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FOOD SUPPLEMENTATION: DOES CONSULTATIVE SELLING CHANGE RANCHER BEHAVIOR?

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Resumo/Abstract

The beef cattle industry and its supply chain, especially the production, distribution and commercialization of its inputs, are important items for the gross domestic product (GDP) of Brazil. A cattle breeder estimates the forage production of his or her ranch and identifies what technological alternatives are feasible to meet the food demand of the herd that he or she plans in the future. On the other hand, the sales team of a producer of inputs can use passive or active strategies when approaching a rancher. The typical passive selling (PS) strategy means making oneself available for contact with a rancher who must bring his or her demands to the point of sale. In contrast, the active, consultative strategy (CS) entails adaptation, that is, adapting a sales discourse to the circumstances of a rancher to show the advantages of one's products in such circumstances. Which of these strategies provides the best results in the beef cattle ranching environment? Does the best result mean more sales volume and greater profitability? To answer these questions, in the present study, we propose and empirically test an econometric model based on data from an animal nutrition producer in Mato Grosso to explain ranchers' purchase decisions through, among other factors, the influence of the sales strategies used by feed producers.

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1. INTRODUCTION

The present study discusses the different sales strategies and respective responses of consumers in a "business-to-business" (B2B) environment. For this purpose, beef cattle ranchers in the state of Mato Grosso are considered consumers, while two food production units are deemed sellers.

Among small and medium-sized producers, two marketing approaches are identified. There are those who offer their products in well-located sales units where ranchers seek products that the latter consider adequate for their goals. This approach can be called passive. On the other hand, there are producers who in addition to the passive strategy, adopt what is typically called "consultative selling", that is, an active approach where a salesperson travels to a customer, analyzes the characteristics and objectives of this customer and then proposes a solution. Thus, producers compete and differentiate themselves by proximity to their customers and the availability of their products or, additionally, via their relationship with and associated services for their customers.

Accordingly, the questions of this research are as follows: which of these strategies is best for small and medium-sized producers of food supplementation for beef cattle? Additionally, are they better in the sense of providing greater volume or increased profitability? Is such profitability measured at the contribution margin or operating profit level? Do these strategies reduce the sensitivity of the rancher to the sales price of a product? In summary, all these questions refer to the power and relevance of consultative selling (CS) compared to those of passive selling (PS) in the agribusiness environment.

To analyze this situation, we propose a panel econometric model that relates quantity sold (kg or bags) to the explanatory variables of unit price of the product sold, price of cattle and calf *arroba*, gross domestic product per capita, indicators of economic expectations, and the rainfall index of the region where a cattle rancher is located.

Our first hypothesis proposes that in the presence of PS, a rancher decides to purchase an animal feed product according to the price of the product and his or her own income, represented by the price of fattening cattle (fattening) or rearing calves (rearing), rainfall conditions and macroeconomic factors. In this case, the demand must be elastic; that is, a 1% discount in a price induces an increase of 1% in the quantity demanded. In addition, food supplementation should be a normal good; thus, a cattle rancher's demand will increase with an increase in income.

Our second hypothesis is that the CS significantly influences the decision-making process in the purchase of an animal feed product, significantly altering the influence of the aforementioned explanatory variables. In this case, demand tends to be less elastic and therefore less price-sensitive. In addition, it is expected that demand for food supplementation will be less dependent on increased income.

Given that CS is a sales technique that seeks to add value to customers and ensure their loyalty, our third hypothesis postulates that CS should provide higher prices and contribution margins than PS.

2. WHAT DOES ECONOMIC THEORY STATE?

For a rancher, demand for animal supplementation products is determined by, among other factors, appreciation (devaluation) in the *arroba* of fat cows, availability (scarcity) of a finished cattle supply, higher (lower) international demand, higher (lower) purchasing power in the domestic market, higher (lower) quantities of slaughterhouses authorized by beef importing countries and alignment (mismatch) between the price of beef cattle and any replacement (Zani, 2019).

For the producers of and traders in food supplementation, supply generally follows the dynamics of a perfectly competitive market including many suppliers, low differentiation, absence of entry barriers, and prices defined by the market. Specifically, mineral supplements and cattle feed represent a third of this market and are dominated by a few large national producers such as Tortuga (25%), Matsuda (15%), Premix (5%), Nutreco and Cargil (Matsuda, 2013). However, approximately 50% of this market is dispersed across several small and medium-sized companies that serve ranchers with locally manufactured products.

Defining a beef cattle rancher as a consumer, the amount of animal supplementation product demanded (x_1) can be modeled by a function that depends on the price of this good (p_1), the price of substitute goods (p_2) and income (m):$x_1 = f(p_1, p_2, m)$, that is, the demand curve describes the optimal level of consumption of a good as a function of its price when the income and price of the substitutes are fixed (Varian, 2010). With this model, it is possible to estimate the sensitivity of demand to changes in the price of a given product. This concept, called the price elasticity of demand, is expressed mathematically by $\varepsilon = \frac{\Delta q/q}{\Delta p/p} = \frac{\%\ change\ in\ the\ amount\ demanded}{\%\ price\ change}$. Thus, if for each 1% reduction in price the consequence is an increase in demand in a proportion greater than 1%, the relevant good is “elastic” ($\varepsilon > 1$)). Otherwise, the good is “inelastic”.

