

Determinants of Brazilian Beef Exports – 2000-2018

Determinantes das Exportações de Carne Bovina Brasileira – 2000-2018

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Abstract

Brazilian commodity exports to the international market are one of its primary sources of foreign exchange generation in the country's trade. Regarding national agricultural products, the export performance is notable in several sectors, including animal protein, especially beef. Therefore, this article intends to analyze the Brazilian trade of beef abroad. The databases come from Comex State and International Trade Statistics Database (UN COMTRADE). Foreign trade analysis techniques are used through Constant-Market- Share (CMS). The main results show that in the first two subperiods, 2000/2006 and 2006/2012, the beef trade depended on the growth of world exports, while for 2012/2018, the market distribution effect took first place. When a general analysis was made, it was found that the export of beef depended on the situation of world trade in the period and showed low dynamics in the trade of the good. It proved to be competitive, results achieved both in the general analysis and the disaggregated one, considering the countries' pioneers in the beef trade.

Keywords: world trade, Brazil, beef.

JEL: F00, F01, F06

Resumo

As exportações de *commodities* brasileiras para o mercado internacional são uma das suas principais fontes de geração de divisas do comércio exterior do país. No concernente aos produtos da agropecuária nacional, o desempenho exportador é notável em vários setores, dentre eles, a

proteína animal, sobretudo, a bovina. Diante disso, este artigo pretende analisar o comércio brasileiro de carne bovina para o exterior. As bases de dados são oriundas *do Comex State e do International Trade Statistics Database* (UN COMTRADE). Recorre-se a técnicas de análise de comércio exterior por meio do *Constant-Market-Share* (CMS). Os principais resultados mostram que nos dois primeiros subperíodos 2000/2006 e 2006/2012 o comércio de carne bovina dependeu do crescimento das exportações mundiais, já para 2012/2018 o efeito distribuição de mercados assumiu a primeira colocação. Quando feita uma análise geral constatou-se que a exportação de carne bovina dependeu da situação do comércio mundial do período e apresentou baixa dinâmica no comércio do bem e ela mostrou-se competitiva, resultados alcançados tanto na análise geral quanto na desagregada, considerando os países pioneiros no comércio de carne bovina.

Palavras-chave: comércio mundial, Brasil, carne bovina.

JEL: F00, F01, F06

1. INITIAL CONSIDERATIONS

Brazil stands out as one of the leading countries in the world in the international trade of commodities. Its performance in this export sector has been renowned for decades, with commodities being the main occupants of its export basket over the years. With the growth of world trade in the 2000s, due to rising incomes in several countries around the world, Brazil was not immune to this boom and gained substantial participation in world trade, especially in this sector (Souza & Veríssimo, 2013).

The Brazilian export performance is relevant in mineral and agricultural commodities, with a large share of both products in the export basket. In these respects, this export sector is relevant in terms of world trade and ensures a large part of the inflow of foreign exchange into the country, thus being relevant in terms of trade macro policy (Silva Filho & Lopreato, 2017).

Concerning agricultural commodities, exports of grains, animal protein, and ores are substantially relevant to Brazilian trade, as this country is internationally recognized as a significant producer and exporter of these commodities to the rest of the world. Furthermore, it is one of the world's main competitors in the soybean and corn segment, with considerable relevance in the world supply of such products (Artuzo et al., 2018).

Concerning livestock commodities, the country also stands out worldwide, with meat exports being one of its primary market niches in the foreign trade of commodities of this nature. In addition, it occupies a high position in the export ranking, being one of the main competitors in the world in exports, as it has been relevant in the product offered in the international market in recent years (Fürstenau, 2007).

Regarding beef, Brazil is one of the foremost world leaders in exports, having one of the world's largest herds and being among the leading world meat traders. Its potential market dominance places it in a privileged position in the world trade of this commodity, allowing substantial expansion of markets, as well as expansion of the product offer over the years (Silva et al., 2008).

In this sense, this article analyses the Brazilian beef trade between 2000 and 2018. In addition to these initial considerations, the article is structured in five more sections: in the second section, there are the methodological procedures adopted; in the third section, based on a review of the empirical literature, we seek to analyse the main determinants of the world and Brazilian trade in beef; in the fourth section, empirical evidence for Brazil is presented; in the fifth section, the final considerations and the perspectives of new approaches are made.

