THE RELATIONSHIP BETWEEN POULTRY PRODUCERS AND THEIR INTEGRATORS: A CASE OF WEST REGION OF PARANÁ, BRAZIL

A relação entre produtores de aves e suas integradoras: o caso da Região Oeste do Paraná, Brasil

La relación entre los avicultores y sus integradoras: el caso de la Región Oeste de Paraná, Brasil

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Resumo: O objetivo principal deste trabalho consiste em discutir a relação entre os produtores avícolas e suas integradoras na região Oeste do Paraná, considerando a percepção dos produtores e suas respectivas decisões com respeito a escolha e permanência em um contrato de integração. Foram entrevistados 98 produtores, aplicados um conjunto de testes estatísticos não paramétricos, incluindo testes de independência ou tabelas de referências cruzadas, tabelas de comparação de proporções e correlações bivariadas. Os resultados indicam que o perfil dos produtores é de pequenas e médias proprietários com um alto de grau de dependência com a agroindústria. Ficou evidenciada uma competição intensa e em sua maioria, os produtores escolhem uma integradora em função da confiabilidade da marca e não de acordo com os preços oferecidos, e isso se explica pela alta especificidade da relação de produção.

Palavras-chave: Coordenação Vertical. Agronegócio. Organização da cadeia de valor. Organização industrial. Desenvolvimento regional.

Abstract: The main objective of this paper consist to discuss the relationship between poultry producers and their integrators in West region of Paraná, capturing poultry producer's perception and theirs decisions for choosing and staying in an integration contract. A sample of 98 producers were interviewed and non-parametric statistical tests were used, including cross-reference tables, comparison proportions tests and bivariate correlations. Results indicate that producer profiles are mainly constituted by small or medium enterprises with a high dependence degree on agro-industry. An intense competition exists and mostly, producers choose an integrator based on brand trustworthiness and not according to prices offered, explained by the high specificity of production relationship.

Keywords: Vertical coordination. Agribusiness. Value chain organization. Industrial organization. Regional development.

Resumen: El objetivo principal de este trabajo consiste en discutir la relación entre los productores avícolas y sus integradoras en la región Oeste de Paraná, considerando la percepción de los productores y sus respectivas decisiones de selección y permanencia en un contrato de integración. Se entrevistó a una muestra de 98 productores y se realizaron un conjunto de pruebas estadísticas no paramétricas, incluyendo pruebas de independencia o tablas de referencias cruzadas, pruebas de comparación de proporciones y correlaciones bivariadas. Los resultados indican que los perfiles de los productores están constituidos principalmente por pequeñas o medianas empresas con un alto grado de dependencia de la agroindustria. Se evidencia una competencia intensa y en su mayoría, los productores eligen una integradora en función de la confiabilidad de la marca y no de acuerdo con los precios ofrecidos, lo cual se explica por la alta especificidad de su relación de producción.

Palabras clave: Coordinación vertical. Agronegocio. Organización de la cadena de valor. Organización Industrial. Desarrollo regional.

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INTRODUCTION

The industrialization of poultry production has been driven by technological developments, such as improvements in poultry feed and medicines; organizational advances such as the increasing specialization and vertical coordination of stakeholders in the poultry value chain; as well as a growing demand for chicken meat fueled by its acknowledged nutritional value as well as its low price relative to other meat products (CIELO, 2015; BELUSSO and HESPANHOL, 2010). According to the Brazilian Association of Animal Proteins (ABPA), the per capita consumption of chicken meat in Brazil has increased by 13.6% between 2007 and 2018, from 37.02 kg to 42.07 kg per capita (ABPA, 2018).

Nowadays, Brazil occupies a prominent position in the global economy related to the production and export of animal protein, especially in regards to chicken meat. Brazilian poultry production ranks second in the world with a total production volume of 13.05 million tons in 2017, behind only the US with a production of 18.59 million tons. Brazil has also been the largest global exporter of chicken meat since 2010, with an export volume of 4.32 million tons in 2018, which is equivalent to almost one-third of world exports (12.12 million tons) (ABPA, 2018; CIELO, 2015; COSTA et al.; 2015).

The poultry production sector generates income as well as direct and indirect employment for more than 3.5 million workers in the Brazilian agro-industries, slaughterhouses, refrigeration plants and meat distributors, among them more than 130 thousand small-scale poultry producers in rural areas, which collaborate with export-oriented agro-industries in an integrated poultry production system (ABPA, 2016). In light of their remuneration that has been considered inadequate for the work and capital invested by farmers (SORJ et al., 2008), as well as their exhaustive working days, a discussion is currently going on in Brazil about these small-scale rural producers' fragility in their integration relationship with globally oriented integrator enterprises (ALVES, 2022; VEIGA and ALIEVI, 2012; VASCONSELOS et al., 2015).

Our paper aims to contribute to this discussion. Considering the importance of chicken producing sector for the Brazilian and world economy, its specificities, strengths and weaknesses, this paper aims to discuss the relationship between poultry producers and their integrators in West region of Paraná, capturing poultry producer's perception and theirs decisions for choosing and staying in an integration contract. The starting point assumed that price paid for product is not per se the main determinant of the verticalization process, as conventional economic theory would assume, so it is part of a set of factors considered determinants for the enterprise success.

Next section presents a brief perspective on the theoretical assumptions underlying vertical coordination in value poultry chains before we review the role of Brazil in global poultry production, trade and consumption, presenting and discussing results obtained by our analyses.

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2 – THEORETICAL FRAMEWORK

The discussion of how enterprises relate to producers in vertical integration finds an adequate theoretical apparatus in the New Institutional Economy (NEI) that builds on works by Coase, Commons, Knight, Barnard and Hayek (ZYLBERSZTAJN, 1995; OLMOS, 2011; OLMOS et al., 2009). The NEI rests on four fundamental assumptions, two transactional and two behavioral. The first assumption is that there are transaction costs in using the price system, through the market or by the firm, hence the need for contracts. The second assumption suggests that transactions take place in a structured institutional environment, which influences transaction costs and the process of transferring property rights (COASE, 1937). The third and fourth assumptions posit that, individuals have limited rationality, and are opportunistic (POPPO, ZHOU and RYU, 2008).

