Espaço & Geografia

A LOCALIZAÇÃO GEOGRÁFICA COMO FATOR DETERMINANTE NA COMPRA DE LATICÍNIOS DURANTE A PANDEMIA COVID-19

Geographic location as a determining factor in the purchase of dairy products during the COVID-19 pandemic

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RESUMO

Os padrões alimentares podem variar nas regiões geográficas brasileiras, que foram afetadas de forma diferente pela pandemia de COVID-19. Este estudo teve como objetivo verificar se o local de residência dos indivíduos afetou o consumo de laticínios durante a pandemia, considerando tanto a quantidade de produto consumida quanto os fatores que influenciam a decisão de compra. Resíduos de Pearson ajustados foram utilizados para avaliar a associação entre a variável estado e aquelas relacionadas ao consumo de laticínios. A coleta de dados foi realizada por meio de aplicação de questionário online, no período de 23 de abril a 3 de maio de 2020. Os resultados mostraram que, para a maioria dos laticínios, foi observada associação significativa entre o local de residência e o consumo de laticínios. Uma maior associação com a manutenção ou maior consumo foi observada para as regiões com maior consumo de laticínios, sendo a marca que os consumidores estavam acostumados a comprar foi o fator determinante no momento da compra, mesmo diante de uma crise financeira. Também foi possível determinar os estados que estavam mais atentos às ações das empresas durante a pandemia e a importância da boa alimentação em uma crise de saúde pública. Por fim, os resultados podem contribuir para um melhor entendimento das particularidades do consumo de laticínios no Brasil, além de avaliar o comportamento do consumidor na atual crise econômica.

Palavras-chave: consumo, decisão, associação, crise econômica.

ABSTRACT

Dietary patterns can vary in the Brazilian geographic regions, which have been affected differently by the COVID-19 pandemic. This study aimed to determine whether the place of residence of the individuals affected the consumption of dairy products during the pandemic, considering both the amount of product consumed and the factors that influence the purchase decision. Adjusted Pearson residuals were used to evaluate the association between the variable state and

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those related to the consumption of dairy products. Data collection was performed using an online questionnaire application, from April 23 to May 3, 2020. The results showed that, for most dairy products, a significant association was observed between the place of residence and the consumption of dairy products. A greater association with the maintenance or higher consumption was observed for the regions with a higher intake of dairy products, and the brand that consumers were used to buy was the determining factor at the time of purchase, even in the face of a financial crisis. It was also possible to determine the states that were most aware of the actions of companies during the pandemic and the importance of good nutrition in a public health crisis. Finally, the results can contribute to a better understanding of the particularities of the consumption of dairy products in Brazil, besides assessing the consumers' behavior in the current economic crisis.

Keywords: consumption, decision, association, economic crisis.

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1. Introduction

Brazil is the third largest world producer of cow's milk, reaching 33.84 million tons in 2018, behind only India (89.83 million tons) and the United States of America (98.69 million tons). In addition, Brazil has the world's second-largest cattle herd (FAO, 2020). It is estimated that around 20 million jobs are involved in the milk production chain, from milking to table (AGROemDIA, 2020).

The great importance of this sector for job generation is accompanied by its strong relevance in the dietary patterns of Brazilians. According to data from the Household Budget Survey (HBS) 2017-2018 of the Brazilian Institute of Geography and Statistics [IBGE] (2020), dairy products correspond to the second class of products most purchased annually (kg per capita), behind beverages and infusions.

Brazil has a territory with continental dimensions, which has led to differences in economic, climatic, social, and cultural aspects, among regions and states, including the eating habits, cooking, and different dietary patterns. According to Pitas (2010), eating habits consist of the individual's attitude towards food. In this sense, each region of the country presents its typical dishes and preferred foods. Thus, the consumption of milk and dairy products is regionalized, with greater consumption in some regions when compared to others (Carvalho, Januário, Moron & Saes, 2013). HBS data show that certain products stand out in some places, such as the consumption of milk powder in the North and Northeast, cheese in the South and Southeast, and yogurt in the South (IBGE, 2020).

Since the beginning of 2020, the consumption of dairy products has been affected by another variable: the novel Coronavirus pandemic. Its arrival in Brazil, on February 26, led to the need for social isolation, which is considered the best measure to control and prevent the disease, according to the World Health Organization [WHO] (2020). Thus, several industries and market places were affected, causing activity to collapse and unemployment to soar. The pandemic also led to changes in the habits of consumers, who were more cautious when making purchases of certain non-essential products. Bezerra, Silva, Soares & Silva (2020) reported that 34% of respondents said they were

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saving money and 20% reported total income cut during the COVID-19 pandemic.

However, the pandemic did not advance uniformly throughout the country, with different consumers' behavior according to the place of residence. The first cases of the novel coronavirus were identified at different times and the growth rate of COVID-19 infection was more pronounced in some states. Therefore, different social isolation measures were taken and, in some locations, only the marketing of essential products, such as pharmacies, grocery stores, and supermarkets remained open, while hair salons, bars, and car dealerships maintained their operation according to rules to mitigate the impacts of contamination.

Although milk and dairy products have been widely consumed by the entire Brazilian population, the changes in the consumers' behavior of each region due to the effects of the pandemic should be investigated. In this context, the objective of this study was to investigate a possible impact of the geographical location on the quantity of dairy products consumed by the population during the pandemic, and the factors that affect the purchase of dairy products.

The dairy sector is a favorable sector for this type of analysis, as it covers products from different categories, ranging from basic food products (UHT milk, and butter), culinary ingredients (cream, milk powder, etc.), products with health appeal (yogurt, fermented milk, etc.) to indulgent products (ice cream, Dulce de leche, and sweetened evaporated milk). Therefore, the present study addressed a wide range of types of dairy products, which serve different audiences and sectors, representative of the Brazilian eating habits.

2. Methodology

1.1. Questionnaire

An online questionnaire was used as a data collection instrument, which was created using Google® forms, according to Resolution 510 of April 7, 2016, of the National Health Council (Brasil, 2016), and disseminated through apps and social networks between 04/23/2020 and 05/03/2020.

Snowball sampling technique was used for data collection, in which each respondent recruits new participants. Because it is a non-probability method, the sample did not represent significantly the Brazilian population. However, the federal units with few observations were cautiously excluded, thus the study allowed assessing possible consumption patterns, encouraging future research using methods of probability sampling to confirm and complement the present information.

Since the survey was conducted online, the responses corresponded to the opinion of the Brazilian population that had access to the internet, corresponding to a non-probabilistic sample with selection bias.

