

Public food procurement sustainability for school food in two municipalities in the immediate region of Toledo – PR

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Abstract

In recent years, concerns about environmental sustainability in food production and consumption have gained greater notoriety. Food policies, such as school feeding, play a relevant role in the review of food systems. The objective of this study was to analyze sustainability aspects of public purchases for school feeding in two municipalities in the immediate region of Toledo - PR. This is a cross-sectional, quantitative field study. Data were obtained through bidding notices and public calls for the purchase of food for the National School Feeding Program of 2022. Excel® 2019 and PSPP software were used for descriptive frequency and chi-square analyses. As a result, most of the items purchased are in natura, conventionally produced and purchased from retailers/wholesalers located in the immediate region. The municipality of Terra Roxa purchases fewer processed, ultra-processed and red meat and purchases organic products, while the municipality of São Pedro do Iguaçu does not purchase any organic items. However, São Pedro do Iguaçu has a higher percentage of purchases from family farming. More attention is needed to public purchases for school meals that also address sustainability issues.

Keywords: Food system. Public policies. Sustainable development.

Sostenibilidad de las compras públicas de alimentación escolar en dos municipios de la comarca inmediata de Toledo – PR

Resumen

En los últimos años, las preocupaciones sobre la sostenibilidad ambiental en la producción y el consumo de alimentos han ganado mayor notoriedad. Las políticas alimentarias, como la alimentación escolar, juegan un papel relevante en la revisión de los sistemas alimentarios. El objetivo de este trabajo fue analizar aspectos de sostenibilidad de las compras públicas de alimentación escolar en dos municipios de la región inmediata de Toledo – PR. Se trata de un estudio de campo cuantitativo y transversal. Los datos se obtuvieron a través de convocatorias y licitaciones públicas para la compra de alimentos para el Programa de Alimentación Escolar en el año 2022. Para los análisis descriptivos de frecuencias y chi-cuadrado se utilizó el programa Excel® 2019 y el software PSPP. Como resultado, la mayoría de los artículos adquiridos son in natura, producidos de manera convencional y comprados a minoristas o mayoristas ubicados en la región inmediata. El municipio de Terra Roxa compra productos menos procesados, ultraprocesados, carnes rojas y compra productos orgánicos, mientras que el municipio de São Pedro do Iguaçu no compra ningún artículo orgánico. Sin embargo, São Pedro do Iguaçu tiene un mayor porcentaje de compras provenientes de la agricultura familiar. Se necesita más atención a las compras públicas de comidas escolares que también aborden cuestiones de sostenibilidad.

Palabras clave: Sistema alimentario. Políticas públicas. Desarrollo sostenible.

1 Introduction

In recent years, the idea of sustainability has gained recognition on a global scale, especially after the United Nations Conferences on the Environment. During these events, topics such as “quality of life” and “depletion of natural resources” were widely discussed, with the objective of finding solutions to alleviate the negative impacts generated, in part, by technological advancement and economic growth, which have affected the environment (Nascimento et al., 2019).

The food issue and food systems have been discussed as an important part of this process, considering that the production, transport, processing, consumption and disposal of food uses natural resources and impacts on climate change, and should be reviewed. This discussion implies food and nutritional security in the medium and long term since resource scarcity and climate change directly interfere with the production, availability and access to food by the population (Alpino et al., 2022; Triches, 2020).

The government and public policies can interfere in this context, directing their resources to encourage sustainable food systems. In this sense, school feeding plays a significant role for the State in promoting sustainable food consumption. Given that the target audience is school children, who often have no decision-making power and are influenced in their consumption choices, the importance of effective control over the food supply is even more evident. In addition, habits, behaviors and preferences developed in childhood tend to be maintained in adulthood, establishing customs that are resistant to change. Therefore, feeding during the first years of life not only has consequences for current and future health, but also influences the maintenance or transformation of specific food systems (Triches, 2015).

In recent years, the concern with environmental sustainability in food production and consumption has gained greater notoriety. However, it is assumed that although the importance of environmental sustainability is known, it is not yet

put into practice when buying food. Therefore, public food purchases should reflect this concern regarding sustainability, since they are the basis for the entire process that involves the production of meals offered in the school environment.

Thus, the importance of this study is justified, which will have the opportunity to explore a subject still little investigated, the notices of food purchases for school meals in two municipalities in the immediate region of Toledo – Paraná (PR) and their adherence to some assumptions of sustainability. Therefore, this article aims to analyze aspects of the sustainability of public procurement for school meals in two municipalities in the immediate region of Toledo – PR. This analysis was carried out by verifying the level of food processing present in the notices of the municipalities studied, identifying the type of food production, whether organic or conventional, identifying the location and type of supplier of the products, verifying the type of meat and the monetary percentage in relation to the total value of purchases. It will also seek to identify similarities and differences in the items analyzed between the municipalities.