In the view of North (1994) and Coase (1937), the neoclassical results of efficient markets are only obtained when there are no transaction costs. When transaction costs are present, institutions gain importance. Contracts between economic agents, while necessarily incomplete, aim to lower transaction costs and to ensure efficient economic outcomes. They are, hence, a fundamental part of corporate governance (ROCHA JR., 2001; ZYLBERSZTAJN and STAJN, 2005) and, in more theoretical terms, a manifestation of the fact that markets are not self-regulating.

Williamson (1985) distinguishes three levels of rationality: (a) strong rationality (or maximization); (b) bounded rationality; and (c) organic (or procedural) rationality. While strong rationality states that individuals are able to absorb and process all available information, thus maximizing their objective, be it utility, profit, revenue or similar, the second concept constitutes, together with the assumption of opportunism, the foundation that sustains the Transaction Cost Economy (TCE). This concept assumes that individuals act rationally, but in a limited way. Therefore, the resource 'rationality' becomes scarce, implying costs for its use. Instead of an optimal decision, the agent is satisfied with satisfactory decisions. The third concept of organic or procedural rationality (Nelson & Winter, 1982) argues that the rational capacity of individuals is not sufficient to direct the choice of an institutional framework in order to alleviate contractual problems, and implies incomplete contractual incompleteness, in an apparent redundancy of terms (ZYLBERSZTAJN and STAJN, 2005; KUHN, ROCHA JR & STADUTO, 2006).

Still according to Williamson (1985), the behavioral assumption of opportunism can be divided into three levels: (a) opportunism or strong self-interest; (b) simple self-interest or lack of opportunism; (c) obedience or lack of self-interest. Opportunism is present when there are no restrictions to the selfish behavior of economic agents, and hence lying, cheating, and bribery are expected actions if they are in an individual's interest. Simple self-interest or opportunism absence assumes that terms originally agreed will be maintained during the execution of the contract, this assumption is adopted by the orthodox economy. The assumption of obedience is used in utopian formulations of social engineering, based on methodological individualism, that is, individual actions are not commanded by the individual, but by an external entity, such as government or ideology (ZYLBERSZTAJN and STAJN, 2005; SCHNAIDER, 2015).

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From another perspective, even more within the institutionalist view, two seminal works mark the TCE: Ronald Coase's (1937) "The Nature of the Firm" and Oliver Williamson's (1975) "Markets and hierarchies: analysis and antitrust implications". Coase's theory fits in with the firm's traditional analysis approach and can be operationalized by the marginal instrument. The developments of neoclassical microeconomics did not consider his ideas, his work as he says is remembered but not read with due attention. Williamson, based on Coase, builds a firms evolution theory and presents an economic market models and hierarchies, which are alternative ways for organizing capitalist production. Then, firm size is limited not only to its ability to produce goods at lower production costs, but having lower costs, added to production and transaction costs, corresponding to other costs incurred during passing the good between technologically distinct interfaces (PESSALI, 1996). In short, the firm exists to save on transaction costs, and only the most efficient survive.

One of the concepts explored by the TCE is that of asset specificity, and perhaps it is the most important when it comes to the organization of the chicken meat sector, as it refers to assets that are not reemployable to another activity, except with loss of value (CIELO, 2015; FARINA, AZEVEDO and SAES, 1997). This characteristic, coupled with the assumption of opportunism and the incompleteness of contracts, makes investments in these assets subject to risks and possible adaptation problems, generating transaction costs (CIELO, 2015; FARINA, AZEVEDO and SAES, 1997; ROCHA JR., 2001; RIBEIRO and ROCHA JR, 2013; CIELO, ROCHA JR., and RIBEIRO, 2017).

Due to the perishable character of poultry meat (respectively the costs of its storage), trust between economic agents becomes important, which can avoid the negative results of opportunistic behavior (MOLLERING, 2006). In addition, there are others positive effects of trust, such as more effective communication and coordination, that are typically overlooked (LINDENBERG, 2000). This view that focuses specifically on possible negative outcomes and neglects positive factors that drive the value of the transaction has been widely criticized (for example, ZAJAC and OLSEN, 1993; DYER, 1997; GEYSKENS, STEENKAMP and KUMAR, 2006).

Research in several areas shows that trust is a vital element for any economic transaction, and the more so the greater the specificity of the asset (see, for example, Ring and Van de Ven (1992); Mayer et al., (1995); Ring (1996)). It also affects the structure of an organization (GULATI and SINGH, 1998), the design of contracts (POPPO, L.; ZHOU, K.; RYU, S 2008), as well as transaction costs and performance results (AULAKH, KOTABE and SAHAY, 1996; CARSON et al., 2003; GULATI and NICKERSON, 2008). As a result, in economic terms, it is extremely rational to trust a commercial partner, as this reduces the cost of production, and generates gains due to cooperation. This perspective is explored in detail also by Zaheer and Harris (2006), Rousseau et al. (1998), and Szulanski et al. (2004).

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3 – THE BRAZILIAN POULTRY MODEL OF INTEGRATION

The integration model adopted in Brazil for chicken's production and even other animals is centered on the integration between producer and the agro-industry, originated in 1940s, in the United States. Egg incubator enterprises started to adopt partnership contracts with producers responsible for fattening the animal, and then the same occurred with all components in the production chain, from research and development, or the feed manufacturer to slaughterhouses adopted the same system (BREWER, 2019; VUKINA, 2001). In Brazil, this system started in the 1960s, and more intensely in the 1970s, with the inclusion of thousands of small producers in integration contracts (ZILLI, 2003; TAVARES and RIBEIRO, 2007; CIELO, 2015; NOGUEIRA and JESUS, 2013).

It is an institutional arrangement in which agro-industry can be a cooperative or private enterprise, provides all the inputs to the producer, from chicks to technical assistance, including feed, medicines, purchase guarantee, etc. Producer is responsible for providing labor, equipment and facilities for fattening the chicken, in addition to the commitment for delivering the product on the agreed date. The agro-industry pays for production batches according to management efficiency rates, feed conversion and other aspects previously defined in contracts (NOGUEIRA and ZYLBERSTAJN, 2003; CIELO, 2015).

