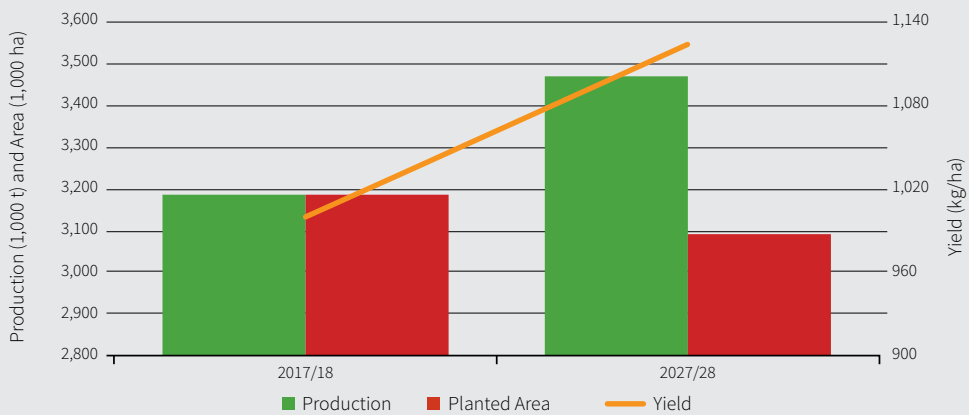
Variation from 2017/18 to 2027/28*

Brazilian Dry Bean Production, Area and Yield

Production
9%

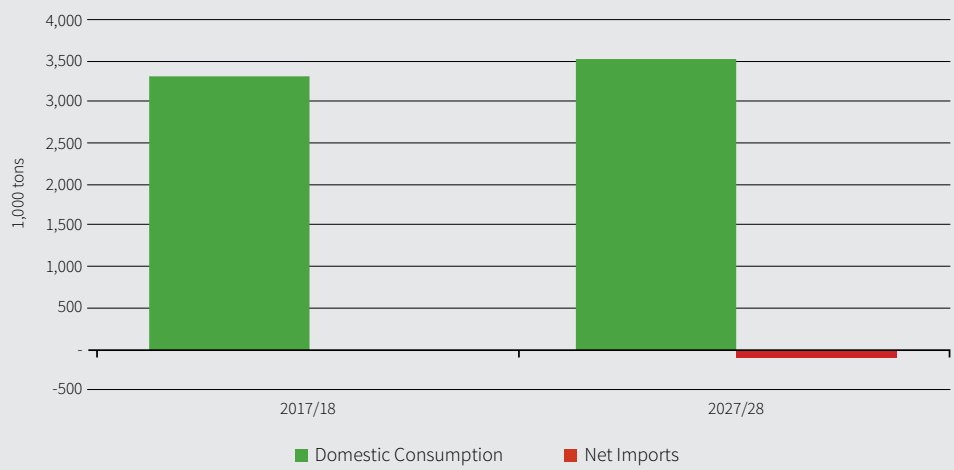
Planted Area
-3%

Yield
12%



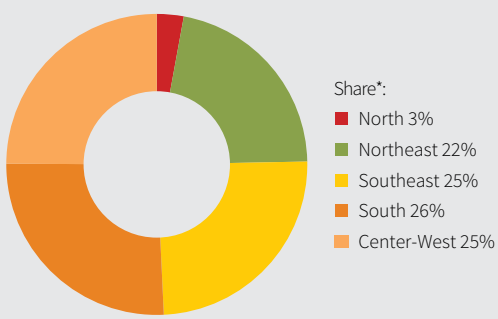
Dry Bean Domestic Consumption and Net Imports

Domestic Consumption
7%

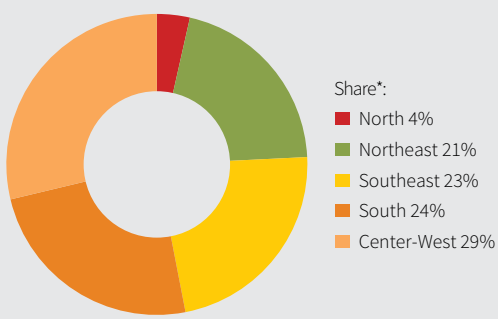


Regional Share in Dry Bean Production

2017/18
Total Production: 3.2 million tons



2027/28
Total Production: 3.5 million tons



Notes: *Amounts relative to three bean crops. **Share sums higher or lower than 100% are an effect of rounding

Source: Outlook Fiesp **Prepared by:** FIESP/DEAGRO and MBAGRO

DRY BEANS

in 2027/28*

3.1 MILLION
hectares planted

3% drop relative to 2017/18

3.5 MILLION
tons produced

9% growth relative to 2017/18

Per capita consumption
(kg/person/year)

15.6 (2017/18) → **15.8** (2027/28)

1% growth

12%
projected yield growth

1.0 2017/2018 → **1.1** 2027/2028

domestic consumption

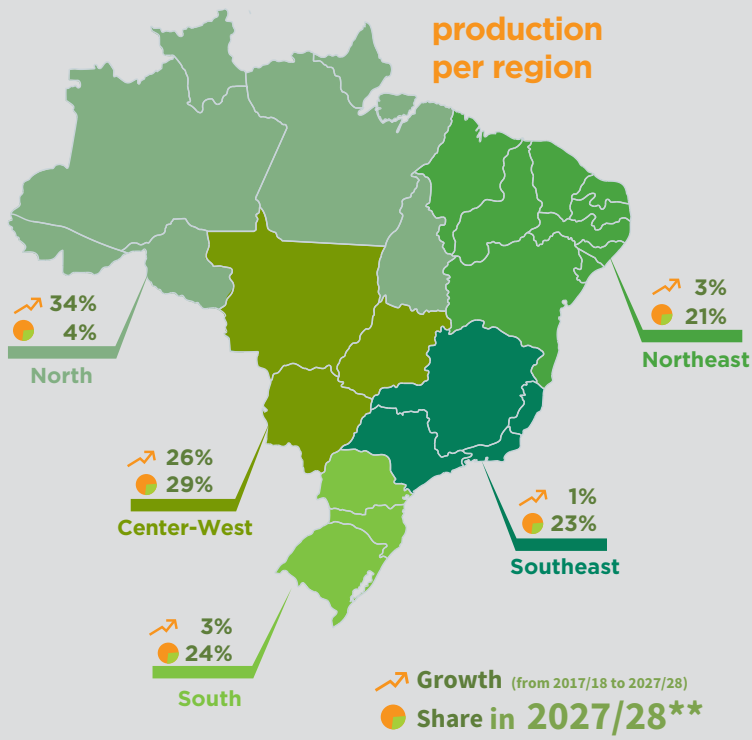
3.3 million t (2017/18) → **3.5** million t (2027/28)

7% growth

share in total 2027/28 production

41% 1st crop
39% 2nd crop
20% 3rd crop

production per region



Notes: *Comparison between the 2017/2018 and 2027/2028 seasons -- Ten-year projection **Share sums higher or lower than 100% are an effect of rounding.
Source: Outlook Fiesp **Prepared by:** FIESP/DEAGRO and MBAGRO

10

CORN

In the 2016/2017 crop season, global corn production surpassed the 1 billion ton mark, making it the most produced and consumed cereal worldwide. Higher per capita income in countries such as China and India has significantly increased animal protein consumption, with direct consequences to the corn production chain, as the cereal is the key input in feed production.

Additionally, these countries have also promoted advances in their animal protein production systems. They have begun using a higher rate of formulated feed to better meet the nutritional demands of the herd.

From a supply standpoint, after intense crop technology investments, Brazil has consolidated its position as one of the world's main producers and exporters of corn and animal protein. Nevertheless, the industry has been surprised by unforeseen events, such as the significant yield losses caused by weather conditions in the 2017/2018 second-crop cycle. Total yields, originally estimated at over 90 million tons, will be closer to 80 million tons.

The lower than expected production has raised prices to near the historical levels recorded in 2016. Prices have remained high for most of 2018 and are expected to continue at current levels through mid-2019, when the second-crop corn is harvested.

Even the lower Chicago prices, driven by the U.S.-China trade war, observed at the time this issue was published, have failed to impact Brazilian prices. Although domestic prices are above export parity, producers have not yet to take full advantage of this scenario because of the truckers' strike, which has led to the establishment of minimum freight rate policy. In addition to increasing transportation costs, the new policy has also hindered future sales and the purchase of inputs for the upcoming season.

Stock displacement was limited to short distances, causing delays in shipments. Consequently, the original 30 million tons of forecasted exports had to be revised down to around 25 million tons for this season. Exports, however, are expected to increase in the 2018/2019 market year.

The legality of the minimum freight rate policy, which negatively affected the regular flow of negotiations in the beginning of the 2018/19 crop season, remains inconclusive, thus becoming an important challenge for the new government.

However, Brazilian exports could be favored by a combination of factors, such as the Argentinian crop failure, the recent drought in Europe, the lack of trade agreements between the U.S. and China, and the U.S. and Mexico. However, the products still need to make it to the ports at competitive freight costs.

Domestic demand is lower than forecasted, particularly in the livestock sector, due to issues faced by the aviculture industry. Although feed consumption continues to rise, China's antidumping tariff on Brazilian chicken meat and the closure of the European market to some domestic industries may have an impact on the sector's corn consumption, lowering previous performance estimates.

Corn ethanol production, on the other hand, has been strongly incentivized by new "flex" processing plants (plants that process both sugarcane and corn) and corn-only processing plants. In 2017, 1.3 million tons of corn were processed into 522 million liters of corn ethanol, suggesting a continuing expansion that could potentially grow three-fold in just a few years, which will also entail a greater by-product (DDG) availability for animal feed. Dried distiller's grain (DDG) could replace part of the corn and meal used as feedstock, reducing the meat industry's demand for these products.

In terms of planed area, area reduction is expected for the first-crop corn and area expansion is expected for the second-crop corn, the latter encouraged by more attractive prices.

Therefore, the outcome of the 2018/2019 crop cycle is still contingent on factors that are critical for the corn market: the minimum freight rate policy situation, the implementation schedule of the new reform agenda and the potential effects of the reform on the economy and the exchange rate, the export rates through at least March 2019, plus the domestic demand should continue to impact prices and, consequently, planting schedules.

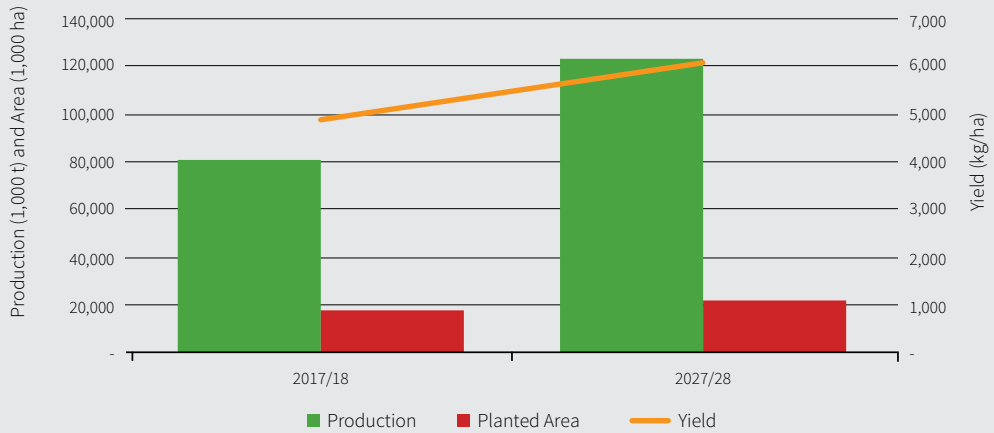
Variation from 2017/18 to 2027/28*

Brazilian Corn Production, Area and Yield

Production
52%

Planted Area
22%

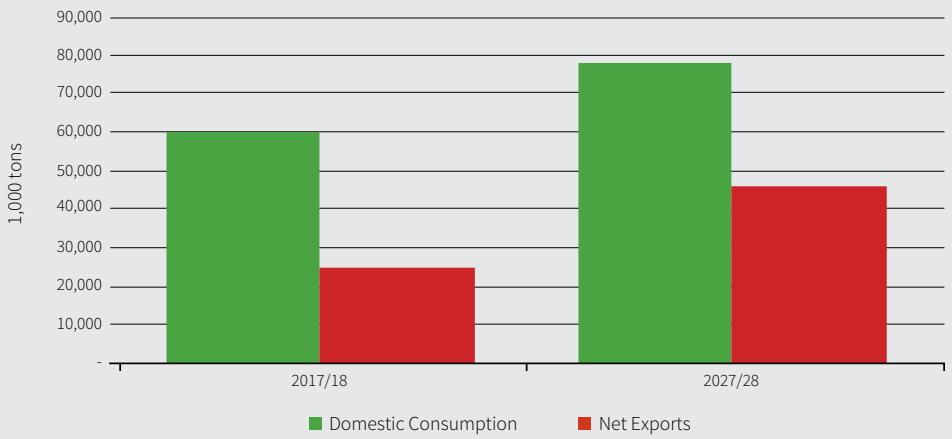
Yield
24%



Corn Domestic Consumption and Net Exports

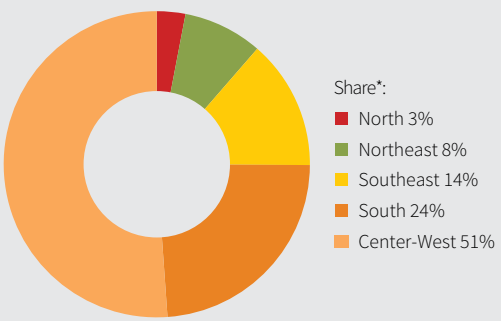
Domestic Consumption
30%

Net Exports
84%

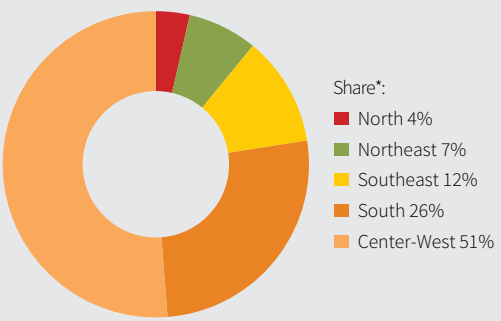


Regional Share in Corn Production

2017/18
Total Production: 81.4 million tons



2027/28
Total Production: 123.7 million tons



Notes: *Amounts relative to two corn crops. **Share sums higher or lower than 100% are an effect of rounding
Source: Outlook Fiesp **Prepared by:** FIESP/DEAGRO and MBAGRO