To this end, this article consists of this introduction, a theoretical contextualization with discussions on food sustainability, in addition to justifying the variables used to compose a set of aspects that would enable sustainable practices at the time of food purchase for the National School Feeding Program (PNAE as per abbreviation in Portuguese). The following is an explanation of the method used, the results found and the respective discussion, ending with the final considerations.

2 Sustainability in public food procurement

The term sustainability has been gaining more and more relevance in recent decades, especially in the wake of the discussion on sustainable development. There is a diversity of academic references that stand for different approaches, making it also a controversial, polysemic and disputed concept.

For Parrado-Barbosa, Ruiz and Triches (2022), when analyzing this dispute, they consider that sustainability does not mean the same for everyone. For the authors, there are different interpretations and different balances for these dimensions, ranging from business as usual, through modernization to the radical change of the capitalist system. Another way to understand sustainability would be to distinguish between approaches that prioritize efficiency or sufficiency. The latter recognizes the so-called natural limits to consumption and production levels, while the efficiency approach sustains a weaker version, sensitive to technological means and economic objectives. In this sense, what is sustainable can vary according to this “weak” or “strong” approach, as well as the underlying values and who (or what) to include to be of concern. Sustainability, especially in the strong sense – invoking absolute limits such as planetary limits – is considered necessary to be associated with institutional change.

Speaking of food issues Josué de Castro is more specifically rescued in his work *Geografia da Fome* (Geography of Hunger), published in 1946. The author anticipated central discussions on sustainability by showing that hunger is the result of social inequalities and not natural scarcity and denounced the poor distribution of food and income, criticizing exclusionary economic models. This perspective dialogues with what Sachs proposes as sustainable development (2002), involving

social, environmental and economic justice. Castro (2005) and Sachs (2002) also valued local production and regional knowledge, something essential in sustainable food systems. These critiques of monoculture and export-oriented development still resonate with current critiques of intensive agribusiness.

Thus, the food problem enters more emphatically into discussions on sustainable development in 2013 when the sustainability of the food system was a topic of discussion at the Food and Agriculture Organization (FAO) Conference, and the theme of World Food Day was “healthy people depend on healthy food systems” (Meybeck; Gitz, 2017). The 2030 Agenda for Sustainable Development, adopted by the United Nations General Assembly on 25 September 2015, would reaffirm the commitment to a world in which “food would be sufficient, safe, affordable and nutritious”. Among the 17 sustainable development goals, this article highlights goal number two, which foresees, by 2030, “ending hunger, achieving food security and improving nutrition and promoting sustainable agriculture” and goal 12, which aims to “ensure sustainable consumption and production patterns”.

It is evident the complexity that faces the discussions about what should be understood as sustainability until its effective application, however, it is argued that the State should not be paralyzed by the urgency of the changes necessary to face climate change and the irrational use of natural resources. Thus, according to Parrado-Barbosa, Ruiz and Triches (2022), it is understood that the configuration of the dominant food system, given by its globalization, the dominance of large corporations, the mass, industrialized and standardized production of food and distributed by long supply chains, dominated by a few retail companies, is not sustainable. In turn, it is agreed that re-evaluating food supply, enhancing short circuits/chains, offering conditions to deconcentrate and democratize food production and supply would make even more feasible what is considered more related to sustainable development.

At this moment, the role of the State in redirecting the food system becomes an important driver, given the amount of resources used in food purchases for public policies and programs. By this, it's highlighted the concept of food policies coined by authors such as Lang and Heasman (2004), as the set of public and private decisions that affect the production, distribution, access and consumption of food, aiming to guarantee food security, sustainability and public health.

Among these policies, the PNAE stands out in Brazil, which offers daily meals to all students from public and philanthropic schools in the country. It has been undergoing changes in its conception and since 2009, it has included sustainable development as one of its legal guidelines. Pragmatically speaking, it emphasizes the incentives for the acquisition of diversified foodstuffs, produced locally and preferably by family farming and rural family entrepreneurs, prioritizing traditional indigenous and quilombo remnant communities (BRASIL, 2009).

