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## **PRICE VARIATION AND AVAILABILITY OF FISH DURING HOLY WEEK IN DOURADOS, MATO GROSSO DO SUL: A UNIVERSITY EXTENSION ACTION**

**VARIAÇÃO DE PREÇOS E DISPONIBILIDADE DE PESCADOS DURANTE A SEMANA SANTA EM DOURADOS, MATO GROSSO DO SUL: UMA AÇÃO DE EXTENSÃO UNIVERSITÁRIA**

**VARIACIÓN DE PRECIOS Y DISPONIBILIDAD DE PESCADO DURANTE LA SEMANA SANTA EN DOURADOS, MATO GROSSO DO SUL: UNA ACCIÓN DE EXTENSIÓN UNIVERSITARIA**

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**Abstract:** Fish processing can add value by offering an essential product for human consumption, especially during Holy Week in Brazil. In this context, the objective was to investigate, within the scope of extension activities, the price variation of processed fish products in supermarkets in the city of Dourados, MS. Variables such as brand, price, weight, type of product, and market were collected for analysis using arithmetic operations and graphical visualization with the RStudio software. Factors such as location and costs may influence these variations. Additionally, more exotic fish products, such as alligator sausage and fish roe, have higher prices, while the prices of ultra-processed products, such as breaded fish, are the most prevalent. Fish brands processed and packaged in other regions of the South were the most economically accessible, whereas brands from the Midwest region presented higher prices. This price variation may be related to the quality and perceived value of the product by consumers. Therefore, we observed that fish prices vary in markets, influenced by special dates, location, and product quality.

**Keywords:** Fish consumption, Nutrition, Processed foods.

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**Resumo:** O processamento de pescados pode agregar valor, oferecendo um produto essencial para consumo humano, especialmente na Semana Santa no Brasil. Com isso, o objetivo foi investigar, no âmbito da extensão, a variação de preços de pescados processados em hipermercados da cidade de Dourados, MS. Foram coletadas variáveis como marca, preço, peso, tipo de produto e mercado para análise de operações aritméticas e visualização gráfica utilizando o software RStudio. Fatores como localização e custos podem influenciar essas variações, além dos produtos de pescados mais exóticos, como linguça de jacaré e ovas de peixe, têm preços mais altos, enquanto os preços dos ultraprocessados como empanados são os mais prevalentes. Marcas de pescado beneficiadas e processadas em outras regiões do Sul foram as mais acessíveis economicamente, enquanto as marcas da região Centro-Oeste apresentam preços mais elevados. Essa variação em relação ao preço pode estar relacionada com a qualidade e o valor percebido pelo consumidor. Logo, verificou-se que há uma variação de preços de pescados nos mercados, mas este pode ser influenciado devido a datas especiais, localização e a qualidade do produto.

**Palavras-chave:** Alimentos processados, Consumo de peixe, Nutrição.

**Resumen:** El procesamiento de pescados puede agregar valor al ofrecer un producto esencial para el consumo humano, especialmente durante la Semana Santa en Brasil. En este contexto, el objetivo fue investigar, en el ámbito de las actividades de extensión, la variación de precios de productos pesqueros procesados en hipermercados de la ciudad de Dourados, MS. Se recopilaron variables como marca, precio, peso, tipo de producto y mercado para su análisis mediante operaciones aritméticas y visualización gráfica utilizando el software RStudio. Factores como la ubicación y los costos pueden influir en estas variaciones. Además, los productos pesqueros más exóticos, como la salchicha de caimán y las huevas de pescado, tienen precios más altos, mientras que los productos ultra procesados, como los empanizados, son los más prevalentes. Las marcas de pescado procesadas y empaquetadas en otras regiones del Sur fueron las más accesibles económicamente, mientras que las marcas de la región del Centro-Oeste presentaron precios más elevados. Esta variación de precios puede estar relacionada con la calidad y el valor percibido por los consumidores. Por lo tanto, observamos que los precios de los pescados varían en los mercados, influenciados por fechas especiales, ubicación y calidad del producto.

**Palabras clave:** Alimentos procesados, Consumo de pescado, Nutrición

## INTRODUCTION

Fish is a widely consumed food worldwide. In 2022, approximately 223.2 million tons of fish and other aquatic foods were consumed, equivalent to about 20.7 kg of aquatic food per person, and this consumption is expected to increase by 10% by 2032, as we may reach approximately 8.5 billion people by 2030 (FAO, 2024). In Brazil alone, fish intake is 9 kg per inhabitant per year (BRAZIL, 2024). This is because it is a highly nutritious food, with vitamins, minerals, good fats, and serves as a very rich source of protein (CORTÉS-SÁNCHEZ et al., 2024; FAO, 2024).