Alternatively, if the price of both good and substitute are fixed and income varies, it is possible to estimate the sensitivity of demand to changes in a consumer’s income, a relationship that is called the income elasticity of demand, expressed mathematically by $\varepsilon = \frac{\Delta q/q}{\Delta m/m} =$

$\frac{\%\ change\ in\ the\ amount\ demanded}{\%\ change\ in\ income}$. Here, a good is "normal" when there is an increase in demand due to an increase in consumer income. Otherwise, a good is deemed "inferior".

Melz et al. (2014) suggest that several variables in addition to price impact the demand for a given good. Based on monthly aggregate data of prices and commercialized quantities of beef from 1995 to 2013, the authors present results that support the hypothesis that beef is an elastic good. Regarding income, other researchers, based on data from 1987–88, 1995–96 and 2002–03, have shown that beef demand is sensitive to variation in consumer income and can therefore be considered normal good—that is, beef demand increases with increasing income (Carvalho et al., 2008; Resende Filho et al., 2012). The conclusions of these Brazilian studies have been confirmed internationally (Gallet, 2010a, 2010b).

Concerning demand, Arruda, Lanari and Souza (1998) observe that the price of beef typically follows the standards of competitive markets according to microeconomic theory. Hence, they argue that production costs play an important role in determining the economic outcome of beef cattle ranchers. Animal nutrition represents approximately 35% of the costs in the final fattening phase (lasting 90 days), according to Dos Santos et al. (2018).

From the macroeconomic point of view, Figure 1 summarizes the factors that influence inflation in the context of agribusiness, measured by the Consumer Price Index (CPI) (Barros et al., 2020). Accordingly, the factors that are directly related to inflation are (1) agribusiness prices, which are influenced by climate, pests and diseases, foreign markets, exchange rates and, in the longer term, agribusiness productivity; (2) any "hiatus"[1] that is affected by macroeconomic policies and the general productivity of the economy; (3) diesel prices, which are affected by foreign markets and foreign exchanges; and (3) expected future inflation (formulated by market agents).

[1] Hiatus is a concept related to the difference between the observed product of an economy (GDP) and the estimate for its potential product. In turn, potential product refers to the level of GDP that can be sustained at a stable inflation rate, i.e., without inflationary pressure.

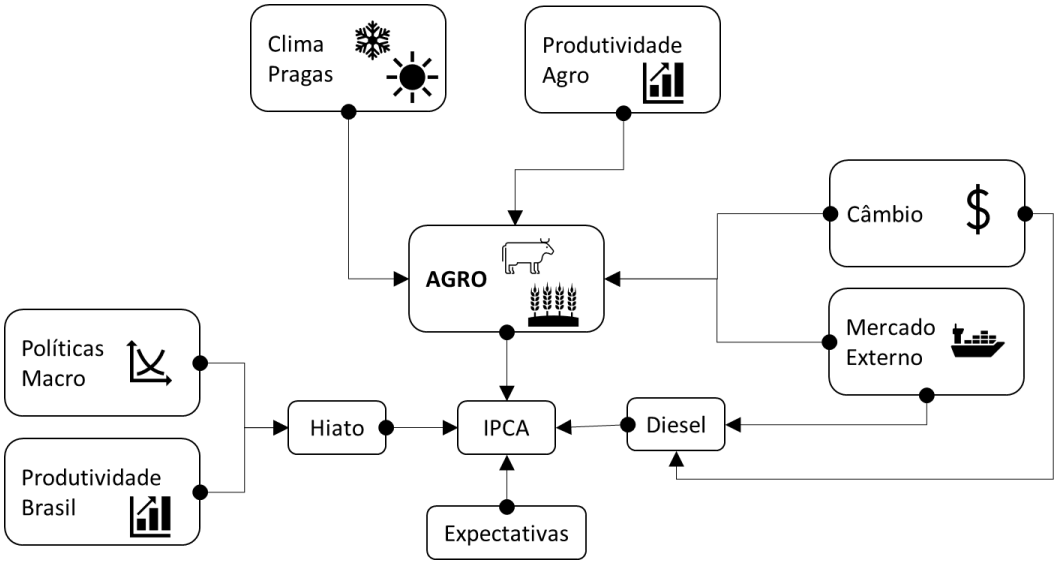

Figure 1. Relationship between inflation and agribusiness (Source Barros et al., 2020)

3. WHAT DOES MARKETING THEORY STATE?

Different types of customers necessitate the flexibility of salespeople. The behavior of salespeople when adapting to different situations and classes of customers is known as "adaptive selling behavior" (Wong and Tan, 2018). The practice of adaptive selling is formally defined as an "alteration in sales behavior during an interaction with a customer or interactions with a customer based on perceived information regarding the nature of the sales situation" (Weitz, Sujan, and Sujan 1986). Following this definition, Weitz et al. (1986) have introduced the concept of adaptive sales, which has been widely analyzed and discussed in academia, to determine the elements that support (or not) the hypothesis that such a practice is positively (or not) correlated with better sales performance. Some researchers argue that the importance of adaptive selling rests in its ability to mitigate price competition, although it is subject to criticism, given the possible aggressiveness that it can be practiced with (Chu et al., 1995).

Thus, this approach is defined as an "active selling" or "consultative selling" and is characterized by the fact that such a sale is the result of proactive efforts by the supplier to identify the right customer for its products and services or to identify a set of products that best fits the needs of a customer (Halbheer and Buehler, 2011; Lau et al., 2004). This more incisive approach can also be applied through heavy investments in advertising or through "persuasive advertising", with the constant objective of influencing consumers' preferences and thereby increasing their willingness to pay for the good(s) in question.