According to Pinotti and Paulillo (2006); Cielo (2015); Zilli (2003); and Jank (1996), this integration model is characterized as an arrangement that would work in a hybrid way, with complex contracts and partial ownership of assets, "...based on the New Institutional Economy, it is classified as a governance structure for formal contracts drawn up between processing enterprises and rural owners", (CIELO, 2015, p. 77). This critical definition would be a counterpoint to the use of term "vertical integration system", which for these authors does not define the system correctly, since the industry does not have possession of all the assets involved throughout the chicken's production process. The most accepted definition is Integration System.

In addition, Nogueira and Zylbersztajn (2003); Brewer (2019); Tavares and Ribeiro, (2007); Cielo (2015), pointed the advantages of poultry integration system would be: efficiency in production scheduling; maximizing equipment and facilities; more accurate decision-making; greater competitiveness; risk reduction; chickens within specifications; bargaining power over raw materials; reduction of transaction and industrial costs. By the other hand, for integrated producers, advantages would be: greater productivity and profitability, with lower costs, guarantee of quality inputs supply and technical assistance by enterprises, in addition to the guarantee of total production commercialization and reduction of financial risks, factors that end up generating a stable income. In addition to these crucial points, for the Agro-industrial System as a whole, the integration system has the impact of ensuring expressive gains in productivity, standardization, reduction of transaction costs, better traceability and food security, intensification of technological advancement and an increased on domestic consumption and exports.

Authors point out that although gains are evidently greater for the agro-industry, this conjoint of integration model advantages ends up minimizing problems stated by producers and researchers (NOGUEIRA and JESUS, 2013).

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Cielo (2015) defends a change on the producer´s profile integrated to Brazilian agro-industries, formerly formed mostly by small producers, and which has been systematically changing for medium and large producers, since technological advances generate a need for investment impracticable for small producers. The financing of this investment would make the producer very dependent on the agro-industry, with longer integration contracts, guarantees for the financing investment, functioning as barriers to the activity exit; in such a way that the producer would give to the agro-industry part of the decision power (PAIVA, 2007).

Another aspect to highlight is related to the contract itself, prepared by the integrating enterprise and stated between parts, submitting the integrated to the technical rules of the enterprises, but not sharing risks and; inexistence of legislation that typifies such contracts, as it exists in most European countries, for example, Teixeira (2012). In this sense, Cielo (2015) points out that contract signed between cooperatives and their producing members have between 3 and 6 pages, with a maximum of 20 clauses, while contracts with the largest private enterprise, object from that research, have 14 pages and 63 clauses. These facts make the decision choice of the integrating enterprise and its permanence, process that transcends elements from market itself, and increase the importance of the trust factor in the relations between producers and integrating enterprises, which is one of the aspects discussed on this research.

4 – THE ROLE OF BRAZIL IN THE EVOLUTION OF WORLD POULTRY SYSTEMS

The US, China, the European Union and Brazil stand out as the world's largest consumers of chicken meat, representing 54% of global consumption in 2015, which corresponds to 47.380 mil tons out of a total consumption of 86.376 mil tons (ABPA, 2016). In reference to the USDA (2016) projections report, world meat production will grow by around 22% by 2023 and Brazil is stated as the leading exporter of chicken meat in this period (Table 1). The report indicates that world meat consumption is expected to increase by 1.9% per year until 2023, with shipments of major exporters expected to grow by 2.2% per year.

Brazil is among the ten largest chicken meat producers in the world and in 2015 reached the second position in the ranking, surpassing China (USDA, 2016). The countries with the highest growth in the year 2015 were Russia, Thailand, India, USA, Brazil, European Union, Mexico and Turkey. More than 150 markets are importers of chicken meat made in Brazil.

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Table 1 - World poultry production - from 2010 to 2015 (million tons)

Country	2010	2011	2012	2013	2014	2015
USA	16,563	16,694	16,621	16,976	17,299	17,966
Brazil	12,312	12,863	12,645	12,308	12,692	13,080
China	12,550	13,200	13,700	13,350	13,000	13,025
European Union	9,202	9,320	9,565	9,800	10,330	10,600
India	2,650	2,900	3,160	3,450	3,725	3,900
Russia	2,310	2,575	2,830	3,002	3,260	3,550
Mexico	2,822	2,906	2,958	3,010	3,025	3,100
Argentina	1,680	1,770	2,014	2,060	2,050	2,060
Turkey	1,420	1,619	1,707	1,760	1,956	1,980
Thailand	1,280	1,350	1,550	1,500	1,570	1,650
Other countries	13,981	14,487	14,953	15,307	17,642	17,033
Total	**78,235**	**81,199**	**83,243**	**84,073**	**86,549**	**87,944**

Source: USDA (2016).

Almost 4,000,000 tons are shipped annually from the country's ports, which is around a third of the country's total production (ABPA, 2016). Figure 1 shows the evolution of the national poultry production, which increased from 10.31 million tons in 2007 to 13.24 million tons in 2019.

Figure 1 - Evolution of the Brazilian poultry production (mil tons)
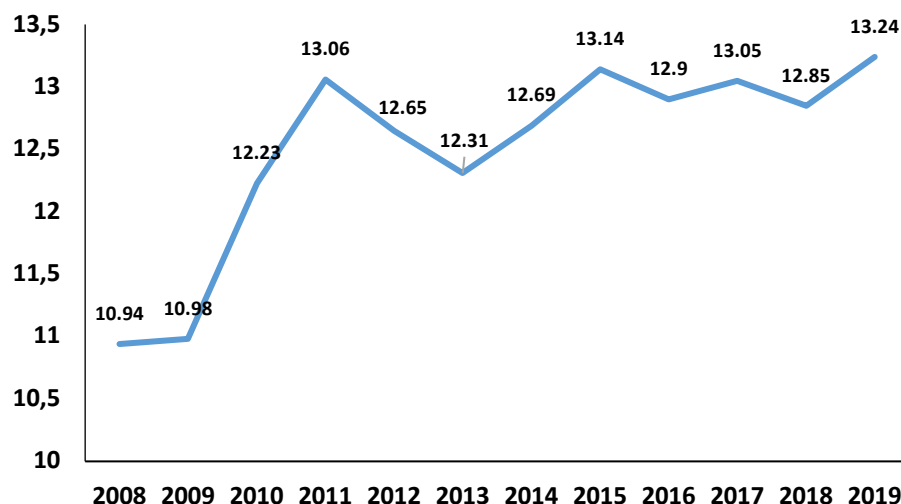
Source: Prepared by authors based on ABPA (2020).