CORN

in 2027/2028*

20.3 MILLION
hectares planted

22% growth relative to 2017/18

123.7 MILLION
tons produced

52% growth relative to 2017/18

24%
projected yield growth (t/ha)

4.9
2017/2018

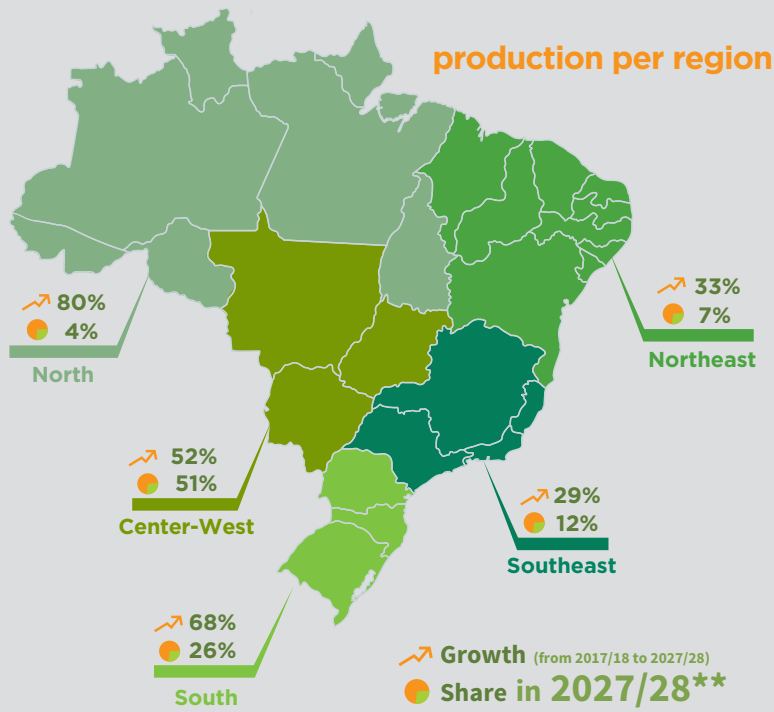
6.1
2027/2028

24.9 MM
net tons exported
(2017/18)

45.8 MM
net tons exported
(2027/28)

84% growth relative to 2017/18

production per region



domestic consumption

59.8
million t
2017/2018

77.7
million t
2027/2028

30% growth

74% growth in 2nd crop corn production

77% share of 2nd crop in total corn production

Notes: *Comparison between the 2017/2018 and 2027/2028 seasons. Amounts relative to two corn crops -- Ten-year projection. **Share sums higher or lower than 100% are an effect of rounding.

Source: Outlook Fiesp **Prepared by:** FIESP/DEAGRO and MBAGRO

11

SOYBEAN, SOYMEAL AND OIL

In 2017, Brazilian soybeans generated almost US$32 billion in the international market, making it the most significant product chain in the country's trade balance. This outcome resulted from the continuing development of the industry and from Brazil's consolidation as one of the key players in the global market, a position the country has held for a few years now. In 2018, 35% of the global supply came from Brazil, who shares the position of main supplier with the United States, producing around the same levels.

From a demand standpoint, China is the largest global soybean consumer and crusher. The country's imports meet nearly 90% of the domestic demand. For years, the United States was China's main supplier. However, the recent trade war between the two nations has had an impact on global trade. Prices on the international stock markets have been reacting to the escalating dispute and to the new tariff barriers that have been imposed.

The Chinese import tariff on U.S. soybean skyrocketed from 3% to 28% in July 2018, an increase that changed global trade logistics, as the U.S. product became 25 percentage points more expensive than soybeans from other important growers like Brazil or Argentina. This substantial surge in the tariff barrier significantly decreased demand for U.S. soybeans, just as the country prepares to reap one of its largest harvests in history.

Forecasts of a decline in Chinese purchases of soybeans have caused the product's price to tumble in Chicago. At the same time, premiums at Brazilian ports have increased substantially, in response to the 2017/2018 crop failure in Argentina, the largest exporter of soymeal and oil. The higher premiums and the exchange rate depreciation were more than enough to offset the Chicago losses. Domestic prices have also been trading up. If the US-China trade disputes continue, the situation could remain unchanged for the entire season, resulting in great profitability for farmers.

In Brazil, the price incentive led to further expansion of soybean planting in the 2018/2019 season, replacing summer corn areas, despite the currently good corn prices. While the current Brazilian soybean season had a promising start, based on expected rains that led to early planting in most of the producing regions, late November brought with it a draught that persisted through December, which affected several producing states, in particular Paraná and Mato Grosso do Sul. The

drought impacted large crop areas during a very sensitive developmental stage, causing significant losses that should reduce the productive potential of the crop season.

As a result, the already insufficient Brazilian crop supply to China is likely to be even more limited, reducing the country's export volume.

Brazil has been the largest global soybean exporter since 2013, and the incentives brought in by the U.S.-China trade dispute have only provided Brazilian production with an even greater boost. Higher international demand should significantly lower the Brazilian carryover stocks for the current season. Crushing operations should also feel the impact of higher export volumes, as they will raise the price of soybeans for this industry. Processing should be limited to what is strictly necessary to meet domestic biodiesel and cooking oil consumption, and oil shipments should fall. The international sales rate for soymeal should remain high, as the crushing industry for oil production will continue to generate a large amount of the by-product. Therefore, exports will continue to uptrend despite the expected higher domestic feed consumption.

Note that it will not be possible to replace the entire U.S. supply of soybeans to China right away, as it is very high. Hence, U.S. purchases should continue through the next South American crop season in early 2019.

Furthermore, the U.S. soybean is currently the cheapest available for all other countries besides China. Therefore, a greater diversification of U.S. exports is expected in 2019, with potential product triangulation. We could see a stronger trend of third parties buying U.S. soybean to, in turn, export it to the Chinese market. Another option would be for third parties to process the U.S. product and export the domestic grain.

In the United States, the crisis has directly impacted producer profitability. In order to circumvent the problem, the Trump administration has announced a bailout package worth more than US$12 billion, which includes direct payouts of up to US$5 billion. According to the U.S. government, soybean production has been the most affected by the conflict, thus soybean farmers will receive US$1.65 per bushel, the equivalent to almost US$4 billion.

This payout reverts the negative operating result, creating a market anomaly. Despite the subsidy, profitability remains low and soybean areas are forecasted to be replaced with corn. The government's bailout program is also an emergency program, that is, it should only remain in effect for this crop season, which makes an analysis of future crops challenging.

What is important to keep in mind still, in the matter of the U.S.-China trade dispute, is that the two nations could change their strategies at any time, which could have an impact on soybean pricing and premiums. The conflict will likely be resolved at some point, but that will depend on how the negotiations evolve, and they have been, so far, lethargic. It is impossible to tell when the two countries will reach an agreement. In the short term, the main effect of the dispute has been the price distortions observed in the different markets.

In Argentina, after a drought-induced crop failure, signs of the recession have been reflected in the sharp exchange rate depreciation and diminished international reserves. The solution that Maurício Macri's administration found to increase

revenue was to impose a tax on exports, which has had the effect of reducing Argentina's competitiveness. Now, in addition to the previous taxation (retenciones), soybeans are hit with a new export tax that will also impact soymeal and oil.

In the Brazilian domestic market, most of the debate has been about the minimum freight rate policy and its impact on the crop season. The crisis created by the policy remains inconclusive, thus becoming an important challenge for the new government.

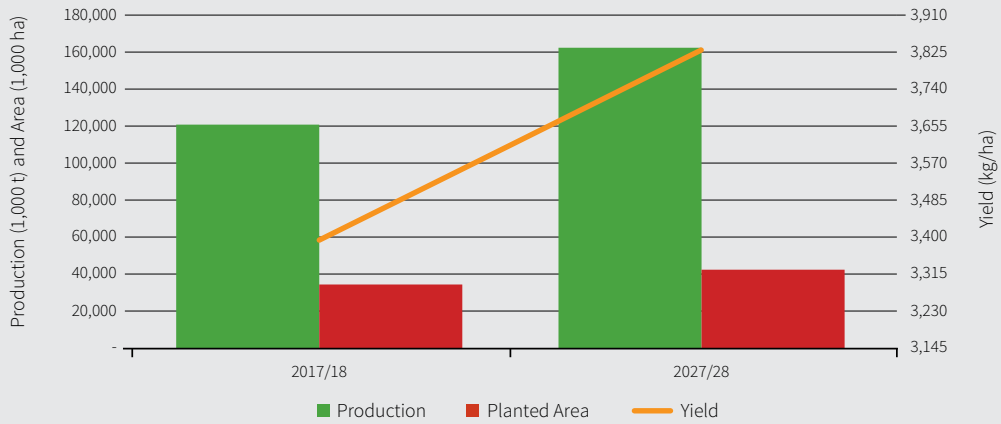
Variation from 2017/18 to 2027/28

Brazilian Soybean Production, Area and Yield

Production
35%

Planted Area
21%

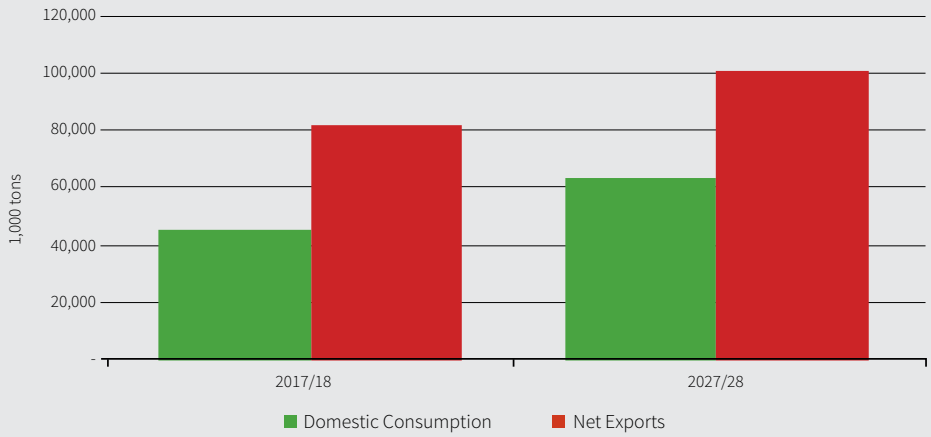
Yield
12%



Soybean Domestic Consumption and Net Exports

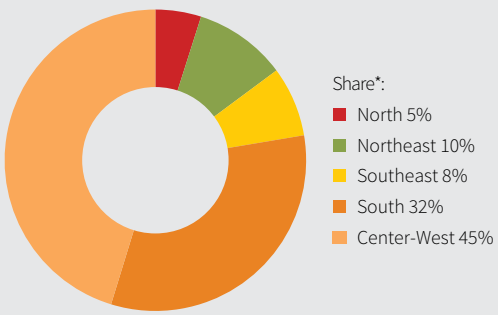
Domestic Consumption
41%

Net Exports
21%

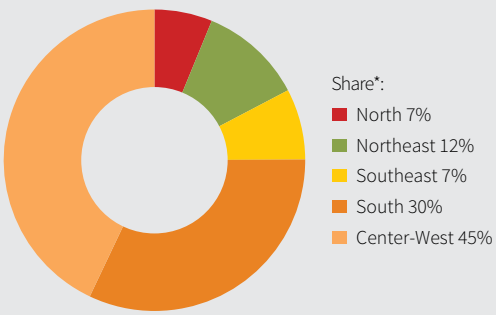


Regional Share in Soybean Production

2017/18
Total Production: 120.2 million tons



2027/28
Total Production: 162.3 million tons



Note: * Share sums higher or lower than 100% are an effect of rounding. **Source:** Outlook Fiesp **Prepared by:** FIESP/DEAGRO and MBAGRO

SOYBEAN, MEAL AND OIL

in 2027/2028*

42.5 MM
hectares planted
21% growth

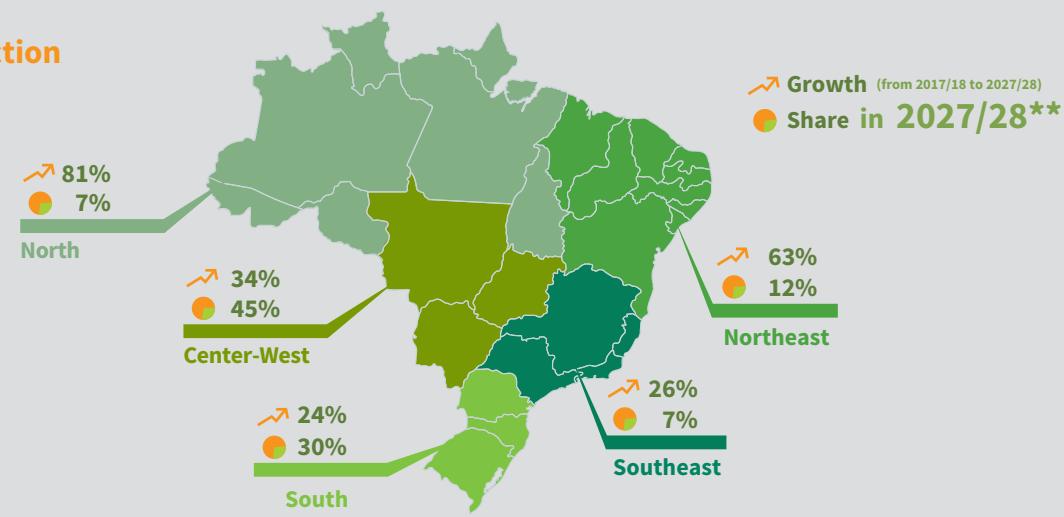
12%
projected yield growth (t/ha)

3.4
2017/2018

3.8
2027/2028

	Soybean	Soymeal	Soy Oil
Production (million tons)	162.3 MM 35% growth	45.9 MM 44% growth	11.6 MM 44% growth
Net exports (million tons)	100.9 MM 21% growth	26.6 MM 59% growth	0.8 MM 42% drop
Domestic Consumption (million tons)	61.5 MM 41% growth	19.3 MM 12% growth	10.8 MM 53% growth

soybean production per region



Notes: *Comparison between the 2017/2018 and 2027/2028 seasons -- Ten-year projection **Share sums higher or lower than 100% are an effect of rounding.
Source: Outlook Fiesp **Prepared by:** FIESP/DEAGRO and MBAGRO

12

ORANGE JUICE

The optimistic projections for the Florida citrus market suggest higher supply for the 2018/2019 season, after the state reaped its smallest harvest since 1945 in the 2017/2018 crop year. Production is forecasted at nearly 70 million boxes, compared to the 45 million produced in the previous cycle.