2. METHODOLOGICAL PROCEDURES

Given the importance of animal protein for Brazilian foreign trade, we sought to demonstrate the determinants of beef exports in the country based on the literature and the economic scenario over the years. The period analysed was from 2000 to 2018, having been organized into subperiods of

time (2000-2006, 2006-2012, and 2012-2018). The study relied on statistical data on general Brazilian exports and the commodities in question and the use of the Constant-Market- Share model, created by Tyszynski (1951) and cited by Leamer and Stern (1970). To decompose the growth of beef exports from Brazil, as described below, this analytical technique was used as it is widely used in studies of this nature, adding up to a total of 1,568 citations in Google Scholar, therefore, able to justify its importance and its use in this study. Thus, we seek to answer the following question: what most impacted Brazilian beef exports between 2000 and 2018?

Data are in current US dollars, as the objective is to analyse their participation in the international context. The central database provides information in the same currency unit for all countries (UN COMTRADE).

The choice of the three periods under observation was because there were three initial years and three final years of a new national government agenda (2000-2006), (2006-2012) a new international trade agenda, and a growing movement of exports given by the Boom of commodities; (2012-2018), reduction of trade flows and the direction of foreign trade policy, as well as the last year of availability of information until the initial construction of this article. These years saw several foreign trade policy actions, each guided by the performance of international demand for Brazilian commodities.

2.1 Database and time frame

Data provided by the International Trade Statistics were used. Database (UN COMTRADE), and by the Foreign Trade Secretariat of the Ministry of Development, Industry and Foreign Trade – MDIC. It should be noted that the data extracted from the MDIC are found in the position filter (SH 4 in positions 0201 and 0202) of the Mercosur Common Nomenclature Table (NCM) (0201). The monetary values presented in this work are in current dollars.

The present study seeks to address the issue of international beef trade, analysing the spatial parameters of what is understood about the functioning of this sector throughout the Brazilian territory, in an attempt to study and understand the dynamism and relevance of the international trade of this commodity, in the period corresponding to the years 2000-2018.

The literature review was carried out by the number of citations in Google Scholar, selecting those with more than five citations in journals, having as theoretical criteria those that dealt with beef exports and cited Brazil as one of the eligibility criteria, as well as how to use international trade measurement methods, based on the use of foreign trade indicators.

Figure 1: World Map - Brazil on the Terrestrial Globe



2.2 Description of the Calculation of the Percentage Growth of Brazilian Exports

To study the percentage growth of Brazilian exports by selected countries, the leading countries where Brazil sells all products, in general, were used: Germany, Argentina, Chile, China, United States, Italy, Japan, Mexico, and the Netherlands (Holland). The other countries can be found in the item named “others.”

The previous identity can be aggregated, creating the subsequent expressions:

$$X'' - X' \equiv \sum_i r_i \cdot X'_i + \sum_i (X''_i - X'_i - r_i \cdot X'_i)$$

$$(i) \quad X'' - X' \equiv r \cdot X' + \sum_i (r_i - r) \cdot X'_i + \sum_i (X''_i - X'_i - r_i \cdot X'_i) \quad (2)$$

In identity (2), it can be understood that the export growth of country A is explained by three elements, namely: (i) = the growth of world exports; (ii)= the composition of country A's export basket; and (iv)= the residual effect arising from the difference between the effective variation in exports of each group of goods and the expected variation for such exports (Fries et al., 2013).

In the third stage of the elaboration of the method, it occurs through the identification of exports from country A by destination, being:

$$X''_{ij} - X'_{ij} \equiv r_{ij} \cdot X'_{ij} + (X''_{ij} - X'_{ij} - r_{ij} \cdot X'_{ij}) \quad (3)$$

When aggregated the identity by group of goods and by destinations of exports, we have:

$$X'' - X' \equiv \sum_i \sum_j r_{ij} \cdot X'_{ij} + \sum_i \sum_j (X''_{ij} - X'_{ij} - r_{ij} \cdot X'_{ij})$$

$$(i) \quad X'' - X' \equiv r \cdot X' + \sum_i (r_i - r) \cdot X'_i + \sum_i \sum_j (r_{ij} - r_i) \cdot X'_{ij} + \sum_i \sum_j (X''_{ij} - X'_{ij} - r_{ij} \cdot X'_{ij}) \quad (4)$$

Expression (4) now differs by adding the market distribution effect (iii) = $\sum_i \sum_j (r_{ij} - r_i) \cdot X'_{ij}$ to the other previously defined components. Therefore, the four effects are defined, which, according to the CMS method, establish the variation in a country's exports between two periods (Lima, Lélis & Cunha, 2015).

