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Chicken production competitiveness: commercial barriers, projections vs. reality, and perspectives of Brazilian industry managers

Arceste Leite Filho
leite@giocosmeticos.com.br
Master's Degree from the Postgraduate Program of Regional Development and Agribusiness at the Western Paraná State University (UNIOESTE), Toledo Campus.. Email:

Mirian Beatriz Schneider
E-mail: mirian-braun@hotmail.com
Associate Professor at the Faculty of Economics and on the Postgraduate Program in Regional Development and Agribusiness (PGDRA) at the Western Paraná State University (UNIOESTE).

Francielly Fonseca da Costa
franciellypr@gmail.com
Master's Degree from the Postgraduate Program of Regional Development and Agribusiness at the Western Paraná State University (UNIOESTE),

Weimar Freire da Rocha Jr.
wrochajr2000@gmail.com
Associate Professor at the Bachelor's Degree in Economic Sciences and the Postgraduate Program in Regional Development and Agribusiness (PGDRA). Western Paraná State University (UNIOESTE).

Alain Hernández Santoyo
santoyocuba@gmail.com
Foreign Visiting Professor of the Postgraduate Program in Economics (PPGEconomia). Institute of Applied Social Science (ICSA). Federal University of Alfenas (UNIFAL-MG)

ABSTRACT

This paper aims to analyze the tariff and non-tariff barriers affecting international trade in chicken meat and their impact on global trade between 2015 and 2016, using two approaches. The first draws from a study by Peterson and Orden (2005), where the authors projected scenarios concerning the evolution of tariff and non-tariff barriers in the international context, evaluating the accuracy of their predictions, and updating future scenarios. The second approach involved interviews with managers from the primary chicken meat-producing industries in the western region of Paraná to gauge their perceptions of the situation. These managers identified several key factors impacting competitiveness, including tariffs, technical and sanitary barriers, and specific legislation related to environmental criteria.

KEYWORDS: tariff barriers; international trade; poultry

INTRODUCTION

Since the 1970s, Brazil's poultry production has witnessed consistent growth. Specifically, exports surged from 32 thousand tons in 1984 to 118 thousand tons in 1991, marking a 267% increase (ESPÍNDOLA, 2002; VASCONCELOS et al., 2015). The 1990s further experienced a 144% rise in domestic chicken consumption during an era of economic stability (BARCELLOS, 2006; SILVA et al., 2011).

By 2001, Brazil achieved a milestone, exporting one million tons of chicken. This marked the commencement of a growth trajectory, reaching two million tons by 2004 and surpassing three million tons annually by 2007 (SCHOR et al., 2015). The country achieved a record export in 2014 of 4.1 million tons, inclusive of whole chicken, frozen cuts, processed meats, salted meats, and chicks (VILANCULOS et al., 2015). Despite this, export revenues witnessed a marginal decline of 0.2% in 2014 to US$8.08 billion, from US$8.09 billion the previous year, according to the Brazilian Association of Animal Proteins (ABPA).

Predictions from the Ministry of Agriculture, Livestock, and Supply (MAPA, 2016) anticipated that by 2020, Brazil would cater to 44.5% of the global meat market, establishing the nation among the top global meat producers and exporters, serving over 200 countries. By 2015, the country led global chicken exports, supplying approximately 40% of the worldwide protein demand. This was followed by the United States (20%), the European Union (9%), and Thailand and China each at 4% (EBC, 2015).

Southern Brazil, renowned as a forerunner in integrated production, houses the nation's major poultry producers. The states of Paraná, Santa Catarina, and Rio Grande do Sul spearheaded the production in 2011, accounting for over 55% of the national output (SILVA et al., 2011; MONTEIRO, 2012; GONÇALVES et al., 2006). Following them was the Southeast region, then the Midwest, notably the state of Goiás. In 2014, Brazil housed 49,333,326 birds (ABPA, 2015). In terms of export value, Paraná, Santa Catarina, and Minas Gerais contributed 39%, 21%, and 21%, respectively (MONTEIRO, 2012; SILVA et al., 2011). Paraná alone constituted 35.7% of Brazil's frozen chicken meat export market (ABPA, 2015), equivalent to 10% of the global market, considering Brazil's 30.26% global market share (RODRIGUES, 2014).

EVOLUTION OF CHICKEN PRODUCTION AND TRADE BARRIERS

Countries have implemented numerous regulations that establish requirements regarding quality, safety, composition, production processes, packaging, labeling, and more for products marketed within their borders (HOWSE, R. et al., 2013; MDIC/SECEX, 2016). Although these measures ensure the protection of legitimate objectives such as health, product safety, and environmental conservation, they might also be wielded for protectionist interests. The challenge in substantiating the potential misuse of these practices impedes exports and diminishes the competitiveness of the impacted sectors. Such issues warrant the attention of the WTO (MDIC/SECEX, 2016). Peterson and Orden (2005) indicated that the most prevalent non-tariff barriers include import quotas, voluntary export restrictions, import licensing, customs procedures, international cartels, dumping, anti-dumping and countervailing measures, and export subsidies. Concurrently, standards and technical regulations, as well as

sanitary, phytosanitary, and animal health regulations, are considered the most significant technical barriers. These can be viewed as equally or potentially more critical than non-tariff barriers.

Among the countries highlighted in the model by Peterson and Orden (2005) that have recently increased tariffs on imports, as presented in Table 1, Russia and China observed a consistent rise in domestic production from 2000 to 2012. In Russia's case, its production, despite declining post-2012, remained superior to Brazil's up until 2015. Meanwhile, the US has consistently been the foremost producer throughout the timeline, also holding the position of the largest consumer—except for 2012, during which China surpassed it by almost 200,000 tons (INDEXMUNDI, 2017). Table 1 details the fifteen leading poultry importers and exporters globally in 2000 and 2016, illustrating the shifts in market representation over time.[1]