It is already given in the scientific literature that the encouragement of family farming, the reduction of food miles, the favoring of socio-biodiversity, seasonality, the local agricultural vocation, tend to rationalize the use of natural resources and reduce environmental footprints, among other benefits. In this sense, short supply chains that operate based on the proximity between producers and consumers favor the availability of fresh and fresh foods with the potential to reduce the consumption of ultra-processed foods (Soares et al., 2017). In turn, accessibility and proximity are

relevant aspects for the increase in the consumption of healthy foods, especially in schools. In addition, local purchases can also prioritize the acquisition of food from family farming, combining environmental and socioeconomic aspects.

It is also important to highlight the issue of food processing and its impacts not only in relation to public health, but in its relationship with the environment. Anastasiou et al. (2022) emphasize that not only processing, but packaging, transportation, use of cold chain, among other factors impact the environment. They presented evidence that indicates that ultra-processed foods contribute significantly to the degradation and loss of biodiversity, since a significant amount of land is required for their production, associated with deforestation in biodiversity areas. In addition to biodiversity loss, massive production would affect soil quality, threatening the ecosystem. The use of too much fertilizers and herbicides for an accelerated production of these foods would favor the imbalance of nutrients in the soil and also eutrophication in the river ecosystem. On the other hand, food standardization generates a homogenization in flavors. The Food Guide for the Brazilian population (2014) highlights the loss of eating and culinary habits with the unbridled increase in the production and consumption of ultra-processed and standardized foods.

In the wake of concerns about how to produce food, organic agriculture is evident as an activity aimed at environmental preservation, with the objective of respecting the biodiversity and biological activities of the soil. Thus, this activity highlights the use of management methods as opposed to the use of pesticides. In this context, agroecology emerges as a viable alternative for sustainable agriculture.

Finally, another food factor that has been gaining prominence regarding its environmental impact is the production/consumption of meat. Some authors point out that the raising of animals for human consumption is one of the main causes of virtually all environmental crises, including deforestation, desertification, biodiversity decline, freshwater scarcity, water pollution and soil erosion (Schuck and Ribeiro, 2018). As an alternative to minimize the impacts, authors consider the possibility of reducing the amount of meat in the composition of each meal (Calderón et al., 2010).

The FAO report that addresses the impacts of animal husbandry on the environment suggests some actions to reduce the environmental impact of livestock activity. These measures involve addressing issues such as soil degradation, gas emissions, water contamination and the decrease of biodiversity (FAO, 2006).

3 Methodology

This work is characterized as a cross-sectional, quantitative field study carried out in two municipalities in the immediate region of Toledo - PR. This is composed of 14 municipalities, namely: Assis Chateaubriand, Formosa do Oeste, Guaíra, Iracema do Oeste, Jesuítas, Maripá, Ouro Verde do Oeste, Palotina, Santa Helena, São José das Palmeiras, São Pedro do Iguaçu, Terra Roxa, Toledo and Tupãssi.

The definition of the two municipalities that were part of this research was based on stratification, considering the size of the population, given that, of the 14 municipalities, seven have more than 10,000 inhabitants and seven have fewer. The choice of a municipality within each of the strata was for convenience, given the availability of the notices on the websites of the city halls. Thus, São Pedro do Iguaçu

was elected, with 5,784 inhabitants and Terra Roxa, with 18,199 inhabitants (2022 Census).

Data collection began in March and lasted until July 2023. The data were collected on the websites of the city halls of the municipalities through a search for bidding notices and public calls for the purchase of food for school meals in 2022.

From these notices, the data were tabulated in the PSPP and Excel® 2019 softwares, with the following variables: municipality (São Pedro do Iguaçu and Terra Roxa); level of processing (in natura or minimally processed, culinary ingredient, processed and ultra-processed); production (conventional and organic); supplier (conventional and family farming); region (immediate region; intermediate region and other intermediate region) unit value; total value; type of food (vegetables, cereals, legumes, dairy products, eggs, chicken meat, beef, pork, fish, sausages, fats, sweets, beverages, seasonings and pasta and baked goods).

The municipalities of the immediate region are those that border the municipality of Toledo – PR, of which São Pedro do Iguaçu and Terra Roxa are part. The intermediate region municipalities are those that belong to the Region of Cascavel – PR, of which the municipality of Toledo is part. Regarding the municipalities of another intermediate region, some are part of other regions of the state, such as Curitiba, Londrina, Guarapuava, among others (IBGE, 2017).