The highest supply estimates for the U.S. state, although significant, are still far from the impressive numbers obtained in the 2003/2004 season, when 242 million boxes were harvested. Notably, the record harvest happened around the same time that the citrus Greening disease was first detected in those orchards.

According to the Florida Citrus Mutual, whose estimates, published in October, are based on data from Florida's Department of Agriculture, the numbers for the 2018/2019 crop are optimistic, considering that the state still has an entire hurricane season ahead of it on top of the always present risk of frost. However, it also points out that Florida citrus growers are beginning to learn how to deal with the citrus Greening disease, many of the orchards are young, and the trees are in great shape, despite the hurricane that hit the state's citrus region in 2017.

While, the supply from the largest producing U.S. state shows signs of recovery this season, juice consumption in the country has been shrinking steadily over the last few years. According to a report on retail sales of orange juice in the United States, prepared by Nielsen and published by Florida's Citrus Department, concentrated orange juice consumption in the country has been falling gradually since the 2003/2004 season, with annual rates of consumption decline ranging from 1.2% to 12.8% in the period. An exception was the 2008/2009 cycle, which saw an increase of 1.1% over the previous period.

The 2017/2018 crop season, which runs from October 2017 to September 2018, followed the downward trend observed in recent years. U.S. retail sales of orange juice reached 1.3 million liters, 4.9% below the previous period.

Comparatively, the downward trend in orange juice consumption worldwide has been more modest, but it is rather significant. According to Tetra Pak's data, organized by Markestrat, global orange juice consumption has dropped at a rate of 1.8% per year between 2006 and 2016.

Among the factors that could explain the significant decline in consumption are changes in eating habits, particularly at breakfast; the product's association with carbohydrate consumption; competition with other products, such as flavored waters, and other juices, such as grape juice.

In 2016, the World Health Organization (WHO) recommended that a levy be imposed on sugar-added beverages, the so-called "sugar tax". Twenty-eight countries and seven U.S. cities implemented this type of tax, with the goal of reducing the sugar content in the products' formulations. After the sugar tax implementation, an assessment of prices and consumer trends revealed that, in France, for example, there was an increase in the consumption of pure fruit juice. Mexico also saw an increase in the consumption of taxed versus non-taxed beverages.

However, it is still too soon to know how consumers in these markets will make choices concerning which products to consume if there is an increases in the price of soft drinks and other sugary beverages due to new regulations. It is also unclear how orange juice could benefit from the situation.

In Brazil, according to Fundecitrus, the citrus belt located between São Paulo and southern Minas Gerais had an excellent 2017/2018 crop year, with production at 389 million boxes, a yield that had not been seen since the 2011/2012 season. Lower yields are forecasted for the 2018/2019 crop, with production at 288 million boxes, due to unfavorable weather conditions during the flowering season -- high temperatures caused the death of floral buds, reducing the productive potential of the orchards.

The low-demand/high-supply mismatch in the international market has been positively affected by the recent lower yielding harvests in both Florida and Brazil, which tightened global stocks and raised the price of frozen concentrate orange juice (FCOJ).

There is room in the international FCOJ market for a good balance between higher supply and profitable prices. However, it is of foremost importance that effective incentives are made to increase orange juice consumption through such measures as marketing campaigns to promote the product's health benefits. The association that represents this industry in Brazil, and in other markets, has already started to implement this type of initiative.

It is important to state that a rebound in the Floridian supply as a result of greater control over the citrus Greening disease may make it more difficult to keep a good balance in this market.

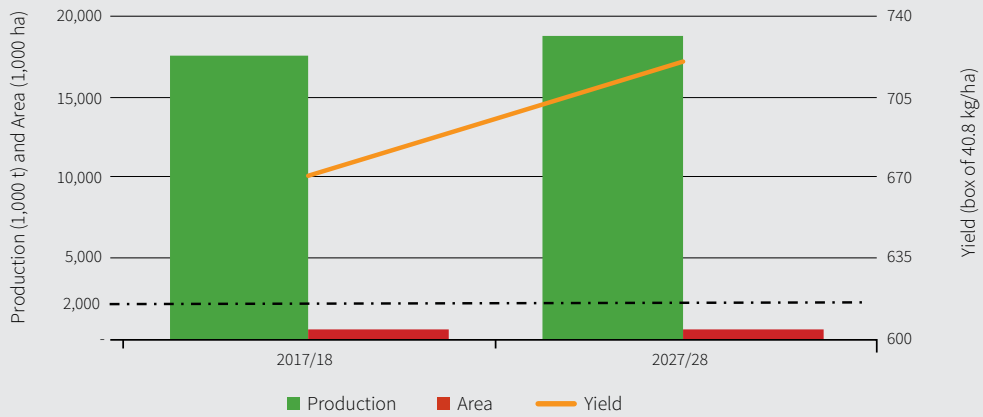
Variation from 2017/18 to 2027/28*

Brazilian Orange Production, Area and Yield

Production
8%

Planted Area
0.3%

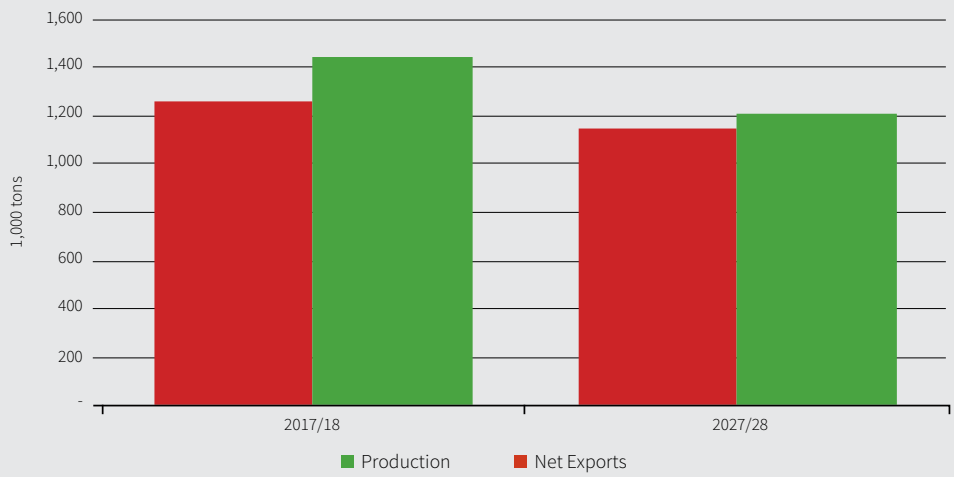
Yield
7%



Orange Juice Production and Net Exports

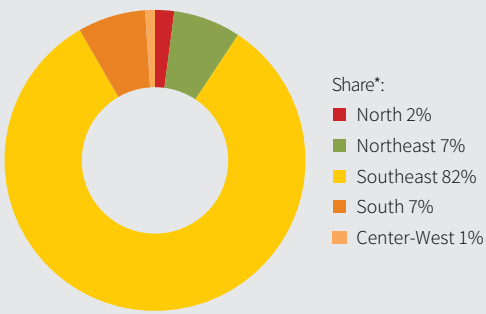
Production
-17%

Net Exports
-9%

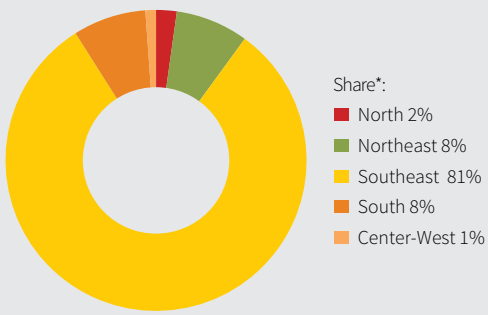


Regional Share in Orange Production

2017/18
Total Production: 17.5 million tons



2027/28
Total Production: 18.8 million tons



Note:* Share sums higher or lower than 100% are an effect of rounding. **Source:** Outlook Fiesp **Prepared by:** FIESP/DEAGRO and MBAGRO

ORANGE JUICE

in 2027/2028*

640 THOUSAND
hectares of oranges planted
0.3% growth relative to 2017/18

18.8 MILLION
tons of oranges produced
8% growth relative to 2017/18

1.2 MILLION
tons of orange juice produced
(2027/28)
17% drop relative to 2017/18

7%
projected yield growth
(box of 40.8 kg/ha)

671
2017/2018

720
2027/2028

domestic demand for orange juice

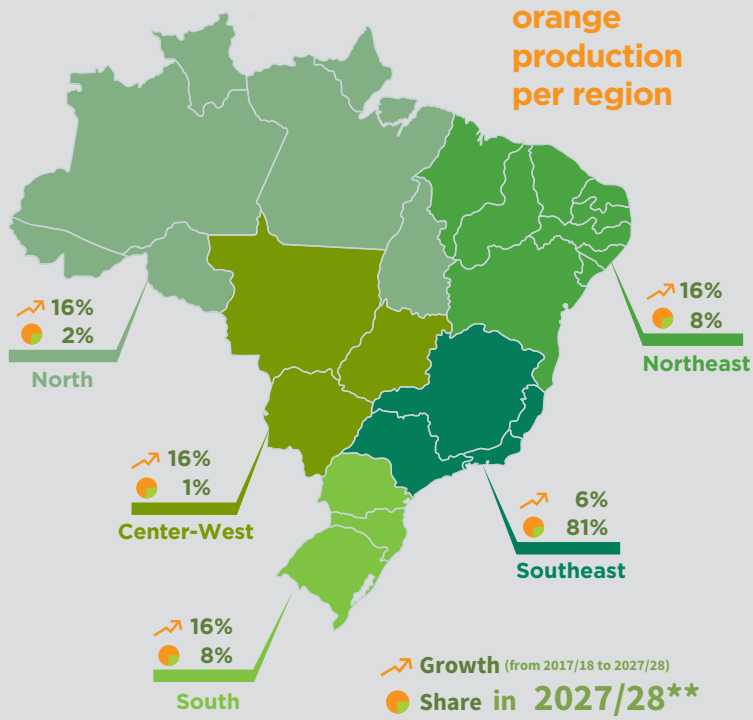
40
thousand t
(2017/18)

45
thousand t
(2027/2028)

13% growth

1.1 MILLION
net tons of orange juice exported
9% drop relative to 2017/2018

orange production per region



Notes: *Comparison between the 2017/2018 and 2027/2028 seasons -- Ten-year projection **Share sums higher or lower than 100% are an effect of rounding.
Source: Outlook Fiesp **Prepared by:** FIESP/DEAGRO and MBAGRO

13

WHEAT

Forecasts of lower wheat production worldwide increased the cereal's price during 2018. Important global producers and exporters, such as the European Union, Russia, Australia, among other countries, had losses due to dry, hot weather. Consequently, the grain's international price rose above its historical average, increasing the product's relevance in the world market to levels unmatched for many years.

In Brazil, wheat prices were boosted in the past few months by both international market prices and a depreciation of the Brazilian Real, improving farmers' profitability yet compromising the milling industry, which is heavily dependent upon foreign supply.

In the early planning stages of the 2018 season, prices were forecasted to be lower, which partially limited the expansion of the planted area. The crops had already been planted when prices rose in the market, greatly increasing growers' expectation. However, weather conditions impacted production. Drought during early planting, followed by excessive rainfalls at the wrong time, and a late frost affected crop yields and quality.

The market is demanding increasingly higher quality Brazilian products, so those producers who are aligned with this premise have an advantage at the negotiating table. Before planting, it is important to choose cultivars with good agronomic traits such as tilling capacity, yield rates, and health, as well as good industrial traits. Therefore, it is import that research studies and the field are aligned with the industry.

The Brazilian wheat production is concentrated in the country's southern region, with Rio Grande do Sul and Paraná leading as the main producing states. Nearly the entire domestic production, 97%, comes from these two states plus Santa Catarina, São Paulo, and Minas Gerais. To supplement domestic demand, wheat is imported from Argentina and, at a much smaller scale, from Paraguay and Uruguay. In the event of shortages in the MERCOSUR supply, wheat is imported from Canada and the United States. Brazil has traditionally been a wheat importing country, and this trend is not likely to change in the outlook period.

The production chain, in collaboration with research institutes, has been working to expand cultivation of the grain in the Cerrado region. The goal of the Wheat National Plan ("Plano Nacional do Trigo", PNT), drafted by the Brazilian Association of Wheat Industries (Abitrigo), is to gradually reduce the country's current 50% reliance on foreign supply.

Consumption will continue to be driven by population growth, while production will have to match the pace of market trends and crop yield expectations.

Brazilian wheat is grown in the winter and, due to weather conditions during this season, crop production is considered to be high risk. In recent years, the industry has faced difficulties varying from challenges to grow a product that meets the market's quality demands to less than satisfactory prices and crop failures, including the current one, which compromise the domestic supply of the product.

