BIOENG

Brazilian Journal of Biosystems Engineering (2024), 18 1236

REGULAR ARTICLE

The participation of family farming production in the Brazilian basic food basket items

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V INTERNATIONAL SYMPOSIUM ON AGRIBUSINESS AND DEVELOPMENT: TECHNOLOGY AND SUSTAINABILITY

Academic Editor: Celso Antonio Goulart

Statements and Declarations

Data availability
All data will be shared upon request.

Institutional Review Board Statement
Not applicable.

Conflicts of interest
The authors declare no conflict of interest.

Funding
This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brasil (CAPES) - Finance Code 001.

Autor contribution
BWAS: Conceptualization, Experimental data collection, Data storage, Data analysis, Literature review, Manuscript writing, Manuscript revision, Funding acquisition; DESB: Data analysis, Literature review, Manuscript writing, Manuscript revision; WLL: Conceptualization, Data analysis, Manuscript revision, Supervision, Funding acquisition; VP/KCSO: Data analysis, Manuscript revision.

Abstract

Family farming is an important social organization, it is the focus of many studies and public policies. It provides food for society and plays a role in regional development, and food and nutritional security. Family farms represent 90% of the agricultural establishments worldwide and 77% in Brazil. From this, it is important to understand the degree of importance of family farmers in food production. Therefore, the objective of this research is to analyze the participation of family farming in the production of Brazilian basic food basket items. Not all items were directly used because some of them were industrialized, such as sugar, and then some substitutes were chosen, like sugarcane. This is possibly the main limitation of this research. The results indicate there is varied participation of family farming production among the items, ranging from 1.93% (sugarcane) to 84.55% (coffee beans). The literature indicates different percentages of participation of family farming in agricultural production, depending on the definition of family farming and the crops considered for analysis. In this research, the results indicate a general participation of 17.21% for the Brazilian basic food basket items. As exploratory research, the results are considered satisfactory and can contribute to the formulation of public and private policies concerning food production and supply.

Keywords

Family farming; Basic food basket; Food production; Food security.

Introduction

The definition of family farming slightly varies according to the source, but it normally represents the same class of farmers. In a global outlook, according to the Food and Agriculture Organization (2014, p. 2), family farming is defined as:

> "[…] a means of organizing agricultural, forestry, fisheries, pastoral and aquaculture production which is managed and operated by a family and predominantly reliant on family labor, including both women's and men's. The family and the farm are linked, co-evolve, and combine economic, environmental, social, and cultural functions."

In Brazil, according to Decree 9.064/2017, it is defined as farming carried out on small properties, with a limit of four fiscal modules, predominance of family labor, and at least half of the income coming from rural activities on the property (Brazil, 2017). Beyond its definitions, it represents more than 90% of farms in most countries, which makes 500 million farms in the world, in a universe of more than 570 million farms (FAO, 2014). In Brazil, it represents 77% of the farms, with 3.9 million family farms occupying 80.9 million hectares or 23% of the area (IBGE, 2019). They contribute to regional development and food security, boosting the economy and generating income with diversified food production, supplying cities with their food demands. It is, in its own way, a socio-political and cultural construction (Abramovay, 2000; Deponti & Preiss, 2021; FAO, 2019; Gazolla et al., 2022; Schneider, 2016).

In this sense, there are four channels of commercialization for family farmers: conventional, supplying the agroindustry; institutional, supplying public actors (highlighting public policies such as Food Acquisition Program and National School Feeding Program); proximity, supplying the final consumer (associated to short food supply chains, such as farmers' market); and territorial, supplying rural cooperatives. Family farmers usually benefit from the last three (Marques et al., 2016). Short food supply chains, especially, allow synergy and social cohesion with other social actors, promoting diversification at a local level, improving competitiveness, and

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https://doi.org/10.18011/bioeng.2024.v18.1236
Received: 29 October 2024 / Accepted: 17 November 2024 / Available online: 23 December 2024

contributing to regional development through food distribution (Scarabelot & Schneider, 2012).