The positive performance trend reflects industrial restructuring processes (adoption of new forms of industrial organization on a large scale), technological changes and improvements in chicken management as well as nutrition and sanitation techniques that occurred in Brazil from the 1970s and intensified in the 1990s (FERREIRA and VIEIRA FILHO, 2019; ABPA, 2020). In addition, the country's position as a major soybean and corn producer, which are the main components of the broiler feed ration, and the consolidation of the "poultry partnership" production system in the main producing states, enabled the supply

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to respond efficiently to increases in demand and help explain the sector's leading performance.

Regarding production and exports, the OECD/FAO projections point out that chicken meat will continue to grow, but will mainly be driven by exports. This position is also supported by MAPA - Ministry of Agriculture, Livestock and Supply, whose studies were developed through its Strategic Management Advisory (AGE). Going one year beyond the OECD/FAO study, the projections of the AGE/MAPA extend until 2025 and estimate that in the current year the poultry production reaches the mark of 13.133 million tons and predicts that within 10 years Brazil will be producing almost a 35% larger volume, namely 17.689 million tons, which corresponds to an average expansion of around 3% per year (MAPA, 2016).

According to MAPA (2016), in 2015, the share of agribusiness in the Brazilian trade balance was the highest since the beginning of the historical series, accounting for 46.2% of all produce that has been sold abroad. The volume of meat exports ranked second in foreign sales (US$ 14.7 billion), especially chicken, which represented 48% of the value exported by the meat sector (US$ 7.07 billion and 4.23 million tons). The main countries importing chicken meat, in order of importance, were Japan and Saudi Arabia with 900 thousand tons (corresponding to 11% of the total each), followed by the European Union with 710 thousand tons (9% of the total), and Iraq with 690 thousand tons (8% of the total) (USDA 2016).

On a national level, Brazil's Southern region is the largest exporter of chicken meat, verified by SECEX (2015). The State of Paraná is the largest exporter, accounting for 35.7% of the market, followed by Santa Catarina with 23.3% and subsequently Rio Grande do Sul with 17.66%. Consolidating these three states, the South is responsible for 76.66% of all national exports. The eminence of the state in the Brazilian context is due to cooperative industrial structures, which links slaughter and processing stages within the state. Since 2003, has been the country's largest chicken producer, accounting for 35% of the total production in 2015 (ABPA, 2016). The agribusinesses (integrators) of slaughter and the poultry processing in the West Region of Paraná are responsible for producing 32.57% of the total chicken production in Paraná.

Table 2 presents the ranking of the most important chicken exporting enterprises of Brazil, which include some of the biggest poultry producers in the world.

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Table 2 - Ranking of chicken exporting enterprises in 2015

Position	Company
1º	BRF
2º	JBS
3º	Aurora Alimentos
4º	Copacol
5º	C. Vale
6º	Cooperativa Agroindustrial Lar
7º	GT Foods
8º	Vibra
9º	Globoaves
10º	Bello Alimentos
11º	Coopavel
12º	Zanchetta Alimentos
13º	Coasul
14º	Agroindustrial Irmãos Dalla Costa
15º	Copagril

Source: SECEX (2015).

As can be observed in table 2, these enterprises are all located in the western part of Paraná and were the largest exporters of chicken meat in 2015.

5 – MATERIAL AND METHODS

The study used a stratified random sampling approach with proportional allocation, considering its potentialities to get more detailed information from some subpopulations (PÉREZ, 2010). This sampling method thereby supports the research goal in the sense that each region and integrator are represented in the final sample, which further guarantees a balanced representation of subpopulations (WALPOLE et al., 2012).

ADAPAR (2016) reports that the region has 3,950 registered poultry producers. Using the simple random sampling formula (BRYMAN, 2016; PARGA and ALONSO, 2018), questionnaires were applied to a sample size of 98 producers (with four incomplete questionnaires), according to equation 1:

$$n = \frac{z^2 * N * p * q}{N * E^2 + z^2 * p * q} \tag{1}$$

Where:
N = Number of producers registered (finite population)
z = Critical value (standard normal distribution) corresponding to a confidence level of 95%
e = Maximum sampling error (10%)
p = Proportion ensuring optimal sample size (0.5) and a maximum population variability (p = q)

Considering a stratified random sampling approach with proportional allocation, table 3 represents the sample size distribution for each agro-industry based on total producer's importance.

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Table 3 - Number of poultry producers per integrator in West Region of Paraná

Agro-industries	Total producers	Sample size
Copacol	890	22
Brazil Foods (BRF)	323	8
C. Vale	448	11
Coopavel	350	9
Cooperativa Lar	528	13
Copagril	230	6
Globoaves	222	5
Others	959	24
	3950	**98**

Source: Prepared by authors based on data from ADAPAR (2016).

Data collection occurred from March to June 2016 and was carried out in the following municipalities: Toledo, Cascavel, Medianeira, Matelândia, Nova Santa Rosa, Marechal Cândido Rondon, Santa Helena, Assis Chateubriand, Palotina, Tupãssi, Pato Bragado, Ouro Verde do Oeste, Cafelândia, Corbélia, Entre Rios do Oeste and Quatro Pontes.

Descriptive and inferential statistics were used to analyze the survey results. A non-parametric chi-square test was applied to verify possible relationships between variables studied and integrator types. Reliability levels of 95 and 99% were considered. In order to determine the intensity or strength of this possible relationship, some symmetric measures were calculated, including Contingency Coefficient (C), Phi Coefficient (ϕ) and Cramer's Coefficient (V).

Other comparison proportion tests were used to compare decision factors for choosing an integrator with decision factors of integrator permanence, classified by integrator types. Finally, bivariate correlations between the set of variables are presented using the Spearman Rho coefficient for each set of variables linked to cooperatives and private integrators.