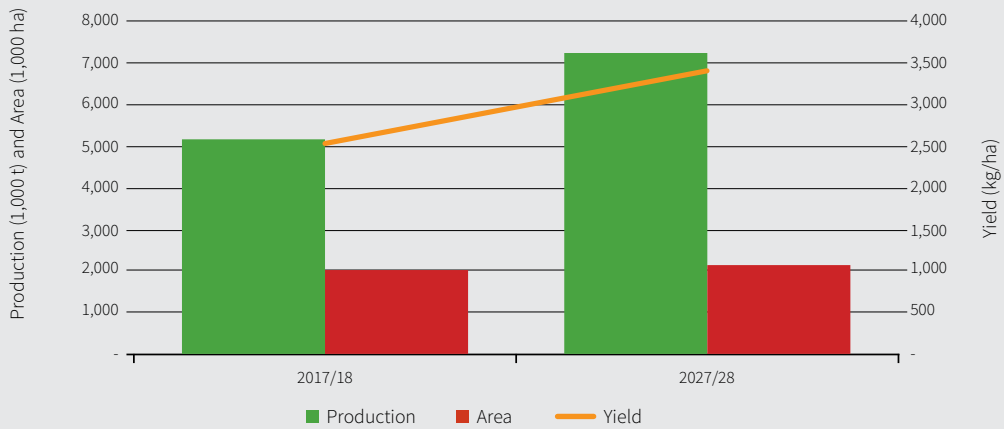
Variation from 2017/18 to 2027/28

Brazilian Wheat Production, Area and Yield

Production
40%

Planted Area
4%

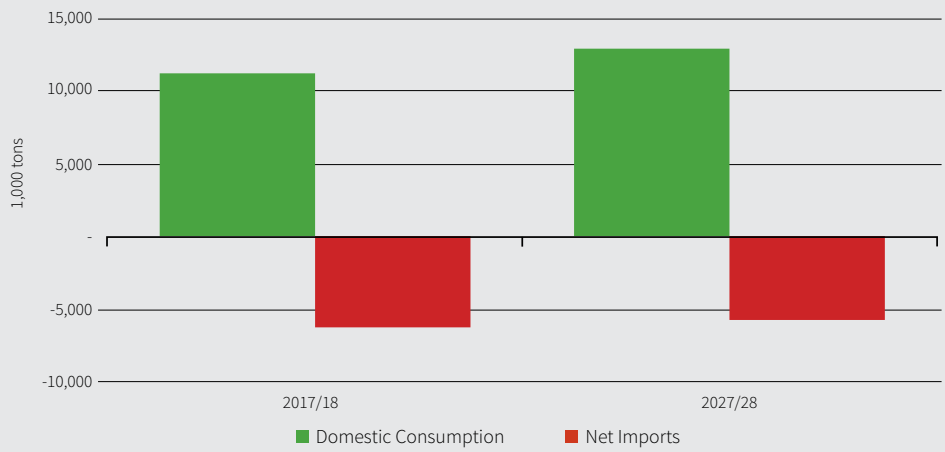
Yield
34%



Wheat Domestic Consumption and Net Imports

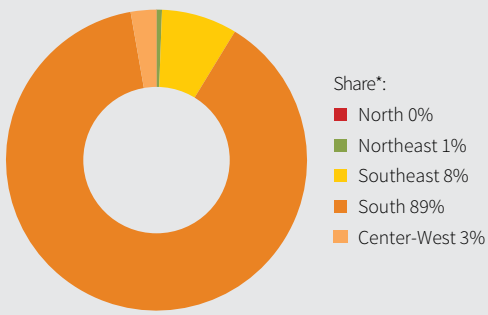
Domestic Consumption
15%

Net Imports
-7%

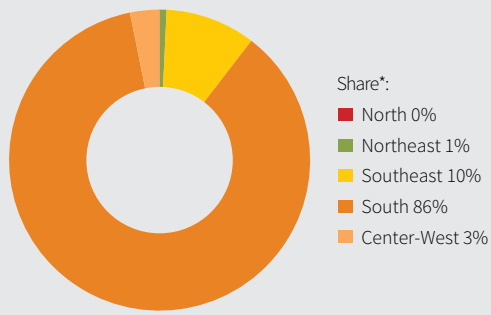


Regional Share in Wheat Production

2017/18
Total Production: 5.1 million tons



2027/28
Total Production: 7.2 million tons



Note: * Share sums higher or lower than 100% are an effect of rounding, **Source:** Outlook Fiesp **Prepared by:** FIESP/DEAGRO and MBAGRO

WHEAT

in 2027/2028*

2.1 MILLION
hectares planted

4% growth relative to 2017/18

7.2 MILLION
tons produced

40% growth relative to 2017/18

5.8 MILLION
net tons imported
(2027/28)

7% drop relative to 2017/18

34%
projected yield growth (t/ha)

2.5
2017/2018

3.4
2027/2028

per capita consumption
(kg/person/year)

53.6
(2017/18)

57.9
(2027/28)

8% growth

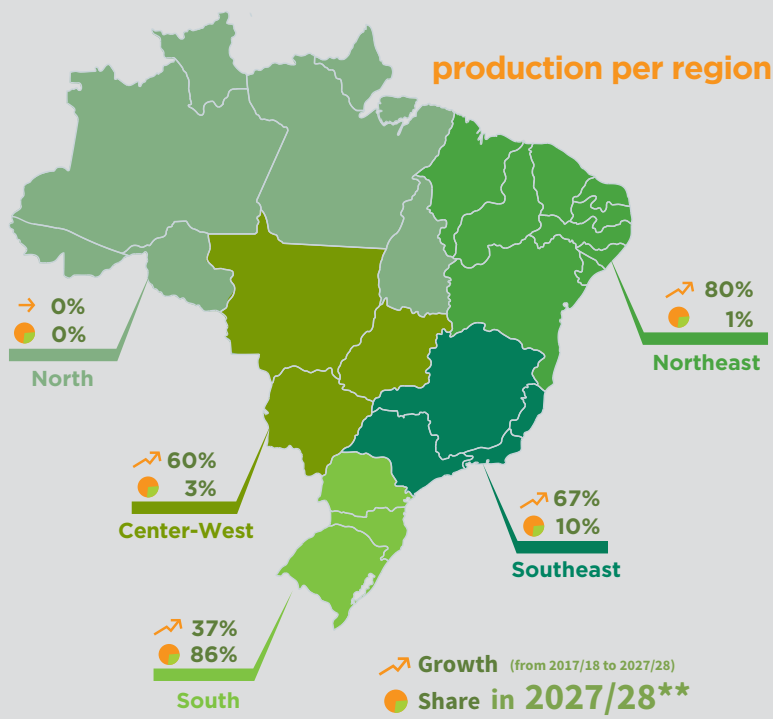
domestic consumption

11.3
million t
(2017/18)

12.9
million t
(2027/28)

15% growth

production per region



Notes: *Comparison between the 2017/2018 and 2027/2028 seasons -- Ten-year projection **Share sums higher or lower than 100% are an effect of rounding.
Source: Outlook Fiesp **Prepared by:** FIESP/DEAGRO and MBAGRO

14

BEEF

After a troubled 2017, due to backlashes from the “Weak Meat” Operation, beef prices fluctuated closer to normal in 2018, as most international buyers lifted their ban on the Brazilian product, except for Russia, which has maintained its ban on Brazilian pork and beef since the end of 2017.

During 2018, the flow of exports was good and there was also a moderate growth in the ready-for-slaughter cattle supply in alignment with the livestock cycle, which reflected the herd expansion resulting from female retention between 2014 and 2016. Appreciation of the U.S. dollar increased revenues from exports, allowing the processing plants to offer better prices to cattle farmers. China was the greatest importer, however, significant growth was observed in the imports of other important countries such as Egypt and Chile

As in previous years, the domestic market remains sluggish, following the slow-paced economic recovery that marked the first half of the year, frustrating expectations of higher per capita beef consumption.

From a supply standpoint, producers continue slaughtering cows, in reflection of the gradual reduction in the reproduction margin observed in recent years, thus slaughtering more females than males. Theoretically though, based on the current phase of the livestock cycle, male animal slaughters should eventually surpass those of females, since the number of females slaughtered is already high.

Consequently, a higher beef supply should curtail cattle prices for the producer. Clearly, domestic and international demand will play a major role when this occurs, and an uptick in consumption could also mitigate the effect of supply expansion, absorbing some of the surplus and keeping prices from plunging.

Besides Brazil, Australia, the United States, and Argentina have also increased their percentages of female slaughter, relative to the previous cycle, suggesting a synchronized slowdown in calf crop production in the next few years. In Australia, drought-related problems compromised the forecasted herd recovery for 2018, raising the short-term export availability but restricting volumes for the upcoming years.

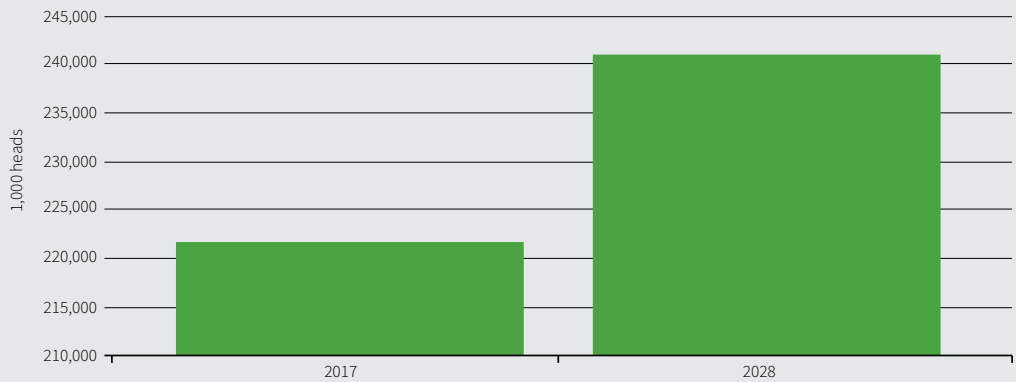
Despite the last year's higher beef cattle prices, the exchange rate devaluation has kept the price of the Brazilian fattened cattle, in dollars, marginally low relative to other producing countries, which incentivized beef exports. The Brazilian livestock industry remains extremely competitive and, if good sanitary conditions are maintained, the country could expand its international market share, reaching not only less developed countries, but also markets where the domestic product would have greater added value.

Variation from 2017 to 2028

Beef Cattle Herd

Beef cattle herd

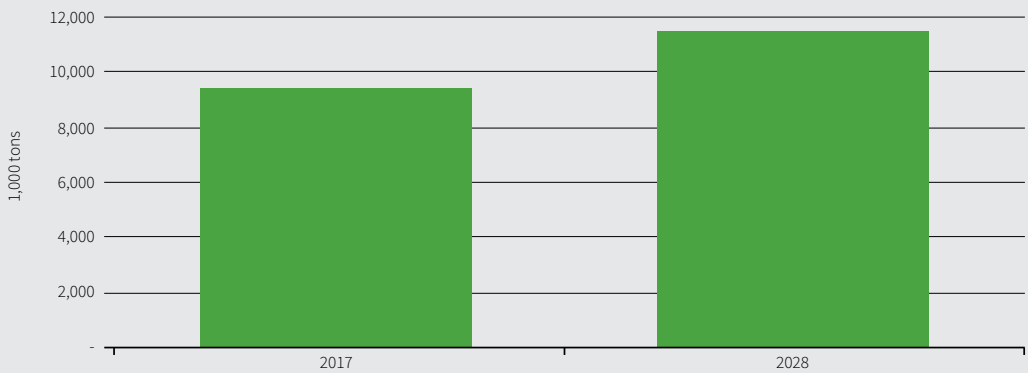
9%



Brazilian Beef Production

Production

22%



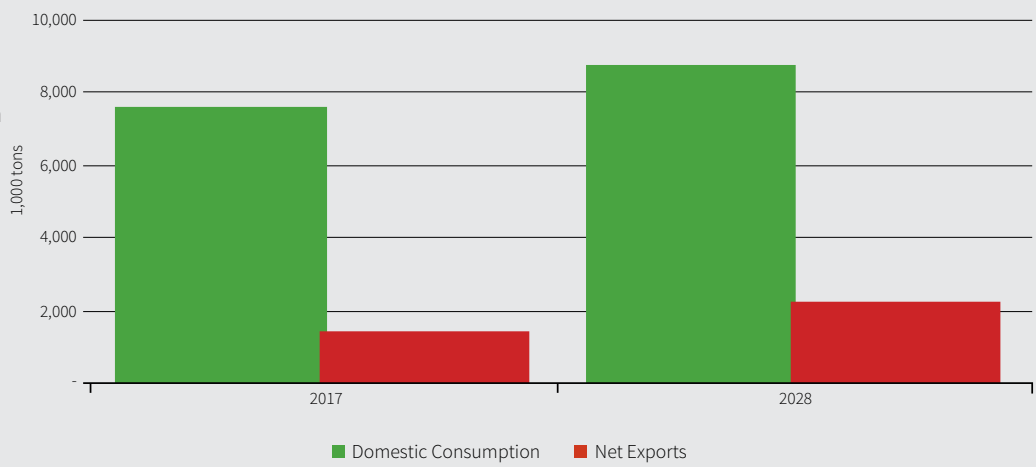
Beef Domestic Consumption and Net Exports