FAO (2012) endorses this issue, stating crop diversification is an effective strategy for promoting food security and nutrition, alongside sustainable rural development, job generation, poverty reduction, and environmental and ecological preservation and conservation. The literature presents evidence in that direction and public policies are oriented toward the development of smallholders since they are considerably more vulnerable than big producers (Assis, 2006; Costabeber & Caporal, 2003; Georgeou et al., 2022; Medina et al., 2015; Sène-Harper et al., 2019).

Therefore, the main premise of this work is that family farming is an important social organization. There may be, beyond that, ways of measuring this. Hence, the main question of this research lies in the degree of importance of family farming to food production. How much do family farmers contribute to food production in Brazil? To answer this, the objective of this research is to analyze the family farming participation in the production of Brazilian basic food basket items.

Materials and methods

The participation of family farming in the production of Brazilian food basket items is based on the method used by Hoffmann (2014). In his paper, he analyzed the Agriculture Census 2006 from the Brazilian Institute of Geography and Statistics (IBGE, 2012). The current work aims to apply the same analysis to the Agriculture Census 2017 (IBGE, 2019), considering the Brazilian basic food basket items (Brazil, 1938; DIEESE, 2016). They are meat, milk, beans, rice, flour, potatoes, vegetables (tomato), bread, ground coffee, fruit (banana), sugar, lard/oil, and butter.

Considering the Agriculture Census 2017 does not present data for all these products, since some of them are industrially processed and both commercial farms and family farms supply the same industry,

Table 1 presents some substitutes to analyze the participation of family farming.

To better understand the method, there is the equation (1), where % means the participation of family farming in percentage; FF means the family farming total production; and T represents the total production (both family and non-family farming).

$$\% = \frac{FF}{T} \qquad (1)$$

It is important to consider the Agriculture Census of 2017 limits part of its data for privacy reasons, which can under or overestimate the family farming participation. Nonetheless, since these are macro-data, they will hopefully not represent a significant deviation from reality. It is not expected, however, to have a perfect representation of reality. Still, since this is exploratory research, it can satisfactorily provide data for future research and lead to new insights.

Results and discussion

Considering its heterogeneity, it is difficult to define what food is for the purpose of calculation. Hoffmann (2014) questions this, asking whether one should use tons of wheat or wheat flour, tons of sugar or sugarcane, tons of soybean or soybean oil, etc. Therefore, different analyses may arise. Another important point from the same author is that it is necessary to analyze real food consumption and not food production.

In this sense, not all produced food is necessarily eaten by the population of that country. There are, for example, food loss and exports. Animals also need to eat, so a lot of these crops are destined for animal feeding. Finally, as it was said previously, some of these items are not direct representatives of the Brazilian food basket items, so some substitutes were elected.

Table 2 presents the results of the participation of family farming in the production of some items related to the Brazilian basic food basket.

Family farming was responsible for 12.27% of the cattle sold for slaughter. However, family farming produced 64.17% of the milk. It suggests meat production is better suited for large producers with extensive creation, while milk production is better suited for smallholders.

It was responsible for 11.63% of bean production, 10.92% of rice, 12.27% of potato, and 9.65% of tomato production. These are basic foods consumed by most Brazilians and this suggests commercial enterprises are the biggest producers.

Regarding wheat production, family farming is responsible for only 18.41%. It is important to note that, despite the production growth, Brazil is still a great importer of this grain (CONAB, 2024).

When it comes to coffee beans, family farming is responsible for 84.55% of the production. Considering it is a perennial crop, it may impact the production costs and stability on returns.

The fruit considered for the analysis is banana, with a percentage of participation of 48.53% for family farming.

Finally, sugarcane and soybean, both commodities, have low family farming participation. Respectively, 1.93% and 9.27%, which is probably justified by these crops being highly integrated into the agroindustry.

Regarding participation in total agriculture and livestock production, Hoffmann (2014) presents an estimate of 21.4% for family farming production, based on the Agriculture Census 2006. He also cites other authors such as Kageyama et al. (2013), with an estimate of 52% (with a broader concept of family farming), and IBGE (2012), with an estimate of 33,2%.