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However, despite these economic and environmental challenges, the Municipality of Dourados, MS, is considered one of the centers for national fish farming, having reached 4th position in the state's fish production ranking in 2022, producing 4,860 thousand fingerlings. This is due to the edaphoclimatic conditions, clay-rich soils, flat relief, and having the necessary structure for the development of the activity (SILVA et al., 2017; DUTRA et al., 2018; IBGE, 2023). Furthermore, the Dourados region has the largest area of water used for raising fish, such as pacu and pintado (SILVA et al., 2017; VALENTI et al., 2021).

These factors—climate, relief, soil—provide the necessary conditions for small and large producers and, consequently, boost the region's fish trade, where wholesalers, hypermarkets, supermarkets, and fishmongers are available, in addition to small markets that occasionally make the product available to their customers (DUTRA et al., 2018). Of the commercialized production, 50% is fresh fish, 30% sells live or dead fish, and 20% is processed, and 70% sells whole fish with viscera, while the rest is sold in cuts or prepared (SILVA et al., 2017). In the context of extension activities, this scenario reinforces the importance of initiatives that connect producers, traders, and consumers, promoting the sustainable development of fish farming in the region.

Based on this context, during Good Friday and/or Lent (Sexta-feira Santa), important dates for Catholicism, which commemorate the crucifixion of Jesus Christ, fish consumption can increase significantly, which is important for boosting the fish farming market, as fish is a symbol of spiritual and miraculous nutrition for religious people, so much so that the commercialization of beef, pork, and others is reduced (VALENTINI et al., 2021; DA ROCHA et al., 2024).

Considering this scenario, this extension practice aims to explore the sale of processed fish in hypermarkets in Dourados, MS, in terms of price variation, quality, and diversity of products sold, during Holy Week.

This extension action provides insights into market dynamics and possible economic impacts for local consumers and traders, and can serve as a basis for consumers to consult in terms of fair prices, quality, and diversity of the processed fish product during the Holy Week demand. Furthermore, the research seeks to identify trends, adjust commercial strategies, and promote policies that ensure the accessibility and food security of the population of Dourados, MS.

## MATERIALS AND METHODS

The execution of this extension activity was conducted in Dourados, MS, during Holy Week of 2024. Currently, Dourados has more than 29 commercial establishments in the food sector, including several hypermarkets (Table 1).

The hypermarkets selected for the processed fish research were: Atacadão, Assaí, Amigão, Abevê, Comper, and Leve Max. These supermarkets were chosen due to the ease of finding a wide variety of items, including processed, canned, fresh, and salted fish.

The variables selected for the extension analysis were: Product brand, Price, Weight in grams, processed product specification, market where the processed product is sold and processed fish species.

**Table 1.** Analysis of processed fish in supermarkets or hypermarkets.

Hypermarkets	Brand	Price (R\$)	Weight (g)	Processed Product	Species
Assaí	Costasul	2,35	100	steak	Tilápia
Assaí	Copacol	32,9	1500	breaded	Tilápia
Assaí	Copacol	21,9	300	breaded	Tilápia
Assaí	Copacol	25,9	400	breaded	Tilápia
Atacadão	Bom Porto	28,9	360	fritter	Bacalhau
Comper	Copacol	22,9	300	breaded	Tilápia
Comper	Copacol	29,79	400	breaded	Tilápia
Comper	Copacol	32,9	1500	breaded	Tilápia
Comper	Copacol	2,95	100	steak	Tilápia
Comper	Caldos Corujao	11,99	500	soup	Pintado e Camarão
Comper	Caldos Corujao	11,95	500	soup	piranha caldo
Comper	Tobiko	59,9	900	roe	Tilápia
Comper	Damm	22,99	1200	cream	Salmão
Comper	Damm	33,99	360	hamburger	Salmão
Comper	Caiaamasul	66,9	500	sausage	Jacaré
Comper	Damm	39,9	330	shell	Siri
Comper	Mar e Rio	61,75	350	breaded	Camarão
Amigão	Ocean	33,69	300	fritter	Bacalhau
Amigão	Copacol	22,89	300	breaded	Tilápia
Amigão	Copacol	32,89	1500	breaded	Tilápia
Amigão	Copacol	27,89	400	breaded	Tilápia