Given the above, it should be noted that the four explanatory elements of the CMS equation are: the growth effect of world trade (i), which indicates whether exports from country A grew at the same rates as world trade; the basket composition effect (ii), which demonstrates changes in the composition of the export basket according to the concentration of goods with lower or higher growth, having a positive result only if world exports of good i have more remarkable growth than the world average for all traded products, becoming null if used to observe exports of a single good; destination of exports effect (iii) demonstrates the changes resulting from the concentration of exports to more dynamic or less dynamic markets, presenting a positive value, if the study country maintains its exports in more dynamic markets; competitiveness effect (iv) is defined through the residual effect arising from the difference between the world proportional growth and the effective growth of a country's exports, which when it presents a negative result means that the country failed to preserve its share in the world market (Florindo et al., 2014).

3. DETERMINANTS OF MEAT EXPORTS

Concerning care with the trade in livestock commodities, including meat, health problems may arise during trade procedures. Presenting some problems in this sense can cause harm to human health after ingestion. This damage generates care that influences the flow of international trade in such products. Sanitary adversities and other tariff measures end up causing barriers to trade between countries. Meat producers need a more incredible amount of time for the maturation of their product and their investments, which has negative consequences on their prices. This happens because there is a perfectly inelastic supply in the short term, causing producers to pass on the burden to other sectors of the economy (Souza et al., 2008).

According to Silva and Miranda (2005), the beef export sector is affected by sanitary issues. The emergence of diseases such as foot-and-mouth disease in a country causes the sector's economic performance to be directly impaired through imposed restrictions that make it difficult for products

from the suspected country to enter the international market. Furthermore, even in situations where the exporting country is considered free of the disease, any meat marketed in nature must be boneless, and, in the case of processed meats, they must undergo treatment, through heat, before being correctly sent out.

Souza et al. (2008) analyse another relevant point that determines the international trade of animal protein. For this author, the fact that companies in a given country become competitive in international trade means that the Government should create conditions that favor more lavish use of natural resources in this national territory.

Additionally, it is worth mentioning that there are still meats whose performance in world trade depends on the performance of other meats, such as pork, which, for Rocha et al. (2006), its performance is directly related to the behaviour of trade in other meats on the world market, causing the import market to react by substituting other sources of protein for pork. Japan, for example, the world's largest importer of pork, equal to 33% of the world market, saw its pork imports grow by around 33% from 2000 to 2005. This generous increase in its imports was due to outbreaks of mad cow disease and avian flu worldwide during this period, causing the redirection of imports from Japan towards this animal protein.

3.1 Determinants of Brazilian Beef Exports: Empirical Evidence in the 2000s

For Bliska & Guilhoto (1999), the following factors influence Brazilian meat exports, namely: the policies used in each country, especially those related to exchange rates, subsidies, and tariffs; and changes in consumer behavior, especially concerning the quality of life, convenience food, meat-free from any health hazard, disturbances to the environment and quality of animal life. The variables can be diverse, but they influence the beef export sector.

Brazil successfully develops meat production, benefiting mainly from expanding its territory. The growth of beef exports from Brazil occurred mainly due to the scenario experienced in the late 1990s and early 2000s. Until that year, Argentina dominated the Latin American export market since it had the status of a free zone of foot-and-mouth disease. However, at the beginning of the second half of 2000, disease outbreaks were catalogued in Argentine territory, causing the country to lose its position as a supplier to the USA until the following year. This situation made Brazil gain an advantage over Argentina by conquering the market. In addition, the European Union had suffered for some years with the mad cow crisis in its member countries, giving more space for Brazilian meat to conquer new markets to supply (Silva et al., 2008). It is also worth emphasizing that the large extension of the Brazilian territory makes the spread of diseases between regions more difficult (Melz et al., 2014).

In Brazil, natural resources give the producer of the agricultural branch the advantage that their products become competitive. In the case of cattle raising, this advantage lies in the extension of land in the Midwest and North regions. In this sense, Brazil manages to compete in the international market with low prices caused by the low costs of producing the animal protein of this nature. This is justified because Brazilian cattle manage to be fed mainly, and often only, with pasture in the extensive breeding regime, which uses the large available territories, unlike countries that depend significantly on the feed production process for their animals. herds (Aurélio Neto, 2018; Silva et al., 2008).