The following questions were applied to the questionnaire: "What changed in the consumption of the following foods during the pandemic?" and "What is the most important issue when purchasing the following products during the pandemic?" The questions should be answered for 14 different dairy products, as follows: pasteurized milk, UHT milk, milk powder, sweetened condensed milk, fermented milk, cheese, yogurt, butter, milk beverage, Dulce de leche, ice cream, cream, petit Suisse, and plant-based beverages. The plant-based beverages were included in the questionnaire once they are competing products of dairy products, thus allowing a comparison of results. For the first question, the possible answers were "Increased", "Decreased", "Maintained" and "I'm not used to consuming". For the second question, the answers were "Company attitude during the crisis", "Nutritional benefits", "Local company", "Brand that I'm used to buy", "Price" and "Product quality".

A question regarding the location was also used, which indicated the respondent's housing unit (UF). For the location-based analysis, only the states with at least 1% of the total respondents were used, to avoid data biases. Thus, the following states were selected: Bahia, Ceara, Distrito Federal, Espírito Santo, Goias, Mato Grosso do Sul, Minas Gerais, Parana, Pernambuco, Rio de Janeiro, Rio Grande do Sul, Rondonia, Santa Catarina, São Paulo, and Sergipe.

1.2. Statistical analysis

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To analyze the association between variables, the following null hypotheses (Ho) were used: no significant differences between the amount of dairy products consumed during the pandemic (variable 1) and state (variable 3); no significant differences between the factors (brand, price, quality, nutritional benefits, company attitudes, and local companies) when buying dairy products during the pandemic (variable 2) and state (variable 3). Pearson's chi-square test was used for testing hypotheses at a significance level of 99%. For products in which this hypothesis was rejected, the adjusted residuals of each cell were analyzed to determine the most significant associations.

Pearson's chi-square test uses Pearson's X^2 statistic to determine the null hypothesis between variables (Heumann & Shalabh, 2016).

For a contingency table k x l, the X^2 statistic is calculated as follows:

$$X^2 = \sum_{i=1}^{k} \sum_{j=1}^{l} (o_{ij} - e_{ij})^2 / e_{ij} \qquad (1)$$

where oij is the value observed in the table, and eij is the expected value under the independence hypothesis, which is calculated as:

$$e_{ij} = \frac{o_{i+} * o_{+j}}{n} \qquad (2)$$

where oi+ is the sum of the quantities of the i-th row, o+j is the sum of the quantities of the j-th column, and n is the total number of observations.

Assuming true Ho, the X^2 follows a chi-square distribution, with q = (k - 1) * (l - 1) degrees of freedom. Then, to decide whether the independence hypothesis is rejected or not, the P-value should be evaluated, which is defined as the probability that the observed X^2 is lower than or equal to the descriptive X^2q.

$$P = P(X^2 \leq X_q^2) \qquad (3)$$

for fixed α, P ≤ α is obtained, then the null hypothesis of independence is rejected (Heumann and Shalabh, 2016). In this study, the level of significance was 99%, thus the α value was 0.01. For the first test, between the variables 1 and 3, the X^2 statistic followed a chi-square with 42 degrees of freedom, while in the second test, between variables 2 and 3, a chi-square with 70 degrees of freedom was observed.

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The adjusted residual (rij), which was used to measure the relevance of the association between the classes of the two variables, is given by:

$$r_{ij} = \frac{o_{ij} - e_{ij}}{\sqrt{\left(e_{ij} * \left(1 - \frac{o_{i+}}{n}\right) * \left(1 - \frac{o_{+j}}{n}\right)\right)}} \qquad (4)$$

Positive residuals indicate the presence of association, while negative values indicate the lack of association. Furthermore, they follow a standard normal distribution (Agresti, 2002), thus rij values lower than -1.96 or greater than 1.96 are significant at a 5% level, and have been highlighted with an asterisk (*) in the tables. In turn, values lower than -2.57 or greater than 2.57 are significant at a 1% level, and have been highlighted with two asterisks (**).

The analyses were performed using IDE RStudio, version 4.1.0, which makes use of the R programming language, and Excel 2016. In addition, the results were analyzed as a function of the residuals, to determine the association between the quantity of product consumed and the determining factor at the time of purchase for the different Brazilian regions during the COVID-19 pandemic.

3. Results na Discussion

3.1.Sampling

The questionnaire was answered by 5105 individuals from all Brazilian states. Of these, 159 respondents did not inform the federative unit (UF) where they reside, thus they were excluded from the study. Furthermore, the federal units with less than 1% of the total respondents were not included in the study due to the robustness of the study. Therefore, only the units colored in green in Figure 01 were analyzed (in descending order of respondents), including: Minas Gerais, São Paulo, Rio Grande do Sul, Parana, Distrito Federal, Rio de Janeiro, Goias, Bahia, Santa Catarina, Rondonia, Ceará, Pernambuco, Alagoas, Espirito Santo, Mato Grosso do Sul, and Sergipe. Thus, the total number of observations decreased from 5105 to 4720.
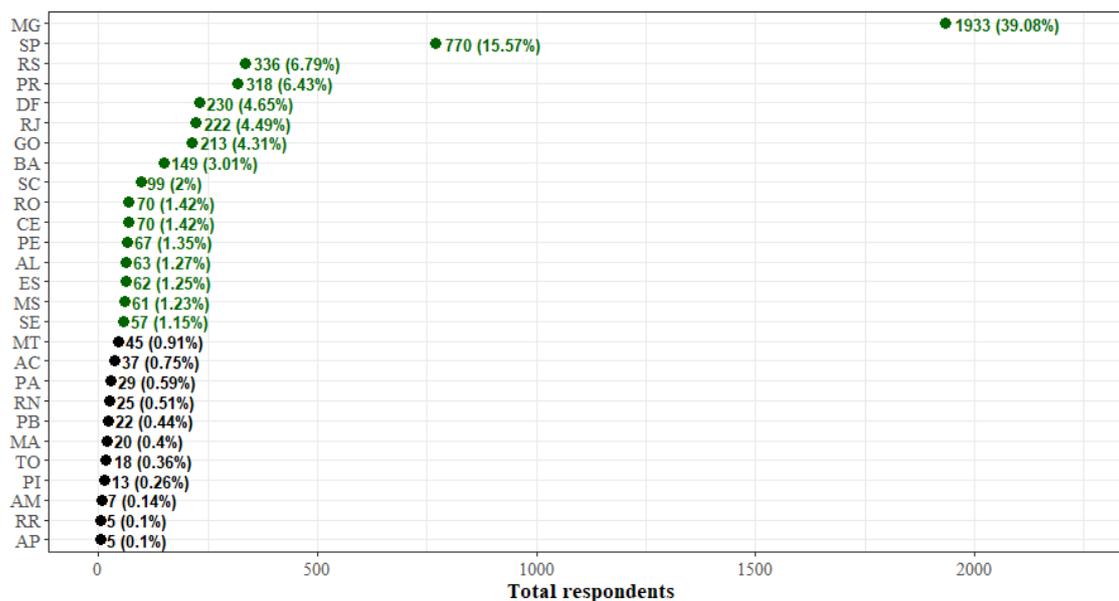
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Figure 01: Total respondents and total percentage representation per federative unit.