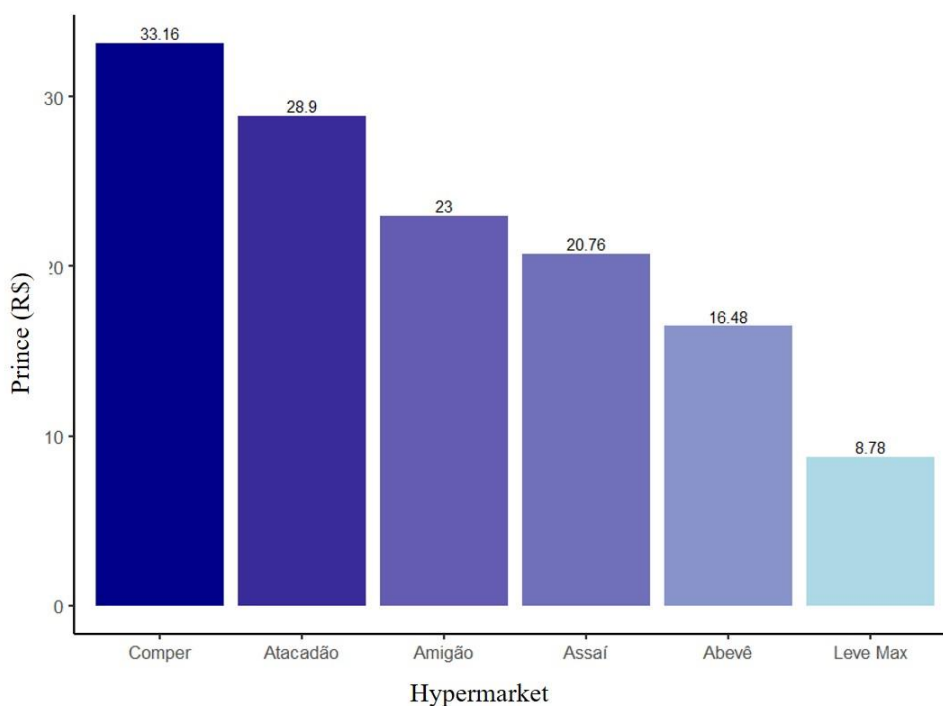
Amigão	Copacol	2,65	100	steak	Tilápia
Amigão	Copacol	17,99	460	pizza	Tilápia
Leve Max	Costasul	8,78	300	breaded	Tilápia
Abevê	Costasul	2,48	100	steak	Tilápia
Abevê	Costasul	8,98	300	breaded	Tilápia
Abevê	Mar e Rio	37,99	360	fritter	Bacalhau

Source: Authors, 2024.

For the investigation of processed fish price variation in different hypermarkets within the municipality, we selected arithmetic operations, such as mean, minimum, and maximum values. The calculation of these operations and their graphical visualization were performed using the R language (R Core Team, 2023).

## RESULTS AND DISCUSSION

A large variation was found in both price and product diversity across the six sampled hypermarkets. Regarding the average price of processed fish, there was variation among the hypermarkets; Comper and Atacadão had the highest average prices, R\$33.16 and R\$28.9, respectively, while Leve Max presented the lowest average price, R\$8.78 (Figure 1).



**Figure 1.** Average price of processed fish products across hypermarkets in Dourados, MS during Holy Week 2024.

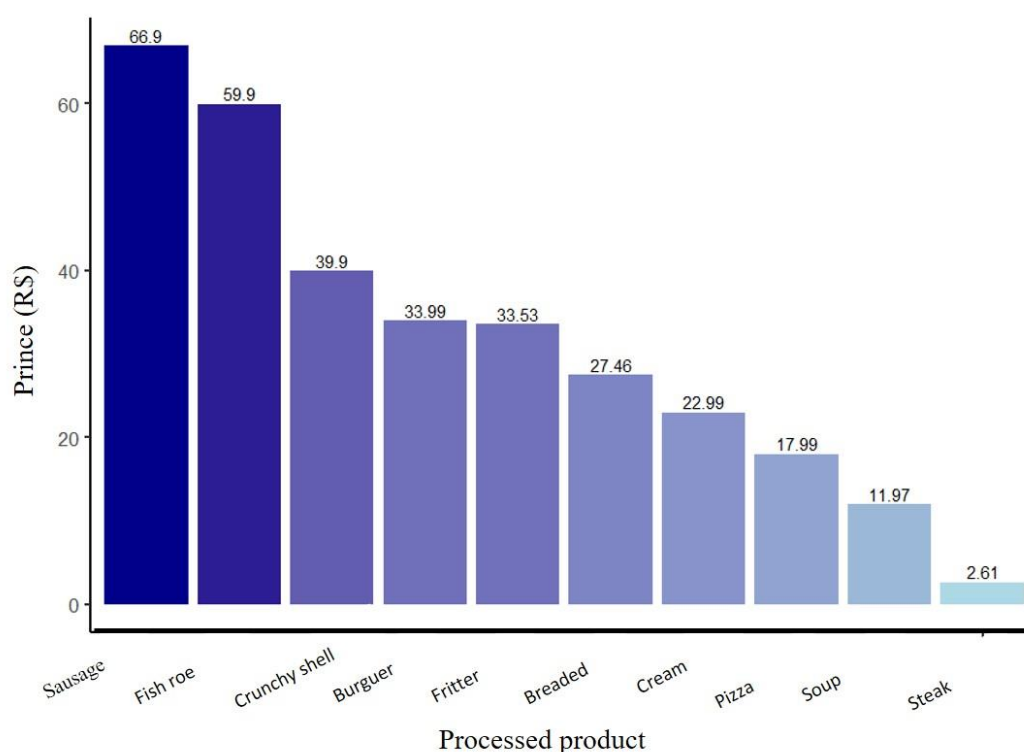
Source: Authors, 2024.