6 – RESULTS AND DISCUSSIONS

Results from interviews applied to the 98 producers in the selected sample from the 3950 integrated producers, shows there is a high predominance of Copacol, reaching the 22,53% of total integrated producers and a conjoint of agro-industries located near the West Region, with a 24,28% , as highlighted in table 3.

It is noteworthy that 13% of respondents were aged between 18 and 30 years indicating that in these cases the properties were successfully handed over to the next generation. Yet, the continued outmigration of youth from rural into urban areas as indicated by the agricultural census (IBGE, 2016), combined with the relatively old age structure of producers, might represent a significant challenge to the industry in the future. Regarding the educational level of producers, 82% of respondents have an education up to the second degree.

Most of the interviewed producers, 72%, do not rely on outsourced labor and 58% do the activity only with the family labor. By the other hand, 41% of respondents used contracted workers, so there are producers who hire workers directly and from labor outsourcing enterprises. As for the number of full-time employees on the property, 32% had one staff member, 65% had between 2 to 4

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employees, and only 2% of respondents employed between 5 to 10 workers. Larger poultry producers used outsourced labor. Only two properties had an entirely outsourced activity.

Concerning the breeding of other animals, 63% do not do so due to a prohibition of the integrator, whereas 37% said they own other animals, as part of the same integrator, such as a simultaneous production of chicken and pork. In 55% of the cases it was verified that activities besides the breeding of animals occurred within the boundaries of the property. Side activities including to 45% and soybean with 46% of the responses. Farmers produce 4% of the farmers, vegetables 1%, fruits 1% and other activities with 3% of the total.

When questioned about their major concerns, many producers named several of the provided options. Overall, 32% of respondents mentioned that the low value paid for chicken meat is the most worrisome factor. 28% listed high production costs among which the expenditure on electricity was the most frequently mentioned item. Furthermore, 24% of respondents indicated to be concerned with chick care-taking activities.

Identifying the factors that determine the producers' decision to choose an integrator was central to this research. Surprisingly, contrary to expectations 42% of respondents expressed that the brand, not the price paid by the integrator, was the deciding factor in choosing an integrator. Theoretically, the specificity of the brand is characterized by the importance that the name of an integrator or even of a product has in the market, being particularly relevant for franchises (FARINA, AZEVEDO and SAES, 1997). Yet, in this case, the producers perceive the brand as synonymous with credibility and security for the investment. Following that, 23% of the interviewed producers opted for the integrator to offer the best conversion value, so it is a ratio for chickens ration/kg compared to the others. In this option also the receipts deadlines are also very important for the continuity of the contractual relationship.

For some producers, integrators are distinguished from others by their payment attributes. Several integrators require less transfer time, whereas others take a longer period to pass on the conversion value. Furthermore, 17% of the interviewees favored integrators they were already collaborating with through other activities, such as grain production. For 9%, the shortest distance was a decision factor. There have been reports of companies capturing producers located 300 km from their headquarters. Such instances underline the fierce competition for contracts with producers as such distances are associated with considerable costs and logistical risks.

Some integrators require that the cost of transporting chicken to the slaughterhouse is a producer's responsibility, others offer producers free transportation services that has led some producers to switch integrators. The geographical proximity between producer and integrator determine transportation costs and contributes to the locational specificity of producers and integrators assets. Finally, 9% of respondents mentioned another reasons not listed in the questionnaire options.

Results of a statistical inference presented in table 4 reinforce how certain variables influence the choice for an integrator, as well as to give insight into the intensity of this relationship. For this, a non-parametric chi-square test was applied, using a cross-reference table, with confidence levels of 95 and 99%.

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First, it was found that dependence relations were statistically significant only for the following variables: conversion value paid per chicken; decision factor for permanence; and distance of the integrator, (p = 0.020; 0.009 and 0.000, respectively). It should be noted that in the case of the decision factor for the permanence and distance of the integrator, these were significant for a confidence level of 99%. Once this relationship is established, they can be quantified through an analysis of the three symmetrical measures presented: Contingency Coefficient (C), Phi Coefficient (φ) and Cramer's Coefficient (V). It can be observed that the coefficients obtained, even if they are not very high, present a difference related to the other variables, which makes them statistically significant. The highest coefficients belong to the decisive factor for the permanence (0.345; 0.368; 0.368) and the integrator distance (0.525; 0.618; 0.618).

The other variables did not show a significant association with the integrator type. The conversion value is related to the final price that the producer receives, and therefore its profitability. However, the distance of the integrator becomes important due to the concept of asset specificity, as the delivery times of inputs and the collection of ready-made chickens are very precise and decisive as cost factors, and thus, greater with distance. There is higher possibility of process failures that may lower expected profitability.

The inference clearly shows that the producer selects an integrator not only based on the price, as would be expected. To ensure stable profits, the integrator needs to operate extremely efficiently throughout the whole process. This means strictly complying with the contract, which includes deadlines for the delivery of chicken, food, medicines, etc., as well as timely chicken collections. A day of delay can cause significant loss and as delay periods increase, losses will grow exponentially. Through the questionnaires, producers make it clear that price is not even the most important variable when deciding which enterprise to integrate with and remain integrated with. The reliability of the contractual relationship is the most important item for producers as it is the real guarantee of profitability throughout the associated integration process.

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Table 4 - Association to the integrator type vs variable

Variable	Chi-square test			Symmetrical measurements		
	Value	Sig.	Decision	Cont. Coef. (*C*)	Phi. Coef. (ϕ)	Cramer Coef. (*V*)
Producer education	13,347	0,064	ns	0,346	0,369	0,369
Outsourced labor force	0,151	0,697	ns	0,039	-0,039	0,039
Number of workers	1,020	0,600	ns	0,152	0,154	0,154
Property size (ha)	8,201	0,145	ns	0,278	0,289	0,289
Number of aviaries	11,416	0,076	ns	0,323	0,341	0,341
Total length of poultry (m²)	4,331	0,741	ns	0,206	0,210	0,210
Total accommodation capacity (chickens)	6,075	0,531	ns	0,242	0,249	0,249
Contract time with the integrator	6,832	0,233	ns	0,255	0,264	0,264
Conversion value paid (per chicken)	9,887	0,020	*	0,303	0,318	0,318
Billing pay per batch	3,898	0,564	ns	0,196	0,199	0,199
Decision factor for choice	1,976	0,577	ns	0,141	0,142	0,142
Increased producer concern	1,044	0,903	ns	0,103	0,103	0,103
Decision factor for permanence	13,247	0,009	**	0,345	0,368	0,368
Distance from integrator (km)	37,374	0,000	**	0,525	0,618	0,618

Source: Prepared by authors.
Notes: * Represents the significant coefficient lower than 5% ** Represents the significant coefficient lower than 1%. ns: Represents the non-significant decision for the calculated coefficient.