3.2. Association between the changes in quantity consumed and location

Concerning the variable 1, which is related to the change in the quantity of dairy products consumed during the pandemic, the majority of consumers (46.08%) maintained the purchase for all products, for all regions. To a lesser extent, 29.72% claimed that they do not consume the products, 13.74% increased the purchase, and 10.45% decreased the purchase of these products.

Considering the variables 1 and 3, which correspond to the change in quantity consumed and location, the chi-square test showed that the null hypothesis of independence between the change in quantities consumed and the state of residence was rejected for eight dairy products, as follows: milk beverage, Dulce de leche, milk powder, fermented milk, pasteurized milk, butter, petit Suisse, and ice cream. Therefore, for these products, relevant differences were observed in the quantities consumed in the various states. Table 1 shows the adjusted residuals for these products.

The most significant dependency of the association between the variables was observed for milk powder, showing the great importance of this product in the North and Northeast regions. Almost all states in these regions showed a strong tendency to maintain the consumption of milk powder, and a weak association with the lack of consumption of this dairy product. Therefore, even

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in the face of an economic crisis, the states of Ceara, Sergipe and Alagoas showed a strong association with the increase in consumption of this product. The importance of milk powder in these regions is confirmed by HBS data 2017-2018, which showed that consumers in the North and Northeast are the largest buyers of milk powder in Brazil, which is about 4 to 5 times higher when compared to consumers in the Southeast region, which is the third region that most purchases this product (IBGE, 2020). The high consumption of milk powder in these regions is due to the greater ease of conservation and transport when compared to UHT milk, in addition to the small production of fresh milk in these locations.

Milk powder was also considered important for the respondents from the state of Goias, with a strong association with maintaining consumption during the pandemic. Goias stands out as the largest consumer of milk powder in the Midwest region (IBGE, 2020). On the other hand, low consumption of this product and low stability of consumption was observed in the states of Rio Grande do Sul and São Paulo.

The second most significant dependency of the association between the change in consumption and location was found for butter. The adjusted residuals showed that this product is not commonly consumed in the southern region, especially in the Rio Grande do Sul. However, it was possible to perceive its importance for the residents of Minas Gerais due to the low association between this state and the lack of consumption habits.

Both fermented milk and pasteurized milk were of great relevance for families in the state of Minas Gerais, with a strong association between maintaining the volume consumed during the pandemic. In contrast, the results revealed a lack of consumption of these products in the state of Rio Grande do Sul.

A significant increase in the consumption of pasteurized milk during the pandemic was observed in the state of Goias. Fermented milk showed low stability of consumption in the states of Ceara and Pernambuco, with a strong association with reduced consumption and a weak association with the maintenance of consumption.

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Dulce de leche proved to be important for consumers in Minas Gerais and the Rio Grande do Sul, who maintained consumption and showed a strong association with the increase in purchase intention of this item. This behavior is due to Dulce de leche is an indulgent product, that is, it is consumed for pleasure. Therefore, stressful events, such as that experienced during the COVID-19 pandemic, can lead to the search for this type of food. In addition, at the beginning of the growth of infected people in Brazil, indulgent products were the most commercialized dairy products (Siqueira et al., 2020). In contrast, this item is not widely consumed in the states of Rio de Janeiro and São Paulo. According to HBS data, these states have a lower per capita consumption of Dulce de leche, second only to some states in the North and Northeast (IBGE, 2020).

Dairy beverages proved to be important for the respondents from the state of Goias, who maintained the consumption during the pandemic. Although strong associations were not observed for ice cream, there was a notable increase in consumption in the states of Ceara and Goias. Despite the consumption of ice cream is lower among the Brazilian population during the cold seasons (Alphagel, 2019), these places remain warm year-round due to the dry periods. In addition, ice cream also falls into the category of indulgent products, which are mostly consumed in times of crisis. Finally, petit Suisse, which is a type of cheese very popular with children (Costa, Maia, Moraes & Tancredi, 2012) appeared as an important product in the states of Rondonia and Minas Gerais, which maintained a significant consumption rate. Among the states considered in the survey, Rondonia has the highest percentage of the population aged 1 to 14 years, corresponding to 25.53% (IBGE, 2012), which suggests the high association between this state and the maintenance of consumption of petit Suisse. The present study found no special reason to explain the strong association between Minas Gerais and the maintenance of consumption of petit Suisse. On the other hand, the state of Ceara exhibited a strong association with the decrease in consumption of this item during the pandemic.

3.3. Association between the determining factors at the time of purchase and the location

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Regarding the second question, which addressed the determining factors in the purchase intention of dairy products during the pandemic (variable 2), most families were concerned with the brand of the product (38.5%), price (30.7%), and quality (19.9%). Other factors such as local companies (4.9%), the company's attitude during the crisis (3.4%), and the nutritional benefits (2.6%) were in the background.

The chi-square test showed a significant dependency of the association between the determining factor at the time of purchase and the respondent's location for eleven of the fourteen dairy products analyzed, including milk beverage, Dulce de leche, yogurt, sweetened condensed milk, milk powder, fermented milk, pasteurized milk, UHT milk, butter, petit Suisse, and cheese (Table 2).

Cheese was the product with the most significant association between the determining factor for purchase and the location. In the state of Minas Gerais, known for its tradition in cheese consumption, there was no association with the price of this product, even during the financial crisis. This finding confirms the importance of cheese for the respondents from Minas Gerais, showing loyalty to local companies and brands. In the Southeast region, the states of Rio de Janeiro and São Paulo showed a significant lack of association with local companies. In comparison with other states, the respondents from Rio de Janeiro were more concerned with the nutritional benefits of this food, which is in line with the reality of a pandemic, once people should pay more attention to the intake of foods with a high nutritional value, such as cheese. On the other hand, the respondents from São Paulo were aware of the actions to stop the pandemic and were concerned with the attitudes of companies when buying cheese.