According to economic experts, several factors can influence product pricing in hypermarkets, such as transportation and storage costs, advertising expenditures, employee wages, and hypermarket location (LARASWATI et al., 2016). It is pertinent to note that Comper is a strategically well-located market, attracting a more affluent clientele. Conversely, Leve Max is situated in peripheral neighborhoods, offering more accessible prices and primarily serving individuals with lower purchasing power.

Moreover, Comper's extensive product variety reflects this disparity, as consumers with limited financial resources are unable to purchase high-value products. Were these products to be sold in hypermarkets located in less affluent neighborhoods, the low demand would likely result in economic losses due to waste, thereby negatively impacting business profitability.

This price variation may pose a challenge for lower-income individuals to purchase processed fish, potentially affecting their ability to maintain a healthy diet (TEH et al., 2024). This is a matter of concern given that fish constitutes a significant source of protein (VALENTI et al., 2021). Limited access to fish can therefore compromise food security and dietary quality.

Regarding the average price of different types of processed fish, it was observed that alligator sausage, fish roe, crab shells, and codfish cakes exhibited the highest average market prices, at R\$66.9, R\$59.9, R\$39.9, and R\$33.53, respectively (Figure 2).



**Figure 2.** Average prices of processed fish products, categorized by product type, in Dourados, MS during Holy Week 2024.

Source: Authors, 2024.

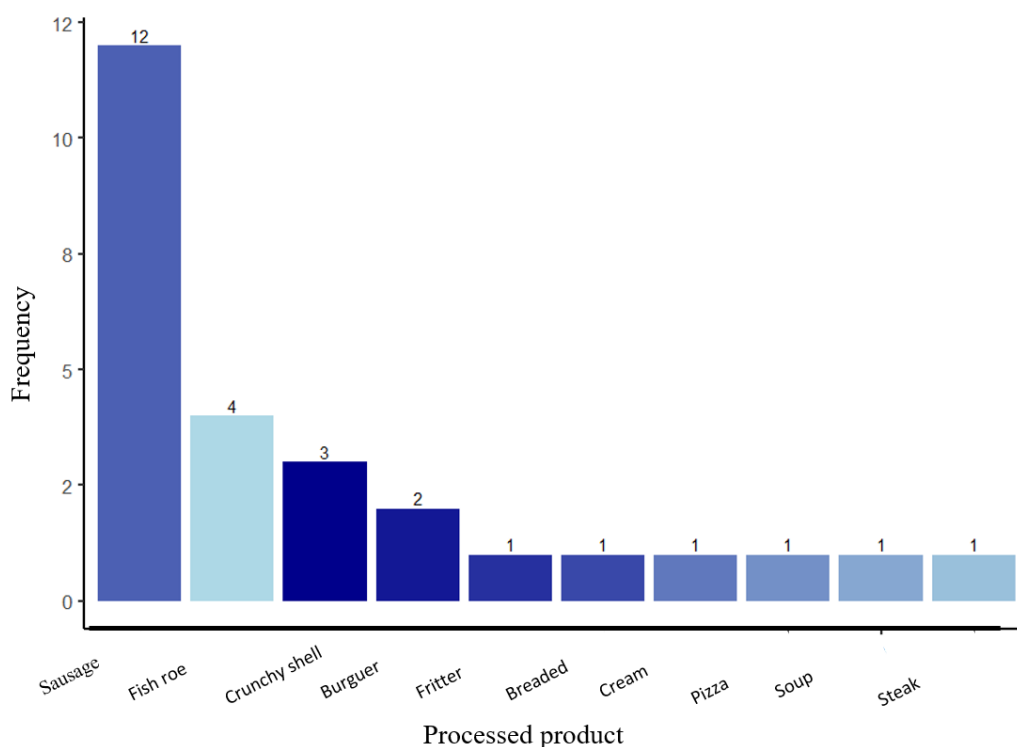
Products such as alligator sausage and cod stand out due to their elevated prices, as evidenced in the graph, attributable to their relative scarcity and complex import processes. Alligator meat, for instance, is difficult to obtain due to the limited number of available farms, necessitating importation from other regions.