Regarding the level of food processing present in the notices of the municipalities studied, they were defined according to the NOVA classification (Monteiro et al., 2019), which indicates the degree of food processing (in natura and minimally processed, culinary, processed and ultra-processed ingredients). Regarding the type of production of foodstuffs, whether organic or conventional, their definition was verified in the purchase notices. The location and type of supplier of the products were in accordance with the sales projects and with the information contained in the websites of the city halls of the winning suppliers of each item. According to the list of products and respective quantities contained in these events, it was possible to verify the type of meat purchased, the quantities and the monetary percentage in relation to the total value of the purchases. The calculations for each of these criteria were made from the number of items (types of food) and the resource invested for their purchase.

This systematization served as a basis for the analysis of some objective aspects of the sustainability of public procurement for school meals. Thus, statistical analyzes were performed with the free software PSPP, where the descriptive tests of frequency and also of inference were calculated, comparing the municipalities. For this purpose, the Chi-square test (Pearson and Fisher) was used with a significance level of 0.05.

4 Results and discussion

Table 1 shows the aggregated results related to public purchases of food for school meals in 2022 in the two municipalities evaluated, according to the independent variables: level of processing, type of production, type of supplier and region where the acquisition is carried out.

Table 1. Characteristics of food purchased in the municipalities of São Pedro do Iguaçu and Terra Roxa for school meals in 2022 – PR.

Variable	No. of Items	%
<u>Level of processing</u>		
In natura	260	78,5%
Ingredients	10	3,0%
Processed	42	12,7%
Ultra-processed	19	5,7%
<u>Production type</u>		
Convencional	321	97,0%
Organic	10	3,0%
<u>Type of supplier</u>		
Convencional	187	56,5%
Family Farming	144	43,5%
<u>Region where the acquisition is carried out</u>		
Immediate region	155	46,8%
Intermediate Region	103	31,1%
Other intermediate region	73	22,1%

Source: prepared by the authors, 2023.

In Table 2, a comparison was made between the two locations, identifying significant differences between them in all the variables evaluated.

Table 2. Comparative analysis between different variables of food purchased in the municipalities of São Pedro do Iguaçu and Terra Roxa for school feeding in 2022 – PR.

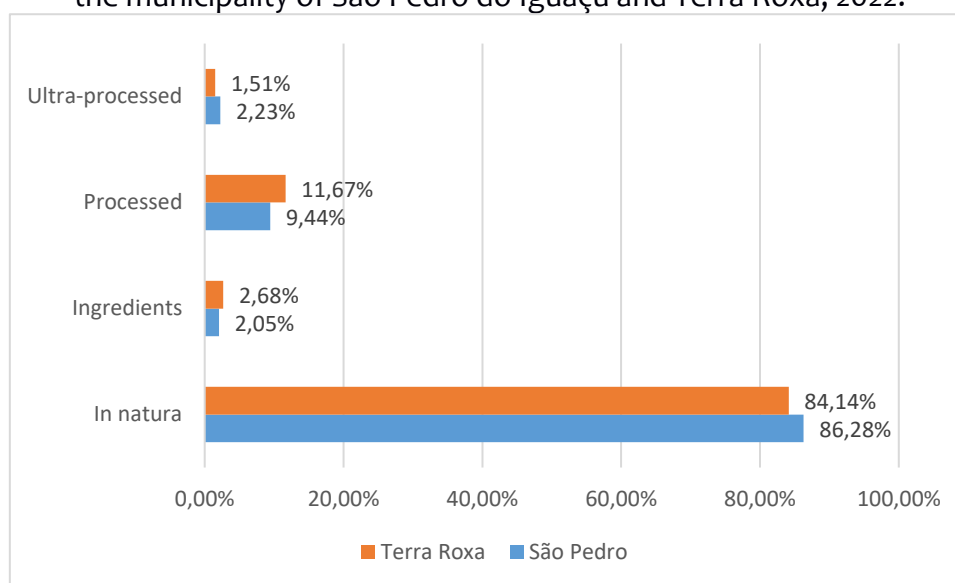
Variable	São Pedro do Iguaçu		Terra Roxa		p*
	No. of Items	%	No. of Items	%	
<u>Relationship between municipality and processing level</u>					
In natura	94	68,6%	166	85,6%	0,002
Ingredients	7	5,1%	3	1,5%	
Processed	23	16,8%	19	9,8%	
Ultraprocessed	13	9,5%	6	3,1%	
<u>Relationship between municipality and production</u>					
Convencional	137	100%	184	94,8%	0,004
Organic	0	0%	10	5,2%	
<u>Relationship between municipality and supplier</u>					
Convencional	98	71,5%	89	45,9%	0,000
Family farming	39	28,5%	105	54,1%	
<u>Relationship between municipality and region</u>					
Immediate region	39	28,5%	116	59,8%	0,000
Intermediate region	97	70,8%	6	3,1%	
Other intermediate region	1	0,7%	72	37,1%	

** Pearson's Chi-square test for processing level, supplier type and region and Fisher's Chi-square for production type.

Source: prepared by the authors, 2023.