Parana, Pernambuco, and Distrito Federal also stood out for the actions concerning the consumption of cheese. The respondents from Parana reported a strong association with the price of the product; while the population of Pernambuco showed association with the local company, probably because it is a state that stands out in cheese manufacture. Finally, the respondents from Distrito Federal were not concerned about the brands of these products, focusing their attention on price and quality.

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No strong association between the variables was observed for the other dairy products when compared to cheese, despite also significant. It is worth noting that some factors have shown a considerable association with certain states for most dairy products. There was a strong association between the respondents from São Paulo and Goias and the attitude of companies during the crisis. Although the association was not very significant, these states gave more importance to this issue when compared to the others, demonstrating a more accurate judgment regarding the preventive actions taken by the dairy industry at the beginning of the pandemic.

Concerning the importance given to the nutritional benefits of these foods, the population of Rio de Janeiro stood out. The respondents showed more awareness about the relevance of well-being during a health crisis when compared to consumers in other states. Protein-based foods like milk and dairy products are important sources of the amino acid tryptophan, which helps to regulate sleep, satiety, and energy intake, which are very common problems during stress events caused by social isolation. In addition, dairy products such as yogurt can reduce the risk of respiratory infections (Muscogiuri, Barrea & Savastano, 2020).

The states of Espirito Santo and Pernambuco most considered the local companies when making a purchase decision, which was observed for six of the eleven products, followed by Bahia, which considered this factor for five products. Rondonia also stood out in this issue, valuing the local companies when purchasing pasteurized milk, sweetened condensed milk, and fermented milk. In these federative units, there is the presence of very influential dairy products.

The respondents from the states of São Paulo and Minas Gerais were more loyal to brands they were used to buy. The only exception was milk powder, which was more important in the Northeast states, probably due to the high consumption of this product, as previously mentioned. Greater customer loyalty was observed for the brands of UHT milk, cheese, yogurt, and Dulce de leche in Minas Gerais, while the consumer in São Paulo was loyal to other dairy products. These results support the prestige of the items among the inhabitants of these

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states, which, even in times of crisis, do not replace the preferred brands with others that offer advantages, such as a better price or other factors.

The results found for the price were contradictory. A strong association was expected between the states with low household income and this factor since the low price is the determining factor for low-income consumers when making purchase decisions (Parente, Barki & Kato, 2005). However, the respondents from Distrito Federal, which is the state with the highest household income in Brazil, considered the price when buying food during the crisis when compared to other states, with a strong association for six of the eleven products studied. It is known that Distrito Federal also has the highest Gini coefficient, corresponding to the place with the highest income inequality in the country (IBGE, 2013), which shows a small portion of respondents with very high income, biasing local data. The respondents from the state of Parana were also concerned with the financial impact generated by COVID-19 and gave importance to the price of products at the time of purchase. In addition, the states of Goias and Rondonia showed a strong association with the price of the items for three dairy products in this study.

Regarding the product quality, although it was the third most considered factor by families in the general panorama, no specific association was observed for the states evaluated in the survey.

4. Conclusions

The present study allowed determining the regional differences in the consumers' behavior of dairy products during the pandemic. Changes in the quantity consumed were associated with the status of the dairy product in each state. The consumption remained stable for the products that were considered relevant in the diet, even in the face of a financial crisis, with a strong association with the maintenance or the increase in the amount consumed. A strong association was also observed for the products with little relevance in the dietary habits. Furthermore, strong associations with the decrease in the quantity purchased were not observed.

Regarding the determining factors at the time of purchase, differences were observed for the perception of the importance of the companies' attitudes towards healthy

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eating during the crisis. The respondents from the states of São Paulo and Goias were most concerned with the attitudes of companies towards the pandemic, while the respondents from the state of Rio de Janeiro were more aware of the need for good nutrition to improve the immune system and the importance of a healthy diet during the COVID-19 pandemic.

In addition, the household income was a determining factor in the importance given to brand and price, probably due to the state of São Paulo has the second-highest household income in the country (IBGE, 2018). The respondents from São Paulo state, in most cases, showed a strong association with the brands they were used to buy, with a lack of association with price, even in times of economic crisis. This behavior was also expected in Distrito Federal, which has a higher household income than that of São Paulo, thus families should give importance to brands rather than prices. However, it was not observed probably due to the inequality of income distribution in Distrito Federal, once the state of São Paulo has the second-highest household income and the fourth-lowest Gini index in the country, while Distrito Federal has a higher household income, with a high Gini index, showing a very poor income distribution.

Therefore, the study showed significant differences in the behavior of consumers of dairy products during the COVID-19 pandemic, proving that geographic location was a determining factor in food choices. In a country of continental dimensions like Brazil, with cultural, economic, social, political, and climatic differences, among others, the place of residence was important in the purchase decision of certain dairy products, which may also be observed for other food products and other periods. Further studies are required to better assess these regional differences at other times in the Brazilian economy, to understand more deeply the factors hidden in the regional consumption differences.

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5. References

AGRESTI, A. Categorical Data Analysis. 2nd Edition, John Wiley & Sons Inc., 2002. Hoboken.

AGROemDIA. Dia Mundial do Leite: Brasil se destaca na produção global do setor. (2020). Available in: <https://agroemdia.com.br/2020/06/01/dia-mundial-do-leite-brasil-se-destaca-na-producao-global-do setor/#:~:text=O%20Brasil%2C%20segundo%20a%20Mapa,atr%C3%A1s%20ap enas%20do%20da%20%C3%8Dndia>. Accessed in: 18 November 2020.

ALPHAGEL. Tudo sobre o mercado de sorvetes no Brasil. (2019). Available in: <https://blog.alphagel.com.br/tudo-sobre-o-mercado-de-sorvetes-no-brasil/>. Accessed in: 19 November 2020.

BEZERRA, A. C. V., SILVA, C. E. M. DA, SOARES, F. R. G., & SILVA, J. A. M. Fatores associados ao comportamento da população durante o isolamento social na pandemia de COVID-19. Ciência & Saúde Coletiva, v. 25, n. 1, p. 2411-2421, 2020. DOI:http://dx.doi.org/10.1590/1413-81232020256.1.10792020

BRASIL. Resolução nº 510, de 07 de abril de 2016. Dispõe sobre as normas aplicáveis a pesquisas em Ciências Humanas e Sociais. Diário Oficial [da] República Federativa do Brasil. Brasília, DF, 2016. Available in: <http://conselho.saude.gov.br/resolucoes/2016/Reso510.pdf>. Accessed in: 19 November 2020.