Similarly, cod, a saltwater fish inhabiting the frigid northern seas at depths of up to 200 meters, also requires importation, thereby justifying its high market cost. Conversely, the steaks presented in the graph exhibit significantly lower values, being widely consumed, ready-to-cook products, which contributes to their greater economic accessibility.

The variation in product values is attributable to the fact that less common species, such as alligator, crab, cod, and fish roe, command higher prices, potentially classifying them as premium products (Clouette, 2022).

Furthermore, the additional cost associated with processing pre-cooked, seasoned, or more elaborately prepared products is generally higher (Julie, 2014). Moreover, when disregarding price values, a predominance of "breaded" and "steak" products is observed, with 12 and 4 occurrences, respectively.

Other items, such as "fritters", "broths," "shells" (referring to crab shells), and "cream," were found in smaller quantities, with 3, 2, 1, and 1 occurrence, respectively (Figure 3).

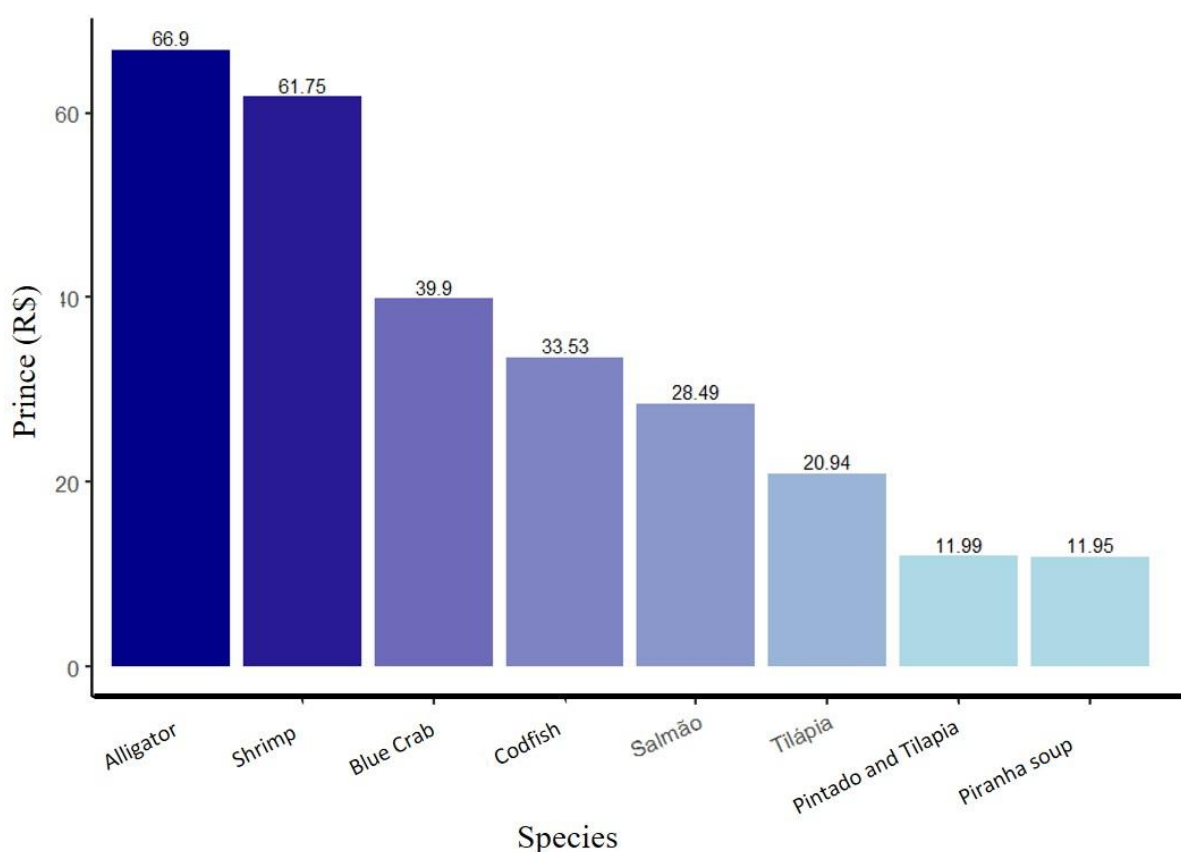


**Figure 3.** Frequency of processed fish products by product category in Dourados, MS during Holy Week 2024.

Source: Authors, 2024.