Starting the analysis by the level of processing of the purchased items, the vast majority corresponds to fresh foods, followed by processed, ultra-processed foods and, finally, culinary ingredients (Table 1). Graph 1 shows the volumes of resources used in the purchase of each of these types, noting that in both municipalities they use more than 80% of the resources to purchase fresh and minimally processed products (R\$414,659.90 in São Pedro do Iguaçu and R\$1,057,493.90 in Terra Roxa).

Graph 1. Monetary percentage spent on food of different levels of processing in the municipality of São Pedro do Iguaçu and Terra Roxa, 2022.



Source: prepared by the authors, 2023.

By analyzing these data in the light of the guidelines of the Food Guide for the Brazilian Population, the attendance of both places is verified. According to this guide, fresh and minimally processed foods should be consumed as the basis of food, culinary ingredients should be used in smaller quantities, the consumption of processed foods should be limited and the consumption of ultra-processed foods should be avoided (BRASIL, 2014).

In turn, Resolution No. 06/2020 in its Article 21 considers that at least 75% of the PNAE resources must be allocated to the acquisition of fresh or minimally processed foods; at most, 20% can be allocated to the acquisition of processed and ultra-processed foods; and at most, 5% can be allocated to the acquisition of processed culinary ingredients, which the analyzed locations met (FNDE, 2020).

However, in the comparison between the municipalities, Terra Roxa stands out positively by buying a greater number of fresh and less processed and ultra-processed foods compared to the municipality of São Pedro do Iguaçu. Research indicates that increased intake of these foods is directly associated with a higher risk of developing obesity and several chronic non-communicable diseases (NCDs) (Askari et al., 2020). It is worth noting that those who consume ultra-processed foods are usually less physically active, have a reduced intake of fresh foods and, therefore, face an increased risk of developing NCDs (Monteiro et al., 2019).

In addition to the damage to people's health, research indicates that, from their production to becoming final products available on the market, ultra-processed foods play a substantial role in greenhouse gas emissions. They are associated with environmental impacts such as biodiversity loss, deforestation and soil degradation (Seferidi, 2020).

The municipality of Terra Roxa also stands out in the acquisition of organic food, while the municipality of São Pedro do Iguaçu did not purchase any such item. Even so, Terra Roxa acquired only 10 items, which points to a low acquisition of these products in these places.

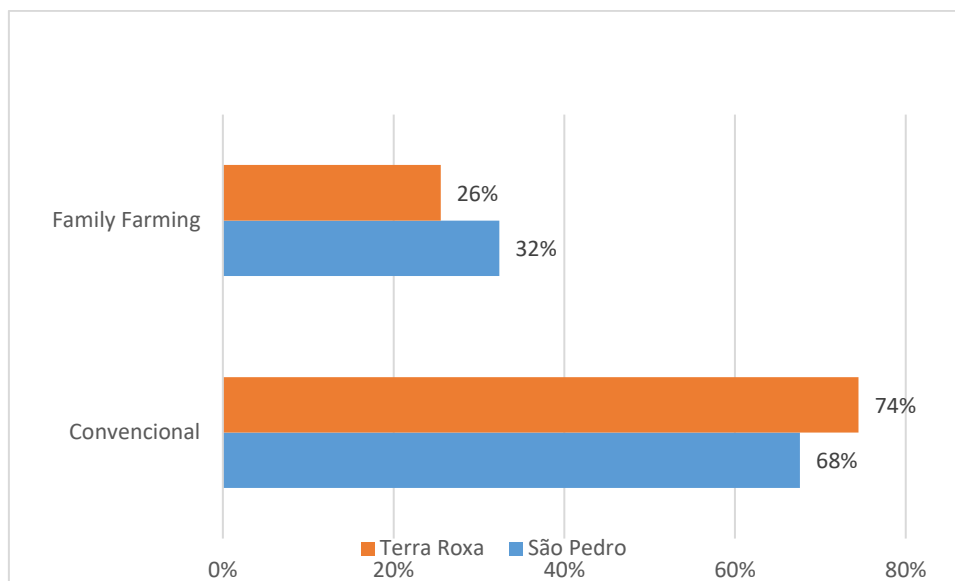
Despite the advantages associated with organic foods, their market presence is limited, and they are generally more expensive. These aspects can have a direct impact on the administration and operation of the meal production process, encompassing menu planning, procurement strategy, expense control, and the act of preparing the meals themselves. Some of the reasons pointed out for the high cost of organic food include smaller scale production, the need for more workers, extended deadlines for growing certain foods, additional expenses related to certification and packaging, the absence of subsidies, incentives, agricultural research and technical assistance directed to organic agriculture (Lima; Sousa, 2011). The authors also report that the costs of organic food represented the main obstacle to the program and that the food purchased by the investigated school had an average cost 128.3% higher than its conventional equivalents.

Although the programs do not offer a clear definition of organic and agroecological foods, it is notable that, more than a decade after the creation of the Federal Law 11.947/2009, the acquisition of these foods still remains at low levels compared to the total purchased from family farming. Based on data from the National Education Development Fund (FNDE as per abbreviation in Portuguese) for 2016 (as reported by Oliveira in 2019), the percentages do not vary significantly when analyzed regionally, except in the Midwest region (North: 9.37%, Northeast: 8.9%, Midwest: 2.77%, Southeast: 8.47%, South: 8.69%) (Oliveira, 2019).

When it comes to the acquisition of organic food in Paraná, according to information provided by FNDE (Oliveira; 2019), about 44% of the 399 municipalities in the state of Paraná purchased organic food in 2016, although in limited quantities (Schabarum; Triches, 2019).

Once again, the municipality of Terra Roxa stands out, now in relation to the type of supplier, acquiring more diversity of food from family farming and less from conventional suppliers. Graph 2 shows the percentages spent according to the type of supplier. It should be noted that the percentages refer to the total spent by the municipality in 2022, including federal and municipal funds.

Graph 2. Monetary percentage spent on food of different levels of processing in the municipality of São Pedro do Iguaçu and Terra Roxa, 2022.



Source: prepared by the authors, 2023.

However, in relation to the resource used for this purpose São Pedro do Iguaçú stands out with more than 30% of the total resource expected to be directed to this type of supplier (R\$ 155,640.20), while Terra Roxa does not reach this percentage (R\$ 320,819.90). Given this, both locations could improve in this regard, and Terra Roxa should seek to increase the percentage of resources spent on family farming and São Pedro do Iguaçú, seeking to diversify the items purchased.

In Paraná, a study carried out in 2019 (Schabarum; Triches, 2019) with data sent by municipalities to the FNDE in 2015 point that approximately half of the municipalities (51%) still did not comply with Law no. 11.947/2009 (Brasil, 2009), which establishes the obligation to use at least 30% of the federal government's resources in the purchase of food from family farming. Other authors mention that in the state of Paraná the average percentage of resources used to purchase food from family farms in 2014 was 26.3% (Vieira et al., 2023).

The same study by Schabarum and Triches (2019) points out that 60% of the municipalities used more than 25% of the resources sent by the FNDE to acquire food from family farming, although, according to the law, this proportion should be at least 30%. Thus, these data reveal that acquisitions had not yet reached a satisfactory level, throughout the state. It should be noted that these studies analyze only the value of the federal resource to calculate this percentage and the present study considered the total amount, adding federal and municipal resources.

The relationship between PNAE and family farming aims to create an agriculture that is organized and improved in its institutional, production and commercial activities for food producers. In addition, it seeks to provide better quality food to consumers of these foods, while promoting the formation of healthy eating habits among students. The objective is for this collaboration between producers and consumers to contribute to sustainable development at the local level, constituting a strong strategy for Food and Nutrition Security (FNS) (BRASIL, 2013). Providing assistance to small and medium-sized rural and urban producers for local food production is considered critical for sustainability. This covers social aspects, such as income generation and occupation for farmers, ecological concerns related

to the diversity and availability of high-quality food, economic considerations, such as reducing transportation costs, and cultural aspects, including product reliability, preservation of regional traditions and artisanal production (Silva; Sousa, 2013).

Regarding the classification of food purchases according to the location of suppliers, in the municipality of Terra Roxa there was a prevalence of food purchased from suppliers located in municipalities that belong to the same immediate geographic region of the municipality (59.8% of items). However, although this municipality is the one that most acquires items from the immediate region, it is also the one that most acquires items from suppliers from other intermediate regions. In São Pedro do Iguaçu, 70.8% of the items were purchased from suppliers located in municipalities that belong to the same intermediate geographic region, acquiring fewer items from other intermediate regions.

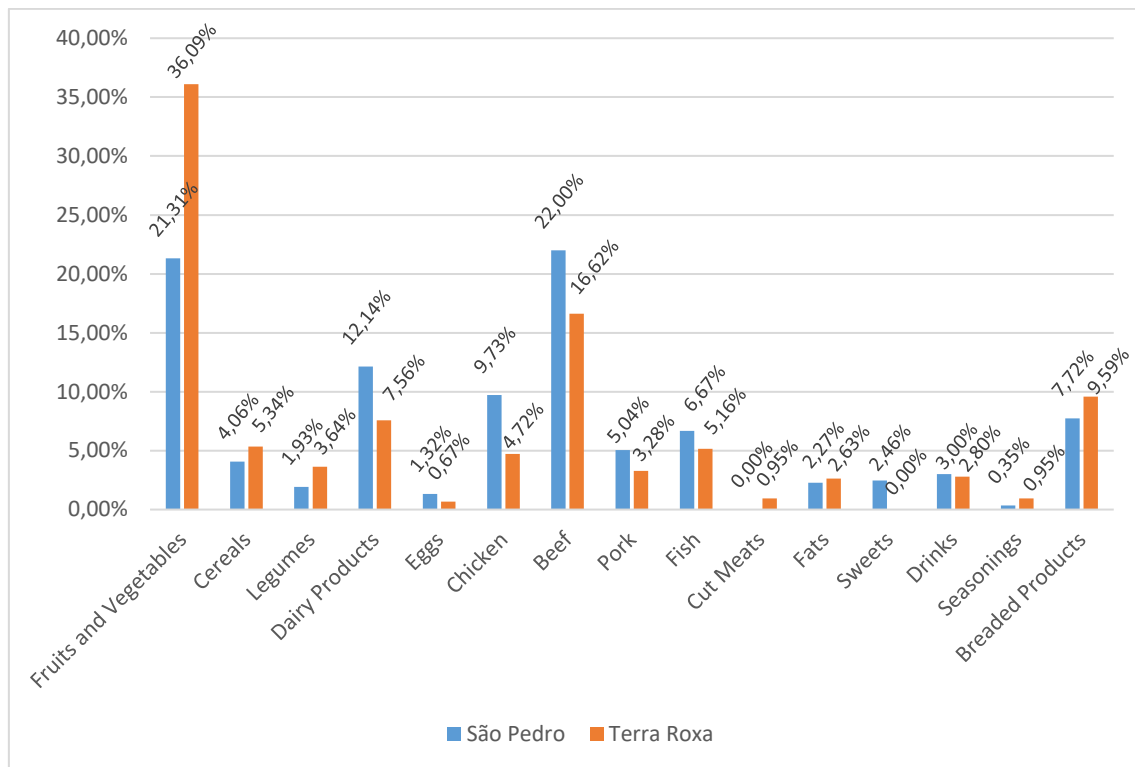
Buying food from suppliers near the place of consumption not only promotes recognition and appreciation for traditional culinary items, but also drives the growth of local communities. In addition, shorter distances facilitate the acquisition of fresh food with little processing, since these, in general, are more susceptible to deterioration. The Brazilian Institute of Geography and Statistics (IBGE, as per abbreviation in Portuguese) classification (2017) incorporates debates by taking into account, for the grouping of municipalities in close and intermediate geographical regions, not only physical proximity, but also the cultural, political and economic connections that exist between them.

In addition to the elements more linked to the act of consuming food, the connection between food and sustainability, through the acquisition of local and regional products, involves concerns related to transportation. Although some authors may consider this dimension to be of secondary importance (Kemp et al., 2010), others argue that this is one of the most frequent environmental disturbances in the food industry (Alsaffar, 2015), as it would reduce greenhouse gas emissions from air, rail and/or road transport used.

Lairon (2010) points out that the choice to purchase food from nearby sources helps reduce energy consumption in transport. By combining these local and regional acquisitions with direct purchase from family farmers and their organizations, it would also support fair trade and solidarity initiatives. In the context of this study, it is essential to note that most food purchases from suppliers in the same immediate region are made directly from individual family farmers or their organizations, such as associations and cooperatives. Therefore, these purchases also contribute to valuing these actors on the part of public food purchases.

In conclusion, as illustrated in Graph 3, an examination of the types of food purchased in the municipality of São Pedro do Iguaçu reveals that the total expenditure allocated to the acquisition of beef, chicken, fish, and pork constitutes 43.44%, listed in that order. In the context of the municipality of Terra Roxa, approximately 30.73% of the total expenditure allocated for food procurement was directed for acquisition of various types of meat, including beef, fish, chicken, pork, and sausages.

Graph 3. Monetary percentage spent on each type of food in the municipality of São Pedro do Iguaçu and Terra Roxa, 2022.



Source: prepared by the authors, 2023.

Regarding meat and its derivatives, it is also relevant to analyze them, classifying them as to their origin, red and white, since, according to the literature, red meat causes greater impacts on the environment and health, in addition to being, in general, more expensive (Strasburg; Jahno, 2015). It can be observed that, of the total number of meat items and derivatives purchased, in both municipalities most refer to the red category, and in both, the number of items related to red meat and derivatives is much higher than that of white meat and derivatives.

Livestock is pointed out as one of the main drivers of environmental degradation, demanding large areas of land and considerable natural and energy resources, while simultaneously producing large amounts of solid, liquid and gaseous waste (Schuck; Ribeiro, 2018). The study by Cassidy et al. (2013) reveals that in Brazil, only 16% of cultivated vegetable proteins are intended for human consumption, while a significant 79% are directed to animal feed, leaving the remaining 5% for various uses, such as biodiesel production. In terms of efficiency in energy conversion, this system is considered totally ineffective.

Alsaffar (2015) confirms that the current consumption pattern, characterized by a high intake of meat, dairy products and ultra-processed products rich in sugar and vegetable oils, is associated with high greenhouse gas emissions and a considerable water footprint. In Brazil, according to the study by Garzillo et al. (2019), it is evident that ultra-processed meats and products are associated with higher levels of carbon, water and ecological footprint. Therefore, a diet centered on plant foods and less industrialized and processed options would contribute to improving food quality, resulting in benefits for people's health and sustainability.

The effects on the environment resulting from beef production manifest themselves in several ways, including the emission of greenhouse gases,

deforestation, soil and pasture degradation, water pollution, and the decrease of biological diversity (Silva et al., 2021). It should be considered that the PNAE provides for the mandatory inclusion of heme iron source foods at least four (4) days a week on school menus. However, considering the impact of meat, especially red meat, on the environment and the cost they reach in total resources, it would be appropriate for the federal government to revise this guideline, considering alternative menus without meat or with the predominance of white meat such as poultry and fish.

6 Conclusion

Given the difficulties that arise when trying to reconcile food production and consumption with sustainability, it is essential to adjust strategies and measures within the context of public policies that seek to promote this objective. Based on this, this article aimed to analyze some aspects of the sustainability of public procurement for school meals. This analysis was carried out by verifying the level of food processing present in the notices of the municipalities studied, identifying the type of food production, whether organic or conventional, identifying the location and type of supplier of the products, verifying the type of meat and the monetary percentage in relation to the total value of purchases and identifying similarities and differences in the items analyzed between the municipalities of São Pedro do Iguaçu and Terra Roxa.

Based on the results found with regard to the acquisition of fresh or minimally processed items, culinary, processed and ultra-processed ingredients, both in the municipality of São Pedro do Iguaçu and in Terra Roxa, most of the items purchased are fresh or minimally processed foods. Therefore, in this regard, none of the municipalities distanced themselves from sustainability.

According to the results found with regard to the acquisition of organic and conventional foods, both in the municipality of São Pedro do Iguaçu and in Terra Roxa, most of the items purchased are conventional foods, pointing to a gap in this regard, especially when talking about two municipalities in Paraná, which in turn has Law 16,751 since 2010, which establishes organic school feeding throughout the state education system of Paraná.

Regarding the category of food suppliers, the data show the need for greater incentives (financial, structural, logistics and legislation) to purchase food from family and organic farms. his motivation stems mainly from the importance that these aspects have for the sustainability of school feeding.

Regarding the classification of food purchases according to the location of suppliers, there is still potential to increase the number of items purchased locally, highlighting the agricultural vocation of municipalities and encouraging the diversification of production and processing of the foodstuffs used by school feeding with family farmers.

Regarding the acquisition of meat and its derivatives, the municipality of São Pedro do Iguaçu invests more resources for the acquisition, indicating the need to review menus and preparations, seeking to reduce the use of red meat and prefer plant foods in all locations.

PNAE guidelines play a key role in promoting healthy and sustainable food systems. In this sense, more attention is needed to the use of financial resources to

encourage school meals that also meet environmental issues. This study sought, based on some variables, to understand how this is effective in two municipalities and already identifies issues to be further addressed by the Program as a whole and locally. It also encourages a potential construction of a research agenda in Brazil on this theme.

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