The region consists of several small properties with small aviaries that have limited capacity to investment in technology. This is creating a technology gap between small producers and agro-industries, which are expanding investments in cutting-edge technology for the activity. Some producers reported this situation by mentioning that they cannot modernize according to agro-industrial demands or at least when they do, it requires significant financing.

About 26% of respondents had an area of 1,601 to 3,200 m2, 24% had an area of 3,201 to 4,200 m2, followed by 17% of respondents with an area of 1,101 to 1,600 m2. It is worth mentioning that most aviaries have 10 m by 120 m of footage. The region is characterized by a collection of small properties, and this is reflected in the data obtained. The interview results also revealed that 64% have up to 25 hectares (ha), 15% have from 26 to 50 ha, 10% from 51 to 100 ha and 11% greater than 101 ha. As far as the profile of the West Paraná producer is concerned, 30% of the interviewees have 2 aviaries, 28% have 3 aviaries, and 22% 1 aviaries. Only 20% of the interviewees have 4 or more aviaries.

A comparison proportions test was conducted to compare possible statistically significant differences in decision factors for choosing an integrator across integrator types. Results are presented in table 5.

The comparison proportions test shows that for the 98 survey respondents there are no statistically significant differences in any of the variables that constitute the attribute choice factor. This means that producers who chose a cooperative to increase income is not different from that chosen by a private

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integrator, and a similar fact occurs with the sale guarantee. This leads us to conclude that, for example, increasing income is not a decisive factor in choosing the type of integrator. The same goes for the issue of the guarantee of sale.

Table 5 - Comparison proportions tests for the decision factors to choice an integrator

Variable	Cooperatives (n = 69)		Privated integrators (n = 29)		p-level		
	n_i	p_i	n_i	p_i	$P(Z< z)$	$P\left(|Z|<|z|\right)$	$P(Z > z)$
Increase income	25	0,3623	8	0,2759	0,7956	0,4087	0,2044
Sale guarantee	21	0,3043	7	0,2414	0,7354	0,5292	0,2646
Tecnical assistance	21	0,3043	13	0,4483	0,0858	0,1716	0,9142
Others	2	0,0290	1	0,0345	0,4427	0,8853	0,5573

Source: Prepared by authors.
Notes: n_i: Absolute frequency of factor i for i = 1, 2, 3, 4; p_i: Probability of factor i for i = 1, 2, 3, 4; p-level: Likelihood of comparison Cooperatives-Private; 1 tail test (Ha: diff <0)); 2 tails test (Ha: diff! = 0); 1 tail test (Ha: diff> 0); * Represents the statistically significant differences with a significance of 5%; ** Represents the statistically significant differences with a significance of 1%.

In the case of technical assistance, there is a small difference between producers choosing a cooperative or a private integrator. However, it is not a significant difference in terms of the statistical analysis. This difference is explained by the fact that the private integrator offers better assistance to compensate for the attributes of participation in a cooperative, such as contract security or profit sharing at the end of the year.

Concerning the total housing capacity per batch, the majority of the respondents (36%) answered to have a capacity of 30,001 to 60,000 chickens per batch. Then, 34% of the respondents answered that the housing capacity per batch is 15,001 to 30,000 chicken. Moreover, for 14% of respondents indicated the average housing capacity to be 60,001 to 90,000 chickens per batch and 8% of the respondents can accommodate 90,001 to 120,000 chickens per batch. Lastly, 4% of the producers have a capacity greater than 150,001 chickens per batch.

A further comparison proportion test was conducted in order to identify significant decision factors related to the permanence with an integrator. The results are presented in table 6. It can be observed that there are significant statistical differences at 5% for the variables conversion value (0.0321), brand or name (0.0317) and partner or stockholder (0.0422). The "others" variable was significant for 1% and 5% (0.0053; 0.0106). This inference is similar to the results in table 4, where there was a dependence relation between the conversion value and type of integrator. Here, it also acts as a decisive variable for the permanence in the relationship with the integrator.

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Table 6 - Comparison proportion test for the decision factors in the permanence with the integrator

Variable	Cooperatives (n = 69)		Privated integrators (n = 29)		p-level		
	n_i	p_i	n_i	p_i	$P(Z< z)$	$P\left(\|Z\|<\|z\|\right)$	$P(Z > z)$
Shorter distance	6	0,0870	3	0,1034	0,3987	0,7975	0,6013
Conversion value	12	0,1739	10	0,3448	0,0321*	0,0642	0,9679
Brand/name	33	0,4783	8	0,2759	0,9683	0,0633	0,0317
Partner or stockholder	15	0,2174	2	0,0690	0,9578	0,0845	0,0422*
Others	3	0,0435	6	0,2069	0,0053**	0,0106 *	0,9947

Source: Prepared by authors.
Notes: n_i: Absolute frequency of factor i for i = 1, 2, 3, 4; p_i: Probability of factor i for i = 1, 2, 3, 4; p-level: Likelihood of comparison Cooperatives-Private; 1 tail test (Ha: diff <0)); 2 tails test (Ha: diff! = 0); 1 tail test (Ha: diff> 0); * Represents the statistically significant differences with a significance of 5%; ** Represents the statistically significant differences with a significance of 1%.

By analyzing the conversion value within the context of permanence in the integration process, it is noted that this is less important for cooperative-integrated producers than for those integrated with private integrators. This is because cooperatives in the region usually have a greater range of relationships, and income is positively impacted by this factor. Producers in the region usually engage in activities other than poultry farming, such as grain production, in the same way that the cooperative works with several activities besides poultry farming.