Table 1 - Top 15 Importers and Exporters of Poultry Meat, 2000–2016

Importers 2000			Importers 2016			Exporters 2000			Exporters 2016		
Country	Mi US$	%	Country	Mi US$	%	Country	Mi US$	%	Country	Mi US$	%
JPN	792.5	11	DEU	1573.3	9.2	US	1843.5	26	BRA	6128	32.0
HKG	747.6	11	GBR	1561.3	9.2	FRA	988.1	14	US	3182.1	16.0
GBR	737.6	10	HKN	1406.4	8.3	NLD	894.7	13	POL	1850.1	9.5
DEU	682.4	9.7	CHN	1284.9	7.5	BRA	803.5	11	DEU	993.6	5.1
CHN	430.3	6.1	JPN	1166.1	6.8	CHN	545.7	7.8	FRA	933	4.8
RUS	330.4	4.7	FRA	1126.3	6.6	THA	313.4	4.5	BEL	847.6	4.4
SAU	328.7	4.7	MEX	1008.2	5.9	NEL	218.1	3.1	HUN	563.5	2.9
MEX	232.5	3.3	ARE	766.8	4.5	DEU	214.4	3.0	CHN	535.4	2.8
NLD	203.1	2.9	BEL	444.9	2.6	GBR	202.2	2.9	HKN	425.9	2.2
FRA	201.9	2.4	CAN	403.5	2.4	HUN	193.4	2.8	ITA	384.6	2.0
BEL	169.2	1.7	ZAF	371.7	2.2	DNK	164.2	2.3	CHL	378.9	1.9
ITA	122.1	1.7	ESP	354.8	2.1	CAN	97.4	1.4	TUR	360.1	1.9
ARE	119.3	1.7	IRL	332.7	2.0	ITA	90.5	1.3	GBR	341.3	1.8
CAN	117.6	1.7	RUS	316.2	1.9	ESP	75.9	1.1	ESP	338.1	1.7
ESP	113.5	1.6	US	300.8	1.8	POL	74	1.1	ARG	234.6	1.2
Total	5328.9	74.3	Total	12417.9	73.0	Total	12417.9	95.3	Total	17496.8	90.2

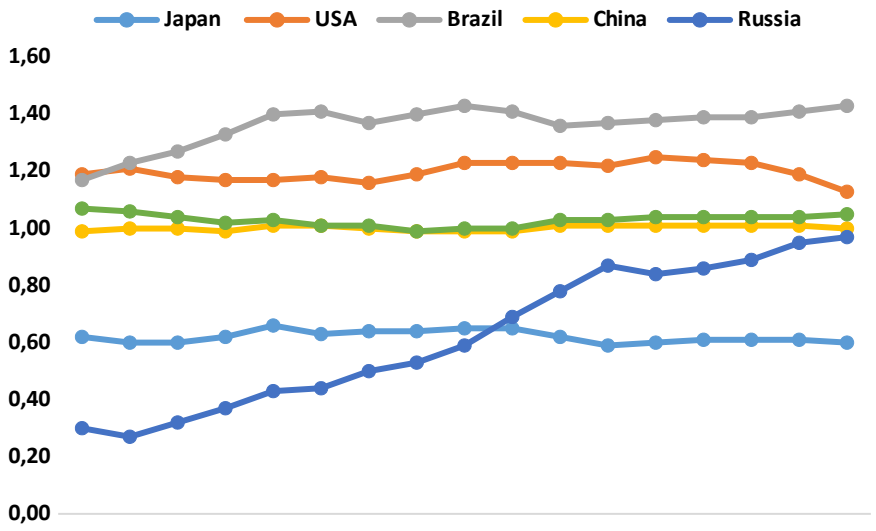
Source: OCE (2016).[2]

A discernible correlation exists between the rise in tariff barriers and the escalation in production for both China and Russia. In the case of Russia, although its production has not met domestic consumption in any year under consideration, the objective remains clear: to eventually achieve this balance. Reflecting on its historical tendencies, Russia, akin to China, often aims to regulate and protect its market. This inclination can be traced back to Russia's past communist orientation, a system that China continues to embrace (Figure 1).

Figure 1 - Poultry meat domestic production in selected regions in 2000 and 2016, in thousands of tons.

[1] For comparison with the 1998 data, the EU-15 grouping was considered. This grouping persisted until 2004. It is important to note that several countries that are currently members of the European Union were not members during that period.

[2] Categories defined according to the Standard International Trade Classification (SITC): 012.31 - Poultry not cut in pieces, fresh or chilled; 012.32 - Poultry not cut in pieces, frozen; 012.33 - Fatty livers of geese or ducks, fresh or chilled; 012.34 - Poultry cuts and other offal, fresh or chilled; and 012.35 - Poultry cuts and offal, frozen.



Source: INDEXMUNDI (2017).

For China, production frequently meets domestic consumption, resulting in a correlated fluctuation. Until 2012, production increased by an average of 2.55% annually. However, it dropped by -2.55% in 2013, -2.62% in 2014, and -8.21% in 2016. Simultaneously, consumption rose by an average of 3.36% between 2005 and 2012 before declining in the subsequent years. The prominence of China in the export marketplace, despite high import tariffs to shield domestic production, compels it to remain a major global importer.

Japan has the lowest average tariff in the group and has remained consistent throughout the period. Its production met only up to 66% of domestic consumption at its peak in 2004. Unlike many countries, the primary sector does not drive the GDP of Japan; rather, it comes from exporting technology products.

The EU, which transitioned from EU-15 in 1998 to EU-27 by 2017, is unique. It decreased its average tariff and consistently met internal demand throughout the period. However, several member nations are not exporters, indicating that, unlike China and Russia, Europe does not often resort to protectionist strategies for this commodity.

Despite numerous non-tariff and technical barriers present globally, the poultry sector has flourished. The predominant non-tariff barriers include import quotas, voluntary export restrictions, import licensing, customs procedures, international cartels, dumping, anti-dumping and countervailing measures, and export subsidies. On the other hand, technical barriers encompass standards and technical regulations as well as sanitary, phytosanitary, and animal health regulations (PETERSON and ORDEN, 2005). Such technical impediments can be deemed as significant, if not more so, than non-tariff barriers like anti-dumping duties, quotas, subsidies, and import bans, among others.

Even with these obstacles, world consumption of poultry meat grew from 10.4 to 13.9 kilograms per capita between 2002 and 2016, surpassing both pork (12.3 kg) and beef (6.5 kg) as the most consumed meat (OECD, 2017). In tandem with this, world poultry exports swelled from 6.5 million tons to 10.6 million tons during this period, while imports surged from under five million tons in 2002 to 8.2 million tons in 2010, reaching 8.9 million in 2016 (USDA, 2010, 2017).

Building on the preceding discussion, in 2020, Brazil captured 44.5% of the global market, becoming one of the predominant meat producers and exporters to over 200 nations (MAPA, 2016). By 2015, Brazil led the pack in chicken exports, fulfilling 40% of global protein demand. This was trailed by the US at 20%, the EU at 9%, and both Thailand and China at 4% (EBC, 2015).