Based on the Agriculture Census 2017, IBGE (2019) estimates the total family farming agricultural and livestock production as about 23%. When it comes to this paper, the authors' calculations for the Brazilian food basket result in 17.21%, considering the Brazilian currency "real" as an equalizer when summing all the productions and applying the equation (1).

Table 1. Items of the Brazilian basic food basket and items considered for analysis

Basic food basket items	Items considered for analysis
Meat [a]	Cattle sold for slaughter (Heads)
Milk	Milk (thousand liters)
Beans	Beans (tons)
Rice	Rice (tons)
Flour [a]	Wheat (tons)
Potatoes	Potatoes (tons)
Vegetables (tomato)	Tomato (tons)
Bread [a]	Wheat (tons)
Ground coffee [a]	Coffee beans (tons)
Fruit (Banana)	Banana (tons)
Sugar [a]	Sugarcane (tons)
Lard/Oil [a]	Soybean (tons)
Butter [a]	Milk (thousand liters)

[a] No data for family farming production of these items. Therefore, those that better work as substitutes were selected.
Based on Brazil (1938) and DIEESE (2016).

Table 2. Participation of family farming in the production of items considered for analysis in 2017

Items	Total	Non-family farming	Family Farming	Percentage of Family Farming
Cattle sold for slaughter (Heads)	23,805,361	20,883,336	2,922,025	12.27%
Produced Milk (thousand liters)	30,156,279	10,805,604	19,350,675	64.17%
Beans (tons)	1,292,645.474	1,142,253.746	150,391.728	11.63%
Rice (tons)	1,1056,718.92	9,849,184.395	1,207,534.521	10.92%
Potatoes (tons)	1,996,144.603	1,751,295.755	244,848.848	12.27%
Tomato (tons)	1,143,922.455	1,033,558.95	110,363.505	9.65%
Wheat (tons)	4,681,068.678	3,819,085.137	861,983.541	18.41%
Coffee beans (tons)	2,356,810.963	1,464,835.395	891,975.568	84.55%
Banana (tons)	4,025,937.177	2,072,124.389	1,953,812.788	48.53%
Sugarcane (tons)	638,689,874.7	626,383,465.4	12,306,409.35	1.93%
Soybean (tons)	103,156,254.6	93,597,597.16	9,558,657.475	9.27%

Conclusions

This research attempts to calculate and analyze the participation of family farming in the production of Brazilian basic food basket items. The results are satisfactory since it is exploratory research, even with its limitations. For future works, it is recommended to consider family consumption, exports, imports, inflation, and other variables that may lead to more important conclusions.

The results are varied and show family farming is not the biggest producer of the Brazilian basic food basket. It has an overall participation of 17.21% and ranges from 1.93% (sugarcane) to 84.55% (coffee beans).

References

Abramovay, R. (2000). O capital social dos territórios: repensando o desenvolvimento rural. *Economia Aplicada*, *4*(2), 379–397. https://doi.org/https://doi.org/10.11606/1413-8050/ea218794

Assis, R. L. (2006). Desenvolvimento rural sustentável no Brasil: perspectivas a partir da integração de ações públicas e privadas com Base na agroecologia. *Economia Aplicada*, *10*(1), 75–89.

Brazil. (1938). *Decreto-Lei nº 399 de 30/04/1938*. Coleção de Leis Do Brasil de 31/12/1938 - Vol. 002. https://legis.senado.leg.br/norma/523433/publicacao/15708212

Brazil. (2017). *Decreto Nº 9.064, de 31 de maio de 2017*. Diário Oficial da União, Seção 1. https://legislacao.presidencia.gov.br/atos/?tipo=DEC&numero=9064&ano=2017&ato=d88oXRE1UeZpWTd3c

CONAB. (2024). *Oferta e Demanda de Grãos*. https://www.conab.gov.br/info-agro/analises-do-mercado-agropecuario-e-extrativista/analises-do-mercado/oferta-e-demanda-de-graos

Costabeber, J. A., & Caporal, F. R. (2003). Possibilidades e alternativas do desenvolvimento rural sustentável. *Agricultura Familiar e Desenvolvimento Rural Sustentável No Mercosul*, 157–194.