CARVALHO, T. B. DE, JANUÁRIO, É. DE C., MORON, C. R., & SAES, M. S. M. Estratégia e cenários de consumo de leite no Brasil. In Anais. São Paulo: EAD/FEA/USP, 2013. Available in:

Siqueira, K.B.
<http://www.semead.com.br/16semead/resultado/trabalhosPDF/470.pdf>.
Accessed in: 19 November 2020.

COSTA, J. F., MAIA, N. C., MORAES, O. M. G., & TANCREDI, R. C. P. Consumo de queijos petit suisse por crianças: aspectos sobre rotulagem, conservação e propaganda. Higiene Alimentar, v. 26, n. 204/205, p. 182-187, 2012.

Food and Agriculture Organization of the United Nations. FAOSTAT. Roma, 2020: Author.

HEUMANN, C., SHALABH, M.S. Introduction to statistics and data analysis: with exercises, solutions and applications in R. Switzerland: Springer, 2016.

IME-USP. Testes Qui-Quadrado: aderência e independência. (2013). Available in: <https://www.ime.usp.br/~hbolfar/aula_2013/Aula11-QuiquadradoA12012.pdf>. Accessed 17 November 2020.

Instituto Brasileiro de Geografia e Estatística. Pesquisa de Orçamentos Familiares 2017-2018 - POF. Rio de Janeiro, 2020.

MUSCOGIURI, G., BARREA, L., & SAVASTANO, S. Nutritional recommendations for CoVID-19 quarantine. European Jornal of Clinical Nutrition, v. 74, p. 850–851, 2020. https://doi.org/10.1038/s41430-020-0635-2.

OCHOA, C. (2015, 11 de novembro). Amostragem não probabilística: Amostra por bola de neve. Netquest. https://www.netquest.com/blog/br/blog/br/amostra-bola-de-neve.

PARENTE, J. C., BARKI, E. E. R., & KATO, H. T. Consumidor de Baixa Renda: Desvendando as Motivações no Varejo de Alimentos. In Anais. Brasília: XXIX ENANPAD, 2005.

PITAS A.M.C.S. Atuação do nutricionista em saúde pública na promoção da alimentação saudável. Dissertação (Mestrado). Serviços de Saúde Pública: Faculdade de Saúde Pública; 2010.

SIQUEIRA, B. K., NOGUEIRA, T. S., CAMPOS, E. W., SOARES, N. D., MORAES, E. A. P., VILLELA, R. M. M. B., DAVID, J. M. N., & GOLIATT, P. V. Z. C. Análise exploratória da imagem dos lácteos em tempos de coronavírus. Indústria de Laticínios, v. 143, p. 64-66, 2020.

STHDA. Chi-Square teste of independence in R: evaluate the association between two categorical variables. (2016). Available in: <http://www.sthda.com/english/wiki/chi-square-test-of-independence-in-r>. Accessed in: 17 November 2020.

ANEXO

Table 1: Adjusted residuals of the chi-square tests for products in which the null hypothesis of independence between the change in the quantity consumed during the pandemic and the location was rejected.

	Pasteurized milk (7,72E-05)[a]				Milk powder (9,46E-28)			
	I	**D**	**M**	**NC**	**I**	**D**	**M**	**NC**
AL	-0,72	0,78	-0,31	0,26	**3,42****	-0,11	**2,96****	**-5,07****
BA	-0,91	1,49	1,01	-1,27	0,12	-0,41	**6,09****	**-5,96****
CE	0,51	1,47	-0,85	-0,25	**4,02****	1,28	0,04	**-3,23****

	I	D	M	NC	I	D	M	NC
DF	1,84	0	0,05	-1,04	1,49	-0,46	-1,7	1
ES	-1,07	-1,58	-0,97	**2,35***	0,31	-0,5	1,09	-1,03
GO	**3,13***	-1,46	1,86	**-2,67***	-0,75	-1,39	**3,54***	**-2,36***
MG	-1,8	0,85	**3,19***	**-2,54***	-1,9	0,82	-0,95	1,73
MS	0,81	-0,18	1,76	**-2,03***	1,52	0,25	-0,98	-0,11
PE	0,59	1,57	**-2,3***	1,04	**2,18***	0,4	**2,96***	**-4,55***
PR	1,05	0,86	1,75	-2,7	**-2,49***	1,65	0,02	0,71
RJ	-0,71	-0,14	-1,9	**2,27***	-0,07	1,33	-0,05	-0,59
RO	0,47	0,48	-0,94	0,39	1,25	0,82	1,94	**-3,15***
RS	0,11	**-2,1***	**-2,27***	**3,23***	-1,55	**-2,19***	**-3,33***	**5,43***
SC	-0,35	0,47	-1,36	1,24	1,12	1,22	-1,76	0,43
SE	-0,52	-0,51	-0,88	1,39	**3,08***	-1,48	**3,39***	**-4,58***
SP	-0,36	-0,92	**-2,38***	**2,96***	-0,69	-0,94	**-3,32***	**4,24***

	Fermented milk (7,17E-05)				Butter (2,78E-15)			
	I	**D**	**M**	**NC**	**I**	**D**	**M**	**NC**
AL	0,61	-0,82	0,5	-0,33	1,01	-0,38	-0,41	-0,64
BA	0,63	-1,07	-0,66	0,95	0,23	-0,57	0,47	-0,85
CE	-0,74	**2,45***	**-3,04***	1,93	**2,16***	1,74	**-2,2***	-1,25
DF	-1,67	-0,77	-0,13	1,53	0,61	-1,25	0,99	-1,94
ES	-1,2	0,25	-1	1,51	1,33	0,3	-0,79	-1,15
GO	1,17	0,18	0,73	-1,49	0,31	-0,28	0,48	-1,32
MG	1,03	-1,46	**3,51***	**-3,16***	-0,49	-0,16	**2,19***	**-3,63***
MS	0,43	1,8	-0,39	-0,95	-1,02	-0,32	1,06	0
PE	0,01	**3,36***	**-2,47***	0,39	0,72	1,6	-1,63	0,4
PR	0,28	1,13	1,34	**-2,17***	**-2,24***	**2,19***	-1,36	**4,81***
RJ	0,13	1,19	**-2,11***	1,29	0,71	0,62	-0,23	-1,53
RO	0,91	-0,11	0,06	-0,5	0,05	1,04	-0,22	-0,76
RS	-1,4	-0,97	**-3,11***	**4,46***	**-3,13***	0,25	-1,34	**8,57***
SC	1,94	-0,64	0,5	-1,18	-0,06	0,12	-1,59	**3,41***
SE	-1,05	0,02	-0,17	0,73	-0,64	-1,28	1,71	-1,07
SP	-1,1	0,06	-0,44	1,01	**2,15***	-1,6	-0,56	-1,14