Rapid expansion in the poultry sector over recent decades positions it as a compelling model for analysis considering rising global food demand and world food system transformations. This industry encompasses complex strategies for both consumer protection and domestic production protection, requiring nuanced examination. Therefore, this work aimed to explore tariff and phytosanitary barriers and perspectives of producers using the forecast model of Peterson and Orden in 2005, contrasting the findings with the broader global scenario. By conducting a prospective analysis with MIC MAC software, the research captured insights from producers in Paraná and aligned them with the global trajectory of the sector.

METHODOLOGY

This study initially compared the world poultry market of 1998 with that of 2016. Data from Peterson and Orden (2005) were employed to establish the 1998 baseline scenario due to their thorough examination of bilateral relations between the key poultry market players at that time: the US, Brazil, the EU, China, Russia, and Japan.

These authors simulated four hypothetical future scenarios that would directly affect trade among these five countries and the EU, collectively referred to as 'six regions.' The first scenario abolished only EU tariffs and tariff quotas among the six regions. The second eliminated solely sanitary and phytosanitary barriers (SPS), while the third removed all trade barriers, leading to a free trade scenario. Finally, they simulated a Russian ban on low-value imports from the US. In each case except the last, some trade barrier was lifted, which had not occurred until 2016. Therefore, the simulation results from these authors are not depicted in this work.

The authors developed a spatial model of competitive partial equilibrium with heterogeneous goods. They categorized poultry meat as high-value and low-value and calculated the average price, consumer preferences, and the elasticity of substitution between sources for 1998 to simulate potential shifts in the world poultry market under different scenarios. As already mentioned, some 1998 data were used for comparison with 2016 data, analyzing changes in tariff barriers and the international poultry trade standing of these regions. The analysis for this approach relied on secondary data sourced from Peterson and Orden (2015), UNCTAD, USDA, WTO, OCE, and INDEXMUNDI.

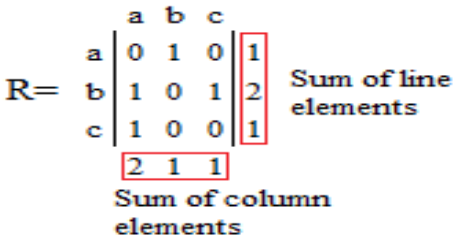
Following this analysis, the study started investigating how local producers, managers, and experts perceive the changes in the non-tariff barrier system over the evaluation period and their impacts on international engagement. This part of the investigation employed a second methodological approach involving the application of the Delphi method and the MICMAC software for structural analysis. The case study implemented the MICMAC® application, developed by the Research Laboratory in Prospective and Organizational Strategy (LIPSOR, 2004), to select the variables deemed most crucial for describing the object system.

The MICMAC method arranges variables hierarchically based on the direct and indirect influence each variable exerts on the others. It can also discern the behavior of the variables under study in terms of their motricity and dependence within the system. Vergara and Netto (2007) define motricity as the degree to which one variable influences another in the system. A variable with high motricity often dictates system performance or the interactions within it. These authors describe dependence as the extent to which other variables influence the behavior of a variable. Behavior from a highly dependent variable can indicate the actions of those with high motricity.

For data collection, the specialists chosen were the export managers of the Lar, Copacol, C-Vale, and BRF (Brasil Foods) cooperatives, as well as the vice-president of ABPA (Brazilian Association of Poultry Producers), representing a sizable portion of the country's production and producers. To understand the behavior of variables composing an object system, Godet (1993) introduced the MICMAC structural analysis methodology (Matrix of Cross-Impacts - Multiplication Applied to Classification). The aim is to scrutinize the internal variables forming the object system, which, in this case, comprises export policies and external variables that interact with the studied system in some way, as also described by Marcial and Grumbach (2004).

In this matrix, any change impacting variable i could reverberate on variable j, signifying an indirect relationship between i and j. An array (matrix R) contains numerous i -> j type indirect relationships not accounted for by direct classification (Figure 2). Squaring the matrix (R^2) reveals second-order relations between variables i and j.

Figure 2 - Example of a structural analysis matrix.



Source: Vergara and Netto (2007).

The structural analysis matrix presented below incorporates variables a, b, and c. The main diagonal elements of this matrix are all set to zero. This design decision stems from the data collected, which disregards any direct influence of a variable upon itself.

Yet, when elevating the matrix to the power of n, certain elements on the main diagonal can adopt non-zero values. These evolved values reveal a variable's indirect influence on itself, mediated by the effects of other variables within the system, as highlighted by BODINI (2001).

In the matrix, a value of 1 in the position (R11) — located at the intersection of the first row and column — results from squaring the matrix. It indicates a second-order feedback loop of variable r influencing itself, as visualized in Figure 3. Similarly, a value of 1 in position (R21), corresponding to the second row and first column, signifies a second-order connection from variable a to b.

Figure 3 - Examples of structural analysis matrices for selected powers.

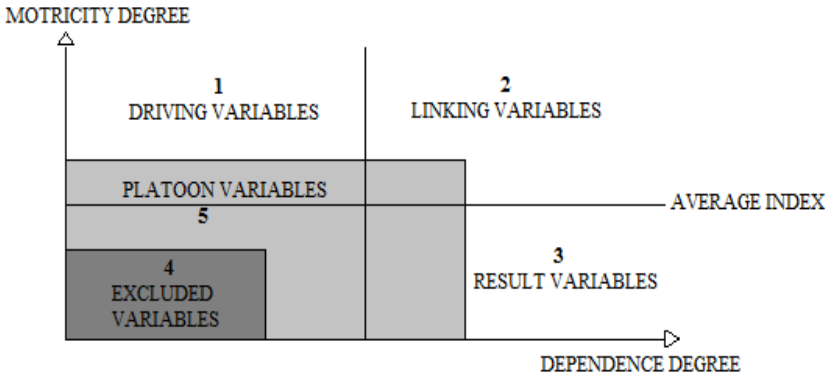
$$R^2=\begin{array}{c|ccc|c} & a & b & c & \\ \hline a & 1 & 0 & 1 & 2 \\ b & 1 & 1 & 0 & 2 \\ c & 0 & 1 & 0 & 1 \\ \hline & 2 & 2 & 1 & \end{array} \qquad R^3=\begin{array}{c|ccc|c} & a & b & c & \\ \hline a & 1 & 1 & 0 & 2 \\ b & 1 & 1 & 1 & 3 \\ c & 1 & 0 & 1 & 2 \\ \hline & 3 & 2 & 2 & \end{array} \qquad R^4=\begin{array}{c|ccc|c} & a & b & c & \\ \hline a & 1 & 1 & 1 & 3 \\ b & 2 & 1 & 1 & 4 \\ c & 1 & 1 & 0 & 2 \\ \hline & 4 & 3 & 2 & \end{array} \qquad R^5=\begin{array}{c|ccc|c} & a & b & c & \\ \hline a & 2 & 1 & 1 & 4 \\ b & 2 & 2 & 1 & 5 \\ c & 1 & 1 & 1 & 3 \\ \hline & 5 & 4 & 3 & \end{array} \qquad R^6=\begin{array}{c|ccc|c} & a & b & c & \\ \hline a & 2 & 2 & 1 & 5 \\ b & 3 & 2 & 2 & 7 \\ c & 2 & 1 & 1 & 4 \\ \hline & 7 & 5 & 4 & \end{array}$$

