CONTRACTS IN PORK CHAIN UNDER MEASUREMENT AND TRANSACTION APPROACHES: A STUDY IN WESTERN PARANÁ[1]

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Abstract

This paper aims to discuss aspects related to contractual arrangements between producers and processors in pork system, in the state of Paraná. Specifically in that state, the performance of that chain is highlighted, justifying the study of factors and conditions directing arrangement choice (integration contracts). The research is supported by TCE and MCE theories. Methodological procedures included qualitative assumptions and a descriptive field research. As results, it has been identified that the arrangement choice (contracts) is justified by the perception of higher levels of coordination and specificity in transaction, as well as higher control due to power asymmetry in the relation. Despite the existence of asset specificity, the possibility to measure and insert in contracts attributes enables contractual arrangements, as an alternative to vertical integration. Thus, contractual formalization seems to indicate appropriate governance structure for processors, making possible standardization, transaction cost reduction and guaranteeing property rights.

Keywords: pork chain; contractual arrangement; transaction costs; measurement costs.

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1. Introduction

In studies considering agribusiness systems (SAG's), different levels of interdependence are identified, and the search for arrangements capable of providing favorable conditions for the economic performance of their agents. It is understood that the competitiveness of SAG's are not linked to individual performance, given that there are coordination gains. Market changes (e. g. increase in consumer demand and advanced competition), higher legal and health demands and increasing participation in global markets, among other factors; have driven the search for greater technical and economic efficiency. In many cases, the need for organization to face new competitive dynamics leads to the construction of coordination arrangements with more complex structures, formalized in integration contracts (MATINEZ, 2002; WILKINSON, 2010).

This type of arrangement has been more conducive in achieving product competitive productivity and suitability, enabling economies of scale, traceability, access to inputs and technology diffusion, among other things. That is the case of the swine system in Brazil, which has as its predominant features low cost of inputs (labor supply and labor), size heterogeneity of rural production, low per capita consumption and relatively integration process forward, with well-coordinated supply chains (IPARDES; IBPQ; GEPAI, 2002). It is noteworthy the role of processing industry as a coordination agent of relations with upstream links. Processors are responsible for defining technical and economic parameters, risk and distribution of earnings, characterizing concentration of economic, strategic and administrative power (COSER, 2010).

It is noticed that Brazilian pork production rose from 2.6 million tones in 2004 to 3.2 million tones in 2009, emphasizing swine industry, with about 90% of the total (ABIPECS, 2010a). According the same source, Brazil's share in world exports increased from 4% in 2000 to 11% in 2009 (over 600 thousand tones), reaching fourth position in the ranking of the largest exporters, after U.S., EU -27 and Canada. According to a study of ABIPECS (2010b), while pork production in Brazil experienced an increase of 19%, and consumption should increase by 17%, exports are up 33% over the same period, reinforcing the Brazilian world position.

In the state of Parana, the performance of pork production is also remarkable. According to data from the Department of Rural Economy of the State Department of Agriculture and Supply of Paraná (SEAB / DERAL, 2011a), Paraná is the third largest producer of pork in the country, with 471,100 tones, in 2010. While beef production in the state decreased by 16%, between 2005 and 2010, poultry production grew 33%, and pork faced an increase of 44% (SEAB / DERAL, 2011a). Paraná is also relevant for national exports, holding position four in pork exports. While Brazilian exports of this product grew 25%, between 2006 and 2010, this growth in Paraná was 87%. Thus, the state, which in 2006 accounted for less than 6% of national pork exports, was responsible for 10.5% of total exports in 2010 (SEAB / DERAL, 2011a).

Considering the importance of swine agribusiness system in Paraná, as well as the need for understanding mechanisms and dynamic conditions present in the choice of arrangement between rural production and processing industry, this paper seeks to understand the aspects related to forms of governance established between farmers and processing companies in that system. The search for understanding factors and conditions that explain the choices and arrangements and the preference for integration contract form identify the main contribution of this study. The question guiding the study, consequently, focuses on answering: which aspects may justify the adoption of a framework contract to conduct raw materials supply from rural producers to pork processors in the state of Parana?

It should be noted that the understanding of the strategic decisions regarding the choices of how to organize to produce and sell, in that regard, receives contributions from several applied social sciences field. In this respect, it is necessary to understand relevant contributions not only of neoclassical theory, but considers behavioral, structural and institutional determinants. These assumptions are consolidated in New Institutional Economics (NIE), especially in Transaction Cost Economics (TCE) Measurement Cost Economics (MCE), considering the seminal work of Coase (1937), as well as the contributions of Williamson (1985, 1991, 2002, 2005) and Barzel (2002, 2003, 2005). Multiplicity and dynamism of influencing variables and the phenomenon involving the firm and its structure, as discussed in literature review, makes its study challenging and current, allowing its approach in different perspectives.