	Milk beverage (6,21E-04)				Dulce de leche (7,71E-06)			
	I	**D**	**M**	**NC**	**I**	**D**	**M**	**NC**
AL	0,84	0,43	0,69	-1,44	-0,18	0,75	-0,6	0,21
BA	-0,85	-1,32	0,55	0,75	1,37	-0,65	-1,5	1,14
CE	**2,18***	0,38	-1,52	0,05	0,54	1,71	-1,26	-0,19
DF	**-1,98***	-0,63	-0,17	1,7	-0,44	-0,39	-0,91	1,44
ES	-1,3	-0,64	-1,35	**2,51***	-0,49	1,4	**-2,1***	1,48
GO	1,59	-0,66	**2,47***	**-3,01***	0,3	0,41	1,59	**-2,08***
MG	-0,65	0,91	-0,21	0,03	**2,38***	0,97	1,58	**-3,67***
MS	-0,7	0,42	1,26	-1,13	-1,3	-0,5	1,16	-0,06
PE	0,75	**2,47***	0,2	**-2,15***	-0,26	0,65	0,25	-0,53
PR	-0,18	1,25	0,01	-0,68	-1,46	-0,49	1,94	-0,77
RJ	-1,46	0,92	-1,53	1,83	-1,23	1	**-3,15***	**3,25***
RO	1,61	0,29	1,11	**-2,24***	0,1	-0,63	1,84	-1,5

Siqueira, K.B.

	I	D	M	NC	I	D	M	NC
RS	1,21	-1,5	**2,27***	**-2,08***	0,24	**-1,96***	**3,4****	**-2,28***
SC	0,89	0,74	-0,8	-0,16	-0,46	0,7	0,87	-1,08
SE	0,3	-1,46	1,83	-1,13	1,69	-0,45	-1,31	0,63
SP	0,06	-1,14	**-2,31***	**3,02****	**-2,02***	-1,08	**-3,41****	**5,39****
	Ice cream (1,23E-04)				Petit suisse (7,08E-06)			
	I	**D**	**M**	**NC**	**I**	**D**	**M**	**NC**
AL	1,69	-0,17	0,13	-1,25	1,77	-0,86	1,57	-1,67
BA	0,34	0,39	-0,87	0,37	0,16	-0,9	-1,11	1,48
CE	**2,7****	-1,6	0,06	-0,53	1,77	**3,06****	**-3****	-0,04
DF	0,78	-1,61	0,16	0,83	0,74	1,62	-1,56	0,05
ES	0,56	-0,35	-1	1,07	-1,12	0,2	-0,88	1,17
GO	**2,71****	-0,09	0,25	**-2,25***	-0,96	**2,1***	**2,19***	**-2,83****
MG	**-2,87****	0,33	-0,75	**2,7****	0,89	-0,72	**3,17****	**-2,79****
MS	-0,94	-0,72	**2,52***	-1,5	0,11	-0,25	0,7	-0,52
PE	1,05	**1,97***	-1,59	-0,9	1,67	1,2	-1,91	0,19
PR	-1,48	1,29	1,38	-1,75	0,11	0,64	-1,43	0,82
RJ	**2,16***	0,48	**-2,86****	1,21	-0,8	0,81	**-2,86****	**2,42***
RO	-0,93	0,16	**2,27***	**-2,09***	-1,31	-0,21	**3,17****	**-2,09***
RS	-0,66	-0,15	1,24	-0,79	0,65	-1,14	-1,57	1,81
SC	**-2,1***	1,22	0,31	0,01	-0,82	1,65	-1,24	0,45
SE	-0,03	**-2,3***	-0,17	**2,49***	-1,1	-1,12	0,15	1,06
SP	1,38	-0,3	0,19	-0,97	-1,47	**-2,15***	0,22	1,82

I: Increased.

D: Decreased.

M: Maintained.

NC: I'm not used to consuming.

* Indicates associations with significance level of 5%.

** Indicates associations with significance level of 1%.

[a] The values in parentheses next to the product names indicate the p-value resulting from the chi-square test.

Table 2: Adjusted residuals of the chi-square tests for products in which the null hypothesis of independence between the determining factors at the time of purchase and the location was rejected.

	Pasteurized milk (9,7E-08)[a]						UHT milk (2,64E-07)					
	CA	**NB**	**LC**	**B**	**P**	**PQ**	**CA**	**NB**	**LC**	**B**	**P**	**PQ**
AL	1,39	1,07	0,03	-1,87	0,86	0,15	0,78	0,61	-0,86	-0,08	0,2	-0,32
BA	-1,92	0,45	**2,69****	0,06	-1,02	-0,41	-1,06	0,77	**2,05***	0,7	-0,88	-0,67

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	CA	NB	LC	B	P	PQ	CA	NB	LC	B	P	PQ
CE	-0,45	0,12	1,61	-1,41	1,34	-0,91	-0,63	-0,22	1,33	-0,62	-0,41	0,97
DF	0,39	1,21	**-2,6****	-1,02	1,08	1,28	0,72	-0,4	-1,19	-0,54	1,14	-0,27
ES	-0,27	0,37	**2,17***	-1,6	-0,56	0,77	-0,16	0,4	**4,75****	**-2,48***	-0,26	0,86
GO	0,84	-0,9	-0,32	**-2,83****	**3,2****	0,12	1,73	-1,24	0,46	**-2,65****	1,16	1,33
MG	-0,69	**-2,4***	1,75	1,38	-0,03	-1,53	**-2,11***	-0,39	-1,73	**2,74****	-0,68	-0,53
MS	-1,3	**2,29***	1,93	1,32	-1,03	-2,4	0,88	-0,22	0,62	0,55	-0,71	-0,49
PE	1,09	-1,43	**2,3***	0,63	-0,8	-1,43	1,32	-1,22	1,01	1,58	-1,12	-1,3
PR	-0,77	-1,57	-0,53	-1,28	0,75	**2,14***	-1,37	0,06	1,95	-1,36	**1,97***	-1,05
RJ	-0,84	**3,21****	**-2,33****	-0,45	1,03	0,06	-1,51	**4,06****	-1,06	**-2,29***	1,53	0,67
RO	-0,45	-0,63	**2,52***	-0,22	0,71	-1,95	0,68	-1,2	1,75	-0,12	0,49	-1,19
RS	-0,84	0,19	0,6	-0,11	-0,07	0,01	-0,7	-1,55	1,64	0,57	-0,43	-0,09
SC	1,04	0,07	-0,22	-1,15	-0,15	1,21	1,68	-0,78	0,21	-1,92	0,99	0,6
SE	-0,32	0,3	1,53	0,11	-1,4	0,23	0,96	-0,18	**3,58****	-1,3	-0,52	0,01
SP	**2,39***	1,38	**-4,41****	**2,89****	**-2,66****	1,24	**2,31***	0,78	**-3,96****	1,23	-1,62	1,04