Source: Vergara and Netto (2007).

By evaluating the matrix raised to the third power (R^3), we discern how the elements delineate third-order paths and circuits, connecting one variable to another. After a certain number of multiplications (or power raises), the classifications of variables in both rows and columns stabilize. To further grasp this method, one should consider the matrices R^4, R^5, and R^6 provided above.

Every variable serves as an indicator of both motricity and dependence within the system under study. As a result, each variable can be situated on a motricity-dependence plane, as depicted in Figure 4 (BODINI, 2001).

Figure 4 – Motricity and dependence plane.



Source: Adapted from GODET (2011).

However, it is crucial to remain objective when selecting input data, analyzing results, and making value judgments inherent to the method.

RESULTS AND DISCUSSIONS

In the initial phase of our methodological approach, recent data aligned with expected trends in global trade as per the General Agreement on Tariffs and Trade (GATT) by Peterson and Orden (2005), for all studied scenarios except the last one. Notably, the Uruguay Round was underway in 1986, culminating in the formation of the WTO in 1994. For the poultry market, a comparison of 1998 tariff and TRQ data with updated figures from the same regions (as depicted in Table 2) shows more tariff hikes than reductions. Furthermore, no countries in the study were excluded.

Table 2 - Summary of tariffs imposed per region.

Source: Adapted from Peterson and Orden (2005), USITC, USDA, and OMC Schedules.

Region	Tariff rates	Average rates
	1998	
US	Tariffs are set at US$0.088/kg for whole chickens and US$0.176/kg for chicken parts, equivalent to 18-36 percent ad valorem.	25%
Brazil	Tariffs set in the WTO are at 35 percent for all poultry products.	35%
China	Tariffs are set at 45 percent for all poultry products.	45%
EU	Tariffs are set at 299 ECU/mt for whole chickens and 358 ECU/mt for chicken parts, equivalent to 18-60 percent ad valorem. Tariff-rate quotas have been established with quantities allocated to Brazil and Central and Eastern European countries.	20%
Japan	Tariffs are set at 11.9 percent for whole chickens and 8.5 percent for chicken parts.	10%
Russia	Tariffs are set at 30 percent for chicken and 15 percent for turkey. The trade agreement with the EU does not grant restricted access to European imports. There are restrictions on transshipments through Baltic Countries.	22,5%
	2016	
US	Applied MFN tariff is 10%, general duty is set at 25%, tariffs are US$0.088/kg for whole chickens, and US$0.176/kg for chicken parts.	25%
Brazil	Tariff is set at a bound rate of 35%.	35%
China	The average bound tariff on poultry is 19.41%. For fresh poultry parts (whole and cut), the rate is 20%, and 10% for frozen. The non-MFN average duty stands at 70%.	70%
EU	Applied MFN tariff is 4.65%. The average bound tariff stands at 4.9%. The list for non-AV includes rates such as 0.262€/kg, 0.299€/kg, and 0.325€/kg for whole chickens, and 1.008€/kg and 1.024€/kg for cut parts.	4,9%
Japan	Applied MFN tariff is 7.2%. The bound rate is set at 7.1%, and the general duty stands at 10.03%.	10%
Russia	Applied MFN tariff is 73.13%, with a bound rate set at 80%.	80%

The US, Brazil, and Japan retained their import tariffs for poultry products. Conversely, China increased its tariff from 45% to 70% and Russia's from 22.5% to 80%. Only the EU reduced its average tariff, bringing it down from 20% to 4.9%.

Table 2 also underscores a trend towards increased trade protection rather than liberalization. The restrictions China imposed on the US and the EU were in response to HPAI outbreaks post-2014 in areas of the US, Belgium, and France. Russia followed suit, additionally banning poultry imports from China due to recent disease outbreaks in Chinese flocks.

This trend suggests that, despite the liberalization ethos championed by GATT and the WTO, for these pivotal regions, both tariff and technical barriers have risen in the poultry trade sector. When examining these technical barriers, it is essential to note the significant health threats avian diseases pose. Such barriers are justified not solely for market protection but for health safeguards. Several epidemics between 1997 and 2006 in countries like China, Hong Kong, the US, the Netherlands, Thailand, Vietnam, Cambodia, Romania, and Turkey had significant impacts on human health, leading to 132 deaths and necessitating the culling of thousands of birds (Vranjac, 2006). In 2009, the H1N1 influenza

pandemic affected 207 countries, resulting in at least 8,768 deaths (CARNEIRO, TRENCH, WAIB, PEDRO, & MOTTA, 2010).

However, when weighed against the massive growth in the poultry sector, the actual number of people affected by these health concerns is minor. The looming "fear" of diseases is often wielded as a tool, enabling countries to raise sanitary barriers against formidable trade competitors without facing WTO sanctions (Table 3). By the time the perceived threats are proven less severe than anticipated, trade dynamics and prices have already felt the impact of these barriers.

Table 3 - Bilateral sanitary and phytosanitary barriers (SPS) for poultry trade.