The guidelines proposed by theory establish new mechanisms to explain the reasons of choosing different arrangements, depending on specific operational and competitive situation and interests to be considered. The conduct of the study in pork agribusiness system, in a particular way in the relationship between the producer and processor segments in the state of Paraná, helps to understand the local conditions in shaping these arrangements. Traditionally the relationship is driven by integration contracts, interconnecting cooperative and non-business cooperatives to producers supplying raw material.

To reach stated purpose, the paper presents, in addition to this introduction, the following structure: second section addresses methodological procedures; the following section discusses theoretical approach, particularly in the currents of TCE and the MCE; fourth section presents data and discussion of results; fifth section contains concluding remarks and, finally, references are presented in section six.

2. Methodological procedures

For this study, focusing on qualitative assumptions, a descriptive research has been conducted, in a transverse and longitudinal perspective. As a research strategy, we sought farmers with contractual relationships with processors, in order to obtain information leading to the explanation of the motivations that underpin the governance structures prevailing in the industry. The option for obtaining information on the side of the producer segment is justified by the greater availability and freedom of listeners for handling the matter.

The gathering of information was accomplished through a semi-structured interview, applied to 26 producers in western Paraná, specifically in finishing units, with integration contract with processing companies (cooperatives and non-cooperatives). The interviews were conducted *in loco* along the first semester of 2010.

The geographical scope is justified by the importance of the western region for swine production in Paraná. The Paraná western is characterized as the main pig-producing region in the state, with almost 40% of actual swine herd in the state, in 2009 (IPARDES, 2011). In

2007, the western region accounted for more than 50% of slaughtering in the state, accounting for 52% of pork production in that year (SEAB / DERAL, 2011B) [2]

Given the statements of Godoy (2006) and Godói (2006), data analysis was accomplished through content analysis method. This view, attached to descriptive statistics, consolidated the practices to obtain inductions in this article. In this respect, to identify the structures of governance, information regarding the transaction attributes and existing forms of relationships reported by producers was considered, as well as additional information. Such procedures were needed to set up and justify the structures proposed in the literature, which are directed towards understanding the dynamics prevailing in those strategic and operational relationships. In addition, secondary sources were used to complement the set of information necessary to meet established objectives.

3. Theoretical approach

In 1937, Ronald Coase, in the article entitled "The nature of the firm", identified the firm (vertical integration) as an alternative to the market, in the definition of organizational arrangements for carrying out the transaction. That new theoretical perspective in their assumptions and analytical unit was offered for understanding the actual mechanisms of competition, regulation and organization. By adding the transaction cost as a variable in composition of the costs to operate and compete, the author offered a new alternative to the Walrasian model to understand the firm, within their boundaries and relationships. Until then, according to this model, the cost curves delimited the firm's size in units to be produced, and the scope of the firm was determined in a similar manner (BARZEL, 2003). The prospect of new guidelines for border demarcation links added complexity hitherto absent in the analysis.

Coase's proposition was consolidated through empirical analysis, mainly from contributions of Oliver E. Williamson. The company, seen as a centralized hierarchical structure, defined by a governance structure, in terms of transaction costs, is systematized by Williamson (1985, 1996). The author proposes that governance structures, which delimit the boundaries of the firm and enable the choice of alternative forms for conducting transactions, are structured from the alignment attributes for feasible analysis: asset specificity, uncertainty, the frequency of transactions. The choice for the internal organization would be, for Williamson (1996), less dependent on technological aspects and the main factor in the decision would be specific assets. A rise in the levels of specific assets would justify the choice of hierarchical structure, considering rising in transaction costs, if maintained market relationship.

In alignment with the attributes of the transaction, the definition of governance structures, which Williamson (1985) discussed, focuses on a continuum from centralized hierarchical organization (vertical integration) to spot market. Moreover, the author offered a mix of intermediate arrangements, systemized in formal and informal agreements, named hybrid forms of governance. Arrangements were considered under the possibility of bounded rationality and opportunistic behavior, providing an alternative to the high costs of monitoring that could lead to vertical integration.

It appears that the dynamic nature of the analysis is provided by the search of alignment between attributes, structures and economic conditions. Williamson (1985, p. 16) states: "The changing character of economic organization over time - within and between markets and hierarchies - is of particular interest." This perspective is also identified in

[2] Industrial production, according data from administrative units of the SEAB/Toledo and Cascavel-PR.

Demsetz (1997, p. 6): "The firm is a nexus of contracts. So, if transactions cost rises, there is a substitution in favor of managed coordination or only if Contracts used to form the firm's not much rise in the cost of the Other transactions ".

That feature inserts a valuable contribution and analytical complexity when considering the guidance as an alternative form of contractual arrangement, in seeking to reduce transaction costs. Problems arising from the bounded rationality and the possibility of opportunistic behavior, generating uncertainty inherent in transactions, increase the list of justifications for alternative ways to align coordination. As Klein, Crawford and Alchian (1978) ratify, after specific investments and the creation of quasi-rent, the possibility of opportunistic behavior is real and can be displayed two ways, following Coase's proposal: vertical integration and contracts.

The authors state, however, that when assets become more specific and greater opportunities of quasi-rent appropriation are created, hiring costs generally increase more than vertical integration costs. In a heuristic way, Williamson (1985, 2000) demonstrates that the choice of governance structure follows a sequence involving alternative technologies, with the possibility of contractual risks and safeguards. That is, interpreted by the author, as a movement from simple to complex, or the market for hierarchy. According to Williamson (2002), safeguards may include penalties, information dissemination, specific forms of conflict solving, joint ownership and checking procedures.

Also based on Coase´s works, Yoram Barzel presents a study of the boundaries of the firm, with reference to property rights in its definition. Transaction costs from the perspective of property rights are directly related, in the author's position, to the design and ensuring ownership of specific assets (BARZEL, 2003). In that respect, Barzel (1997, p. 2) defines transaction costs as "[...] the costs associated with the transfer, capture, and protection of rights." The protection of property rights would take place by two alternative pathways: by the side of economic law, based on agreements signed, by the side of the legal right, guaranteed by contractual formalization. For the author, the difficulty of measuring the attributes contributes to the definition of the governance structure. According Barzel (2002, p. 5):

> *We expect highly valued attributes that are relatively easy to measure be guaranteed by contract. Guaranteeing them by long-term relations would require high level of investment in the relationship. On the other hand, we expect attributes that are valuable but costly to measure to be placed in the long-term relation component of the agreement.*

Thus, easy-to-measure attributes can be set in the contract; difficult-to-measure attributes depend on reputation and trust built in long-term relationships and, ultimately, on vertical integration. In that sense, the costs of assets, related to hold up problems, delimit the size of the firm, and define the cost of ownership. Firms incorporated in those conditions have advantages over rivals.

Moreover, the need to control also sets the variable influential. Hart and Moore (1990) note that property rights approach considers that the ownership of control rights is fundamental to the decision to integrate. According to them, making profit from another firm (profit stream) can be performed by contract, but if the goal is to have control, you must integrate activities (residual control rights). Thus, Zylbersztajn (2005, p. 6) concludes:

"Therefore, strict control is associated with vertical integration, while market transactions are chosen when low asset specificity prevails, leaving less room for expropriation."

By taking into account the difficulty of measuring variables related to the attributes of the transaction, Barzel (2003) proposed considering measurement and production costs of relations (production team), as important assumptions in this definition. Barzel (2003, p. 48) states: "The team production model and the measurement model costs both explain how alternative payment schemes (using input instead of output) result in differing costs of using the market instead of using firms to organize production." The firm defined by the author characterizes thus a set of contracts, which variability is contractually guaranteed by an equivalent capital. The boundaries of the firm would result from the balance between the costs of securing ownership rights over the assets and guarantees established by the actions of their employees, in relation to the bureaucratic monitoring costs.

The search for resources associated with the reduction of opportunistic captures, according to Barzel (2005), points to vertical integration as a feasible alternative, besides the standardization of assets idiosyncratic as a means to avoid contention. Standardization reduces quasi-rent and the incentive to capture. The author points out that vertical integration is attractive when downstream processors want to ensure their products through upstream transactions under the possibility of opportunistic gains. Barzel (2005, p. 368) notes:

> *The existence of capture opportunities implies that (economic) property rights are not well delineated. When measurement is costless, writing and enforcing complete contracts is trivial, and ownership is well defined. Neither specialized assets' quasi rents nor anything else will then be captured. Measurement, however, is costly and subject to error, so transactors are not certain how they will fare in their changes; their economic rights are not well defined. Capture opportunities exist everywhere, and transactors will spend resources to capture what they can.*

The information, to Barzel (2005), establishes the essence to guarantee property rights, influencing the decision to integrate or not activities. For the author, without information there is no definition of what you own. Information must be produced and the cost to purchase a product featuring only a partial transfer of related information, enabling the occurrence of disputes, in view of the errors generated. It also provides meaning for economic rights over a product, both in terms of standard process as well as of value.

For the author, considering that information is incomplete, individual rights are not clearly delineated, which ends up generating additional costs (transaction costs). "To be effective, then, contract must be objectively measurable and verifiable" (BARZEL, 2005, P. 361). Vertical integration would define a suitable arrangement in the absence or limitation of information or for their effective transmission when it involves different stages. The measurement in this respect features, for Barzel, a particular form of information.

Moreover Barzel (2005) proposed that configuration of integrated organizations happens in high measuring cost of goods traded. Zylbersztajn (2005, p. 6) summarizes as follows: "The easy-to-measure dimensions are contracted, whilst the difficult-to-measure attributes make room for capture of value and are expected to remain within the firm. High measurement cost invokes the capture of value. "

Thus, Barzel (2003, 2005) provides another explanation for the use of contractual form, when the measurement adds up to ensure the legal right of ownership. The author

explains that the choice of contractual arrangement only happens in the presence of guarantee mechanisms and measurable information so as to safeguard property rights between the parties. In order words, even under high asset specificity and possibilities of opportunistic behavior, vertical integration would not be the only option, given the possibility of ensuring the continuity of the transaction and property rights between the parties, through measurement and contract.

The explanation and prediction about the choices that lead to adoption of specific forms of governance structures, notably between vertical integration and contractual form, may consider two distinct treatments. Although ECT state that an increase in specific assets traded justify vertical integration as the best alternative for reducing transaction costs, to prevention of behavior opportunities, when considering Barzel's proposal, contractual relationship may prevail in some cases.

Figure 1 illustrates the contractual scheme from the approaches of TCE and MCE. Considering the model originally proposed by Williamson (1996), were inserted measure aspects of the attributes. Considering the specificity of assets (k), the presence of safeguards (s) and the measurability of attributes (m), the scheme proposes the adoption of more efficient governance structures. Transactions involving assets in general use - ie, those with zero specificity (k = 0) - do not require protective structures of governance. Thus, such transactions can occur via the spot market, under the laws of competition (A). On the other hand, if observed some degree of asset specificity (k> 0), parties must transact under other forms of governance. In the existence of asset specificity, if there is no contractual safeguards (s = 0), the transaction is unstable, and the agents inevitably be subject to opportunistic behavior (B). As compensation, the transaction through market can provide better payment, given the associated risks. Furthermore, there may be an attempt to eliminate such specificity to enable return to a transaction with the market (for example, by replacing a specific technology by a commonly used technology) or the displacement of the transaction to more complex structures.

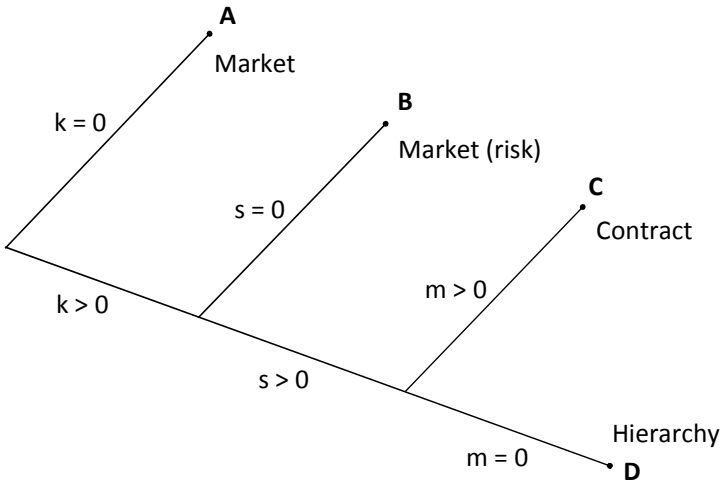

Figure 1 – Contractual scheme in TCE and MCE context
Source: Based on Williamson (2005).

The inclusion of safeguards in the transaction (s > 0) discourages opportunistic behavior, providing reduction of uncertainty and introduces some level of protection. If the assets are not related to specific measurable dimensions (m = 0), or if the measurement is

highly expensive, the most appropriate form of governance is the hierarchy (D), as there are no ways to ensure property rights and avoid quasi-rent ownership. There would therefore the presence of higher levels of control. Finally, if the relevant dimensions in the transaction are measurable and measured (m> 0), the transaction can occur via contract. The measurement of attributes, along with contractual safeguards, makes contract effective form of governance (point C). Most be emphasizes the need for high levels of coordination in this case.

As noted, the feasibility of contracting and its guarantee by the side of legal right, given the possibility of effective measurement, allow the maintenance of hybrid form, even in the presence of high asset specificity. This discussion supports the analytical content of this study and aims to contribute to better explain the mechanisms related to the formatting of the governance structures, punctually in Paraná pork chain.

4. RESULTS

4.1 **Producers' characteristics**

Considering 26 finishing pig producers interviewed, 19 reported to be part of integration system with private companies and seven were linked to cooperative pork processing (TABLE 01). Producers in the sample finished an average of 4,137 pigs per year, with a minimum of 450 and a maximum of 11,000 animals.

Table 1 – Number of farmes interviewed, for each processors

Processors	**N**	**%**
Non-Cooperative A	10	38,5
Non cooperative B	9	34,6
Cooperative A	5	19,2
Cooperative B	2	7,7
TOTAL	26	100,0

Source: Field research, 2010.

Considering the average rate in the western region, of 2.6 lots per year, according FAEP (2010), we observe that the average of animals is 1,591 per lot. By observing the data in Table 2, one can see that the producers are distributed in the four production strata (pigs finished / batch), predominantly medium-sized (50%) and large (38.5%).

Table 02 - Producers considering size, by number of animals per batch*

Size	**Numbers of Animals**	**N**	**%**
Minimum	until 200	1	3,8
Small	from 201 to 500	1	3,8
Medium	from 501 to 1.500	13	50,0
Large	1.501 to 4.000	10	38,5
Exceptional	Over 4.000	1	3,8
	Total	**26**	**100,0**

Source: field research (2010).
* Considering IAP´s classification of size (2004).

Regarding the importance of swine production in the income composition, it was observed that the income from swine farming corresponds on average to 61.5% of agricultural income, indicating very important activity for the respondents. In fact, for 73% of them, the swine is characterized as the main agricultural activity. However, it is observed that the majority of producers (93%) haven't the pork industry as the only agricultural activity, indicating some degree of diversification. The other activities relevant to the farmers interviewed are the production of grains and dairy cattle.

To conduct swine activity, the respondents kept an average of 2.5 workers involved (between family and hired ones), with minimum of one and a maximum of eight workers. In 65.4% of properties surveyed, labor is predominantly contracted, characterized, therefore, anon-familiar agriculture. When asked about the success factors for swine production, 85% of respondents highlighted cost efficiencies, followed by health standards (50%).

Finally, we identified possible deficiency in horizontal coordination, whereas the vast majority of respondents (89%) were not linked to any form of association. As the contractor provides the technology and resources needed for production, insertion into associations, whose initial motivation might be to obtain economies of scale, is not necessary. In this case, the need to network, as proposed Lazzarini, Chadad and Cook (2002), is supplied by the contractor. There may be here an obstacle in negotiations with industry, as the organization of producer in associations could assist in information sharing and coordination among the processors, promoting greater economic balance in the negotiations. This could be justified by the difficulty to perceive gains or benefits of membership.

4.2 Governance structure and measurable attributes

With regard to the governance structure observed, the 26 respondents reported to lead to swine production under formal standard contract with the processors. With respect to the terms of the transaction, 100% of respondents said that all terms are set by contract. According to one respondent: "If it is not contracted, they (the processing company) cannot charge." Thus, there is no room for farmers to make adjustments.

In general, according to interviews, the producers are responsible for: providing labor force and infrastructure (plants, facilities, energy, water, etc.); growing of the animal (following handling techniques, cleaning and sanitation established by the integrator); manure management and, most of the time, by loading the truck at the time of product delivery. The processor is typically responsible for providing piglets, food, veterinary products and technical assistance, as well as the transportation of animals after truck loading.

To characterize and understand governance structures, some relevant variables were considered. First, we investigate the duration of transaction. On average, producers said they negotiate with the same processor for 10.5 years, with at least two and up to 24 years. Moreover, about 70% of respondents produce to the same purchaser for at least five years. This indicates long-term relationships between the parties, with high frequency in the transaction, since two or three batches are settled along a year. Such situation may be related to reputation and consequent transaction costs reduction (search for new agents, new negotiations of contract terms, safeguards, among others).

With respect to uncertainty in the transaction, it must be considered that transaction costs can be present in situations of environmental disturbances and opportunistic attitudes in the transaction. When asked about the disturbance of the environment, 61.5% of producers stated that the occurrences of the market do not affect production. The remainder said that

market disturbance may affect the price received, depending on the prevailing market price at the time of product delivery, since the spot market price (swine independent) is a reference to determine the price paid for the product in the integration contract. With regard to technological changes in product and process, it was observed that producers are subject to high rate of innovation, since 73% indicated technological innovations in product and process every six months, and another 15% said that such innovations are annually.

Regarding contract changes, 92% of producers said they did not address changes in hired aspects. The only change indicated by the producers is related to how to weigh and pay for the product, since the processor starts to consider the weight of the carcass, and not live animal weight, for payment. Although no changes occur in contracted aspects, 77% of farmers interviewed said that processors have the power to make unanticipated changes in the contract, 15% said that changes may occur in the contract by mutual agreement. For 8% of respondents, there is no possibility of negotiation. Such changes can occur on price, quantity and other specifications. Thus, it is clear the largest processor power in the relationship, as stated by Coser (2010). This situation may indicate a condition of rent appropriation by information asymmetry generated, since producers cannot control carcass weight.

Most producers (88% of them) said that none of the parties violates contract terms. For 12% of them, however, the processor has violated the terms of the contract at least once, mainly by providing poor quality inputs, such as piglets and feed. According to one respondent: "The contract establishes that the lot should come good and healthy, instead they had received bad lots, and who takes the damage is the producer." Finally, when asked about the degree of confidence that producers deposited on the processor, 77% said they fully trust industry, and 23% have little confidence, mainly because they have already received poor-quality inputs.

In general, producers states that major uncertainties inherent in the transaction: low price was mentioned by 50% of respondents, followed by health issues such as epidemics (46%) and disease (27%). Despite the high rate of technological change, only 15.5% of respondents identified this as a source of uncertainty. This indicates that, in general, producers were adapted to the need for innovation in the sector in which they operate. Thus, it is clear that, although most of the uncertainties could be associated with aspects of the macro environment, price is a variable with potentially influenced by the processor, which can make room for opportunistic attitude.

So, some specific assets are required to conduct the swine activity. Among them, we can highlight the physical facilities and expertise for the activity. It is also observed temporal and locational specificity. In locational terms, the distance between the farm and the slaughterhouse can compromise productivity, since it is directly related to stress during transport, meat quality, weight loss and loss of animals (mortality). The locational specificity is still tied to the conditions of access to rural property, considering not only the time of transport, as well as the risk of accidents and potential delays.

The temporal specificity, in turn, is present in some important aspects, mainly in the management of finishing pigs, specifically regarding the fattening period and pre-slaughter management (fasting). The fattening period corresponds to the time that the pig (approximately 70 days) enters the growth and finishing, until it reaches slaughtering weight of approximately 100-120 kg (generally between 150 and 170 days of life) (COSER, 2010). The fulfillment of the finishing period is important to ensure adequate productivity in rural production (carcass yield, feed conversion and processing time).

Time specificity, in turn, is present in the pre-slaughter time, since it sets a time period of fasting solid, before the loading of the animals. It is required to ensure the carcass quality and yield. Very short periods of fasting can compromise animal welfare, causing contamination of meat during evisceration, raising the mortality rate and increase the concentration of muscle glycogen; extended periods of fasting, in turn, can lead to great loss of carcass weight and compromised animal welfare. (EMBRAPA, 2000; DRIESSEN; GEERS, 2000).

The need for coordination between the producer and processor segments can increase the specificity of assets, as the specific features of products and processes are now required by the processor. Specific sizes of farm, certain equipment and infrastructure systems and specific manure treatment are some requirements for processing. Thus, the installation of biodigesters in the property, which can be valued by a company, may not be relevant, and therefore represent a loss of value of the asset transaction with another processor. Added to this the fact that in systems integration, the producer operates under exclusive contract manufacturing and is trustee of the goods involved in the process (piglets, feed, medicines, etc..), which makes the activity even more specifically.

Through fieldwork, asset specificity was also verified from some considerations. When asked about the key valued attributes in the transaction, 92% highlighted the quality of housing, 81% sanity, 70%, the weight as the most relevant. Finally, respondents also highlighted productivity as a factor associated with specificity, considering that it is linked to specific physical assets (infrastructure) and human (technical knowledge). Some aspects may be considered for explanation of these attributes:

- Carcass quality: this is related to physical characteristics of the housing (amount of meat and meat quality) regarding the percentage of fat, marbling and backfat thickness, carcass size, appearance of the meat (texture, color, presence of lesions and hematomas, for example), lumbar thickness, etc., and uniformity of the flock;
- Health: In this case, there is mainly the occurrence of viral and bacterial diseases and their consequences, the correct use of medicines and vaccines, influencing mortality in the animal's weight and disposal;
- Weight: carcass weight is an important factor, it is examined the carcass weight for calculation and payment of income;
- Productivity: In this respect, are considered technical factors, such as adequate infrastructure and appropriate management, to reduce mortality and disposal, and increase feed conversion and weight gain.

Thus, it is considered that there are transactions involving high asset specificity.. Considering the specificity of assets, some points are required by processors. It is observed that some demanded aspects are related to valued attributes. Respondents highlighted especially careful in handling (100% of respondents), food and nutritional aspects (100%), cleaning (96%), vaccination (88.5%) and disease control (85%).

Chart 1 lists the attributes valued in the transaction with those required in the process, indicating high consistency between them. Thus, requirements relating to food and nutrition, management, cleaning and sanitary control are important to achieve good quality housing. Sanity, in turn, is related to the demands of handling, cleaning, vaccination and sanitary control. Finally, food and nutrition, health management and control are important influencers of weight, and productivity is influenced by diet and nutrition, health management and control. Thus, it can be stated that the process requirements are according to the valued attributes.

Requirements in the process		Attributes associated with specificity			
		Carcass quality	Health	Weight	Productivity
Process Requirement	Food and nutrition	X		X	X
	Handling	X	X	X	X
	Cleaning	X	X		
	Vaccination		X		X
	Sanitary control	X	X	X	X

Fonte: Pesquisa de campo, 2010.
Chart 1 – Relations between attributes of specificity and process requirements.

Considering the requirements process, respondents highlighted the main issues set out in the contract. Among these are: pre-established standards of product and process, encompassing cleanliness standards, health standards and management, procedures for referral; explicit financial penalties, delivery, and duration of the contract.

With respect to the measurement of attributes, it is emphasized that the processors have mechanisms for measuring the aspects required in the process. The producers interviewed highlighted the key dimensions measured by the companies, as indicated in Chart 2. Thus, measurement of health problems, for example, mainly associated with respiratory diseases, arthritis and bacterial infections, are related to: (a) carcass quality, that can compromise the quality and quantity of meat, as well as the uniformity of herd, (b) weight, that can lead to low gain or weight loss, (c) productivity, which is associated with mortality and disposal of animals; (d) the actual health of the herd.

		Attributes associated with specificity			
		Carcass quality	health	weight	productivity
Measurable Dimentios	Mortality		X		X
	Discard				X
	Health problems	X	X	X	X
	Weight			X	X
	Trough Clean		X	X	X
	Gain of weight	X		X	X
	Bruises and hematomas	X			X
	Internal injuries	X			X
	Farm Temperature		X	X	X

Source: Field research, 2010.
Chart 2 – Relation between the attributes of specificity and measurable dimensions

Thus, it is observed, in chart 2, strong consistency between attributes associated with specificity and measurement, because all attributes associated with specificity are related to at least four measurable dimensions, which indicates the processor's ability to measure the

dimensions associated with asset specificity. Thus, it is understood that, although there are specific assets, the processors can establish them under contract and put in place measurement mechanisms, which enables the contractual form of governance. However, note that to the producer side the measurement does not guarantee property rights. This is because the monitoring of the slaughtering process, evisceration and carcass weight is not accompanied by the producer, which generates information asymmetry. In this way, although also meets the need to generate information and control to the processor, does not have reciprocity for producer, setting opportunity for income appropriation.

5. FINAL REMARKS

The new market, with the intensification of global competition and greater demands in terms of quality and standardization, contributed to increase the specificity of assets in pigs, the presence of new features demand more specific operational responses. The need for planning in the chain to supply the market adequately and meet specific customer needs (quantity and quality of product) has led companies to seek ways of processing chain coordination, among which stands out the use of contracts for integration with swine farmers.

In that sense, the present study sought to identify the determinants of governance structures observed between swine farmers and processing firms in the state of Parana, considering the theories of ECT and the ECM. When considering the two aspects of NEI, the concern was identifying complementary aspects between them, which enabled the implementation of the proposed objectives.

From the study, some considerations can be made. First, it is understood that the inclusion of aspects covered by the contractual scheme in TCE and MCE perspectives indicates complementarities and represents an important theoretical contribution. The measurability of specific attributes, based on measurable dimensions, allows the establishment of verification procedures, which reduces the uncertainty associated with the risk of contract and the appropriation of quasi-rent, ensuring property rights. Thus, high uncertainty, which in the model of Williamson (2005) would direct the transaction to the hierarchy, is reduced, enabling contractual form.

Moreover, the empirical study brought support, allowing to ratify new contract scheme. Returning to the figure presented in the theoretical section (Figure 1), field research indicates a situation where there is asset specificity ($k > 0$) with the presence of safeguards ($s > 0$) and measurement of specific attributes ($m > 0$), which reduces uncertainty, contractual risk and consequent appropriation of quasi-rent, especially on the side of the processor, justifying the hybrid form as sufficient to conduct transactions.

It should be noted, finally, that the transactions studied are characterized by asymmetrical relations in which processor, in certain situations, has the possibility of exercising power, not complying with the provisions in the contract or performing unanticipated changes in the contract. As more specific assets are entered in the transaction, there is loss of control over the product and the process by the farmer, which in turn, can establish a relationship of processor dependency, and create the possibility of appropriation income by informational asymmetry. On the other hand, this asymmetry of power favoring the attitude of coordination and decision-making by the processing company. Thus, transactions are characterized not only by higher levels of coordination and specificity, as well as by higher control, whose contractual formalization seems to indicate the most appropriate governance structure, providing standardization, reducing transaction costs and guaranteeing property rights.

6. REFERENCES

ABIPECS – Associação Brasileira da Indústria Produtora e Exportadora de Carne Suína. **Carne suína brasileira**. Relatório 2009/2010. Disponível em: www.abipecs.org . Acesso em 20 jan 2011.

ABIPECS – Associação Brasileira da Indústria Produtora e Exportadora de Carne Suína. **Complexo carnes**. Cenário 2012. 2010b. Disponível em: www.abipecs.org . Acesso em 02 fev 2011.

BARZEL, Y. **Economic analysis of property rights.** Cambridge University Press. 1997.

BARZEL, Y. Organizational forms and measurement costs. **Journal of Institutional and Theoretical Economics**. Tübingen/Germany, v. 161, n. 3, p. 357-373, 2005.

BARZEL, Y. Organizational Forms and Measurement Costs. **International Society for New Institutional Economics** - ISNIE. Aug, 2002.

BARZEL, Y. **Property rights in the firm.** In: ANDERSON, T.L. MCCHESNEY, F.S. Property Rights: Cooperation, Conflict, and Law. Princeton University, 2003.

COASE, R. H. The nature of the firm. **Economica**. London, v. 5, n. 16. p. 386-405, 1937.

COSER, F.J. **Contrato de integração de suínos: formatos, conteúdos e deficiências da estrutura de governança predominante na suinocultura brasileira**. Dissertação de Mestrado. Faculdade de Agronomia e Medicina Veterinária. Universidade de Brasília, 2010.

DEMSETZ, H. The firm of the theory: its definition and existence. In: Demsetz, H. **The economics of the business firm:** seven critical commentaries. Cambridge University Press, 1997.

DRIESSEN, B.; GEERS, R. Estresse durante o transporte e qualidade da carne suína: uma visão européia. 1ª Conferência Internacional Virtual sobre Qualidade da Carne Suína. **Anais...** Concordia, SC , pp. 39–51, 2000.

EMBRAPA. A suinocultura brasileira pode competir com a européia. Disponível em: <http://www.embrapa.br/imprensa/artigos/2000>. Acesso em 20 fev. 2011.

GODOI, C. K. Perspectivas de análise do discurso nos estudos organizacionais. In: GODOI, C.K.; BANDEIRA-DE-MELLO, R.; DA SILVA, A.B. **Pesquisa qualitativa em estudos organizacionais**: paradigmas, estratégias e métodos. São Paulo: Saraiva, p. 376-401, 2006

GODOY, Arilda S. Estudo de caso qualitativo. In: GODOI, C.K.; BANDEIRA-DE-MELLO, R.; DA SILVA, A.B. **Pesquisa qualitativa em estudos organizacionais:** paradigmas, estratégias e métodos. São Paulo: Saraiva, p. 115-146, 2006.

GOLDBERG, V. P. Regulation and administered contracts. **Bell Journal of Economics**. London, v. 7, n. 2, 1976, p. 426-448.

HART, O.; MOORE, J. Property rights and the nature of the firm. **Journal of Political Economy**. Chicago, v. 98, n. 6, p. 1119-1158, December, 1990.

IPARDES; IBPQ; GEPAI. **Análise da competitividade da cadeia agroindustrial da carne suína no estado do Paraná**: sumário executivo. Curitiba, 2002.

KLEIN, B.; CRWFORD R. G.; ALCHIAN, A. A. Vertical integration, appropriable rents, and the competitive contracting process. **The Journal of Law and Economics**. Chicago, v. 21, n. 2, p. 297-326, 1978.

MARTINEZ, S. W. Vertical coordination of market systems: lessons from poultry, egg, and pork industries. **Agricultural Economic Report**, n. 08. USDA, April, 2002. Disponível em: http://www.ers.usda.gov/Publications/AER807 . Acesso em 15 dez. 2010.

SEAB/DERAL. **Números da pecuária paranaense.** 2011a. Disponível em: http://www.seab.pr.gov.br/arquivos/File/deral/nppr.pdf . Acesso em 15 fev. 2011.

SEAB/DERAL. **Produção Agropecuária.** 20011b. Disponível em http://www.seab.pr.gov.br/arquivos/File/deral/pec5.pdf . Acesso em 20 fev 2011.
WILKINSON, J. Transformações e perspectivas dos agronegócios brasileiros. **Revista Brasileira de Zootecnia**. Viçosa/ MG, v. 39, edição especial, p. 26-34, 2010.
WILLIAMSON, Oliver E. Comparative Economic Organization: The Analysis of Discrete Structural Alternatives. **Administrative Science Quarterly**. Nova York, v. 36, n. 2, p 269-296, June, 1991, pp. 269-296.
WILLIAMSON, Oliver E. **The economic institutions of capitalism** – firms, markets, relational contracting. New York: The Free Press, 1985. 468 p.
WILLIAMSON, Oliver E. The Economics of Governance. **American Economic Association Annual Meeting**. Philadelphia, Jan. 2005. Disponível em: http://www.aeaweb.org/annual_mtg_papers/2005/0107_1645_0101.pdf. Acesso em: 03 fev. 2006.
WILLIAMSON, Oliver E. The Institutions and Governance of Economic Development and Reform. **Annual Bank Conference on Development Economics**, 1994
WILLIAMSON, Oliver E. **The Mechanisms of Governance**. Oxford: Oxford University Press, 1996. 429 p.
WILLIAMSON, Oliver E. The Theory of Firm as Governance Structure: from Choice to Contract. **Journal of Economic Perspectives**. Pittsburgh, v. 16, n. 3, pp. 171–195, 2002.
ZYLBERSZTAJN, Decio. **Estruturas de governança e coordenação do *agribusiness*:** uma aplicação da nova economia das instituições. Tese de livre docência apresentada ao Departamento de Administração da Faculdade de Economia, Administração e contabilidade da Universidade de São Paulo. São Paulo, 1995.
ZYLBERSZTAJN, Decio. Measurement costs and governance: bridging perspectives of transaction cost economics. **International Society for the New Institutional Economics** – ISNIE, Barcelona-Espanha, 2005