It is noteworthy that the availability of food products such as breaded items and steaks is considerably greater compared to shrimp and other products requiring more complex preparation. This phenomenon can be attributed to the fact that individuals, due to their demanding daily routines, seek food items that offer a favorable cost-benefit ratio and are easy to prepare.

Upon analyzing the average price of processed fish by fish type, it was observed that alligator meat was marketed at an average of R\$66.90, followed by shrimp at R\$61.75, crab at R\$39.99, and cod at R\$33.53. Conversely, the more accessible meats were piranha, pintado (a type of catfish), shrimp, and tilapia at R\$11.95, R\$1.99, and R\$20.94, respectively (Figure 4).



**Figure 4.** Average price of fish by species in Dourados, MS during Holy Week 2024.

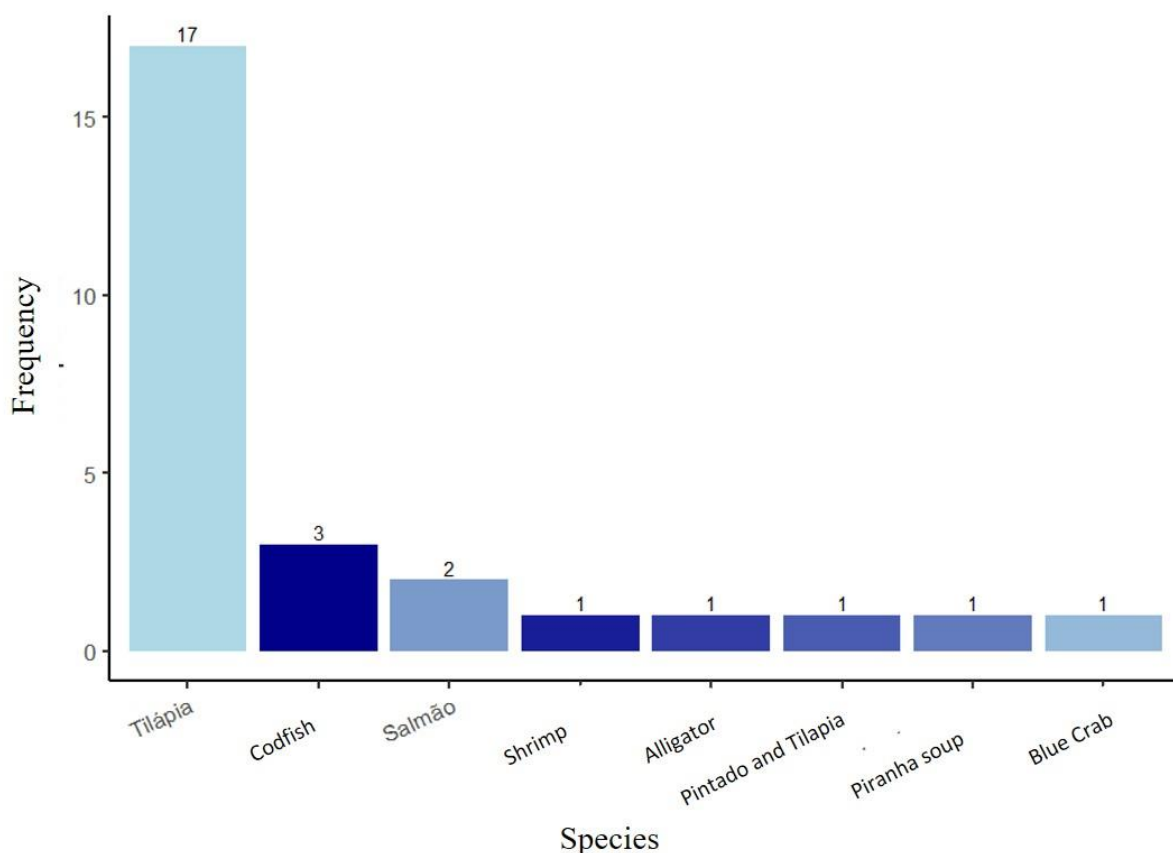
Source: Authors, 2024.

Despite the fact that the more premium fish were, on average, more expensive than others, tilapia was the most frequently found, with 17 occurrences, followed by cod with 3 occurrences, and salmon with 2 occurrences. Other types of fish, such as shrimp, alligator and pintado and shrimp, were found in smaller numbers, with one occurrence each (Figure 5).



Alligator meat is rarely commercialized; however, in the state of Mato Grosso, there is a company located in the Pantanal that is dedicated to the production of this meat. The region presents favorable environmental conditions that enable such activity (DE LIMA et al., 2023).