Domestic Consumption

15%

Net Exports

54%

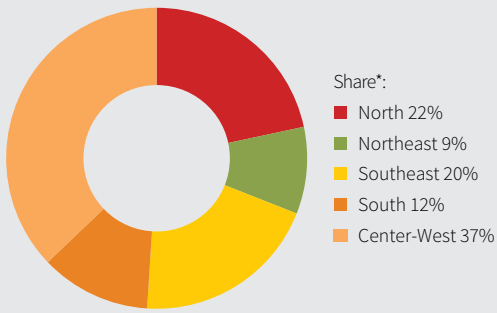


Source: Outlook Fiesp **Prepared by:** FIESP/DEAGRO and MBAGRO

Regional Share in Beef Production

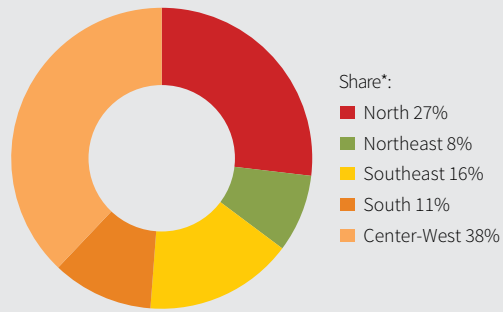
2017

Total Production: 9.3 million tons



2028

Total Production: 11.4 million tons



Note: * Share sums higher or lower than 100% are an effect of rounding, **Source:** Outlook Fiesp **Prepared by:** FIESP/DEAGRO and MBAGRO

BEEF

in 2028*

11.4 MILLION
tons of beef produced

22% growth relative to 2017

2.3 MILLION
net tons of beef exported

54% growth relative to 2017

beef herd

240.7 MILLION
heads of beef cattle
2028

9% growth relative to 2017

domestic consumption

7.6
million t
2017

8.8
million t
2028

15% growth relative to 2017

pasture area

181.6 MM
hectares of pasture
2017

174.5 MM
hectares of pasture
2028

-4% drop relative to 2017

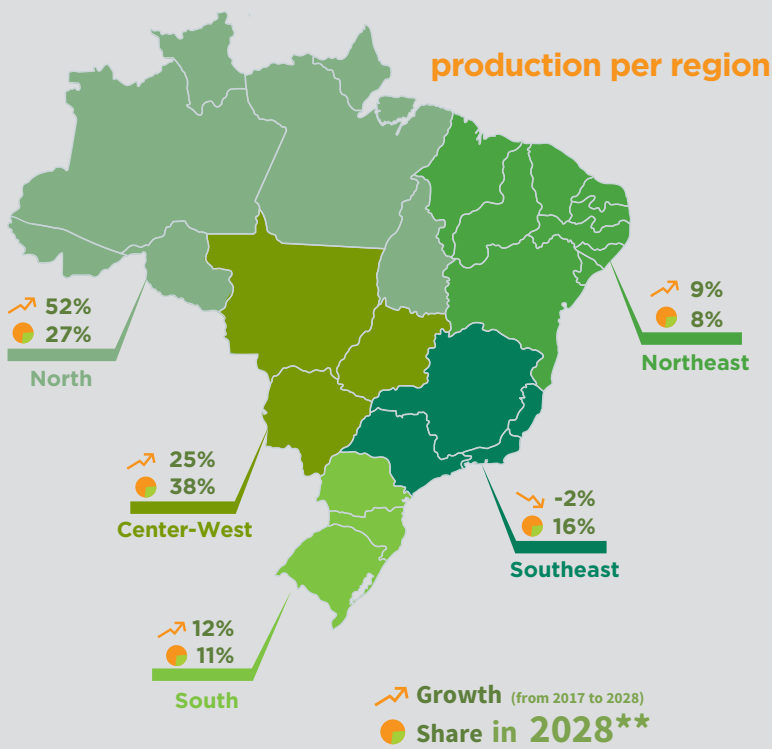
capacity rate

1.2
heads per hectare
2017

1.4
heads per hectare
2028

13% growth relative to 2017

production per region



Notes: *Comparison between the 2017 and 2028 -- Eleven-year projection **Share sums higher or lower than 100% are an effect of rounding.

Source: Outlook Fiesp **Prepared by:** FIESP/DEAGRO and MBAGRO

15

POULTRY AND EGGS

The Brazilian poultry industry faced another tough year as a result of export problems arising from localized failures in product inspections that affected the domestic product's reputation in the international market. A surge in poultry feed costs, due to crop failures in Argentina and in some Brazilian regions, also contributed to the industry's performance. The inspection failings that compromised chicken meat exports in the first half of 2018 were analogous to those faced by the beef industry in the previous year.

The effect of the U.S. dollar appreciation on grain prices and the truck drivers' strike also compounded the industry's problems, while more pessimistic Brazilian economy indicators frustrated projected rises in demand. Furthermore, the price hike that followed reductions in chick housing – a necessary measure to rebalance the margins –, also restricted improvements in consumption.

The volume of Brazilian chicken meat exports remained stable at approximately 3.8 million tons between 2015 and 2017, but a slight decline is forecasted for 2018. Exports to Saudi Arabia, in particular, as well as Japan, the two main buyers of Brazilian chicken meat, also fell. Following the trend, sales to Egypt also showed a considerably sharp decline. The European Union's ban on several Brazilian plants only aggravated the situation.

The higher volume of exports to China was not enough to offset the export losses recorded for some of the main export destinations, and, as of June, the Chinese antidumping measures on Brazilian chicken meat became yet another concern for Brazilian exporters.

Avian flu outbreaks were one of China's main sources of concern in 2016 and 2017 and they continued to impact the Asian country in 2018, damaging consumer trust. Despite reduced domestic demand, Chinese production increased in 2018 and it is forecasted to continue to expand in 2019, due to better-controlled feed costs and relative success in replacing their traditional suppliers of genetic material, such as the United States and some European countries, on which bans were imposed due to the avian flu. The solution has been to develop local avian genetics from live birds imported from New Zealand, currently the only approved supplier. As it pertains to the Chinese market, Brazil could benefit from higher Chinese taxation on U.S. products, however, the Asian country's antidumping measures on Brazilian chicken meat must be addressed first.

Production in the United States, the largest world producer and second largest global exporter, after Brazil, was expanded yet again in 2018 and this year it should end at a high of just over 2%, while domestic consumption is forecasted to increase by nearly 3%. Chinese taxation on U.S. grains could also benefit the U.S. meat producer, as it reduces the cost of feed inputs, ensuing greater producer competitiveness.

EGGS

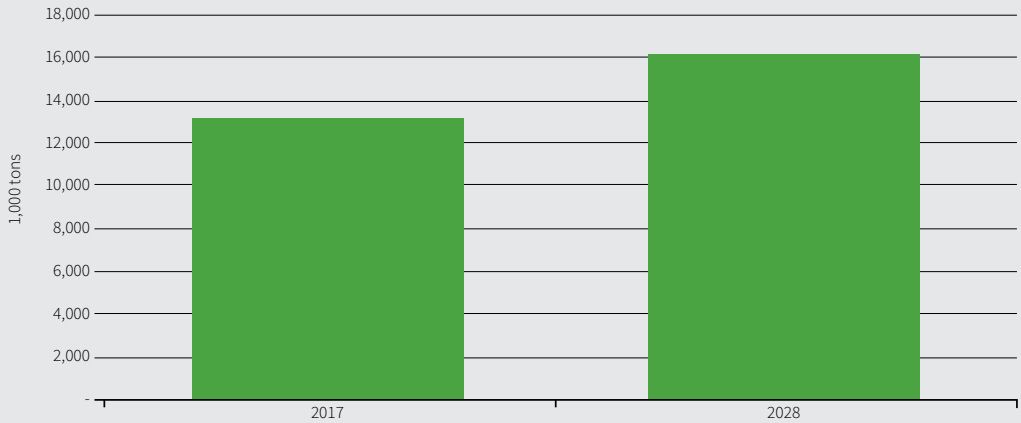
In recent years, due to the growth in demand derived from the economic crisis, eggs took the forefront among desired animal protein commodities. In 2018, despite higher feed costs and lower product prices, the industry continued to boom with high production levels.

Demand prospects remain promising. The consolidation of the product's image as a healthy and nutritious food source should continue to boost the industry's growth. Also, according to the Brazilian Association of Animal Protein (ABPA), eggs have been ranked as one of the most accessible proteins in the market, with a forecast of continued high *per capita* consumption.

Variation from 2017 to 2028*

Brazilian Chicken Meat Production

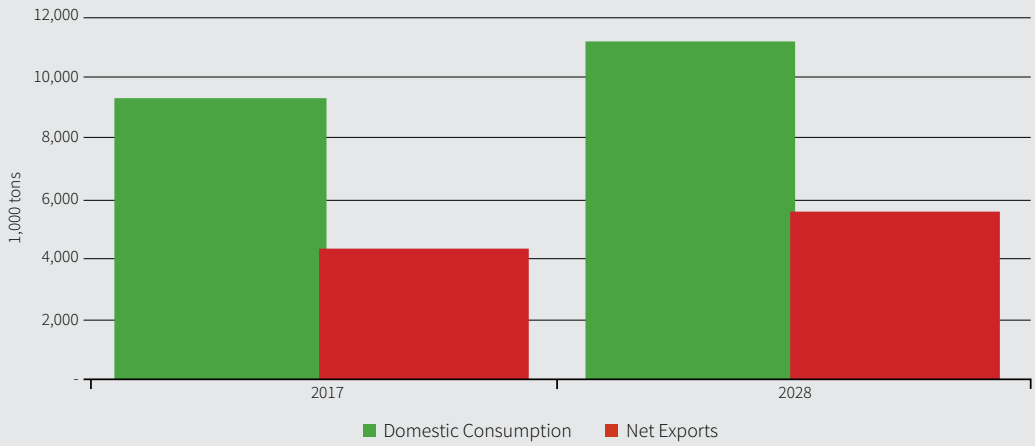
Production
23%



Chicken Meat Domestic Consumption and Net Exports

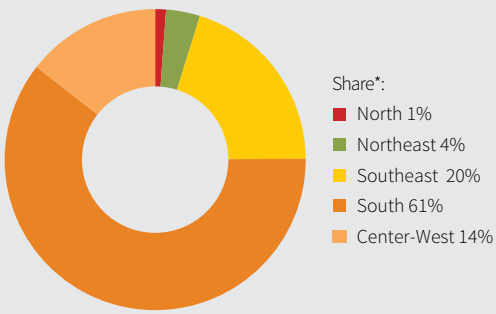
Domestic Consumption
20%

Net Exports
29%

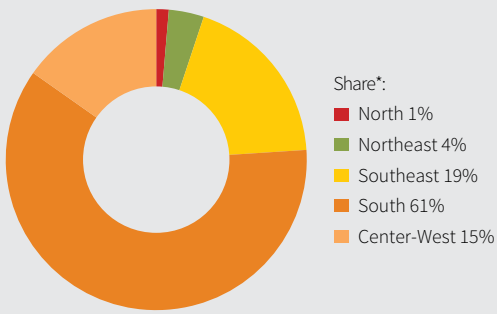


Regional Share in Chicken Meat Production

2017
Total Production: 13.2 million tons



2028
Total Production: 16.1 million tons

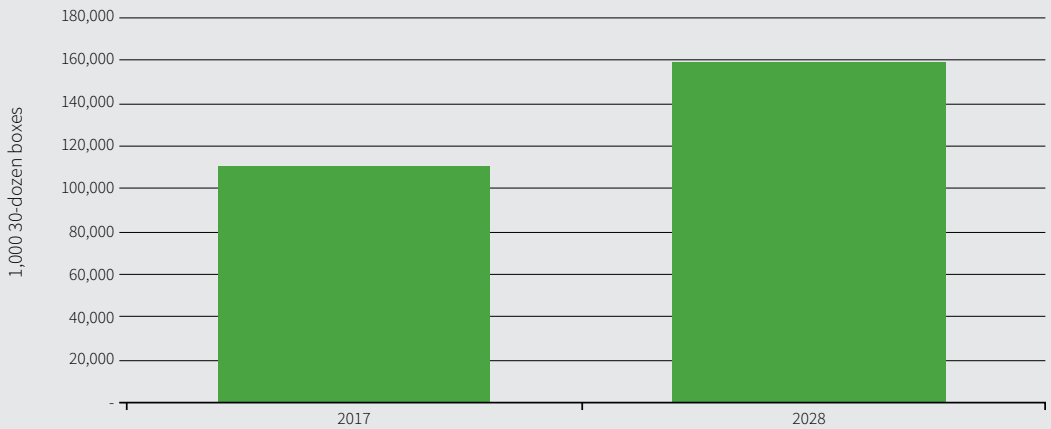


Notes: *Comparison between 2017 and 2018. 11-year projection. **Share sums higher or lower than 100% are an effect of rounding.
Source: Outlook Fiesp **Prepared by:** FIESP/DEAGRO and MBAGRO

Variation from 2017 to 2028*

Brazilian Egg Production

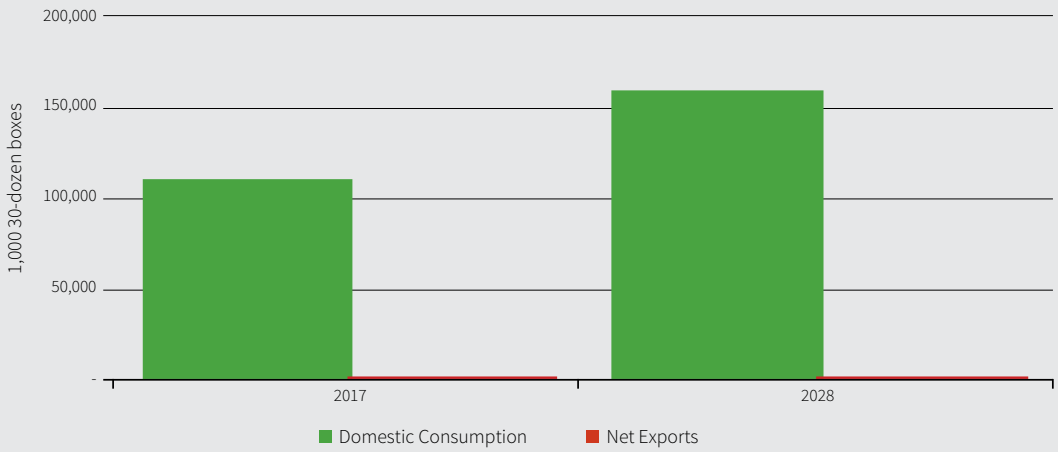
Production
44%



Egg Domestic Consumption and Net Exports

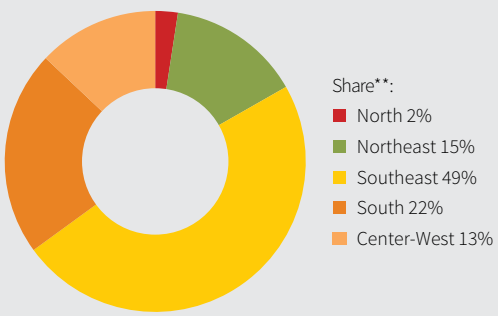
Domestic consumption
44%

Net Exports
166%

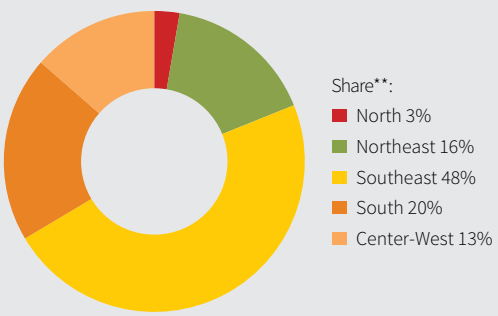


Regional Share in Egg Production

2017
Total Production: 109.7 million 30-dozen boxes



2028
Total Production: 159.5 million 30-dozen boxes



Notes: *Comparison between 2017 and 2018. 11-year projection. **Share sums higher or lower than 100% are an effect of rounding
Source: Outlook Fiesp **Prepared by:** FIESP/DEAGRO and MBAGRO