Exporters (1998)	***Importers (1998)***					
	US	*Brazil*	*EU*	*China*	*Japan*	*Russia*
US	-	*Banned*	*Banned*	*Allowed*	*Allowed*	*Allowed*
Brazil	*Banned*	-	*Allowed*	*Allowed*	*Allowed*	*Allowed*
EU	*Allowed*	*Allowed*	-	*Allowed*	*Allowed*	*Allowed*
China	*Banned*	*Banned*	*Banned*	-	*Allowed*	*Allowed*
Exporters (2016)	***Importers (2016)***					
	US	*Brazil*	*EU*	*China*	*Japan*	*Russia*
US	-	*Banned*	*Banned*	*Restricted*	*Allowed*	*Restricted*
Brazil	*Banned*	-	*Allowed*	*Allowed*	*Allowed*	*Allowed*
EU	*Allowed*	*Allowed*	-	*Restricted*	*Allowed*	*Restricted*
China	*Banned*	*Banned*	*Banned*	-	*Allowed*	*Banned*

Source: Adapted by the authors from USDA reports.

Some variables potentially influenced by protectionist measures between 2000 and 2016 are discussed herein. The observed regions represented 70% of the international market in 1998, but this changed over the subsequent 18 years due to factors like the entry of new countries into the poultry import market. For instance, in 1998, the US, Brazil, the EU, China, Japan, and Russia collectively accounted for 75% of imports and 90% of exports (Peterson and Orden, 2005). By 2016, they represented approximately 72% of exports, with individual contributions as follows: Brazil (32%), EU (EU-15) (21%), the US (16%), and China (2%). In 2016, these regions made up approximately 53% of worldwide imports. Factoring in intra-group trade, the distribution was as follows: EU-15 led with 35%, followed by China at 7.5%, Japan at 6.8%, Russia at 1.9%, and the US at 1.8% (OEC, 2016).

There were a few changes among the 15 largest. While imports from Saudi Arabia, the Netherlands, and Italy decreased, there was an uptick in imports from South Africa, Ireland, and the US. As for exporters, the Netherlands, Thailand, Denmark, and Canada made way for Chile, Turkey, Argentina, and Hong Kong. The monetary value of traded goods experienced substantial growth. In 2000, 74.3% of importers accounted for approximately US$5.3 billion, and 95.3% of exporters made up US$6.7 billion. By 2016, these figures had evolved: 73% of importers accounted for US$12.4 billion, and 90.2% of exporters for US$17.4 billion.

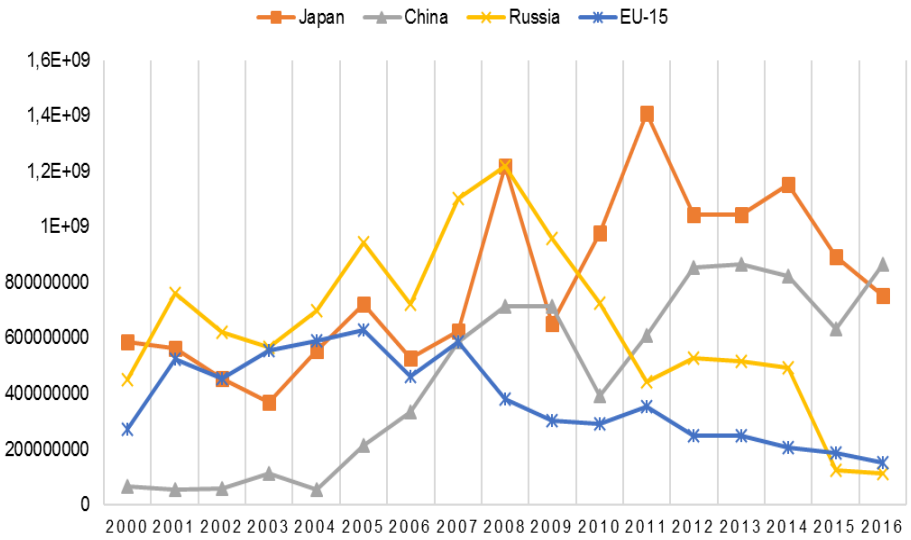
Examining these surges in trade values, exports from countries like Brazil and Poland increased by 21% and 8.4%, respectively. In monetary terms, Brazil enhanced its poultry exports by US$5.3 billion, and Poland by US$1.7 billion. The US, while increasing by US$1.3 billion, lost 10% of its share in poultry exports.

Using the same regions as Peterson and Orden (2005), we can verify that China has ceased to be an exporter from 2009 onwards. However, Japan still permits imports from China, but this involves poultry meat rather than frozen cuts, as indicated for the products in the table (USDA, 2017). While Russian imports were halted in 2003, 2004, 2005, 2007, 2012, and 2013, in the years when Russia did export, the trade values were modest. A similar trend was observed for Japan, positioning both countries primarily as importers within the group.

A comparative evaluation of the US and Brazil highlights Brazil's ascending prominence in the import market from 2005 onwards within the group, despite its prices surpassing those of the US. During the specified years, Japan consistently favored imports from Brazil, a sentiment echoed by the EU, particularly within its EU-15 configuration. However, China's inclination began to shift towards Brazilian exports starting in 2010, as reported by the USDA (2017). Until 2009, the US dominated as the primary chicken meat supplier, claiming 75% of the market. China's introduction of anti-dumping and countervailing duties in 2010, combined with HPAI restrictions in 2014/15, curtailed and eventually ceased US shipments. Consequently, Brazil rose to prominence as China's principal supplier by 2010, securing a 40% market stake. This figure skyrocketed to approximately 90% by 2016, and Brazil's commanding presence is anticipated to persist. Russia showed a preference for US imports until 2016, at which point it halted their entry. Meanwhile, the pattern of import preferences between Brazil and the EU-15 oscillated until 2011 when Brazil started to dominate a massive portion of these imports.

Exports from the EU-15 to Brazil are small in quantity but high in value, due to their emphasis on premium-priced birds such as geese, turkeys, and ducks. The trend is similar for EU-15 exports to Japan. Over the study period, while China's imports from EU-15 poultry declined, those from Brazil experienced a rise (Figure 5).

Figure 5 - Intra-group imports of frozen poultry cuts by major importers from 2000 to 2016 (in dollars).



Source: USDA (s.d.). HS-6 Code: 020714. 020727. 020736. 020741. 020743. 020745. 020755.

For most bilateral relations concerning these products within this regional grouping, there was a decline over the period. The notable exception was Brazil, which consistently experienced export growth to these regions. Conversely, major importers in the region—excluding China—demonstrated a descending trend in their imports over the period. This was particularly evident post-2008 for the EU and Russia, and post-2011 for Japan, as depicted in Figure 2. As for intra-group imports, China witnessed reductions between 2008-2010 and 2012-2015, even though it was the sole country to record an increase in 2016.