CS, in general, is product-based; that is, it seeks to find the customers for a given product through advertising campaigns or other active mechanisms. Alternatively, based on the

relevant clients, CS seeks to identify the right products for these particular clients, making it well-suited to the present study.

Specifically, when a team of sales consultants from an animal supplementation producer make technical visits to a particular rancher (client) to analyze the conditions of his or her pastures, their goals concern the herd, e.g., proposing a nutritional plan that best fits such goals (breeding, rearing, fattening, finishing, milk production); therefore, this is a customer-based consultative sale.

In contrast, passive selling refers to a sales opportunity that occurs when a customer travel's to a supplier's location, contacts a "call center" or accesses a supplier's website on his or her own initiative. (Lau et al., 2004). In the context of the study, for example, PS occurs when an animal supplement vendor remains at the disposal of the rancher at a point of sale and the rancher then takes the initiative to contact and discuss a nutritional plan that best fits his or her goals.

Below, Figure 2 illustrates these concepts.

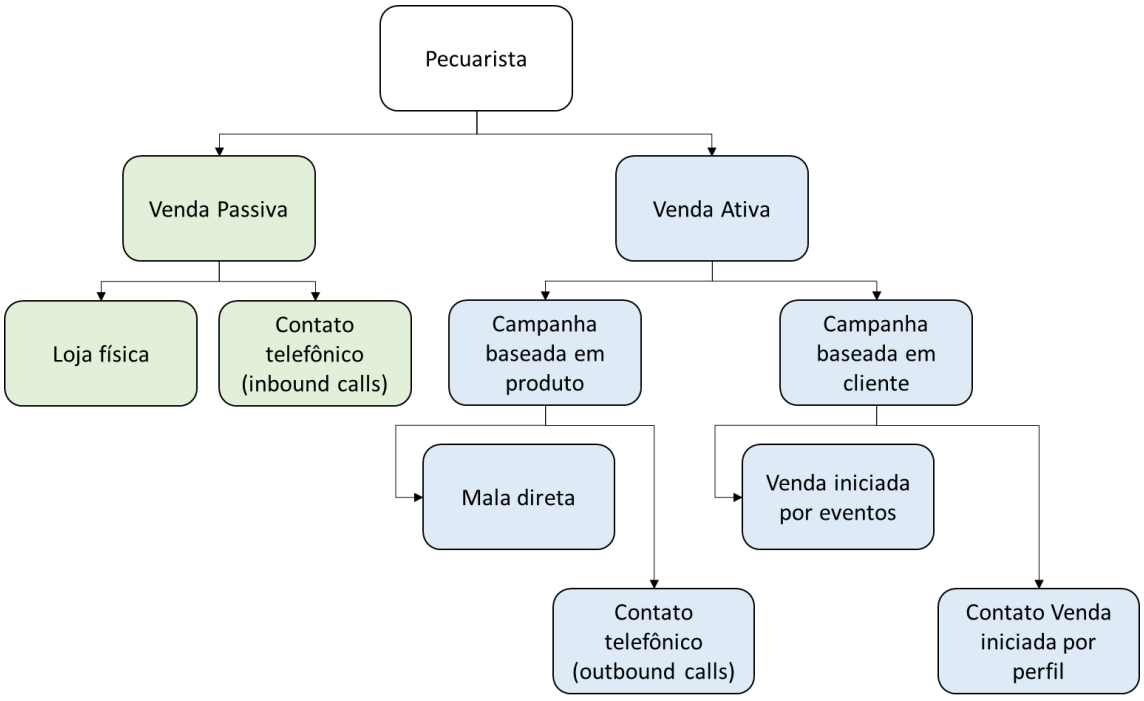

Figure 2. Consultative selling (CS) and passive selling (PS) (Source: Lau et al., 2004)

4. WHAT ARE BEEF CATTLE?

Traditionally, beef cattle production can be divided into three phases, visualized in Figure 1; ranchers can specialize in one or more of these phases and can even implement the full cycle. The breeding phase is focused on reproduction, that is, it aims to produce calves. Thus, calf production includes insemination and pregnancy as well as the development of a calf until weaning, which usually occurs between seven and eight months of age. The rearing phase, the

longest of all the phases, entails cultivating an animal, that is, forming its structure to allow for future weight gain.

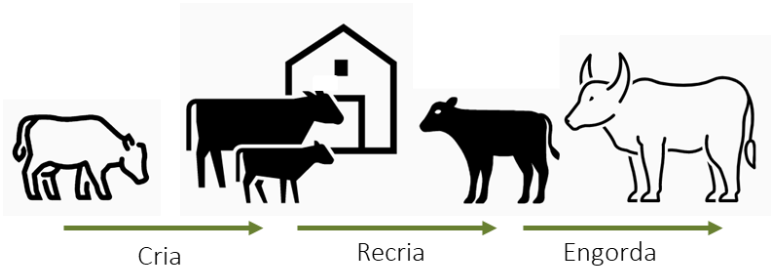

Figure 1. Cycle of beef cattle

Finally, the fattening phase, which is the shortest, focuses on weight gain and fat deposition. For physiological reasons, animals in this phase require a high amount of calories, which not only implies higher costs but also requires greater care and more intensive use of technologies, such as a confinement or semiconfinement system (Barbosa et al., 2015; Nogueira et al., 2004).