	Milk powder (5,75E-06)						Sweetened condensed milk (7,16E-03)					
	CA	NB	LC	B	P	PQ	CA	NB	LC	B	P	PQ
AL	0	-0,72	0,25	-0,43	0,97	-0,36	0,89	-0,74	0,63	**-2,02***	1,08	0,78
BA	-0,37	-1,32	0,5	**2,33***	-1,15	-0,98	0	-1,1	0,1	0,46	-0,57	0,35
CE	-0,8	-0,1	0,15	1,54	-0,82	-0,6	-1,36	0,68	-0,23	0,63	0,17	-0,47
DF	0,4	0,82	-0,51	-0,89	1,43	-0,9	1,62	**2,46***	-1,17	-1,8	1,14	-0,01
ES	0,14	0,14	**5,34****	-0,74	**-2,53***	1,39	1,05	0,74	1,7	-1,26	-0,98	1,5
GO	**2,7****	-0,77	0,06	-0,87	0,65	-0,6	1,79	-0,56	0,95	**-2,14***	1,56	-0,23
MG	-0,75	-0,56	-1,4	0,33	0,15	0,63	-1,09	-0,83	-0,11	0,77	-0,16	-0,05
MS	-0,44	1,21	-0,26	0,83	-0,28	-0,96	0,15	0,66	0,66	0,51	-0,21	-0,87
PE	0,63	-0,78	0,94	**2,2***	**-2,47***	-0,21	0,18	-0,73	0,68	1,18	**-2,1***	0,92
PR	**-2,06***	0,79	-0,15	-1,51	1,83	0,41	-1,42	-1,05	0,66	1,33	-0,58	-0,32
RJ	-1,66	**3,08****	-1,84	-0,34	0,02	0,53	-0,89	**2,47***	-1,66	-0,25	-0,66	1,54
RO	-0,05	-0,05	-0,58	0,17	0,78	-0,81	0,06	-0,76	**2,3***	**-2,56***	**2,67****	-0,76
RS	-1,95	-0,85	**3,95****	-1,15	0,33	0,65	-1,5	0,17	0,16	0	0,18	0,35
SC	**2,42***	0,02	1,63	**-2,37***	0,3	0,73	0,66	-0,94	1,39	**-3,07****	1,8	1,08
SE	-0,66	-1,41	0,33	**2,15***	-1,15	-0,51	0,23	-0,71	1,66	-0,53	1,23	-1,41
SP	**2,52***	0,28	**-2,36***	0,42	-0,61	-0,11	1,41	0,36	**-2,28***	**2,75****	-1,74	-1,2

	Fermented milk (5,76E-04)						Cheese (1,08E-13)					
	CA	NB	LC	B	P	PQ	CA	NB	LC	B	P	PQ
AL	0,32	0,31	-0,32	-1,76	-0,11	**2,19***	0,4	-1,03	1,06	-1,36	0,89	0,15
BA	-1,38	0,26	0,02	-0,75	0,17	1,28	-0,26	0,44	**2,23***	0,27	0,9	**-2,68****
CE	0,35	**2,78****	-0,3	-0,72	0,64	-1,23	-0,48	0,91	1,39	-0,61	0,36	-0,65
DF	0,69	1,55	-0,31	**-2,24***	**2,52***	-1,14	0,3	0,77	-1,53	**-3,88****	**2,61****	**2,45***
ES	-0,39	-0,4	1,61	-0,69	-0,02	0,57	1,29	-1,01	1,64	0,44	-1,68	-0,01
GO	**2,4***	-1,15	-0,83	-1,42	**2,16***	-1,04	1,01	-1,29	-0,09	-1,68	**2,04***	-0,06
MG	-1,84	-1,54	0,14	0,79	0,86	-0,48	-0,58	-0,3	**2,13***	**2,75****	**-4,86****	0,72
MS	-0,54	1,03	-0,36	1,05	-0,94	-0,27	-1,23	1,04	1,15	-1,17	-0,16	0,92
PE	0,83	0,07	1,93	1,17	**-2,05***	-0,29	-0,49	-0,08	**4,13****	0,58	-1,74	-1,3
PR	-0,67	-0,34	0,17	-0,82	0,93	0,32	**-2,08***	-0,93	0,13	-1,6	**3,57****	-0,82
RJ	-0,57	1,68	-1,21	-0,84	0,57	0,38	-1,92	**4,13****	**-3,02****	-1,33	1,53	1,35

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	CA	NB	LC	B	P	PQ	CA	NB	LC	B	P	PQ
RO	0,97	-1,36	**2,11***	0,8	-0,5	-1,14	0,35	-1,04	1,91	-1,29	**2,8***	**-2,38***
RS	-0,98	0,9	0,65	-1,23	0,97	0,13	-1,07	-1,95	0,04	0,93	1,11	-1,24
SC	0,09	-1,75	1,7	-1,04	-1,09	**2,67***	1,09	-1,28	-0,57	-0,98	0,39	1,08
SE	-0,51	-1,32	1,39	0,27	0,74	-0,96	0,58	-0,96	0,89	-0,95	1,18	-0,59
SP	**2,38***	0,82	**-2,08***	**3,55***	**-4,28***	0,05	**2,88***	1,24	**-4,97***	**2,34***	-1,34	0,38