One plausible reason for the shift in imports post-2008 is the 2009 avian flu pandemic, which impacted all the key exporting regions in this study. However, Brazil remained unaffected, as its poultry flocks were free from the disease. This fortuitous circumstance enabled Brazil to gain a larger market share within this group, as suggested by Dos Santos Filho, Miele, Martins, and Talamini (2011). Another potential factor influencing the dynamics of exports, imports, and trade barriers is the evolution of internal production in this group. This aspect will be further explored in the subsequent subsection.

From a strategic perspective, based on interviews with foreign market experts and representatives from export companies in western Paraná state, 17 variables emerged as pertinent to our study. Table 4 shows the relationship of these variables within the MICMAC system. They are organized to allocate values of mutual influence, facilitating the operation of the program in question.

Table 4 - Variables employed in the MICMAC analysis software.

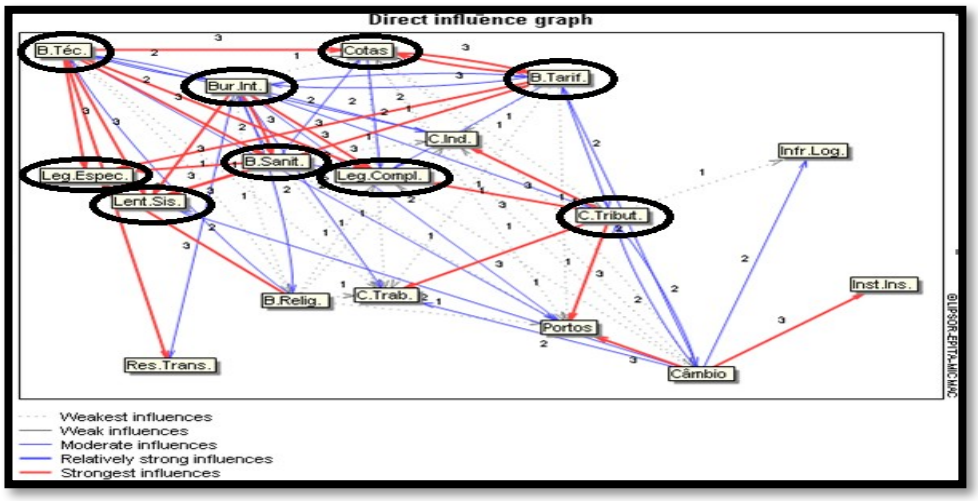
No.	Long label	Short label	Description
1	HALAL Religious Barriers	Relig. B	Demand of Muslim countries for the purchase of meat, following the precepts of the Islamic religion.
2	Sanitary Barriers	Sanit. B	Requirement that exporting countries be demonstrably free of certain contagious diseases.
3	Tariff Barriers	Tarif. B	Charges imposed by purchasing countries on imported products, these rates suffer significant increases when volumes exceed a stipulated quota.
4	Technical Barriers	Tec. B	Certifications, of the most varied types, which are required by certain countries, were intended to hinder the entry of products.
5	MAPA Internal Bureaucracy	Int.Bur	Brazilian legislation is quite complex and sometimes causes re-work, with internal inspections of the industry being repeated at the time of shipment, in the port.
6	Unstable Exchange	Exchange	Foreign exchange is an extremely important variable in international business and this insecurity makes it impossible to close long-term contracts.
7	High Tax Rates	Tax	The taxes on production in Brazil are among the highest in the world, which hampers our competitiveness.
8	Import Quotas	Quotas	Imposition of import volume limits by country, whenever this limit is exceeded, the tariffs charged suffer exorbitant increases.
9	Port Infrastructure and Costs	Ports	The costs of using port structures in Brazil are among the highest in the world and involve time-consuming processes and outdated infrastructure.
10	Industrial Costs	Ind.C.	Brazilian industrial costs, which include investments in infrastructure, labor, and packaging, have increased compared with our main competitors over the years.
11	High Labor Costs	Lab.C.	Brazilian legislation imposes a remarkably high tax burden on workers' wages, burdening labor-intensive industries with little automation.
12	Poor Logistical Infrastructure	Log.Infr.	Roads, ports, and railroads are in bad repair and insufficient to meet the demands, in addition to extremely excessive costs compared to our direct competitors.
13	Instability of Input Costs	Inp.Inst.	The lack of concern and planning with domestic supplies has caused grain exports to cause an imbalance in domestic supply, raising prices and hampering production.
14	Complex Legislation	Compl.Leg.	A substantial number of roles, forms, and sectors for the processing and release of new crops and products.
15	Specific Legislation	Spec.Leg	Own requirement of each importing country is not always legitimate and are used purely and simply to hinder or delay the entry of foreign products.
16	Slow System	Slow.Sys.	All internal regulatory processes are very time-consuming, with great difficulties in registering and adopting new products.
17	Transgenic Food Residues	Trans.Res.	Some countries require that food used in production be free of transgenic cereals, with the exclusive use of conventional grain.

Source: Adapted by the authors from researched data.

Figure 6 illustrates the established interrelations in a direct influence map. This detailed model delineates varying degrees of influence and dependence using an easily interpretable methodology. To enhance clarity, the map employs lines of differing thicknesses and textures to represent these degrees.

Based on our research findings, the tax burden stands out as a particularly influential variable. It has both direct and indirect impacts on numerous other factors. Alongside the tax burden, tariff and technical barriers exhibit the highest levels of interaction with other system variables. Some variables, like specific and complex legislation, experience significant direct influence but do not notably affect other elements in the system. Notably, tariff quotas and barriers display a marked mutual influence, highlighting their substantial interdependence (Figure 6).

Figure 6 - Key variables illustrating direct influence.



Source: Adapted by the authors from the MICMAC analysis software (2016).

The insights provided by the interviewees echo the perspectives discussed throughout this study. One notable exception is the emphasis placed on the tax burden. This focus can be attributed to the fact that managers, representing the industry, are more engrossed in internal organizational issues. However, this granular focus is also addressed in our research. This suggests that sectors involved in production might lack an accurate understanding of the real factors impacting the company's international competitiveness. Merely reducing the tax burden might not be a sufficient countermeasure against the rise of non-tariff barriers (LEITE FILHO & SCHNEIDER, 2018).

A prospective structural analysis offers a clear visualization of the positions occupied by these variables, depending on their degrees of dependence and influence on others. As illustrated in Figure 7, the map is segmented into five sectors, as delineated by Godet et al. (2011) to enhance clarity:

Sector 1 - Explanatory or Driving Variables: These are highly influential, yet not very dependent variables that shape the entire system.