An interesting analysis associated with this research was the study of the relations between the set of variables for each type of integrator in order to explain relations between them. These links describe the characteristics of the producer, the structure of ownership, production, revenue and income, as well as the producer's relationship with the integrator to which it is associated with. For this purpose, the bivariate correlations between the set of variables were calculated using the Spearman's Rho coefficient. Results obtained for each of the integrator types are shown in tables 7 and 8.

It can be observed that in the case of the cooperative integrators, there is a greater correlation between the set of variables. The analysis showed 16 significant inter-variable relationships in the case of cooperative-linked producers, while private integrators have 10 significant correlations. Another important element is the intensity of these correlations, and regarding cooperatives most of them are significant to a higher confidence level (99%), 11 in total. In the case of private integrator this totals to 4 instances. In cooperatives these relationships are stronger and often go beyond the contractual relationship itself. For example, the producers can participate in cooperative decision-making, have access to more information about the cooperative's operations, and have greater confidence in the entire production process and sale of their product.

The study further demonstrates that there is a clear proximity between producers and integrators in the region. A proportion of 36% have partnerships with integrators located within a distance of between 21 and 50 km, another 26% indicated a distance of 51 to 100 km, 17% from 11 to 21km and a 9% answered that they are up

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to 10km from the agro-industry. Another 8% of them are 101 to 200 km away. For 3% the distance is 201 to 300 km and only 1% of producers are more than 300 km away.

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Table 7 - Bivariate correlations from Spearman's Rho Coefficient (Cooperatives)

Dimension /Variable														
Producer education	1,000													
Outsourced workforce	-0,223	1,000												
Number of workers	0,060	0,000	1,000											
Property size (ha)	0,180	-0,371**	0,200	1,000										
Number of aviaries	0,097	-0,325**	0,406*	0,424**	1,000									
Total length of poultry (m2)	0,090	-0,043	0,215	0,188	0,325**	1,000								
Total accommodation capacity per batch (poultry)	0,228	-0,037	0,350	0,183	0,340**	0,162	1,000							
Contract time with the integrator	-0,119	0,182	-0,553**	0,186	-0,073	-0,188	0,081	1,000						
Conversion value paid (per chicken)	0,287*	-0,134	0,012	0,134	-0,015	0,190	0,124	-0,024	1,000					
Billing pay per batch	-0,030	-0,354**	0,047	0,470**	0,679**	0,340**	0,350**	-0,051	0,131	1,000				
Decision factor for choice	-0,226	0,074	0,042	-0,026	-0,058	-0,035	-0,142	0,107	-0,259*	0,025	1,000			
Increased producer concern	-0,063	-0,107	0,413*	0,043	0,199	0,073	0,029	-0,204	0,147	0,194	0,184	1,000		
Decision factor for permanence	0,253*	-0,076	-0,128	-0,007	-0,134	-0,099	-0,048	0,002	0,120	-0,109	0,176	-0,095	1,000	
Distance with the integrator (Km)	0,128	0,069	-0,561**	-0,009	-0,122	-0,048	-0,016	0,292*	0,188	-0,143	-0,218	-0,218	0,185	1,000

Source: Prepared by authors.

* Represents the significant coefficient with a significance of 5%;

** Represents the significant coefficient with a significance of 1%.

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Table 8 - Bivariate correlations from Spearman's Rho Coefficient (Private)

Dimension /Variable														
Producer education	1,000													
Outsourced workforce	-0,186	1,000												
Number of workers	-0,109	0,237	1,000											
Property size (ha)	0,160	-0,176	0,300	1,000										
Number of aviaries	0,134	-0,331	0,500	0,534**	1,000									
Total length of poultry (m²)	0,112	-0,229	0,406	0,175	0,444*	1,000								
Total accommodation capacity per batch (poultry)	-0,202	-0,172	0,232	0,111	0,119	0,344	1,000							
Contract time with the integrator	-0,021	0,118	-0,124	-0,156	-0,205	-0,363	0,189	1,000						
Conversion value paid (per chicken)	0,250	-0,236	-0,042	0,315	0,216	-0,110	-0,270	-0,293	1,000					
Billing pay per batch	0,101	-0,471**	0,363	0,431*	0,822**	0,538**	0,303	-0,196	0,243	1,000				
Decision factor for choice	-0,080	-0,049	-0,331	0,076	0,094	-0,083	-0,041	-0,378*	0,337	0,218	1,000			
Increased producer concern	-0,266	0,385*	0,152	-0,018	0,167	0,020	-0,085	-0,150	0,304	0,195	0,259	1,000		
Decision factor for permanence	0,177	0,021	0,036	-0,211	-0,110	0,217	0,325	-0,139	-0,149	0,046	-0,028	-0,183	1,000	
Distance with the integrator (Km)	-0,085	0,351	-0,120	0,048	-0,106	-0,122	-0,040	-0,371*	0,184	-0,055	0,327	0,407*	-0,075	1,000

Source: Prepared by authors.
* Represents the significant coefficient with a significance of 5%;
** Represents the significant coefficient with a significance of 1%.

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In the poultry industry, remuneration, referred in this research as "conversion", is associated to good management practices, quality control and mortality. If fulfilled, the return will be in accordance with agribusiness requirements. It was verified that the conversion value paid by integrators to producer varies, but on average 68% of producers receive from R$ 0.61 to R$ 0.80 per chicken, 24% reported receiving from R$0.81 to R$1.00 per chicken, 6% received from R$ 0.41 to R$ 0.60 and for 2% the receipt is from R$ 1.01 to R$ 1.20 per chicken.

Integrators from the poultry production chain coordinate actions, provide inputs and technical assistance, slaughter animals, handle meat (cut) and products as well as distribute and market the final product (COUTINHO and FERRAZ, 2014). Thus, we inquired whether producers would individually invest in infrastructural developments, technical assistance, medicines and marketing. Answers exposed the producers' dependence on the integrators, with 87% of the producers saying that they would not pay while only 13% responded positively.

This integration system allows for the fulfillment of both parts of the productive chain, mostly implemented by means of cooperatives, which is a strong characteristic in the region studied. For 36% of the interviewed, the time of partnership with the integrator is 8.1 to 16 years, 21% of them have a partnership of 4.1 to 8 years, 16% from 16.1 to 32 years, 7% more than 32 years and 8% indicated the length of their partnership to be up to 2 years.

For 96% of the interviewees expressed that without a partnership with an integrator, there would be no activity and only 4% believe there would be activities without the existence of the integrator. Producers depend on the integrators in multiple ways:

- In regards to marketing, producers typically lack competitiveness to deal with agribusinesses, quantity, lack of buyers' knowledge, market policies and even export barriers.
- As for the "raw material", as some call the day-old chicks that arrive at the aviaries to be fattened, producers would not be able to "produce this raw material".
- Medicines, vaccines and specialized assistance are factors that were most cited by producers. It is also the biggest concern as without medicines, vaccines and technical support provided by agro-industries, producers were not able to carry out the activity.

The most common agro-industrial integrations are those coordinated by a single enterprise, which performs all the stages and maintains contractual ties with the other participants, among them the tenants and partners. The integrators that lead the activities can be constituted in the form of a cooperative society, a limited enterprise or anonymous society, with the corporate purpose being the authorization for integration in the business partnership (BURANELLO, 2009).

Based on the study's interview results, it is possible to evaluate the remuneration producers receive from the integrators, represented as the conversion value after a batch delivery. Most interviewed receive from R$ 0.61 to R$ 0.80 on average. For these producers the conversion value "could be better", as they reported during the interviews. A total 46% answered that the contract type and the form is "reasonability adequate", 43% answered "adequate" and 9% are "not satisfied" with the way the integrators carry out the contracts and remunerate producers.

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Related to the total revenue paid to producers, 37% responded receive from R$ 9,001 to R $ 20,000 per batch delivered, 36% received from R$ 20,001 to R$ 50,000; 11% from R$ 50,001 to R$ 70,000; 8% from R$ 5,001 to R$ 9,000 and only 3% more than R$ 150,000 per batch.

The producers that have financing relationships with integrators were also investigated and the results showed that 62% are in financing periods from 9 to 12 years, for 24% the financing term is up to 5 years and for another 10% it is valid for 5 to 8 years. Furthermore, 5% of the respondents answered to have financing with a term of more than 31 years with the integrators.

In terms of receiving information from the integrator regarding market values, exports, feed prices and other issues related to the activity, 44% of the respondents answered they receive information. This information transfer occurs mainly through a technical visit of integrator employees, who continually monitor aviaries for adequacy surveys of surveillance standards. For 33% of respondents the information is sometimes passed on, or at least partially, as some have reported during interviews. Finally, 21% of producers interviewed answered that they do not receive information. Overall, most producers do not feel adequately informed about market issues, and this exposes their fragility to possible changes in scenario or production conditions.

A great proportion (80%) did not receive financing from the integrators, but joined financing from traditional financial institutions to expand aviaries and to acquire machines and equipment for reach requirements established by integrators. Some producers have credit lines with financing banks such as the National Bank for Economic and Social Development (BNDES) and the Regional Bank for the Development of the Extreme South (BRDE). These offer easy payment conditions and flexibility in the opening and release of credits. The credit cooperatives in the region, namely Cooperative Credit System (SICREDI) and SICOOB, were also identified as important credit sources.

Summarizing, the discussion of collected data by means of the field research let it clear that many further aspects to the price paid for the product solidify the producers choosing or permanence in partnership with integrators. In this sense, some problems associated to the integration process itself were verified, but in fact, integration process grows systematically.

Among these problems, could be highlighted that often the process has formats that weaken producers, as in the financing aspect or even in the contracts formatting. Producers are linked to the enterprise for extremely long periods, and contracts are written by the enterprises without a recognized producer's participation, or even the country's legislation, which still treats small producers and large integrating enterprises as equal poles in the contract.

Although these problems were verified, some factors contribute to the growing of integration process. There is a delivery guarantee of adequate and on time inputs, technical assistance and medicines supplied, as well as the guarantee of stability of this supply, in addition to the purchase guarantee and payment of the product with very clearly determined dates.

These attributes guarantee producers the stability required for investment, depending on the specificity of assets they produce. Prices does not mean a very important variable if the enterprise does not meet the deadlines for delivery inputs, or for collection of ready-made chickens, as losses quickly consume the advantages of a higher price. When evaluating reports of producers integrated to a cooperative,

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where they are partners, and therefore, consider themselves also owners of the integrating enterprise, the stability guarantee is even greater and complemented by the fact that cooperative also buys other products produced in parallel, maximizing transaction costs for them.

Thus, for the majority of interviewed producers, the truth of having a stability in the production process has considerable relevance related to the product price.

CONCLUSIONS

The Brazilian poultry production chain is one of the most important in the world. Suppliers are responding to the growth of internal and external demand by increasing competitiveness and productivity. The demand increase is linked to an increase in urbanization and growing population income as well as the diversification of diets and changes in dietary habits. The State of Paraná has the highest concentration of herds of chickens in the country, and this is concentrated predominantly in the West Region of the state. The state's importance in the sector and the fact that production is carried out in an integration format, prompted this study to understand how the producers choose and associate to the integrators.

It was interesting to reveal that producers choose the integration partners much more for the brand than for the offered price, as would be expected. Credibility has proved to be an indispensable asset for the sector, which is characterized by a rapid production cycle as well as a crucial dependence on the efficiency of the supply of inputs and logistics as a whole. An integrator's errors and losses that impact producers can take years to be compensated.

The questionnaires revealed producers mostly use family labor, which may be problematic in the future as the average age is rising and the field to city migration continues. It was also clear that producers are relatively uninformed of the sector performance as a whole. Once the enterprise is integrated, it becomes responsible for ensuring the purchase and distribution of the product, and producers move away from important discussions, such as protectionist barriers in importing countries. Signs of future problems go unnoticed by farmers, who will be the biggest losers when unfavorable events take place.

In Brazil it is necessary to advance the discussion on strategic commercial policy, aiming to guarantee greater stability of the market and thus guarantee solidity to important sectors for the development of country. Considering that Brazil's other trading partners are extremely active in protecting their markets and producers, in our view, this should be a decisive role for the state, since farmers and entrepreneurs cannot interfere in situations of this magnitude.

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