Silva et al. (2008) compared the average prices (in dollars) of a ton of beef from the major exporting countries traded internationally between 2003 and 2005: Brazil, US\$ 2,218.35 thousand per ton; United Kingdom, US\$ 3,403.58 thousand per ton; USA, US\$ 3,805.81 thousand per ton; and Australia, US\$ 2,966.59 thousand per ton. During this period, the average price of Brazilian beef was lower than those charged by its main competitors: Australia, the European Union, and the USA. It is observed that the Brazilian productive advantages influenced the offer of a product with a lower price.

The European Union and the Middle East played a significant role in the demand and, consequently, in the destination of Brazilian beef exports. In 2000, the European Union imported 169.2 thousand tons, and in 2006 reached a volume of 316 thousand tons. Analysing the same years, the countries of the Middle East recorded an increase in the volume purchased from 29.9 thousand tons to 463 thousand tons respectively. Brazilian exports to the European Union grew substantially, going from US\$ 471.85 million in 2000 to US\$ 1,255.9 million in 2006, respectively. In 2006, the

Netherlands and Italy imported US\$ 299.61 million and US\$ 268.77 million, respectively (Braun et al., 2008).

The rise of Middle East countries in the share of Brazilian exports was due to variations in the destinations of international sales carried out by ABIEC, but also by slaughterhouses that export beef, which managed to succeed in this diversification, given that these new markets were consolidated quite a bit—promising countries, like Egypt, Israel and Iran (Macedo, 2007).

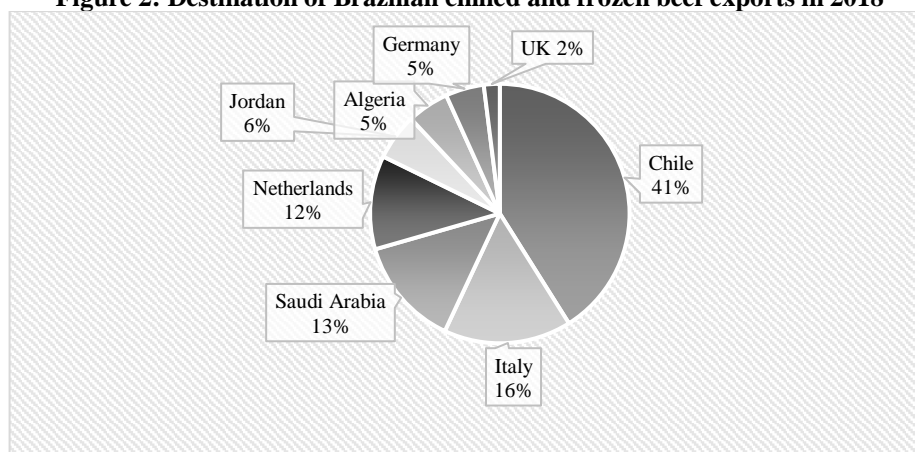
Among the mentioned countries, the one that stood out the most was Egypt, conquering second place in the category: of the biggest importer of Brazilian beef, in 2006, with a volume of 199.2 thousand tons and a value of US\$ 371.83 million. Iran also appeared with very significant values in 2006, with 45.1 thousand tons and a value of US\$107.33 million (Braun et al., 2008).

According to USDA data, the volume of beef produced grew from 1995 to 2012 around 48%. Exports, on the other hand, grew by 568%. Therefore, the Brazilian capacity in this particular sector is observed since, in this productive chain, it is not only prices that define demand, but other variables such as the prices of other meats, the exchange rate, and tariff and non-tax barriers—tariffs practiced by importing countries and similar competitors.

Another significant factor for Brazilian exports is the way cattle are raised. The extensive way of raising increases the product's competitiveness worldwide by not using mixtures with animal proteins in the herd's feed, reducing the incidence of bovine spongiform encephalopathy in their animals (Melz et al . , 2014).

The distribution of Brazilian chilled and frozen beef exports in 2018 can be seen in Figure 1. It can be noted that the leading destination country was Chile, which acquired 41% of beef exports from Brazil. Next, imports from Italy 16%, Saudi Arabia 13%, and the Netherlands 12% of the total value exported by Brazil in 2019 stand out.

Figure 2: Destination of Brazilian chilled and frozen beef exports in 2018



Source: elaborated by the authors based on Comex data State, 2019.

4. RESULTS OF THE CONSTANT-MARKET- SHARE METHOD FOR BRAZILIAN BEEF EXPORTS IN THE 2000s

Before addressing beef exports directly, it is essential to analyze the results presented in Table 1. This lists the leading countries to which Brazil exported most of its goods in general in the period 2000-2018. Furthermore, the results presented are divided into subperiods 2000/2006, 2006/2012, and 2012/2018, as presented in this analysis. Here, it is appropriate to identify the percentage growth of Brazilian exports to these selected countries in the given period.