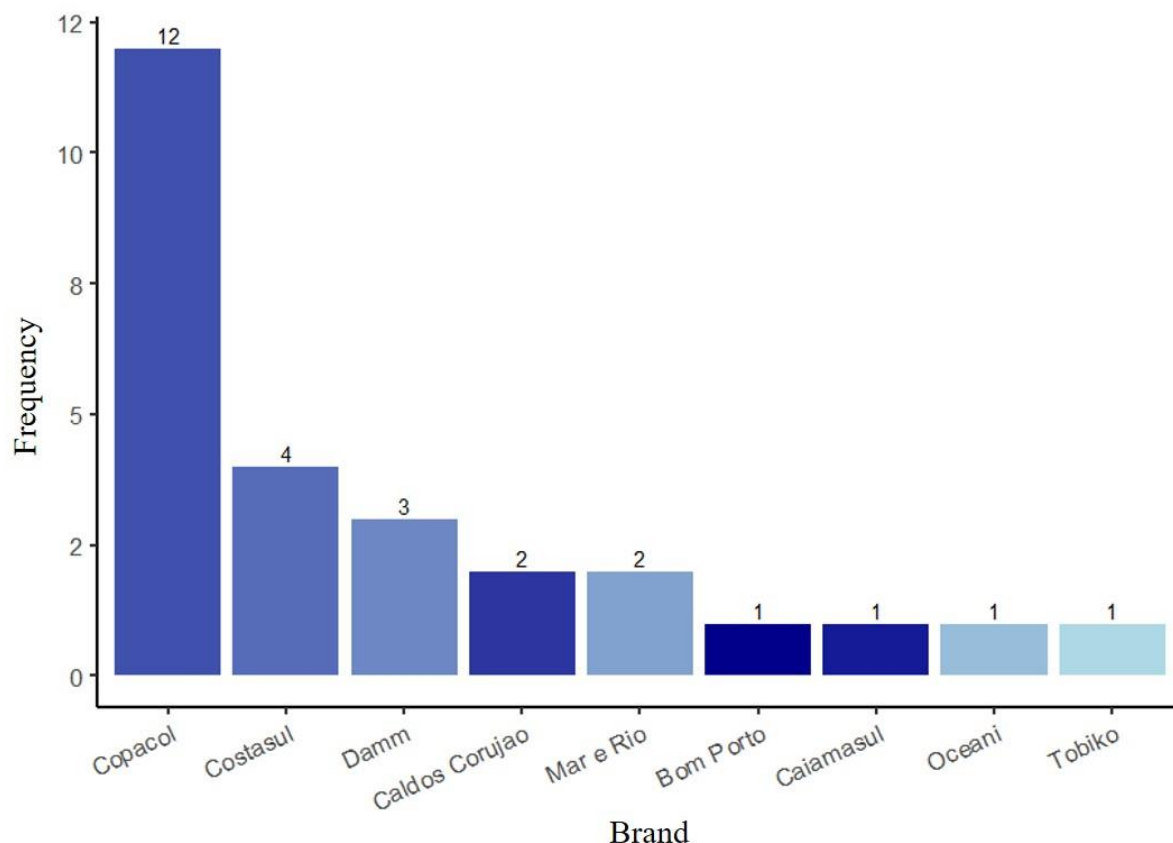
It was observed that unbranded processed fish products show the highest frequency, totaling 12 occurrences, followed by "Costasul," which appears 4 times, and finally "Damm," with 3 occurrences. Other brands, such as "Caldos Corujão," "Mar e Rio," and "Bom Porto," appear with less frequency (Figure 6). These brands can be the target of studies in extension projects, aiming to understand their influence on the local market.



**Figure 5.** Frequency of processed fish species consumed in Dourados, MS during Holy Week 2024.

Source: Authors, 2024.

Copacol, despite being more visible in our results, is not located in Dourados but rather in Campo Grande, MS, approximately 259 km away. The brand recognition, product excellence, availability of processing for poultry, beef, fish, and other elements may enhance the brand's credibility (IBGE, 2023).