CHICKEN MEAT

in 2028*

16.1 MILLION
tons produced

23% growth relative to 2017

5.6 MILLION
net tons exported

29% growth relative to 2017

per capita consumption
(kg/person/year)

44.5 2017 → 49.8 2028

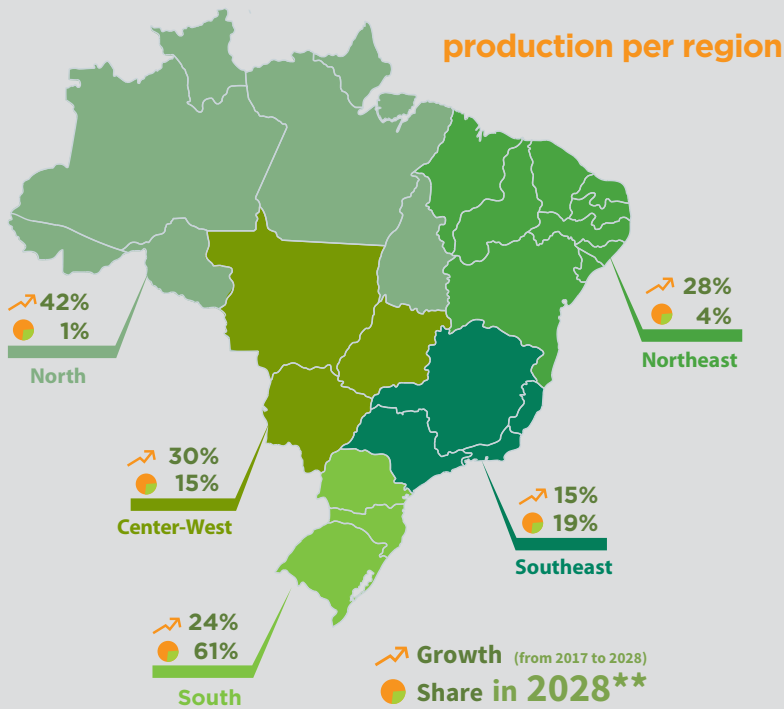
12% growth

domestic consumption

9.3 million t 2017 → 11.1 million t 2028

20% growth

production per region



EGGS

In 2028*

110.4 MM 30-dozen boxes produced 2017

159.5 MM 30-dozen boxes produced 2028

44% growth

per capita consumption
(kg/person/year)

15.8 2017 → 21.3 2028

35% growth

Notes: *Comparison between the 2017 and 2028 -- Eleven-year projection **Share sums higher or lower than 100% are an effect of rounding.
Source: Outlook Fiesp **Prepared by:** FIESP/DEAGRO and MBAGRO

16

PORK

China, the main worldwide producer of pork, continues to recover from the sharp production drop experienced between 2014 and 2016, but even the 2018 production forecast of 55 million tons is still 2 million tons below 2014's production. Nonetheless, the USDA projects the Asian country's 2018 imports to remain robust at an estimated 1.5 million tons. China's recovery, however, could be impacted by the African swine fever outbreaks the country has been recording since the beginning of the third quarter, and if the problem worsens, it could slow down the recovery and increase the opportunity for exporting countries to expand their commercial volumes.

Brazil, which started exporting to continental China in 2015, substantially increased their number of shipments in 2018. Exports to Hong Kong have also risen significantly. However, the Russian ban on Brazilian pork, enacted in late 2017, has become a major problem for the industry. The production surplus was diverted to the domestic market, causing prices to drop and preventing the industry from offsetting higher production costs.

The industry faced negative profitability as producers were unable to moderate the pace of slaughter during that time, and this scenario would have been worse if it were not for the spike in exports to China and Hong Kong. While trading opportunities with China have been very important, the pork industry's exports are restricted to limited markets. In 2017, nearly half of the Brazilian exports went to Russia, while in 2018 a similar volume was traded with China and Hong Kong.

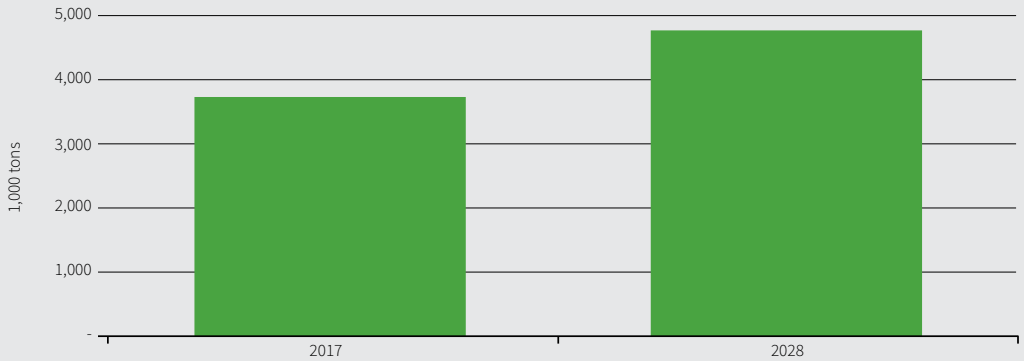
In addition, the United States protectionist measures in the international market resulted in retaliation from China and Mexico, which have placed a hefty tariff on the U.S. product, these countries being the first and third largest worldwide importers of pork, respectively.

The effects of these disputes are just now becoming apparent and a lot could change in the future based upon negotiations between these countries, although the drop in U.S. pork exports to both Mexico and China has been tangible. Noteworthy is that the Mexican market is still closed to Brazilian pork exports, thus, a change in this situation would substantially help the domestic industry. However, other exporting countries, like Canada and the European Union, are also interested in this opportunity, despite the fact that the economic bloc continues to systematically register new cases of African swine fever.

Variation from 2017 to 2028*

Brazilian Pork Production

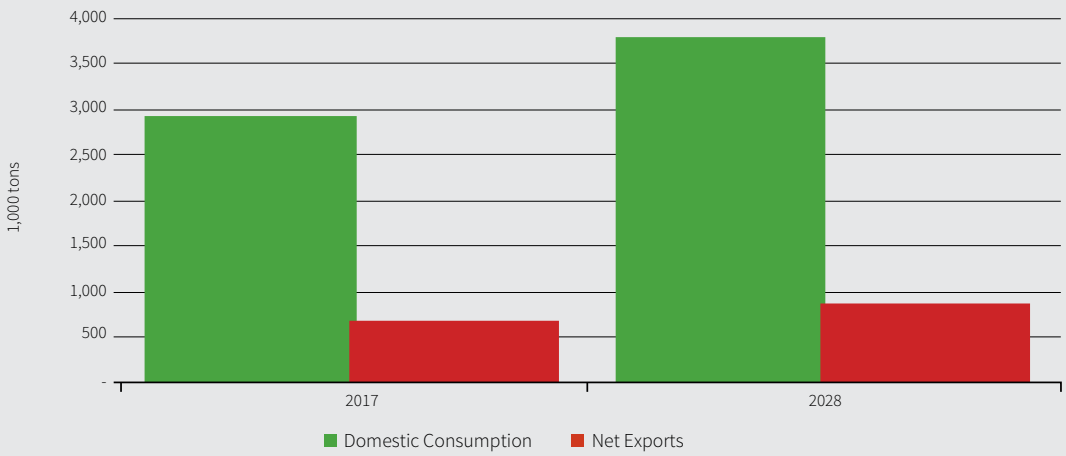
Production
28%



Pork Domestic Consumption and Net Exports

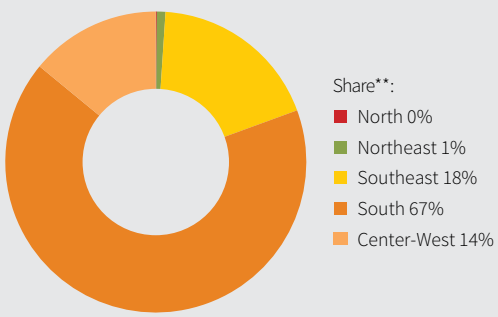
Domestic Consumption
29%

Net Exports
25%

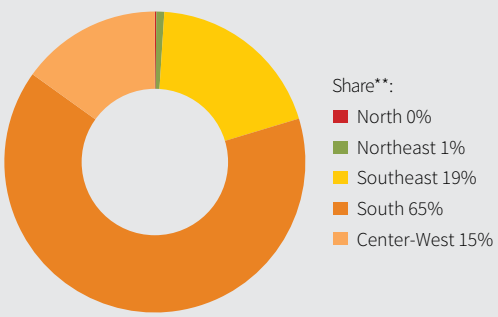


Regional Share in Pork Production

2017
Total Production: 3.7 million tons



2028
Total Production: 4.8 million tons



Notes: *Comparison between 2017 and 2018. 11-year projection. **Share sums higher or lower than 100% are an effect of rounding
Source: Outlook Fiesp **Prepared by:** FIESP/DEAGRO and MBAGRO

PORK

in 2028*

4.8 MILLION
tons produced

28% growth relative to 2017

867 THOUSAND
net tons exported

25% growth relative to 2017

domestic consumption

2.9 million t 2017

3.8 million t 2028

29% growth

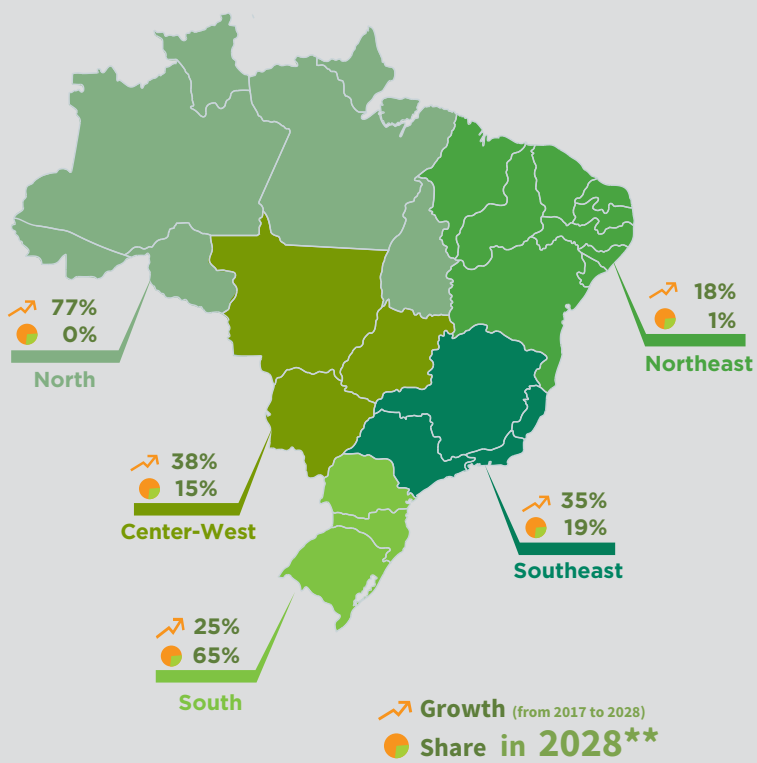
per capita consumption
(kg/person/year)

14.1 2017

17.0 2028

21% growth

production per region



Notes: *Comparison between the 2017 and 2028 -- Eleven-year projection **Share sums higher or lower than 100% are an effect of rounding.

Source: Outlook Fiesp **Prepared by:** FIESP/DEAGRO and MBAGRO

17

DAIRY PRODUCTS

The plights of the milk industry in 2018 were very similar to those experienced in 2016. For instance, high production costs began early in the year, lowering the industry's margins and discouraging production. The consequential supply shortage caused a spike in dairy products' prices throughout the year.

Despite milk producers' lowered profitability in the second half of 2017, production continued to grow at a steady rate reaching a 5% expansion by the end of the year according to IBGE. Good weather conditions and lower grain prices were decisive in driving such an expansion. The abundant supply forced premiums paid to producers to drop by 36% between August 2017 and January 2018. In turn, the lower prices affected profitability and discouraged milk production, which resulted in supply limitations at the beginning of 2018.

The increasing production costs only worsened the situation, significantly lowering producers' margins. Higher grain prices due to the Argentinian crop failure recorded in the second quarter and the exchange rate depreciation further discouraged milk production.

Consequently, it was left to the industrial sector to absorb the higher cost of the product in early 2018, as the diminished purchasing power of the end consumer prevented this sector from passing the cost difference on to retail.

In 2018, the limited production caused the prices of milk by-products to spike, notably in late May, during the truck drivers' strike, which was particularly detrimental to the milk industry.