Deponti, C. M., & Preiss, V. (2021). Covid-19, a agricultura familiar e desenvolvimento regional: uma análise da Região do Vale do Caí, RS. *X Seminário Internacional Sobre Desenvolvimento Regional*, 1–20. https://online.unisc.br/acadnet/anais/index.php/sidr/article/view/21239

DIEESE. (2016). *Metodologia da Pesquisa Nacional da Cesta Básica de Alimentos*. https://www.dieese.org.br/metodologia/metodologiaCestaBasica2016.pdf

FAO. (2012). *The role of FAO's Plant Production and Protection Division*. https://www.fao.org/ag/agp/greenercities/pdf/CDSDN.pdf

FAO. (2014). *International Year of Family Farming 2014*. https://www.fao.org/fileadmin/user_upload/iyff/docs/Final_Master_Plan_IYFF_2014_30-05.pdf

FAO. (2019). *Putting family farmers at the centre to achieve the SDGs*. FAO.

Gazolla, M., Tomporoski, A. A., Conterato, M. A., Sabourin, E. P., Rambo, A. G., Bernartt, M. de L., & Pedrassani, D. (2022). Agricultura familiar: Contribuições para o desenvolvimento regional no Sul do Brasil. *DRd - Desenvolvimento Regional Em Debate*, *12*(ed.esp.Dossie), 1–6. https://doi.org/10.24302/drd.v12ied.esp.Dossie.4174

Georgeou, N., Hawksley, C., Wali, N., Lountain, S., Rowe, E., West, C., & Barratt, L. (2022). Food security and small holder farming in Pacific Island countries and territories: A scoping review. *PLOS Sustainability and Transformation*, *1*(4), e0000009. https://doi.org/10.1371/journal.pstr.0000009

Hoffmann, R. (2014). A agricultura familiar produz 70% dos alimentos consumidos no Brasil? *Segurança Alimentar e Nutricional*, *13*(1), 417. https://doi.org/10.20396/san.v21i1.1386

IBGE. (2012). *Censo Agropecuário 2006*. IBGE. https://ftp.ibge.gov.br/Censo_Agropecuario/Censo_Agropecuario_2006/Segunda_Apuracao/censoagro2006_2aapuracao.pdf

IBGE. (2019). *Censo Agropecuário 2017*. IBGE. https://biblioteca.ibge.gov.br/index.php/biblioteca-catalogo?view=detalhes&id=73096

Kageyama, A. A., Bergamasco, S. M. P. P., & Oliveira, J. T. A. de. (2013). Uma tipologia dos estabelecimentos agropecuários do Brasil a partir do censo de 2006. *Revista de Economia e Sociologia Rural*, *51*(1), 105–122. https://doi.org/10.1590/S0103-20032013000100006

Marques, F. C., Conterato, M. A., & Schneider, S. (2016). *Construção de mercados e agricultura familiar: desafios para o desenvolvimento rural*. Editora da UFRGS.

Medina, G., Almeida, C., Novaes, E., Godar, J., & Pokorny, B. (2015). Development Conditions for Family Farming: Lessons From Brazil. *World Development*, *74*, 386–396. https://doi.org/10.1016/j.worlddev.2015.05.023

Scarabelot, M., & Schneider, S. (2012). As cadeias agroalimentares curtas e o desenvolvimento local: um estudo no município de Nova Veneza-SC. *Revista Faz Ciência*, *14*(19), 101–130. https://doi.org/https://doi.org/10.48075/rfc.v14i19.8028

Schneider, S. (2016). A presença e as potencialidades da Agricultura Familiar na América Latina e no Caribe. *Redes*, *21*(3), 11–33. https://doi.org/10.17058/redes.v21i3.8390

Sène-Harper, A. L., Camara, S. M. E., & Matarrita-Cascante, D. (2019). Does Diversification Lead to Livelihood Security in Fishing-Farming Communities? Insight from the Senegal River Delta. *Human Ecology*, *47*(6), 797–809. https://doi.org/10.1007/s10745-019-00121-8