	Yogurt (4,84E-08)						Butter (5,04E-09)					
	CA	NB	LC	B	P	PQ	CA	NB	LC	B	P	PQ
AL	0,34	-0,7	0,59	-1,32	0,26	1,24	0,33	**3,2***	0,43	-0,29	-0,99	0,1
BA	-0,29	0,31	**3,87***	0,94	-0,93	**-2,01***	-0,33	1,3	**3,31***	-1,09	0,94	-1,87
CE	-1,27	1,53	**2,03***	-0,4	-0,3	-0,32	-1,29	0,06	1	-1,08	1,34	-0,23
DF	0,65	-1,13	-0,58	**-2,71***	**2,24***	1,5	-0,35	0,87	-1,8	**-2,14***	**2,2***	1,11
ES	0,42	-1,4	**2,84***	1,22	-1,46	-0,85	1,17	-0,98	**3,93***	-0,18	-1,21	-0,83
GO	**2,34***	-0,9	-0,71	-1,76	-0,25	**2,19***	0,84	-0,62	-0,5	-1,84	0,82	1,52
MG	-0,45	-1,46	-1,02	**2,18***	-1,49	0,19	-0,67	-1,26	1,77	0,11	-0,71	0,32
MS	-1,21	0,96	0,79	-0,34	0,74	-0,65	-0,39	1,24	0,01	-0,53	-0,01	0,44
PE	0,24	1,35	**3,85***	1,36	**-2,48***	-1,59	-0,5	1,08	**3,8***	0,38	-1,93	-0,61
PR	**-2,17***	0,82	-0,18	**-2,36***	**4,19***	-0,85	-1,4	-0,27	-0,2	-1,86	**3,64***	-1
RJ	-0,52	**2,74***	**-2,37***	-1,39	1,65	0,08	-0,71	1,52	**-2,01***	0,03	0,84	-0,02
RO	1,06	-0,05	0,5	-0,34	1,89	**-2,17***	1,11	-0,99	-0,75	0,9	1,25	**-2,24***
RS	-1,13	0,68	-0,95	1,6	-1,45	0,15	0,17	0,26	0,43	0,3	-0,78	0,1
SC	0,95	-1,24	0,87	-1,15	-0,01	1,18	0,4	-0,35	0,52	**-2,61***	1,05	1,74
SE	0,5	-0,58	1,53	-0,91	0,74	-0,31	1,33	-0,93	0,64	-0,14	0,38	-0,87
SP	1,19	0,52	-1,79	1,17	-1,32	0,05	1,33	-0,7	**-4,61***	5	**-3,72***	0,23

	Milk beverage (1,05E-03)						Dulce de leche (2,05E-06)					
	CA	NB	LC	B	P	PQ	CA	NB	LC	B	P	PQ
AL	0,87	-1,37	1,4	-1,61	-0,97	**2,65***	-0,57	1,62	-0,07	**-2,6***	1,49	1,27
BA	0,2	1,37	1,54	0,81	-1,48	-0,76	-0,41	1,26	1,28	0,19	-0,71	-0,38
CE	0,26	0,31	-0,64	0,43	-0,18	-0,26	-1,38	1,55	-0,72	-1,9	**2,87***	-0,25
DF	0,62	0,71	-0,92	**-2,72***	**3,4***	-0,88	-0,32	**3,24***	-0,13	**-3,38***	**2,06***	1,04
ES	-0,38	-1,21	1,95	**-2,13***	1,5	0,6	-0,52	-0,82	1,81	-1,22	0,71	0,06
GO	1,44	-1,12	-0,55	-0,83	-0,15	1,31	1,66	-0,78	-0,21	-1,87	1,63	0,04
MG	-0,81	0,06	-0,46	-0,31	0,08	0,89	0,24	-2,17	1,62	**3,68***	**-3,75***	-0,72
MS	1,23	-0,4	1,04	-1,02	0,58	-0,37	0,37	0,5	0,12	-0,9	0,67	-0,05
PE	-0,03	0,75	**3,25***	0,2	-1,4	-0,56	-0,71	-0,9	**3,55***	0,98	-1,6	-0,93
PR	**-2,07***	0,17	1,1	-0,68	**2,58***	-1,87	-1,35	0,86	-1,58	-0,2	1,03	0,41
RJ	-0,65	**2,6***	**-2,14***	-0,92	1,33	-0,3	0,68	**4,09***	-1,98	-1,43	1,59	-0,33
RO	0,79	0,85	-0,09	0,81	-0,25	-1,43	0,85	0,31	-0,21	-1,23	**2,34***	-1,38
RS	-0,72	0,09	-0,34	1,78	-1,28	-0,19	-1,74	-0,85	-0,83	1,74	-0,31	-0,2
SC	0,14	-1,69	1,13	-0,65	-0,82	1,93	0,07	-1,09	0,36	0,36	-0,35	0,03
SE	0,2	-0,54	1,54	0,2	-0,38	-0,4	-0,45	-0,79	0,74	-1,21	1,69	-0,41
SP	1,15	-0,98	-1,81	**2,98***	**-2,14***	-0,29	1,7	-1,43	-1,67	0,05	-0,54	1,13

	Petit suisse (2,71E-03)					
	CA	NB	LC	B	P	PQ
AL	-0,74	-0,17	-0,55	-0,41	-0,56	1,89
BA	0,6	-0,18	-0,71	-1,67	-0,27	**2,42***

Siqueira, K.B.

	CA	NB	LC	B	P	PQ
CE	-0,5	1,1	-0,32	-0,11	0,85	-0,92
DF	0,32	1,28	-0,1	-0,78	1,62	-1,67
ES	-0,5	0,05	**3,2****	-1,52	-0,18	0,75
GO	1,92	-1,47	-0,15	-0,77	1,76	-1,56
MG	-1,32	-0,09	-0,26	0,98	-0,45	0,22
MS	0,92	-1,05	0,41	-0,88	0	0,8
PE	0,63	0,7	0,95	0,32	-0,47	-0,87
PR	**-1,97***	-0,32	0,3	-1,66	**2,95****	-0,61
RJ	-0,5	**2,93****	-1,46	-1,09	1,15	-0,32
RO	1,39	-1,12	1,77	0,42	-0,36	-1,17
RS	-0,64	-1,45	0,64	0,07	0,74	-0,37
SC	0,43	-0,67	**2,05***	-0,41	-1,73	1,66
SE	0,15	-0,05	1,25	-1,55	1,31	-0,39
SP	1,64	0,33	-1,94	**3,37****	**-3,84****	0,61

CA: Company attitude during the crisis.

NB: Nutritional benefits.

LC: Local company.

B: Brand that I'm used to buy.

P: Price.

PQ: Product quality.

* Indicates associations with significance level of 5%.

** Indicates associations with significance level of 1%.

[a] The values in parentheses next to the product names indicate the p-value resulting from the chi-square test.