The supply disruption in the peak of the offseason drained the retail sector, and when the normal supply was restored, bulk prices surged, quickly rebalancing supply and demand. This caused producer premiums to improve until the second half of the last year when they began to decelerate again.

Although the Brazilian 2017/2018 grain harvest has met domestic demand, factors such as the second-crop corn failure, logistics issues created by the minimum rate freight tariff policy, and the depreciation of the Brazilian Real have kept feed prices high, which has the tendency to lower milk production.

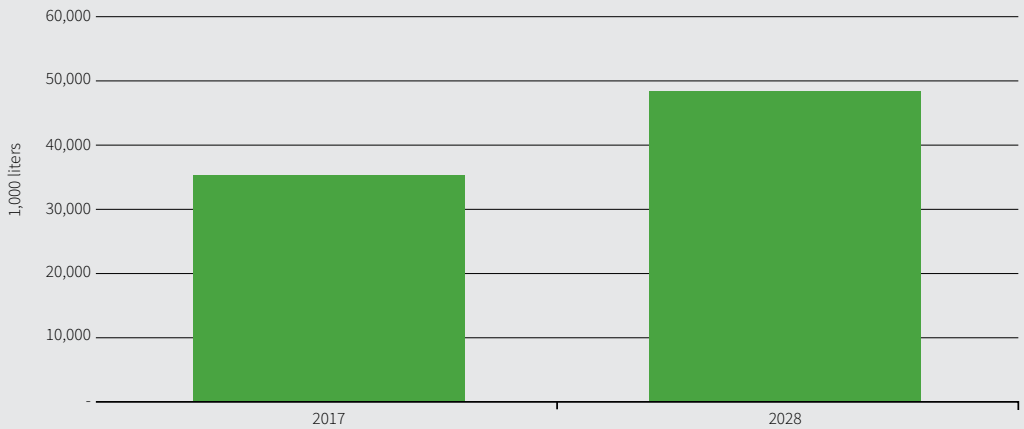
Another great concern for the animal protein industry is a potential reduction in second-crop corn area resulting from increased production costs onset by the exchange rate depreciation effects on fertilizers and pesticides. Another concern is the minimum rate freight policy, which has not only pushed input prices up, but also significantly impacted grain transportation logistics, especially for operations based farther away from the ports.

Devaluation of the Brazilian Real also had restrictive effects on the country' imports of dairy products. However, the country's exports were hit harder, which increased the trade deficit. While currency devaluation usually tends to improve export competitiveness, the substantial rise in the price of domestic products prevented that from happening this time. With good production rates in most producing countries, the reference price of powdered milk in the international market fell, but the domestic market did not reflect this decline. Therefore, domestic milk became more expensive, increasing the disparity between domestic and international prices for the product. Notwithstanding, the upcoming supply season should lead to a better alignment between domestic and international prices, reducing the discrepancy between the two markets.

Variation from 2017 to 2028*

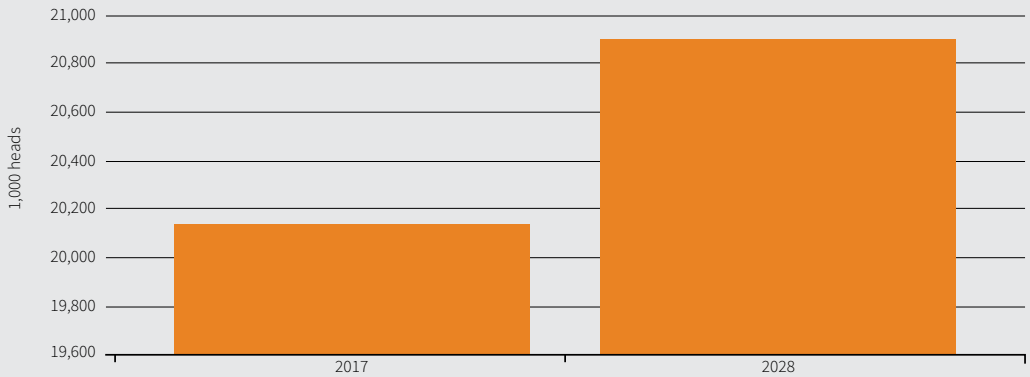
Brazilian Milk Production

Production
37%



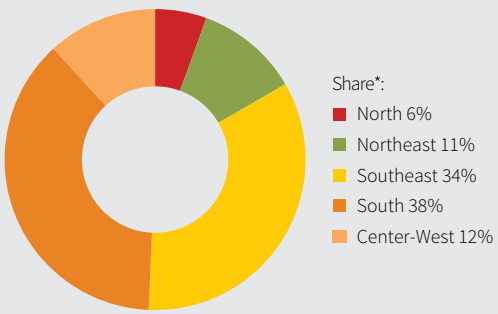
Milk Cattle Herd

Herd
4%

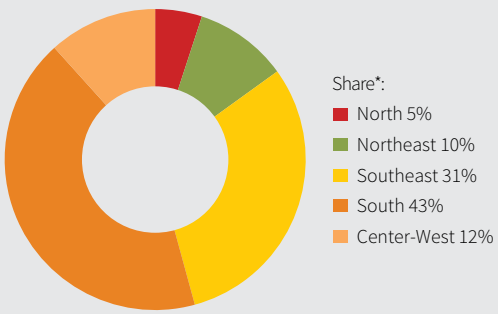


Regional Share in Milk Production

2017
Total Production: 35.3 billion liters



2028
Total Production: 48.5 billion liters



Notes: *Comparison between 2017 and 2018. 11-year projection. **Share sums higher or lower than 100% are an effect of rounding
Source: Outlook Fiesp **Prepared by:** FIESP/DEAGRO and MBAGRO

DAIRY PRODUCTS

in 2028*

48.5 BILLION
liters of milk produced

37% growth relative to 2017

20.9 MILLION
heads
2028

4% growth relative to 2017

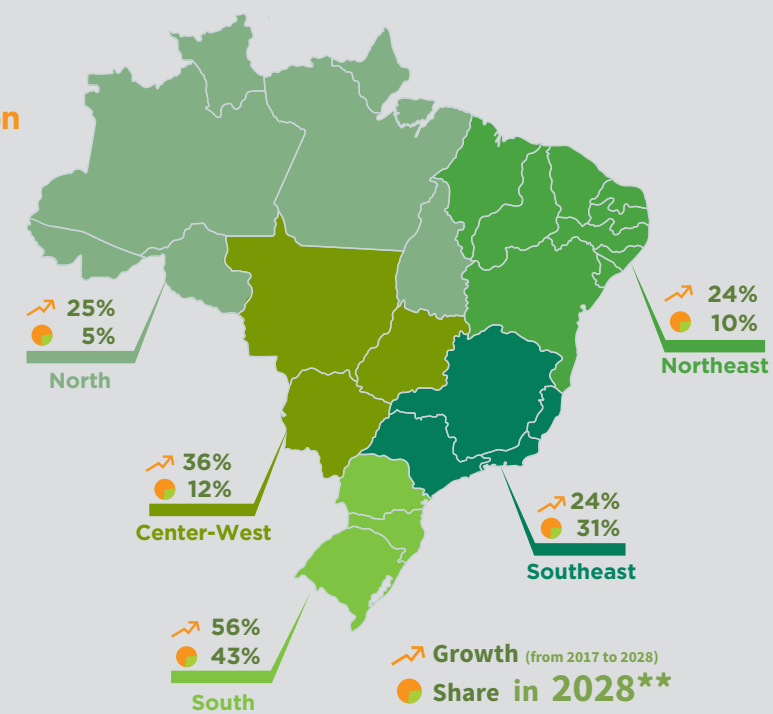
per capita consumption
(l/person/year)

168.7 2017

217.0 2028

29% growth relative to 2017

production per region



Notes: *Comparison between the 2017 and 2028 -- Eleven-year projection **Share sums higher or lower than 100% are an effect of rounding.
Source: Outlook Fiesp **Prepared by:** FIESP/DEAGRO and MBAGRO

18

FISH FARMING

According to Intrafish's estimates, the global tilapia market produced 5.6 million tons in 2016, with the top three producers totaling close to 3.7 million tons in the year.

China, the world's largest producer, generated 1.93 million tons of the fish, with exports reaching 410 thousand tons in 2017 (USDA). Despite the production increases attained in recent years and technological advances, the country has struggled to sustain this growth rate due to environmental and regulatory challenges in obtaining fish farming licenses, markedly for operations carried out in marine environments. Consequently, total production area dropped by 1.4% in 2016, with marine farming area shrinking by 6.4%.

Although land-based farming areas were not as strongly impacted by these restrictions, growth rates are declining. Some provinces already show area reductions for this type of production (USDA). The incidence of diseases and stricter product quality inspections are other hardships the Chinese industry has been facing in the domestic market.

According to FAO data, the Asian giant should experience a diminished growth rate relative to other producing countries in Asia, Latin America, and Africa, indicating an opportunity for expansion of the Brazilian product. The export potential is also rather significant.

USDA data shows that the United States alone imported 183,000 tons of tilapia in 2017. This volume, worth US$675 million, was equivalent to 30% of the country's international purchases, of which 134 thousand tons came from China. However, the current trade war between the two nations and the ensuing new import tariffs may cause Chinese products, including tilapia, to lose competitiveness in the American market.

In Brazil, fish farming is growing significantly, despite the challenging domestic situation. According to data from the Brazilian Association of Fish Farming (Peixe BR), in 2017, there was an 8% increase in aquaculture in Brazil, with yields reaching 691.7 thousand tons of farmed fish.

Tilapia is the main fish species farmed in the country, accounting for 51.7% of the Brazilian fish production in 2017. The state of Paraná is the largest producer of this type of fish, with a yield of 105.4 thousand tons, followed by São Paulo, where at least 95% of the production, the equivalent to 66.1 thousand tons, is dedicated to tilapia farming. Tilapia is also the fish species most farmed in nearly every single Brazilian state. With a production of 358 thousand tons, Brazil is now the fourth largest producer of the fish worldwide, after China, Indonesia, and Egypt.

In 2017, native fish accounted for 43.7% of the Brazilian production, the equivalent to 302,200 tons, with the highest production being that of Tambaqui. The share of other fish species in the domestic fish farming production was 4.6%, the equivalent to 31.8 thousand tons, with carp and trout being most prominent in this group.

Peixe BR forecasts a 2% drop in growth rate in 2018, due to the early 2018 truck drivers' strike that impacted many sectors of the Brazilian agribusiness industry.

Fish farming in Brazil needs to overcome several challenges in order to grow more rapidly and steadily. Some of these challenges are environmental regulations and permits to expand production to government-controlled areas. Drought has been another critical factor for farmers in the country's northeastern region.

Farming systems in the country are very diverse. According to Peixe BR data, the largest producer in 2017 was the state of Paraná with 112 thousand tons, an increase of 19.3% compared to 2016. The state of Rondonia was second with 77 thousand tons, a 2% growth relative to 2016. São Paulo was the third-largest producer with 69.5 tons, a 6.3% increase from the previous year.

Despite all the aforementioned obstacles, fish farming in Brazil is a very promising activity. The country's average per capita consumption remains below the global average and the international market is still mostly unexplored. Brazil has an abundance of water, area and inputs for fish farming. The weather is favorable and the country's broad experience with meat production is an additional advantage to the industry. Production growth estimates to meet fish demand suggest that the industry will continue to expand at higher rates than other animal protein sectors, despite the previously stated limitations to production.

19

FERTILIZERS

Geographically, Brazil is a country of continental proportions. Therefore, agricultural production is largely concentrated in the center of the country. Most of the basic fertilizers required for the crops, however, are imported, as the country's supply does not meet domestic demand, and the cost of raw materials used to produce fertilizers is also high. This scenario shows how logistically challenging it is to supply farmers with the nutrients needed for agricultural production. The cost of logistics weighs heavily in setting the final price of this input. Therefore, any transportation issues severely impact the fertilizer industry.

Initial fertilizer sales estimates for 2018 projected significant growth, relative to 2017, when 34.4 million tons of the product were traded. The year's accrued volume in April was 3.4% above the same period in 2017. However, the transportation shutdown caused by the truck drivers' strike in May severely limited deliveries. Sales started to rise again in June and reached a good momentum in July. By October, the increase reached a high of 4%, relative to 2017.

At the end of the last year, the controversy created by the government's minimum rate freight policy had yet to be resolved. Coupled with the exchange rate depreciation, this policy caused the contribution of these inputs to production cost calculations to become even more relevant.

While a stronger U.S. dollar makes inputs more expensive, it also raises the producers' income and the overall profitability of the industry. For instance, higher corn and soybean future prices should encourage planting area expansions in the 2018/2019 crop season, and these area expansion prospects have led to positive projections for fertilizer sales in 2018.

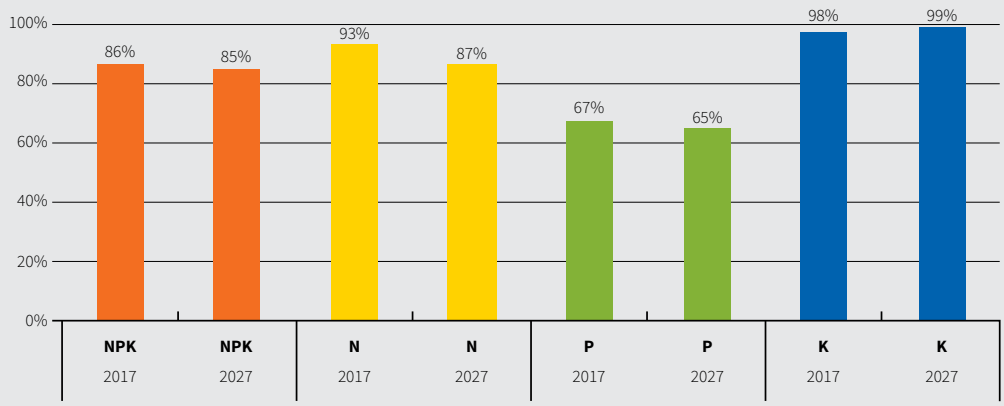
Nevertheless, this scenario of high volatility in international prices and the exchange rate, the latter being strongly influenced by the elections, brings with it a real risk of a drop in future prices, making farmers plant at a higher cost and, once the harvest comes, forcing them to trade their products at renegotiated prices.

In addition, the unavailability of a freight pricing base has also dampened crop trade for next year, adding to the farmers' already high market risks.

Investments in the expansion of domestic nitrogen and phosphate production capacity—nutrients for which Brazil does have some raw material supply—continue to develop at a slow pace with no indication of whether domestic supply will significantly increase in the foreseeable future. Therefore, reliance on imported production should grow in the future.

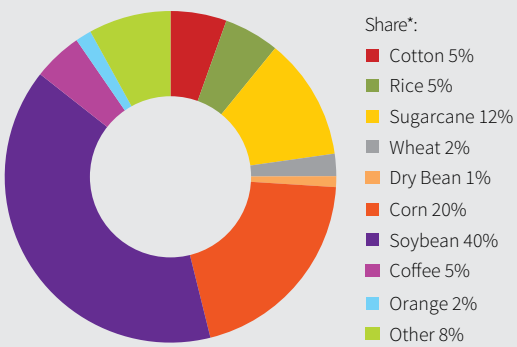
Notwithstanding, input demands will continue to rise in the coming years and renovations at some of the South and Southeast regions ports, notably in the Paranaguá Port, plus the addition of new ports in the Northern region should have a significant and positive impact on fertilizer supply efficiency for the country's several producing regions.

Estimated Imports Needed to Meet Brazilian Fertilizer Consumption

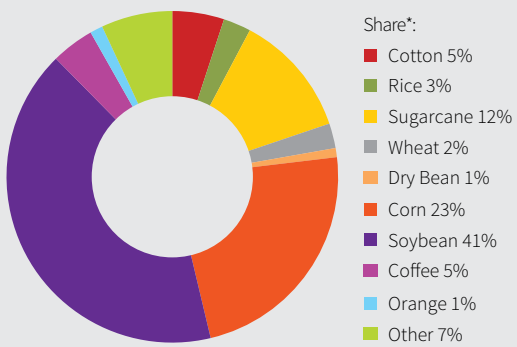


Fertilizer (NPK) Share in Domestic Consumption, by crop type

2017
Consumption: 15.3 Million Tons



2027
Consumption: 29.9 Million Tons



Note: * Share sums higher or lower than 100% are an effect of rounding
Source: Outlook Fiesp **Prepared by:** FIESP/DEAGRO and MBAGRO

FERTILIZERS

In 2027*

National production
(in million tons)

NPK	N	P	K
3.7 MM	1.0 MM	2.6 MM	0.2 MM
34% growth relative to 2017	73% growth relative to 2017	31% growth relative to 2017	25% drop relative to 2017

domestic consumption
(in million tons)

NPK	N	P	K
20.9 mi	6.0 mi	6.8 mi	8.1 mi
36% growth relative to 2017	37% growth relative to 2017	33% growth relative to 2017	39% growth relative to 2017

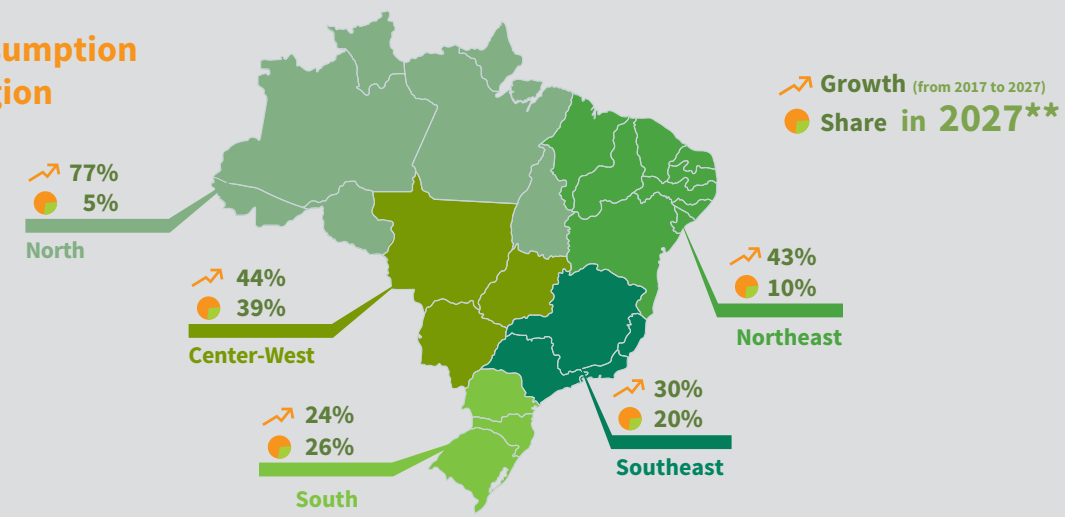
foreign reliance
(imported nutrients share)

NPK		N		P		K	
86%	85%	93%	87%	67%	65%	98%	99%
2017	2027	2017	2027	2017	2027	2017	2027

domestic NPK consumption in 2027 key crops
(in million tons)

Soybean	8.6 MM 41% growth relative to 2017
Corn	4.8 MM 57% growth relative to 2017
Sugarcane	2.5 MM 38% growth relative to 2017
Cotton	1.1 MM 26% growth relative to 2017
Rice	0.6 MM -32% drop relative to 2017

domestic consumption of NPK per region



Notes: *Comparison between the 2017 and 2027 -- Ten-year projection **Share sums higher or lower than 100% are an effect of rounding.

Source: Outlook Fiesp **Prepared by:** FIESP/DEAGRO and MBAGRO

LAND USE

In addition to the New Forestry Code's Rural Environmental Registry (CAR), which has become a crucial tool for monitoring and controlling land use in rural properties, several new initiatives to map Brazil's unsettled and occupied areas are under development. Advancements in radar imaging, big data and other technologies have enabled better data interpretation and improved data collection accuracy.

Given Brazil's continental proportions and diversity of natural formations, this type of information is critical to the understanding of changes in land use in the country, making it possible to monitor the land and enact policies specific for each biome.

In this context, the MapBiomas Project, an initiative set forth by SEEG/OC (the Greenhouse Gas Emissions Estimate System of the Climate Observatory), which operates through a network of several entities that collaborate to generate annual maps of land coverage and use based on automatic classification processes applied to satellite imagery, is a tool that can greatly assist in providing land use data.

The number of areas registered in the CAR system has increased to 519,191 thousand hectares distributed across 4,695 thousand properties. In early 2018, the updated Embrapa data indicated that natural vegetation preservation areas within agricultural properties accounted for 25.6% of Brazil's total area. The figure rises to 32.6% when native pastures are also taken into account. On average, farmers preserve about 50% of their properties. The equity value associated with these private reservation areas is estimated at approximately R$ 3.1 trillion, according to Embrapa.

MapBiomas' data is innovative because it pulls together surveys conducted by multiple entities and consolidates them into a single database through which it is possible to monitor the evolution of different categories of land use in each biome.

When deforestation numbers are published singularly, they are not the best indicators of how well preserved a particular area may be, given the complex dynamics between forest areas that become production areas and non-forest areas that are under regeneration.

This is illustrated by the Terraclass data, a government survey on the Amazon biome, which showed large areas of native

[1] a descrição completa do projeto encontra-se em http://mapbiomas.org

vegetation under regeneration. These areas may be intentionally recovered through environmental adequation or natural recovery processes, applied to abandoned or isolated areas, gradually allowing native vegetation to regenerate.

According to MapBiomas, an analysis of forestry area variation in the last five years, as related to the previous five years, indicates a substantial decrease in natural vegetation loss rates in the recent period. These formations include various types of forest as well as other forms of non-forest natural vegetation, such as wetlands, floodplains, fields, and caatinga.

Variation in natural vegetation area (km2)

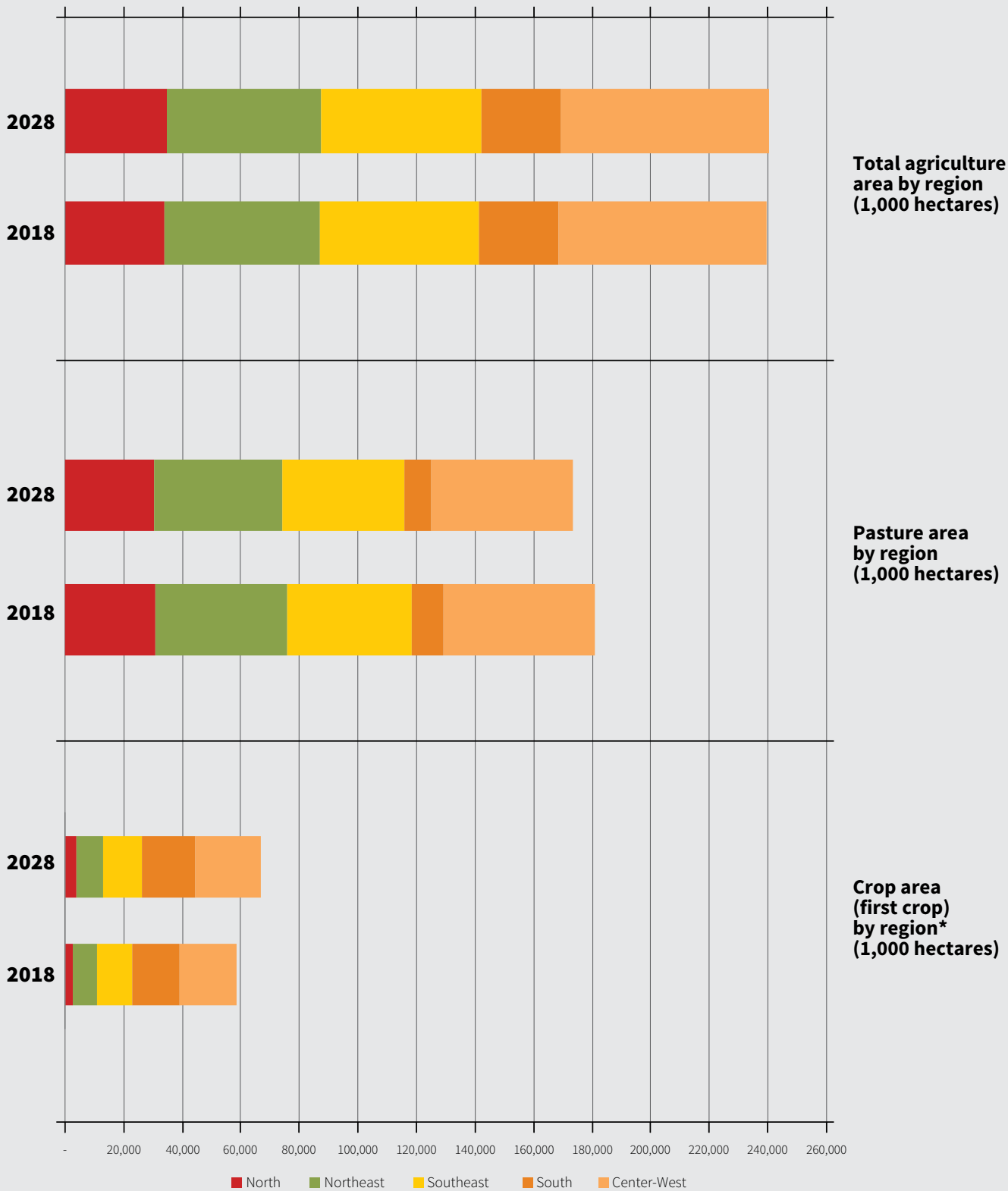
Period	Area	% Period
2002 to 2007	(9,472,111)	-1.6%
2007 to 2012	(8,151,943)	-1.4%
2012 to 2017	(1,622,199)	-0.3%

It is important to note that the data shows that these changes were observed after the New Forestry Code was enacted in 2012, not meeting the forecast of those who opposed the legislation by claiming that the new environmental rule changes would significantly increase natural vegetation losses in various biomes.

We believe this outcome resulted from the more intense environmental regulations of the properties driven by measure such as the Rural Environmental Registry (CAR) and the state's Environmental Regularization Programs (PRAs), which aided farmers in complying with the new environmental legislation. Many farmers had to either rearrange their Legal Reserve and Permanent Preservation Areas (RL and APP, respectively) or acquire natural vegetation from the same biome in order to meet the parameters defined in the legislation.

The forestry code, therefore, helped to ensure legal compliance of the sector by establishing clear guidelines for land use and occupation, aiding Brazilian farmers in meeting environmental regulations and thus benefiting the entire society.

Major concerns arose pertaining to the almost three-year suspension of the State of São Paulo's Environmental Regulatory Program (PRA), after an injunction granted by São Paulo's Court of Justice (TJ/SP) in motion filed by State Prosecutor's Office. It is expected that the Federal Supreme Court's recent decision regarding the constitutionality of the Forestry Code will prompt the TJ/SP to review the case, restoring the legal assurance needed for the state to keep up with its forestry regeneration process.



Note: *Only crops analyzed in this study were included.

LAND USE

In 2028*

241.3 MILLION

hectares used for agricultural production in 2028

67 MILLION

hectares used for crops (1st crop)

8.3 million hectares
expansion relative to 2018

174.5 MILLION

hectares used for pasture

6.5 million hectares
reduction relative to 2018
(area to be used for crops)

184 thousand hectares per year

demand for new areas from 2018 to 2028

33%

Winter crop share
in total grain production in Brazil in 2028**

example: 77% of corn production will come from the second crop season

Notes: *Comparison between the 2018 and 2028 -- Ten-year projection **Taken into account corn (2nd crop), beans (2nd and 3rd crops) and wheat.
Source: Outlook Fiesp **Prepared by:** FIESP/DEAGRO and MBAGRO

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