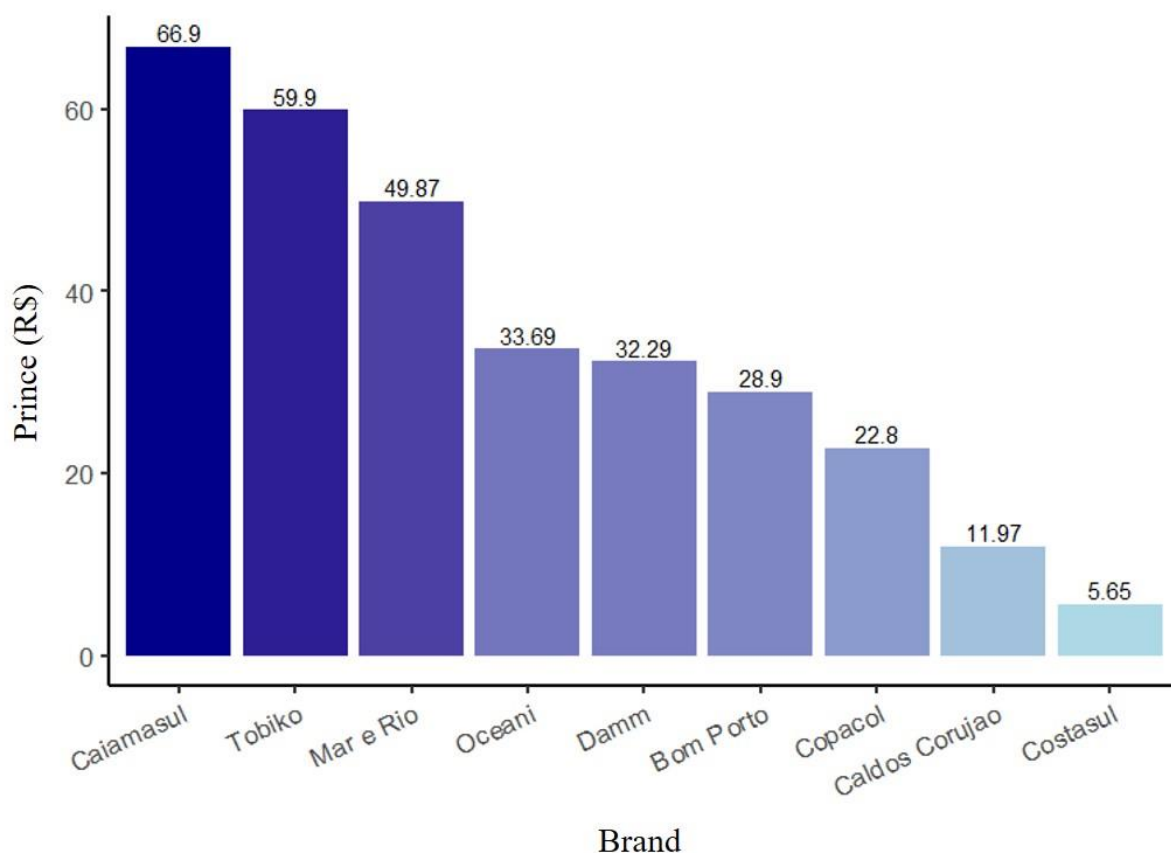


**Figure 6.** Frequency of the most consumed processed fish brands in Dourados, MS during Holy Week 2024.

Source: Authors, 2024.

Regarding average prices by product brand, it was observed that the companies Caiamasul, Tobiko, and Mar e Rio exhibited the highest market values, at R\$66.9, R\$59.90,

and R\$49.87, respectively. Conversely, the brand Contasul presented the lowest market value, at R\$5.75 (Figure 7).



**Figure 7.** Average price of processed fish by brand in Dourados, MS during Holy Week 2024. Source: Authors, 2024.

Due to their national recognition, the Cotasul and Copacol brands exhibit higher demand and search volume compared to other brands, such as Caldos Coruja. Furthermore, the geographical proximity of their facilities to Dourados allows these companies to meet this demand more efficiently. Brand values may vary due to the quality of product processing to achieve profitability, which consequently impacts price and consumer choice (DUTRA et al., 2018; CLOUETTE, 2022; CORTÉS-SÁNCHEZ et al., 2024).

## FINAL CONSIDERATIONS

Based on the results obtained, it is concluded that the variation in processed fish prices in Dourados, MS hypermarkets is influenced by several factors, such as location, transportation and storage costs, advertising, and product brand. This variation can represent a significant challenge for low-income individuals, hindering access to healthy food and, consequently, affecting their food security and quality of life.

Additionally, the analysis by product type and fish species revealed expected patterns, with rarer and harder-to-acquire products tending to have higher prices. In terms of brands, the excellence of the manufacturing process plays a crucial role in price determination.

These results, therefore, reinforce the importance of public policies and interventions that promote the accessibility and availability of healthy food, especially for the most vulnerable socioeconomic groups.

In terms of outreach, the data obtained also serve as a valuable basis for the development of educational and community programs aimed at raising awareness about the importance of healthy eating and strategies to mitigate the economic challenges in accessing these foods.

Such initiatives may include the promotion of local markets, incentives for the consumption of regional products, and the creation of partnerships between the public and private sectors to ensure that all citizens, regardless of their income, have access to a balanced and nutritious diet.

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