Regarding the intensive use of technology, in general, the breeding phase requires larger tracts of land and lower levels of technification, locating this complete cycle in an intermediate position, which followed by rearing. Fattening, in contrast, necessitates smaller areas, higher land use and highly intensive technology use (Nogueira et al., 2004).

5. THE MATHEMATICAL MODEL

In scientific research, a model is a theoretical abstraction, a simplified and often mathematical way of representing reality with complex processes and phenomena of interest to a researcher. Our proposed model is a panel econometric model where the groups (or individuals) are a set of ranchers in the same municipality and where time is measured in months.

In the context of the abovementioned cycles, Equation 1 describes our model for a cattle breeder who specializes in beef cattle rearing, while Equation 2 describes our model for a cattle breeder who specializes in the rearing and fattening phases of beef cattle.

$kg_{i,t} = \beta_{0,i} + \beta_1 pu_{i,t} + \beta_2 ipb_t + \beta_3 ip_t + \beta_4 pib_t + \beta_5 expec_t + \varepsilon_{it}$	**Equation 1**
$kg_{i,t} = \beta_{0,i} + \beta_1 pu_{i,t} + \beta_2 ibg_t + \beta_3 ip_t + \beta_4 pib_t + \beta_5 expec_t + \varepsilon_{it}$	**Equation 2**

On the left side of both equations, the explained variable is the amount acquired by group i in period t, expressed in kilograms or bags ($kg_{i,t}, sacos_{i,t}$). On the right side, the first explanatory variable is the average unit selling price in group i in period t, expressed in R$ per kilogram or

R$ per bag ($pu_{i,t}$), varying with the producer, and obtained by the ratio between the total revenue and the quantity sold in the period. The relationship between the variables $kg_{i,t}$ and $pu_{i,t}$ indicates the price-demand elasticity of the feed product for animal nutrition.

The other explanatory variables, from the second to the fifth, are all constant for all components of group i, varying only in period t.

In Equation **1**, the second explanatory variable is the calf price indicator (IPB; ipb_t), as these are products intended for the rearing process; in Equation **2**, the second variable is the fat boiler indicator (IBG), as the relevant products are intended for rearing and fattening. The IPB and IBG are the result of an agreement between the Luiz de Queiroz Agrarian Studies Foundation (Fundação de Estudos Agrarios Luiz de Queiroz; FEALQ) and B3, the São Paulo Stock Exchange, which oversees the Center for Advanced Studies in Applied Economics (CEPEA) at the Department of Economics, Administration and Sociology of the Luiz de Queiroz College of Agriculture (Escola Superior de Agricultura Luiz de Queiroz; ESALQ), University of São Paulo (USP). These two variables are thus proxies of the income of a rancher; that is, they are the variables that represent the income of a rancher, and they are used to understand the income-demand elasticity of a feed product for animal nutrition.

The third explanatory variable common to both models is the rainfall index of the region, observed by group i in period t and expressed in millimeters of water column (ip_t). In addition to common sense, previous studies have supported the hypothesis that there is an increase in the demand for supplemental nutrition for cattle in the months of the dry season (Augusto et al., 2016). Between the months of November and April, the “rainy season”, the demand for nutritional supplementation for these animals tends to decline due to relative water and pasture availability; hence, during the dry season, which runs from May to October, such demand should increase. Thus, one can interpret the variable ($ip_{i,t}$) to be a proxy for “climate” in **Error! Reference source not found.**. It can also be considered a proxy for the price of a substitute good, i.e., a pasture. Although the same variable appears in both equations, the rainfall data that feed our database are specific to the region where ranchers are found.

The fourth variable, also common to both models, is GDP per capita, expressed in thousands of R$ per capita (pib_t). This follows the structure proposed by Barros et al. (2020) for the main variables that affect the agribusiness economy, as illustrated in **Error! Reference source not found.**. GDP per capita is used as a proxy for the income of the final consumers of animal protein, i.e., households in Brazil and abroad, through both component household consumption (domestic consumer) and trade balance (international consumer).

Finally, the fifth variable common to the models, which also follows Barros et al. (2020) and is displayed in **Error! Reference source not found.**, can comprise one or more indicators of expectation—Index of Future Expectations (ief_t), Household Consumption Intention (icf_t) or Consumer Confidence Index (icc_t)—all of which are used as proxies for expectations regarding the future of the economy. These three indicators are calculated by the Federation of

Commerce of Goods, Services and Tourism of the State of São Paulo (FECOMERCIO) and released by the Central Bank of Brazil.

Hence, in Equation **1** and Equation **2**, group of ranchers i determines in period t the amount of animal feed to be acquired based on the price of the good (pu) according to the value of the *arroba* of fat cows (ibg) or calves (ipb) under meteorological conditions (ip) with respect to the national product (pib) and expectations for the future (ief), in principle, provided all these factors are available in period t. However, this premise is not necessarily correct; that is, nothing prevents a rancher who decides to purchase the good in a given month from being influenced by information that he or she received weeks or months previously, i.e., there may be a lag between information acquisition and purchase decision. The associated need to lag the variables follows Sussai (2020); that is, the purchase decision of a client rancher is planned in advance due to factors such as forage availability, existing stock and expected future sales (Juliana Sussai, 2020). Thus, our model initially considers that the purchase decision in a given month may be influenced by the current or past income of the rancher and not exclusively by his or her current income. The same comment is valid for the other explanatory variables.

Finally, the concept of contribution margin is used to compare the profitability provided of each of the sales strategies. Contribution margin is defined as the difference between a gross unit price and the direct variable costs and expenses, namely, direct taxes, raw materials and freight. It is used to identify what sales strategies contribute the most to covering other direct costs (energy, direct labor, depreciation) as well as sales and administration expenses, taxes on profit and finally, the profits of an operation.

6. THE SOURCES OF OUR DATA AND HOW THEY RELATE TO COMMERCIAL CHOICES

Our data sample comprises data from January 2016 to December 2020, i.e., 60 months, and is nonprobabilistic, i.e., it does not statistically represent the population of livestock ranchers and food supplement producers. Specifically, our data come from two factories in the state of Mato Grosso that are part of an association of companies that share a brand and technology licensing system, similar to a franchise. Table 1 summarizes the characteristics of these two data sources.

The licensing company (FL), which owns the rights to the brand and its associated technology, provides marketing services for brand reinforcement, annual meetings with ranchers, specialized zootechnical services, commercial and price strategies, and cost control and accounting services management to licensees. In addition, these licensees share the same ERP software and make purchases of their raw materials centrally to maximize negotiation power. FL emerged from the vision of an entrepreneur of delivering solutions to livestock ranchers with added value through services, thereby avoiding commoditization and making sales less price-sensitive.

Characteristic	NCN Unit (CS)	P&L Unit (PS)
Location	Nova Canaã do Norte	Pontes and Lacerda
Longitude and latitude	55.7089° W, 10.6369° S	59.3282° W, 15.2332° S
Distance from Cuiabá	680 km north	443 km west
Altitude	301 m	335 m
Product lines (PLs)	Feed, protein, nuclei and minerals	

Table 1. Characterization of data sources

Despite the similarities between the NCN and P&L units, each has adopted a different commercial strategy. NCN, the first to be incorporated into the licensing system in 2012, has been improving its consultative selling approach. P&L, a unit incorporated into the system only in 2017, has not yet fully implemented this new approach and can be characterized as a unit where passive selling predominates. Since their brand, product lines (PL) and technology are the same and cattle ranchers are a homogeneous population, it is therefore reasonable to suggest that the only significant difference between these units is their use of CS or PS.

To evaluate the two hypotheses, we presented in our introduction, that is, to compare the effect of the different sales approaches, CS and PS, we used two databases; one from the NCN unit (CS) and the other from the P&L unit (PS). For each of them, the analyses of cattle-breeding clients and cattle-breeders specialized in fattening were distinct, generating a total of four panels: NCN-CS-fattening, NCN-CS-rearing, P&L-PS-fattening and P&L-PS-rearing.

The PL that we considered in the study was feed due to three factors: (1) it is the most repetitive selling product and therefore has greater statistical representativeness; (2) as a product of low differentiation with few entry barriers and low added value, it is the PL that best fits the definition of a perfect competition market; and (3) it is a supplement associated with the complete developmental cycle of the animals, i.e., the fattening of a cattle herd.

Below, Table 2 shows the descriptive statistics of the initial database, starting with the data relative to the products of all PLs. From this database, only the records related to the "feed" PL and the CFOPs 5101[2] and 5126[3] were considered. These valid tickets provide some important indications. Compared to the P&L (PS) unit, the NCN (CS) unit has fewer customers, operates in fewer municipalities, and has less activity but has a higher average ticket—352% for rearing and 157% for fattening. On the other hand, the P&L (PS) unit has a much higher sales volume (394%), thus obtaining a gross revenue 358% higher than NCN's for the considered PL.

[2] Sales of productions of an establishment.
[3] Production sales, for future delivery.

Descriptive Statistic	NCN Unit	P&L Unit
Research period	2016 to 2020, 60 months	
Number of clients[4]	2,445	3,356
Reach in municipalities	49	55
Records in the period, all product lines	21,268	89,234
Annual mean of "RATION", CFOP 5101 or 5116	287,433 sacks = 8.9 thousand tons	44 thousand tons
Total tickets[5] of "RATION", CFOP 5101 or 5116	358 for rearing 1,342 for fattening	11,902 for rearing 15,280 for fattening
Average ticket	R$2,084.20 rearing R$6,594.78 fattening	R$461.52 rearing R$2,562.25 fattening
Gross revenue with feed for rearing	R$0.8 million	R$5 million
Gross revenue with feed for fattening	R$8.8 million	R$39 million
Average gross revenue	R$9.6 million	R$44 million

Table 2. Descriptive statistics, initial database (Source: Author)

Then, we decided to aggregate the clients located in the same municipality to facilitate our analysis without loss of generality. Thus, a "customer" in the context of this research corresponds to a rural property (ranch), characterized by the binomial property municipality, because the same individual can have more than one ranch in different locations. In other words, all transactions that occurred in a given period (year and month), originating from all ranches, were aggregated by municipality.

[4] The county-property binomial is equivalent to a "client"..
[5] Total search period.

Among other reasons, this option is justified because freight is a very significant component in the final price of any product in this region of Brazil and may represent up to 10% of a final price. As sales revenue, which appears in the database, includes freight and there is no simple way to purge it, this is one of the justifications for this option. In addition, the repeatability of a purchase by each rural property is relatively small, and there is a large dispersion in the sample; therefore, the aggregate data are more statistically representative. However, the prices of the products in the database do not consider differences between a list price and any discount applied in each negotiation or payment terms. Thus, there is an intrinsic bias to our data collection[6].

7. INTERPRETATION OF RESULTS

Initially, for the PLs feed for fattening and feed for rearing, the unit price (pu) and the contribution margin (mc) of the feed in the NCN unit (CS) are compared with those of the P&L unit (PS). The result is shown in Table 3. The table indicates that the unit price (pu) and contribution margin (mc) of the feed are higher in the NCN unit (CS) than in the P&L unit (PS). The statistic (Student's t test*)* corroborates that this difference is significant at 5%, that is, with a confidence level of 95%, it can be stated that the mc of the NCN unit (CS) is greater than that of the P&L unit (PS) for both the fattening and rearing feed. An mc of the NCN unit (CS) represents 33.8% of the pu, while an mc of the P&L unit (PS) represents 16.8% of the pu.

	Fattening		**Breeding, rearing**	
	NCN (CS)	**P&L (PS)**	**NCN (CS)**	**P&L (PS)**
QTY observations (binomial property-municipality)	438	513	182	483
Average unit price and standard deviation (pu) (R$/kg)	1.019 (0.200)	0.987 (0.167)	1.320 (0.268)	1.294 (0.226)
Contribution Margin (mc))	0.344 (0.140)	0.166 (0.167)	0.489 (0.195)	0.271 (0.218)
Percentage Contribution Margin ($mc\%$))	33.8%	16.8%	37.0%	20.9%

Table 3. Unit price and contribution margin

[6] Data or participant bias .

On the other hand, with a confidence level of 95%, it can be stated that the pu of the feed for fattening of the NCN (CS) unit is significantly different from that of the P&L (PS) unit; however, the pu of the feed for rearing of the NCN unit (CS) is not significantly different from that of the P&L unit (PS), although it is numerically higher.

Next, four panel regressions were created, as previously mentioned: NCN-CS-fattening, NCN-CS-rearing, P&L-PS-fattening and P&L-PS-rearing. The fixed effect (EF) and random effect (EA) options were then tested[7].

For each of the panels, we sought to find the best option to lag the explanatory variables, that is, the combination that was statistically more consistent with economic and marketing theory and the common sense that had been observed in the field. Table **4** and Table 5 show the results for these three lags, and the rounds are numbered in Columns 1 to 3. The round hatch is considered the most appropriate.

[7] Hausman's test indicated the acceptance of the null hypothesis, that is, the use of EF or AS is indifferent. We chose the EA because it is more reasonable to postulate that there is no correlation between any specific characteristics of the set of all cattle ranchers of a municipality and the price charged by the manufacturer of the supplements or the income obtained in the sale of the fat ox or any other independent variable..

NCN-VC PARA ENGORDA				P&L-VP PARA ENGORDA		
	(1)	(2)	(3)	(1)	(2)	(5)
	lnwsc	lnwsc	lnwsc	lnwsc	lnwsc	lnwsc
VARIABLES	RE	RE	RE	RE	RE	RE
lnwpusc	-2.840***	-2.879***	-2.809***	-1.596***	-1.685***	-1.962***
	(0.255)	(0.291)	(0.332)	(0.403)	(0.423)	(0.397)
lnibg	-0.282			0.665		
	(0.361)			(0.441)		
lnibg defasado 1 mês		-0.444			0.945*	
		(0.439)			(0.490)	
lnibg defasado 2 meses			0.171			1.319***
			(0.480)			(0.413)
ip	-9.61e-05			-0.000691*		
	(0.000325)			(0.000356)		
ip defasado 1 mês		0.000524	9.37e-05		-0.000658*	-0.000618**
		(0.000374)	(0.000353)		(0.000343)	(0.000291)
pibcap	-0.901**			0.599**		
	(0.359)			(0.299)		
pibcap defasado 1 mês		-0.611	-1.642***		0.358	0.125
		(0.429)	(0.431)		(0.306)	(0.238)
ief	-0.0201			0.0121		
	(0.0171)			(0.0146)		
icf	-0.0204*			0.00521		
	(0.0116)			(0.0108)		
icc	0.0240			-0.0102		
	(0.0245)			(0.0216)		
ief defasado 1 mês		-0.0162			0.00525	
		(0.0196)			(0.0155)	
icf defasado 1 mês		-0.0267**			0.00106	
		(0.0129)			(0.0112)	
icc defasado 1 mês		0.0186			-0.00550	
		(0.0275)			(0.0226)	
Constant	20.96***	21.79***	19.04***	3.378	3.649	2.675
	(2.064)	(2.402)	(2.038)	(2.390)	(2.684)	(2.059)
Observations	438	321	254	513	433	395
Number of idmun	23	20	15	20	16	15

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4. NCN-CS-fattening and P&L-PS-fattening panels (Source: Author)

NCN-VC PARA CRIA E RECRIA				P&L-VP PARA CRIA E RECRIA		
	(1)	(2)	(3)	(1)	(2)	(4)
	lnwsc	lnwsc	lnwsc	lnwsc	lnwsc	lnwsc
VARIABLES	RE	RE	RE	RE	RE	RE
lnpu	-2.058***	-2.794***	-2.588***	-2.701***	-2.758***	-3.159***
	(0.494)	(0.552)	(0.507)	(0.463)	(0.484)	(0.437)
lnipb	-0.462			0.789*		
	(0.631)			(0.426)		
lnipb defasado 1 mês					1.122**	
					(0.454)	
lnipb defasado 2 meses			-1.905***			1.866***
			(0.677)			(0.370)
ip	-0.00147*			-0.00133***		
	(0.000862)			(0.000477)		
ip defasado 1 mês		-0.000827	0.000396		-0.00159***	-0.00186***
		(0.00107)	(0.00104)		(0.000474)	(0.000405)
pibcap	2.092***			1.667***		
	(0.762)			(0.375)		
pibcap defasado 1 mês		3.067***	4.909***		1.485***	1.158***
		(0.992)	(0.973)		(0.388)	(0.305)
ief	-0.00449			-0.00498		
	(0.0388)			(0.0202)		
ief defasado 1 mês		0.0370		-0.0111		
		(0.0468)		(0.0144)		
icf	0.0106			0.00749		
	(0.0259)			(0.0294)		
icf defasado 1 mês		0.0251			-0.00433	
		(0.0292)			(0.0216)	
icc	0.0186				-0.0124	
	(0.0555)				(0.0151)	
icc defasado 1 mês		-0.0296			0.00660	
		(0.0643)			(0.0312)	
Constant	6.350	3.986	13.21***	-1.637	-3.353	-8.169***
	(5.574)	(6.790)	(4.878)	(3.348)	(3.664)	(2.566)
Observations	182	104	70	483	393	352
Number of idmun	18	14	10	19	16	13

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5. NCN-CS-rearing and P&L-PS-rearing panels (Source: Author)

Finally, Table 7 provides a managerial interpretation of the data in Table **4** and Table **5**.

	NCN-CS fattening	**P&L-PS fattening**	**NCN-CS breeding, rearing**	**P&L-PS breeding, rearing**
1. PU	-2.809***	-1.962***	-2.588***	-3.159***
Interpretation: In CS for fattening, a 1% decrease in feed price is sufficient for there to be an increase in sales volume of 2.8%; in PS for fattening, the induced sales increase is only 2.0%. Thus, to obtain the same increase in sales volume, a PS discount must be greater than a CS discount. However, an increase in sales volume induced by CS for breeding and rearing is approximately 2.6%, but in PS, it is greater than or equal to 3.2%, which means an inversion in the observed trend for feed for fattening.				
2. IBG and **IPB both lagged 2 months**	Not significant	1.319***	-1.905***	1.866***
Interpretation: In CS, the price of the cattle fat or calf *arroba*, lagged by 60 days, is not significant when considering feed for fattening. On the other hand, in CS for breeding and rearing feed, the result is inverse to that predicted by the theory. In the case of PS, the price of the cattle fat or calf *arroba* is significant at 1% and influences purchase decision. For fattening, a 1% increase in *arroba* induces an increase in sales volume of 1.3%, while a 1% increase in calf price induces an increase of 1.8%.				
3. PI lagged by 1 month	Not significant	-0.0006**	Not significant	-0.0019***
Interpretation: in CS, rainfall lagged by 30 days is not significant, either for fattening or rearing feed, i.e., the decision to purchase feed for fattening is apparently not affected by the rainfall in the previous month. In PS, an increase of 100 mm in PI induces a 6% decrease in sales of fattening feed and 19% in sales of rearing feed; thus PI is significant at 1% and influences purchase decision.				

Table 6. Results of the four executed models (Source: Author)

	NCN-CS fattening	P&L-PS fattening	NCN-CS breeding, rearing	P&L-PS breeding, rearing
4. GDP per capita lagged by 1 month	-1.642***	Not significant	4.909***	1.158***
Interpretation: In CS for rearing, an increase of R$100 in GDP per capita, lagged 30 days, induces a 49% increase in sales volume; in PS for rearing, this drives only an 11% increase. This result is not consistent in regard to feed for fattening. In CS for fattening, the result requires further analysis, as an increase in GDP apparently induces a decrease in sales; in PS for fattening, the result was not statistically significant.				
5. IEF, ICF, ICC with any lag	Not significant			
Interpretation: In CS and PS, a rancher apparently disregards future expectations and focuses on historical data from the recent past.				

Table 7. Continuation

8.1. RESULTS FOR THE FIRST HYPOTHESIS

Our first hypothesis proposes that in the presence of PS, a rancher decides to purchase an animal feed product according to its price, his or her income, the price of fat cattle (fattening) or calves (rearing), rainfall conditions and macroeconomic factors (recent GDP and future expectations). In this case, it is assumed that demand is elastic and food supplementation is a normal good, concepts that we have explored above.

According to the data in Table 4 and Table 5, properly interpreted in Table 7, the results that we have obtained with our sample support this first hypothesis, albeit partially.

In PS, as the second and fourth columns of Table 7 show, the amount of supplementation demanded by a rancher is a function of unit price, income and rainfall: the coefficients of these explanatory variables were statistically significant.

However, the coefficient of the explanatory variable GDP per capita was statistically significant only in the case of feed for breeding and rearing. Thus, apparently, the data do not support the hypothesis of the influence of GDP per capita on the decision to purchase feed for fattening. In all the cases, moreover, future expectation seems to have no influence, given that the coefficients of the variables IEF, ICF, and ICC were not significant with any lag that we tested.

As for the hypothesis that demand is elastic in the case of PS, since the coefficients of the explanatory variable unit price (pu) were negative, larger than the unit and statistically significant at 1%, our data support thus support this hypothesis, for both breeding and rearing and fattening feed.

Finally, given that we found the coefficients of the variables IBG and IPB, which represent the income of a rancher, to be positive and statistically significant at 1%, there is support for the supposition that animal supplementation is a normal good.

8.2. RESULTS FOR THE SECOND HYPOTHESIS

Our second hypothesis is that CS influences the decision-making process for the purchase of an animal feed product, significantly altering the influence of the aforementioned explanatory variables. In this case, it is expected that demand tends to be less price-sensitive and is thus not as dependent on an increase in income.

According to the first and third columns ofTable 7, our second hypothesis is partially supported, as subsidies affirm that CS alters the behavior of a rancher at the time of purchase. The quantity demanded, in contrast to what was observed in PS, is a function of the unit price and GDP per capita; the coefficient of these explanatory variables was the only statistically significant and consistent figure for both fattening and breeding and rearing feed.

Our results for the other coefficients were inconsistent or nonsignificant, which indicates that the IBG and IPB variables, representing the income of a rancher, rainfall and future expectancy indices (IEF, ICF, ICC), apparently do not influence the quantity demanded. Thus, it is possible to identify a profound change in consumer behavior in CS with respect to PS: both livestock income and environmental factors (rainfall, GDP per capita and future expectation indices) lose importance or generate inconsistent results.

Regarding elasticity, in CS for fattening, a 1% price reduction is sufficient to increase sales by 2.8%; in PS, for the seller to obtain the same increase in demand, the discount should be higher as described in Item 1 of Table 7. Thus, this result confirms our second hypothesis, i.e., CS is less elastic than PS. Similarly, CS makes the sales process less dependent on the income of a rancher than PS.

However, the trend is reversed in regard to CS for breeding and rearing, as PS is less elastic than CS in this case. This trend reversal does not have a simple interpretation. Since fattening is a more technology-intensive phase, according to Nogueira et al. (2004), it is more susceptible to the marketing appeal of CS. In addition, the representativeness of sales for breeding and rearing in the database that we used is much lower than sales for fattening, as shown in Table 2.

Notably, in all cases, rainfall not significant in the presence of CS, at least at the 90% confidence level. One interpretation for this is that rainfall can regulate “when to buy”;

however, it does not significantly change the volumes purchased when considering longer periods of 2 or 3 months.

The economic expectation, based on confidence indices (IEF, ICF, ICC), was not significant under any circumstances. Economic intuition allows us to postulate that a rancher can use his or her per capita GDP, specifically, its components of household consumption and exports, as a parameter for capital budgeting—that is, for an investment decision, the acquisition of inputs, for example. However, in the case of operating expenses, they must occur regardless of the macroeconomic scenario.

In the case of GDP per capita, for rearing, it is apparently a more relevant macroeconomic factor in CS than PS. However, for fattening, the GDP per capita factor produced inclusive results because it was not significant for PS and showed a behavior opposite to that implied by economic theory in the presence of CS. Similar to the economic expectation indices, it is possible that this is the most relevant parameter for capital budgeting.

8.3. RESULTS FOR THE THIRD HYPOTHESIS

Because CS adds value to customers and ensures their loyalty, our third hypothesis postulates that CS should provide higher prices and contribution margins than PS. As Table 3 shows, CS presented a contribution margin ranging from 33.8% to 37.0%, while that of PS varied from 16.8% to 20.9%.

Thus, there is support for our third hypothesis: the use of PS means higher sales volumes and therefore higher revenues, but applying CS allows notably better unit prices and contribution margins.

9. LIMITATIONS

There are some limitations of and potential improvements to this study. The value of freight, the financial cost of credit sales and price discounts could be included in revenue. Only the available rainfall indices for two points in the state of Mato Grosso, close to the manufacturing units, were used. Meteorological data per municipality should also be considered, but these were not available; an alternative would be to obtain this information from some ranchers, as many of them keep such records. Finally, only one PL was used, animal feed for cattle, mainly due to the abundance of relevant data. The inclusion of other product lines could therefore contribute to broadening the knowledge on the behavior of the cattle rancher.

10. RECOMMENDATIONS

For manufacturers who intend to implement the active strategy (CS) to address their customers, the greater contribution margin implied by CS is important—based on the sample we obtained from this particular manufacturer—but this does not necessarily mean profit for a shareholder. However, CS may entail greater sales efforts, as the allocation of costs of sales

consultants is made at the level of sales and administration expenses. Thus, a manufacturer that adopts CS should incur higher indirect costs, which could reverse the favorable scenario presented here.

Thus, a manufacturer must be aware that a salesperson in the case of CS must present a much more technical professional profile than that of a traditional salesperson; he or she must understand the objectives of a rancher, analyze pasture conditions and breed quality to therefore propose appropriate technological alternatives. In addition, even with more technically qualified salespeople, at least one zootechnician with excellent training should be available to support the activity of these salespeople, dedicating much of their time to relevant research.

Clearly, it is up to any manufacturer, whether in a PS or CS scenario, to value an excellent relationship with its customers, gain the trust of ranchers and ensure the high quality of the products it brings to the market.

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