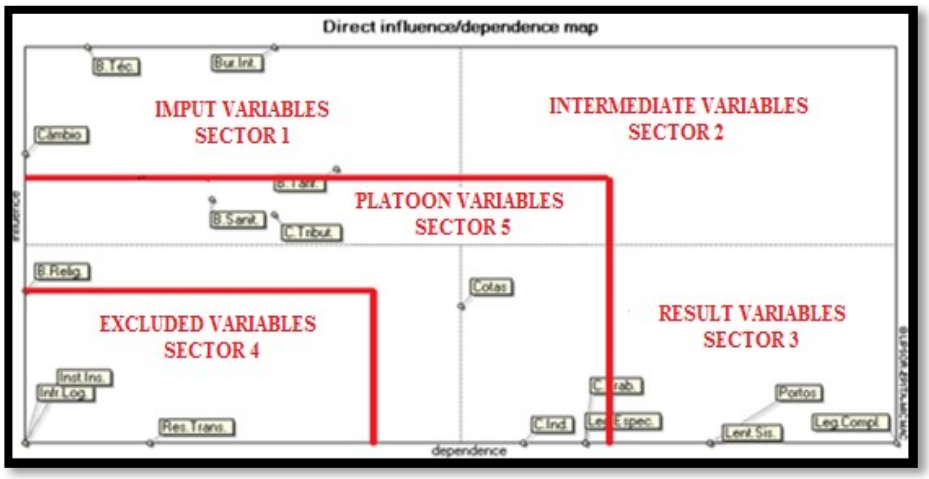
Sector 2 - Intermediate or Link Variables: Actions on these variables influence other variables within the system and the variables themselves, profoundly impacting the data under scrutiny.

Sector 3 - Result Variables: The dynamics of these variables are determined by the behavior of the variables within Sectors 1 and 2.

Sector 4 - Excluded Variables: These variables minimally interact with the system and thus are not deemed pivotal in influencing the model. They are neither significantly influential nor dependent.

Sector 5 - Platoon Variables: These are complex to assess due to their position on the map. Residing in an intermediate zone, they possess characteristics of being moderately influential and moderately dependent.

Figure 7 - Post-analysis map of variable influence and dependence.



Source: Adapted by the authors from the MICMAC analysis software (2016).

After examining Figure 7, we proceeded to eliminate variables deemed less pertinent based on their positioning within the system. It is important to underscore that every variable, regardless of its degree of influence or dependence, holds value within the system. These variables were initially identified by specialists and inherently provide support to other more influential ones.

Consequently, four variables were deemed superfluous for our analysis: religious barriers, logistic infrastructure, instability of input costs, and transgenic food residues. These variables exhibit limited interactions and are rarely affected, hence their influences on the study are marginal at best.

Such findings prompted reflection upon the fact that export market entrepreneurs and managers have a broader perspective that sometimes overshadows critical elements. For instance, logistics infrastructure, crucial for evaluating export costs and market competitiveness, was surprisingly sidelined.

Often, the complexities of industrial processes and challenges in international relations take precedence, overshadowing crucial internal matters. These overlooked issues warrant thorough evaluation and in-depth studies.

Variables in Sector 5 encompass sanitary barriers, tax burden, quotas, industrial and labor costs, and specific legislation. These transitionary variables exert a moderate influence on other variables and within the system.

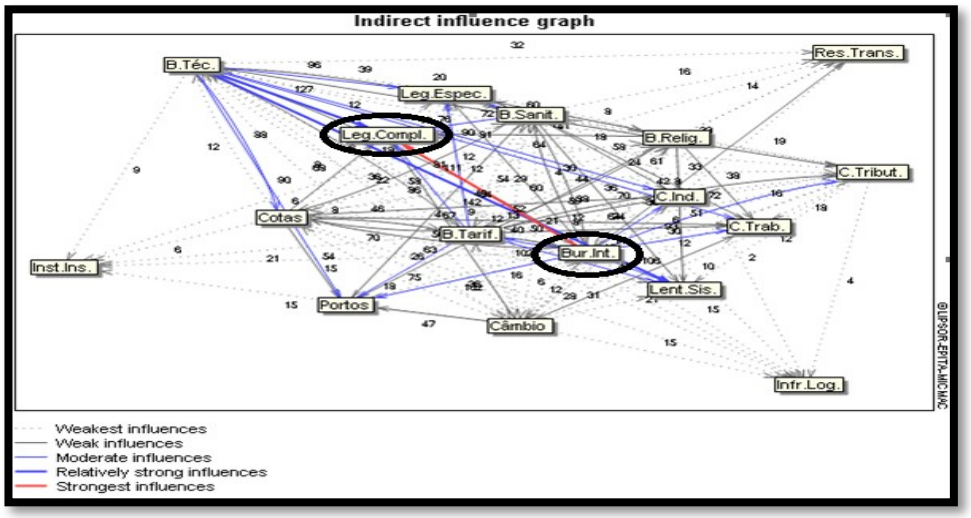
Sector 1 houses the foundational input variables: technical barriers, internal bureaucracy, exchange rates, and tariff barriers. These are highly influential with minimal dependence on others.

In this specific instance, Sector 2 contains no variables. Typically, variables in this sector function as intermediates or linkages, displaying unstable behaviors and bridging the influence process between other variables.

Lastly, we assessed the 'result variables' in Sector 3, which include aspects like ports, system slowness, and complex legislation. These variables are poorly driven yet highly dependent. Their actions are assessed in light of the behavior of variables in Quadrants 1 and 2. However, in our study, only Quadrant 1 is applicable, as Quadrant 2 remained void post-program implementation.

As depicted in Figure 8, numerous indirect interrelations exist within the system. Even in the absence of direct connections between specific variables, they can still exert an indirect influence on other elements within the system.

Figure 8 - Stability of the MID Matrix.