Table 1: Percentage Growth of Brazilian Exports by Selected Countries - 2000/2006/2012/2018

Countries	2000/2006	2006/2012	2012/2018	2000/2018
Germany	125.34	27.87	-28.43	106.21
Argentina	88.35	53.30	-17.09	139.39
Chile	214.15	17.59	38.94	413.25
China	674.13	390.89	55.07	5,792.89
US	86.22	8.73	7.69	118.05
Italy	78.95	19.43	-22.39	65.87
Japan	57.57	104.29	-45.68	74.87
Mexico	160.59	-10.17	12.55	163.47
Netherlands	105.61	161.71	-13.16	367.28
Others	202.65	72.37	-16.18	337.26

Source: elaboration by the authors based on data from the foreign trade secretariat – SECEX – MDIC, 2020.

The records show that the percentage growth of Brazilian exports obtained in 2000/2006 was the most expressive of the period under analysis. During this period, exports to China, Chile, and Mexico stand out among other countries. There is a deceleration of this growth in the period 2006/2012, and soon after, there is an abrupt drop in the period 2012/2018, thus registering the lowest values of the period studied, where the falls in the growth of more significant exports are to Japan, Germany, and Mexico.

For Serrano & Summa (2011), when observing Brazilian economic growth in the 2000s, it is noted that before 2003 its growth rates remained low. However, soon after, they began to grow mainly due to the export boom in that period.

Vogel & Azevedo (2012) point out that Brazil benefited from the international scenario between 2000 and 2008, taking advantage of the then relative international economic growth and the increase in international exchanges that brought favourable trade results. From 2000 to 2010, the variation in Brazilian exports was 366.3%. From 2000 to 2002, Brazilian exports remained stable and soon after showed significant growth until 2008. However, from 2008 onwards, with the global financial crisis slowing down international trade, Brazil felt its effects in the abrupt drop in export values, which went from US\$ 197.9 billion to US\$ 153 billion between 2008 and 2009, respectively.

According to Paula and Pires (2017), the growth rate of the Brazilian economy from 2004-2013 corresponded to an average of 4.0% per year, along with a process that improved income distribution and poverty. This scenario contracted in 2014, worsening even more in 2015-2016 with a prolonged recession. The GDP showed a negative average growth rate of 3.7%, and in the same period, there was a deterioration in social indicators. Concerning the discussion about the economic slowdown and the recession that followed, a series of factors have been taken into account, with some authors highlighting that the crisis is linked to the interventionist policies adopted in the period close to the crisis. In contrast, others claim that the recession is the result of contractionary policies implemented in 2015/2016.

It uses the primary buyers of Brazilian beef as a criterion for selecting the countries that make up Table 2; it brings to the table the percentage of Brazilian exports of this specific good for each of the countries under analysis in the period 2000-2018.

Looking at Table 2, it is worth highlighting beef exports to countries such as Algeria, Chile, and Jordan, which had a sharp increase, surpassing the percentage growth of all other countries in the period 2006/2012. It is observed that the period in which the most outstanding harmful amounts of percentage growth were obtained was 2012/2018. It can be noticed that among the selected countries, only the United Kingdom had a decrease in its percentage if the entire period is observed, which is 2000/2018. The other countries in the same period showed positive and significant growth figures.

Table 2: Percent Growth of Brazilian Beef Exports by Selected Countries - 2000/2006/2012/2018

Countries	2000/2006	2006/2012	2012/2018	2000/2018
Germany	332.43	-49.15	-0.75	118.24
Saudi Arabia	681.25	65.67	-10.09	1,063.67
Algeria	-14.95	30,360.94	11.33	28,742.65
Chile	-49.70	1920.93	8.13	999.10
Italy	1,360.61	-71.69	-10.30	270.88
Jordan	97.54	2,113.89	40.57	6,047.76
Lebanon	241.42	90.10	-5.43	513.83
Netherlands (Netherlands)	320.08	-44.08	-17.14	94.64
UK	252.34	-80.61	-59.84	-72.55
Others	367.33	-43.74	64.95	333.72

Source: elaboration by the authors based on data from the foreign trade secretariat – SECEX – MDIC, 2020.

Almeida and Michels (2012), when analysing the performance of beef exports between 2001 and 2007, found that the growth of exports of this product was also due to internal production conditions. Because Brazil started to meet the requirements required by the demanding countries, thus increasing its performance in the foreign market. Furthermore, between 2006 and 2009, there was a decrease in the growth rates of world beef exports, compared to the period between 2002 and 2005, with a growth of 19.20%. This decrease may have resulted from the 2008 crisis, which directly affected the growth of world exports, generating consequences for exports in several countries (Florindo et al., 2014).

Brazilian beef exports suffered severe sanitary restrictions from several countries in 2005 after the emergence of animals contaminated with foot-and-mouth disease (Souza et al., 2008). This made Brazil look for less demanding markets with fewer restrictions but lower prices. As shown in Table 2, Algeria and Jordan stood out as new markets influencing the growth of beef exports. Furthermore, between 2010 and 2013, world exports began to grow again, although the downward trend in the growth of beef exports was maintained. The growth of Brazilian exports in this period was evidently due to engagement in new markets (Florindo et al., 2014).

Table 3 shows the breakdown of the growth of Brazilian beef exports: the growth effect of world exports, the composition effect of the basket, the distribution of markets, and the competitiveness effect.

The growth effect of world exports in the period 2000/2006 was the one that most contributed to the realization of Brazilian beef exports (100.37%). For Florindo et al. (2014), the expansion of world exports is evidenced by the growth of the European market, which begins to expand by importing beef from Brazil. This growth in world trade encourages exports from developing countries such as Brazil and India, which primarily benefit from this boom. At the same time, Australia remains stable and grows at the same rate as the rest of the world. The agenda's composition effect is irrelevant because, in this work, it is a single good.

The distribution of markets obtained a negative value (-12.37%), which indicates that the countries with which Brazil maintained beef trade relations had relatively low growth in relation to all other countries in general. For Fries et al. (2013), the negative value in the market distribution effect means that the import rates of the most relevant importers of Brazilian beef grew at lower rates than world imports. The competitiveness effect registered a positive value (12.37%). For Buhse et al. (2014), factors such as trade openness; the reduction of customs tariffs; the search for increased efficiency in production; the increase in world income; were the main factors that contributed to Brazil becoming globally competitive in this sector.

Table 3: Breakdown of Brazilian Beef Export Growth -2000/2006/2012/2018

	2000-2006	2006-2012	2012-2018	2000-2018
Growth in world exports	100.37	100.55	100.31	101.28
Composition of the agenda	0.07	-0.28	-2.99	0.02
Distribution of markets	-12.82	-2.42	4,578.55	-204.39
competitiveness effect	12.37	2.14	-4,575.86	203.10
total growth	100.00	100.00	100.00	100.00

Source: Authors' elaboration based on data from UN COMTRADE/International Trade Statistics Database, 2020.

The growth effect of world exports in the period 2006/2012 once again takes first place in the contribution to the formation of Brazilian exports of the good in question, presenting a value of (100.55%). According to Florindo et al. (2014), even with the reduction in the growth of world exports caused by the global financial crisis of 2008, world exports resumed growth in 2010, causing countries like India, for example, to achieve a growth higher than the average world export of beef, still in 2010. The tariff's composition effect is irrelevant because, in this work, it is a single good.

The market distribution effect registered a negative value (-2.42), but more significant than the previous period, which, according to Florindo et al. (2014), it was when Brazil began to export its goods to markets that required less sanitary controls and offered lower prices compared to the European market such as Mediterranean countries. The competitiveness effect resulted in (a 2.14%) drop compared to the previous period, according to Souza et al. (2008). Brazil lost a large part of the European market with the restrictions applied after outbreaks of the foot-and-mouth disease appeared in the country, mainly in 2005.

The growth effect of world exports in 2012/2018 takes second place in the contribution of the formation of Brazilian exports (100.31%). For Aurélio Neto (2018), the demand for this product increased in this period both in the domestic market and in the world market, valuing beef, causing producers to expand their herds to meet this growing demand. The agenda's composition effect is irrelevant because, in this work, it is a single good.

The market distribution effect suffered a sharp increase in the formation of the growth of Brazilian exports in this period (4,578.55%), indicating a surprising increase in the dynamism of the markets that demand the product. To Menezes and Bacha (2020), there was a significant drop in Brazilian products exported to Europe, mainly to countries such as the Netherlands, Germany, the United Kingdom, and Spain. An example is that in 2000 Brazilian beef accounted for around 8.8% of its total imports, but in 2018 this figure dropped to 4.7%. On the other hand, new markets began to absorb the largest share of beef exports from Brazil, Arab, African, and Asian markets.

The competitiveness effect fell drastically in this period (-4,575.86), which can be explained by the occurrence of the Carne Fraca Operation, launched by the Federal Police in March 2017, according to Aurélio Neto (2018); such an operation came to show severe problems in the most prominent Brazilian slaughterhouses that questioned the sanitary quality of beef, pork, and poultry, and a scheme was also found that used bribes to make it easier to sell products of questionable sanitary quality. For Silva (2017), the operation involving around 30 Brazilian slaughterhouses had drastic consequences on international trade, and the largest consumer markets for Brazilian meat immediately stopped imports from all companies involved.

Considering the totality of the economic conjuncture over the years, which negatively and positively affected beef exports, an analysis is carried out of the entire period in which data from 2000 and 2018 were used. Of this period, was decomposed and explained (101.28%) by the growth of world exports, (0.02%) by the composition of the basket, (-204.39%) by the destination of exports, and (203.10%) by the effect of competitiveness.

Table 3 presents the breakdown of the growth of Brazilian beef exports concerning the destination effect of exports in the aggregate. Table 4, on the other hand, brings the agenda of the destination of Brazilian exports, taking into account the main beef exporting countries, on the world stage, during the period under analysis.

Table 4 shows the nine major beef trading countries worldwide, in the breakdown of Brazilian exports of the product in question. In 2000/2006, only 1 (one) country presented a positive result, Canada (100.17%). Other results include Germany (-0.01%), the Netherlands (-0.02%), and Others (-0.14%). In the period 2006/2012, the results were all positive, the most prominent being France (56.12%), followed by Ireland (17.78%), the Netherlands (11.43%), Germany (6.20%), Belgium (5.58%), Others (2.84%) and USA (0.05%). In 2012/2018, Ireland alone presented a result of 99.99%. Therefore, Brazil has yet to maintain a stable dynamic in the trade of Brazilian beef with those leading exporters of this animal protein.

Table 4: Breakdown of Brazilian beef export growth - 2000/2006/2012/2018 export destination effect.

	2000-2006	2006-2012	2012-2018	2000-2018
USA	0.00	0.05	0.00	0.00
Netherlands	-0.02	11.43	0.02	0.02
Canada	100.17	0.00	0.00	4.94
Australia	0.00	0.00	0.00	0.00
France	0.00	56.12	0.00	0.18
Germany	-0.01	6.20	0.00	0.01
Ireland	0.00	17.78	99.99	94.45
Belgium	0.00	5.58	0.00	0.00
Argentina	0.00	0.00	0.00	0.00
Others	-0.14	2.84	-0.02	0.41

Source: Authors' elaboration based on data from UN COMTRADE / International Trade Statistics Database, 2020.

Menezes and Bacha (2020) point out that other markets have become increasingly significant for Brazilian exports in the period studied, such as Asian, Arab, and African markets that increasingly absorb meat from Brazil. In 2018, for example, the biggest beef importers from Brazil were China, Hong Kong, Egypt, Chile, and Iran. These countries, about the world's largest exporters, export almost zero or significantly lower amounts of meat to the rest of the world, according to data from UN COMTRADE (2020).

Considering that Table 3 addressed the competitiveness effect of beef exports in its entirety, Table 05 proposes to address Brazil's competitiveness in beef exports with the countries that lead exports of the product, these being the nine countries that remained among the leading exporters of the good in the period 2000-2018 and the remainder that received the nomenclature of "others."

Table 5: Breakdown of Brazilian beef exports growth - 2000/2006/2012/2018 competitiveness effect.

	2000-2006	2006-2012	2012-2018	2000-2018
USA	0.00	0.06	0.00	0.00
Netherlands	-0.77	10.50	0.02	-0.02
Canada	103.77	0.00	0.00	4.97
Australia	0.00	0.00	0.00	0.00
France	-0.07	63.15	0.00	0.18
Germany	-0.35	5.90	0.00	-0.01
Ireland	-0.01	19.94	100.05	95.05
Belgium	-0.01	6.26	0.00	0.00
Argentina	0.00	0.00	0.00	0.00
Others	-2.57	-5.79	-0.07	-0.16

Source: Authors' elaboration based on data from UN COMTRADE / International Trade Statistics Database, 2020.

In the period 2000/2006, Brazil's competitiveness in the beef market with the analysed countries obtained, for the most part, negative values (06), however inexpressive. The most significant value in terms of competitiveness in this period was between Brazil/Canada (103.77%). In the period 2006/2012, there is only a negative value (-5.79) referring to Brazil/Others, and expressive, positive values in competitiveness with France (63.15%), Ireland (19.94%), Netherlands (10.50%), Belgium (6.26%), Germany (5.90%) and USA (0.06). In the 2012/2018 period, the competitive effect was concentrated in Brazil/Ireland (100.05%), indicating the highest value.

Through what was shown in Table 5, it can be stated that Brazil is competitive as a beef exporter with the central exporting countries of the good. For Almeida and Michels (2012), in the early 2000s, Brazil was gaining more and more space in world markets due to having adapted to the demands regarding issues, mainly sanitary. For Machado and Amin (2005), the low costs and the excellent availability of land gave Brazil the possibility of increasing its herd more and more in order to meet the international demand that grew in favour of the Brazilian product, giving Brazil advantages over some of its competitors.

According to Silva et al. (2008), Brazil has become competitive in the world market for beef due to the land available, making its production cost low compared to other countries, as cattle are raised through an extensive system, making use of such available lands for cattle to feed predominantly on pasture. Furthermore, changes in the sanitary part of the production, such as: eradicating diseases in the Brazilian herd, such as foot-and-mouth disease and bovine spongiform encephalopathy (BSE), and improving meat quality in general, making Brazil more accepted in the market worldwide, conquering new destinations for its product.

5. FINAL CONSIDERATIONS

The objective of this article was to analyse the determinants of the world trade in Brazilian beef between the years 2000 and 2018. It is appropriate to state that Brazil is among the largest producers in this market, as it has comparative advantages in the production of the product in question, among other factors, highlighting the vast territorial extension, which enables the creation of cattle in the field, depending to a lesser extent on the feed production process; and thereby reducing their costs.

When using the Constant-Market- Share model, it can be noted that the periods 2000/2006 and 2006/2012 had the formation of export growth explained by the growth effect of world exports, which had the great moment experienced by the European market in the first subperiod, contributing to the development of trade with the demand for a notable amount of this good. Even with the economic crisis of 2008, the meat market returned to its growth in 2010 along with world trade. Such events explain the results achieved in these two subperiods.

In the 2012/2018 period, in addition to the growth effect of world exports remaining at the growth level of previous years, the market distribution effect deserved to be highlighted, as it surpassed all others with astronomical growth. During this period, Brazil markets its product with new commercial partners, such as Arab, African, and Asian markets. When analysing the entire period, in general (2000/2018), it was noted that the effect of competitiveness and the growth of world exports explained the growth of Brazilian beef exports between 2000/2018.

When decomposing the growth of Brazilian beef exports for market distribution and competitiveness effects in a disaggregated way, using only the leading trading countries of the product in question, it can be stated that only a few countries, among those selected for their ability to participate in the world trade of this product, proved to be dynamic to the demand for Brazilian beef. They are Canada (2000/2006), France, Ireland, Netherlands, Germany, Belgium, and Others, and the USA (2006/2012); Ireland and the Netherlands (2012/2018). Brazil has almost no beef export dynamics to countries already specialized in exporting this product, having significant numbers for a few of them and in specific periods.

Regarding the decomposition of the effect of the growth of Brazilian beef exports for the effect of competitiveness in a disaggregated way, it can be stated that Brazil is competitive only for sure of the selected countries, namely: Canada (2000/2012); France, Ireland, Netherlands, Belgium, Germany, and USA (2006/2012); Ireland and the Netherlands (2012/2018). Concerning the competitiveness effect, it is correct to say that Brazil competes internationally with other countries considered the leading beef exporters globally.

Because of the above, it is suggested that Brazil achieved this performance in beef exports after the economic opening of the countries to the rest of the world, but also, mainly, due to its natural conditions that make it hold how to reduce its livestock costs.

It is necessary to consider that Brazil took advantage of its comparative advantages in meat production to specialize, significantly improving the quality of the product in general, but mainly worked hard to eradicate diseases such as foot-and-mouth disease and bovine spongiform encephalopathy (BSE) in order not to run the risk of international markets barring their meat, through sanitary barriers. Because of this, Brazilian beef began to be seen internationally with more acceptance.

Finally, Brazil has benefited from its comparative advantages in beef production and the fantastic moment that world trade has provided for sales of this good. It is convenient to emphasize the magnitude of the Brazilian effort to become one of the product's most important producers and exporters over time, even after the world economic crisis of 2008 and sanitary barriers imposed on it. Therefore, the present study brought to the agenda the need for an in-depth analysis of the reasons that lead Brazil to demonstrate that it needs more dynamic demand for beef by countries considered to be the prominent traders of the product.

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