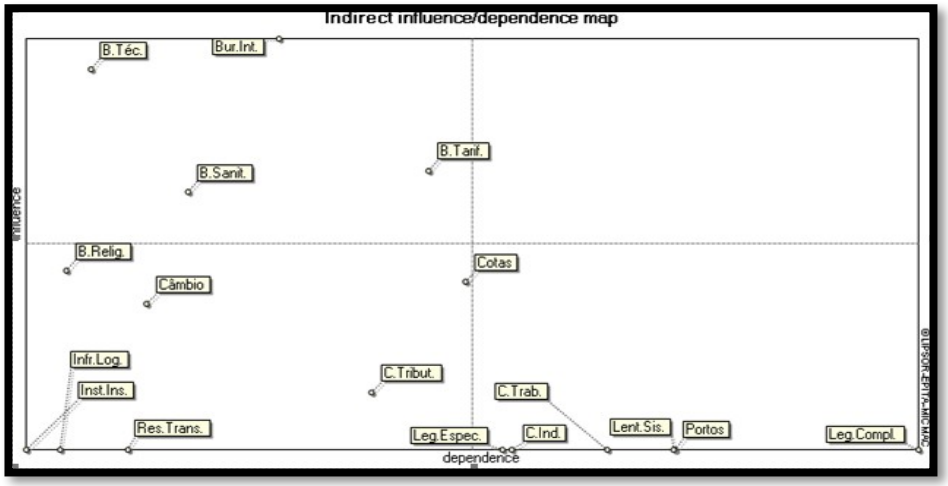


Source: Adapted by the authors from the MICMAC analysis software (2016).

The two variables, complex legislation and internal bureaucracy, stand out for their considerable indirect influence on the system. For clarity, they have been emphasized in the analysis. Additionally, technical barriers have a notable influence, impacting numerous other system variables.

To decipher the myriad of direct and indirect interactions within the system, the MID matrix (direct impact matrix) underwent iterative multiplications until a state of complete stability was reached. In Figure 9, the resulting patterns of influence and dependence after system stabilization are depicted. Once a balanced state is attained in the system, the graph detailing influence and indirect dependence can be evaluated. It is evident from the map that minimal variations exist between this and the previously discussed map of direct influence and dependence.

Figure 9 - Map of variable influence and dependence.



Source: Adapted by the authors from the MICMAC analysis software (2016).

It is evident that the 'tax load' variable shifts rightward, settling within Sector 3, departing from its previous classification as a platoon variable. This movement

signifies an unstable system where indirect relationships are not delineated yet remain crucial because they continue to influence the overall model.

Considering the objective outlined at the start of this paper, the major barriers hindering Brazil's entry into various international markets—identified by interviewed managers who are experts in this subject—were analyzed and cross-referenced using the MICMAC system. The final analysis demonstrates that these barriers are the most pertinent and therefore, urgently need to be addressed to streamline all processes within this intricate market (Leite Filho & Schneider, 2018).

The findings led to an important reflection on the depth of understanding that executives and export market managers possess regarding this vast market's intricacies. For instance, it is concerning that aspects such as logistics infrastructure have been downplayed, or that internal regulatory matters are viewed with greater priority than emerging non-tariff challenges like food safety concerns. These elements are undeniably pivotal when considering export cost analysis and, by extension, market competitiveness.

FINAL CONSIDERATIONS

The global poultry market has undergone significant changes since 1998, diverging from the scenarios posited by Peterson and Orden (2005). Their predictions, which revolved around the removal of tariff or non-tariff barriers, have not materialized yet. Contrarily, most regions have heightened these barriers. The US, for instance, did cut down on tariff barriers but retained phytosanitary barriers. Russia, in turn, halted US poultry imports only in 2016; before that, the country preferred American poultry, but increased its average tariffs, and set restrictions on imports from other regions.

Even against the backdrop of the liberalization agenda of the GATT and the World Trade Organization (WTO), poultry trade among the considered regions saw an upsurge in tariff and technical barriers, signaling protectionism. This protectionism was often defended on the grounds of prevalent avian diseases worldwide, but it also extended beyond just food safety, especially as new entrants emerged in the market. Notably, while countries such as the US, Brazil, Japan, China, and Russia retained a significant share in the 2016 poultry market (53% of imports and 72% of exports), their dominance had diminished from 1998 levels (70% of imports and 90% of exports).

The stiffening of trade barriers, combined with bird flu epidemics, particularly in the US and China, opened opportunities for Brazil. As a result, Brazilian poultry exports surged, securing the country's top position in global poultry exports from 2004, outpacing the US.

Feedback from Brazilian poultry industry managers, based on the MIC MAC results, suggests a need for addressing external barriers, such as "tariff barriers", "health barriers", "technical barriers", "quotas", and "specific legislation". These issues, they believe, should be negotiated aiming for mutual benefits. And when bilateral negotiations falter, the WTO should step in. This mediation, sadly, is often overlooked by Brazil.

Regarding domestic issues, "complex legislation", tied with "internal bureaucracy", "systemic slowness", and "tax burdens", need urgent reevaluation. These variables are interrelated, where intricate legislation inadvertently results in systemic inefficiencies, leading to escalating bureaucracies and costs, which in

turn, necessitate higher taxes. These costs were consistently flagged as significant challenges by the study's participants.

Conclusively, it is crucial to note that the managers equate external tariff barriers with internal, both bureaucratic and non-bureaucratic, challenges. Their limited understanding of global poultry industry dynamics is evident. They lean heavily towards rectifying internal constraints to bolster competitiveness. Such an inward-focused approach could be detrimental. In the global playground of the WTO, any deviation of Brazilian production from international norms can be construed as state-led protectionism. This could prompt international competitors to either challenge these practices or mimic them, rendering local strategies ineffective. The emphasis should be on understanding international market dynamics and adapting swiftly. Relying solely on the state to ensure sectoral competitiveness, especially given the sheer production volume, is a flawed strategy.

Competitividade na produção de frangos: barreiras comerciais, projeções versus realidade e perspectivas dos gestores da indústria brasileira

ABSTRACT

Este trabalho teve como objetivo analisar as barreiras tarifárias e não tarifárias no comércio internacional de carne de frango e seu impacto no comércio mundial entre 2015 e 2016, com base em duas abordagens teóricas. A primeira baseou-se no trabalho de Peterson e Orden (2005), no qual os autores traçaram cenários quanto ao avanço de barreiras tarifárias e não tarifárias no contexto internacional, este trabalho verificou a efetividade das previsões e renovou os cenários para o futuro. A outra abordagem envolveu entrevistas com gestores das principais indústrias produtoras de carne de frango da região oeste do Paraná, a fim de compreender a percepção que eles têm do cenário. Estes reforçaram os mesmos temas como causas de perda de competitividade, barreiras sanitárias, técnicas e tarifárias, além de legislações específicas, relativas a questões ambientais por exemplo, como possíveis causas de perda de competitividade.

PALAVRAS CHAVE: barreiras tarifárias; comércio internacional; produção de frangos

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Correspondência: