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ORIGINAL PAPER

Do Foods Products Labeled "Home-made" Contain Fewer Additives? A Brazilian Survey

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ABSTRACT

The objective of this study was to investigate the presence and classes of food additives in packaged foods labeled 'home-made'. Food identification information was collected by photographing food labels (n = 5,620); the ingredients lists were subsequently transcribed for analysis. The ingredients list (foods labeled 'home-made' and similar foods) were compared regarding the presence and classes of additives (function) using the chi-square test and regarding the median number of additives using the Mann–Whitney test. For all tests, $p < .05$ was used as the significance level. We evaluated 65 products labeled 'home-made' and 172 comparable conventional products. Seventy-nine percent (n = 188) of all products (n = 237) contained additives. There was no significant difference between the percentage of foods with the 'home-made' claim (81%) and those without (78%) regarding the presence of additives ($p = .605$). No significant difference was observed in the median number of additives ($p = .61$) and in the number of classes of additives ($p = .79$) between foods with and without the claim. It can contribute globally to the reflection and the creation of public policies for the elaboration of criteria for the use or prohibition of the use of "home-made" claims on labels.

KEYWORDS

Food legislation; home-made; packaged food; nutrition labeling

Introduction

The purchase of processed foods has increased globally in recent years, and their excessive consumption, especially of ultra-processed foods, is associated with an increase in the prevalence of chronic non-communicable diseases (Malik, Willett, & Hu, 2013; Popkin, Adair, & Ng, 2012; Rauber et al., 2018). Generally, these products are characterized by containing considerable amounts of fats, added sugars, salt, and food additives (Monteiro et al., 2017).

Food additives are substances that have no nutritional value and are intentionally added to food products to modify physical, chemical, biological, and/or sensory characteristics (World Health Organization/Food and Agriculture Organization of the United Nations, 2007, 2017a). Although food manufacturers must attest to the use of safe doses of food additives, systematic reviews draw attention to potential risks arising from their accumulative consumption. Intake of some food additives may increase the risk of allergic reactions (Feketea & Tsabouri, 2017), attention deficit hyperactivity disorder (Polonio & Peres, 2009; Sá et al., 2016), cancer (Bahadoran et al., 2015; Polonio & Peres, 2009), headaches (Toth, 2003), and cardiometabolic diseases (Azad et al., 2017).

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Brazilian food labeling regulations require that ingredients be listed in descending order of weight on packaged foods, but this rule does not apply to ingredients that are food additives (Brazilian Health Regulatory Agency, 2002). Thus, food additives may appear at the end of the ingredients list regardless of the amount present in the product.

The main purpose of food labels is to provide consumers with information to support informed decision making (World Health Organization, 2004, 2007). However, manufacturers also use labels for marketing claims (Rayner et al., 2013). Some claims may mislead consumers as to certain quality attributes, affecting food choices (Lwin, Vijaykumar, & Chao, 2015; Rayner et al., 2013).

Although the consumption of processed foods is high throughout the world, consumers attach great importance to traditional or local foods (Almli, Verbeke, Vanhonacker, Naes, & Hersleth, 2011; Aprile, Caputo, & Nayga, 2016; Contine et al., 2016; Fibri & Frøst, 2019; Guerrero et al., 2009; Pieniak, Verbeke, Vanhonacker, Guerrero, & Herleth, 2010; Vanhonacker et al., 2010), particularly home-made foods. These foods are valued for their artisanal production, traditional recipe, lack of preservatives (Chousou & Mattas, 2019), higher quality (Chambers, Lobb, Butler, Harvey, & Traill, 2007), healthiness, and rich flavor (Byrla, 2015). Food manufacturers have, therefore, used claims related to traditional and home-made production methods as marketing strategies to attract the attention of consumers (Amilien, Fort, & Ferras, 2007; Sadílek, 2019).

Most countries do not have regulations on the definition of traditional or home-made foods or the production, packaging, and distribution requirements for using home-made claims. Balogh, Békési, Gorton, Popp, and Lengyel (2016) argued that traditional food products must have quality certification, authentic ingredients, and an adequate retail channel. Consumers prefer buying traditional foods and are willing to pay more for these added value products at farmers' markets or small retailers than at hyper- and supermarkets. Although there has been a trend toward the use of "traditional" claims, Byrla (2015) highlights that the appeal to tradition reflects the need for reference points, trust, and stability. According to Vlontzs, Kyrgiakos, and Duquenne (2018), consumers have a positive attitude toward local and traditional foods but show some concerns about health issues.

The process of regulating food products with home-made claims in the global market is still incipient. No regulatory mechanisms were found, only British and Canadian recommendations on the use of traditional claims. The United Kingdom Food Standards Agency (FSA) published guidelines on the use of commonly misused terms in food labels, including fresh, natural, pure, traditional, and home-made, among others. The main objective of the document was to help food manufacturers and producers decide when to use these marketing terms, help enforcement authorities identify inappropriate uses, and help consumers make informed choices (Food Standards Agency, 2008). According to the FSA, the term home-made should be used solely to refer to foods prepared from primary ingredients in a manner that reflects a typical domestic situation, with some degree of fundamental culinary preparation. Home-made foods can be made from pre-prepared ingredients that are commercially available for domestic use.

The Canadian Food Inspection Agency defines that the term home-made refers to foods that are not commercially prepared and do not require further preparation. The term is considered misleading when used for foods that are intended to be marketed, even if in small, artisan establishments (Canadian Food Inspection Agency, Artisan Made, 2020). The fact that home-made claims are not defined in food labeling regulations suggests that such claims should not be used. In Brazil, food labels should not contain misleading information on the nature, composition, origin, or quality of the food product (Brazilian Health Regulatory Agency, 2015). Thus, it can be understood that food labels should not contain home-made or traditional claims.

The Dietary Guidelines for the Brazilian Population (Brazilian Ministry of Health, 2014) provide an example of the ingredients used to prepare home-made bread, including basic culinary ingredients but no food additives other than yeast. Thus, as recommended by the Food Standards Agency [FSA] (2008) and the Dietary Guidelines for the Brazilian Population, to convey the meaning expected by consumers, products labeled 'home-made' or other related terms should not contain food additives that are not commonly found in domestic kitchens (e.g., yeast and baking powder). According to the

Canadian Food Inspection Agency, additives and preservatives typically found in grocery stores, such as vinegar, salt, sugar, and lemon juice, are adequate for use in home-made foods (Canadian Food Inspection Agency, 2020).

The question remains as to whether the use of home-made or similar claims on food labels can lead consumers to perceive the food product as healthier, as the preparation of home-made foods is expected to reflect that of a typical domestic situation.

Noteworthy, there are no studies comparing the use of food additives between products with and without the claim 'home-made', as proposed in this study. The objective of this study was to analyze the ingredients list of packaged foods with and without the claim 'home-made' regarding the presence of food additives.

Methods

Study design

This was a cross-sectional study that investigated all packaged food products available in a large supermarket in Brazil. The supermarket was chosen deliberately and belongs to one of the ten largest Brazilian chain stores, according to the Brazilian Supermarket Association, with twenty-seven stores throughout the country (Brazilian Supermarket Association, 2013). Therefore, most of the products sold in this supermarket are of well-known food and beverage brands and represent products sold in other large supermarket chain stores throughout Brazil. This same study design and data gathering method has been used in previous studies (Kraemer et al., 2016a, Rodrigues et al., 2016; Scapin, Fernandes, Dos Anjos, & Proença, 2018; Silveira, Gonzalez-Chica, & Proenca, 2013).

A survey was performed mapping all aisles in the supermarket. Data collectors were responsible for mapping every product in assigned aisles. All packaged food products available in the supermarket that met the criteria established by the Brazilian and Mercosur regulation on food labeling (no. 360/2003) were included in the audit (Brazilian Health Regulatory Agency, 2003). Products not included in the study were those covered by different regulations (e.g. food for babies and toddlers) or those that did not require mandatory nutrition labeling (e.g. bakery products produced, packaged, and labeled in-store and meat and cheese products cut, packaged, and labeled in-store). The supermarket manager gave written consent for the survey.

Data collection

Data were collected between October and December 2013. Nutritional composition and food identification information of 5.620 products were identified by analyzing the food label. All sides of the food pack were photographed in-store, including the ingredients list. Dataset and collection procedures are detailed elsewhere (Rodrigues et al., 2016).

All data collectors (n = 12) received training and participated, one month before data collection, in a field test in a different supermarket: they were asked to feed the electronic forms with information from fifteen food products of different food groups, individually and without help, and the information was checked by the main researcher. Subsequently, data were examined, difficulties and inconsistencies were identified, and extra training was provided.

Data collected in-store were transferred directly from the tablet computers to an online database at the end of each collection day. The database was exported to a Microsoft Excel® 2010 spreadsheet. Each food product was coded with a number, and each image in the database was renamed according to the corresponding food product number.

All ingredients listed on the label of each product were transcribed from the photographic records to the Microsoft Excel® 2010 spreadsheet. For quality control purposes, transcribed data were checked by three researchers.

To improve quality control of data, as in a previous study(Rodrigues et al., 2016), the inter-rater agreement between the photographs and data transcribed to the electronic forms was evaluated for 5% of the products. Kappa test results showed a high degree of inter-rater agreement between the two databases (>99%; $p < 0 \cdot 05$).

Identification of foods with 'home-made' or similar claims

The presence of 'home-made' or similar claims was assessed by analyzing the front of pack of the 5,620 packaged foods surveyed (Machado, Santos, Uggioni, Fabri, & Müller, 2018; Rodrigues et al., 2016). These terms were analyzed in a comprehensive study by Machado et al. (2018).

Classification of products into food groups and identification of comparable foods

Packaged foods labeled "home-made" (Machado et al., 2018) were classified into eight food groups according to similarities in nutritional composition, as defined by the Brazilian and Mercosur resolution. The groups were as follows: 'Baking goods, breads, cereals, legumes, roots, tubers, and related products', 'Canned vegetables', 'Fruits, juices, syrups, and drink mixes', Milk and dairy products', 'Meats and eggs', 'Oils, fats, and nuts', 'Sugars and products in which carbohydrates and fats are the main energy sources', and 'Gravies, sauces, ready-made seasonings, broths, soups, and ready-to-eat dishes' (Brazilian Health Regulatory Agency, 2003).

Conventional foods and 'home-made' foods of the same category (food groups), with similar characteristics, and prepared in a similar manner were deemed comparable. We considered as similar food, products were considered the ones that presented the same product name, as collected in the product identification.

All comparable conventional products (without the 'home-made' claim) were used in the comparison analysis, generating comparative groups with different numbers of products.

Identification and categorization of additives

Food additives allowed in Brazil were identified by consulting food labeling regulations issued by the Brazilian Health Regulatory Agency, the agency that regulates the use of these ingredients in the country.

The functional class of additives present in the ingredients list of each food product was also identified. Food additives are divided into classes according to their function: bulking agent, anti-foaming agent, anticaking agent, antioxidant, coloring, preservative, artificial sweetener, flavoring, thickener, gelling agent, stabilizer, humectant, acidity regulator, acid, emulsifier, flour treatment agent, flavor enhancer, raising agent, glazing agent, firming agent, sequestrant, color retention agent, and foaming agent (Brazilian Health Regulatory Agency, 1997; World Health Organization, 2017b).

Foods labeled as home-made or similar were further classified according to their origin as local, national, or international. We evaluated the presence of different terms associated with the claim "home-made," the major food additives, and their frequency.

Statistical analysis

We quantified the absolute (N) and relative (%) frequencies of foods labeled 'home-made' and comparable conventional foods(a) in each food group, (b) with two or more food additives, and (c) according to each class of additive.

The chi-square test was used to evaluate possible associations in the presence and class of additives between foods labeled 'home-made' and comparable conventional foods.

Regarding the total number of food additives, normality of data was tested by the Shapiro–Wilk test, coefficient of variation, and frequency histogram. As no normal distribution was verified, data

were described using median, maximum, and minimum values. The Mann–Whitney test was used to assess differences between foods labeled 'home-made' and comparable conventional foods regarding the total number of additives and the number of classes of additives.

The number of products with and without home-made claims differed between food types, as we identified more products without the claim. Thus, we calculated the mean number of food additives for foods of each category and used these values for analysis. This procedure was adopted to take into account the number of additives of a specific food type only once for median determination.

Stata version 11.0 (StataCorp LP) was used to carry out the statistical analyses. For all tests, $p < .05$ was used as the significance level.

Results

This study's sample consisted of 65 packaged food products labeled 'home-made' and 172 comparable products without the 'home-made' claim on the label, totaling 237 food products. Of the 81 products labeled 'home-made' initially included in the study, six were rejected for analysis because of legibility issues. Of the resulting 75 products with legible ingredients list, 10 could not be paired with a similar product without the 'home-made' claim and were therefore excluded from the study. Fourteen different terms associated with "home-made" were identified in 75 products: home-made taste (n = 17), home-made product (n = 13), home-made-like recipe (n = 6), home-made-like (n = 6), from home (n = 2), delicious dishes with a homey touch (n = 2), well home-made (n = 2), taste of home (n = 2), home taste (n = 2), caseirito (n = 2), taste of homemade (n = 1), home-made taste always (n = 1), with that home-made taste (n = 1), and grandma's recipe (n = 1).

Of the total foods analyzed, 79% (n = 188) cited food additives in the list of ingredients. Interestingly, 81% of the products labeled 'home-made' had additives, compared with 78% of the products without this claim (Table 1). No statistically significant difference was found between products labeled 'home-made' and comparable conventional products regarding the presence of food additives ($p = .605$).

Table 1. Presence of food additives in products labeled 'home-made' and in comparable conventional products according to food group. Florianópolis, Brazil.

		Products labeled 'home-made'			Conventional products				Total number of products containing additives	
Food group	Main products containing additives	Number of products	Products containing additives		Number of products	Products containing additives		*p*-value		
		n	n	%	n	n	%		n	%
Baking goods, breads, cereals, legumes, roots, tubers, and related products	Bread and cake mix	30	22	73.3	53	40	75.5	-	62	74.7
Canned vegetables	Tomato sauce	2	0	0.0	24	12	50.0	-	12	46.2
Fruits, juices, syrups, and drink mixes	Nectar	3	3	100.0	19	19	100.0	-	22	100.0
Milk and dairy products	Pudding mix	3	3	100.0	7	5	71.4	-	8	80.0
Oils, fats, and nuts	Mayonnaise and salad dressings	4	4	100.0	18	18	100.0	-	22	100.0
Sugars and products in which carbohydrates and fats are the main energy sources	Sandwich cookies and peanut butter	7	7	100.0	32	23	71.9	-	30	76.9
Gravies, sauces, ready-made seasonings, broths, soups, and ready-to-eat dishes	Instant noodles and ready-made seasonings	16	14	87.5	19	18	94.7	-	32	91.4
Total		65	53	81.5	172	135	78.5	0.605*	188	79.3

*Chi-squared test was used to investigate if the number of additives differed significantly between products labeled 'home-made' and comparable conventional products.

Table 2. Presence of food additives in products labeled 'home-made' and in comparable conventional products according to the class of food additives. Florianópolis, Brazil.

	Products labeled 'home-made' (n = 65)		Conventional products (n = 172)			Number of products	
Food additive class	n	%	n	%	*p*-value	n	%
Flavoring	32	49.2	101	58.7	0.189	133	56.1
Acid	13	20.0	54	31.4	0.082	67	28.2
Coloring	17	26.1	47	27.3	0.856	64	27.0
Raising agent	21	32.3	38	22.0	0105	59	24.8
Preservative	13	20.0	42	24.4	0.472	55	23.2
Antioxidant	12	18.4	32	18.6	0.98	44	18.6
Emulsifying agent	14	21.5	28	16.2	0.344	42	17.7
Thickener	13	20.0	28	16.2	0.499	41	17.2
Flavor enhancer	12	18.4	27	15.7	0.609	39	16.4
Stabilizer	13	20.0	24	13.9	0.253	37	15.6
Sequestrant	5	7.6	22	12.8	0.27	27	11.3

* Chi-squared test.

Of the eight food groups, only 'Meats and eggs' did not include any product labeled 'home-made'. Products in the group 'Canned vegetables' did not contain any food additive, regardless of whether the product was labeled 'home-made' or not (Table 1).

The groups with the greatest percentage of products containing food additives were 'Fruits, juices, syrups, and drink mixes' (100%), 'Oils, fats, and nuts' (100%), and 'Gravies, sauces, ready-made seasonings, broths, soups, and ready-to-eat dishes' (91%) (Table 1).

Additives were present in 100% of products labeled 'home-made' in the groups 'Fruits, juices, syrups, and drink mixes', 'Milk and dairy products', 'Oils, fats, and nuts', and 'Sugars and products in which carbohydrates and fats are the main energy sources' (Table 1).

There were 11 different classes of food additives in the analyzed ingredients lists (Table 2). Flavorings were the most frequent food additives, followed by acids, colorings, and raising agents. No significant difference was observed regarding the classes of additives between products labeled 'home-made' and conventional products (Table 2).

We found that 63% of products labeled 'home-made' and 67% of products without this claim had two or more additives and that 60% of these 'home-made' foods and 66% of the conventional foods contained more than two classes of food additives (Table 3).

There was no significant difference in the number of food additives and the number of additives of different classes between 'home-made' products and conventional products (Table 3).

Of all food products ('home-made' and conventional), those that had the maximum number of additives (n = 14 and n = 16, respectively) and the maximum number of different classes of additives (n = 8) were instant noodles that came with seasoning sachet, included in the group 'Gravies, sauces, ready-made seasonings, broths, soups, and ready-to-eat dishes'.

Table 3. Number of food additives and number of different classes of food additives in products labeled 'home-made' and in comparable conventional products. Florianópolis, Brazil.

	Number of food additives per product					Number of classesof food additives per product				
				>2 additives					>2 additives	
	Median	Min	Max	n	%	Median	Min	Max	n	%
Products labeled 'home-made'	3	0	14	47	63	3	0	8	45	60
Conventional products	3	0	16	116	67	2.5	0	8	114	66
p-value*	0.61					0.79				
%Difference between medians**	0					20				

* Mann–Whitney test.

** %Difference between medians: $[(\text{Median}_{HM}/\text{Median}_{CV}) - 1] \times 100$, where Median_{HM} is themedian number of food additives or the median number of classes of food additives in products labeled 'home-made' and Median_{CV} is themedian number of food additives or the median number of classes of food additives in comparable conventional products.

Table 4. Presence of terms related to home-made in products from different brands (local, national, or international). Florianópolis, Brazil, 2020.

	Number of products (%)		
Terms related to home-made	Local brands (n = 12)	Nationa lbrands (n = 36)	International brands (n = 27)
Home-made (17)	4 (33.3%)	7 (19.4%)	6 (22.2%)
Home-made taste (17)	0	7 (19.4%)	10 (37.0%)
Home-made product (13)	7 (58.3%)	5 (13.9%)	1 (3.7%)
Home-made type recipe (6)	0	2 (5.5%)	4 (14.9%)
Home-made type (6)	1 (8.3%)	5 (13.9%)	0
From home (2)	0	0	2 (7.4%)
Delicious dishes with a homey touch (2)	0	0	2 (7.4%)
Well home-made (2)	0	2 (5.5%)	0
Taste of home (2)	0	2 (5.5%)	0
Home taste (2)	0	2 (5.5%)	0
Caseirito(2)	0	2 (5.5%)	0
Taste of home-made (1)	0	0	1 (3.7%)
Home-made taste always (1)	0	1 (2.8%)	0
With that home-made taste (1)	0	0	1 (3.7%)
Grandma's recipe (1)	0	1 (2.8%)	0
Total (75)	12 (100)	36 (100)	27 (100)

Table 5. Presence of food additives in products labeled 'home-made' from according with the type of brand (local, national, or international). Florianópolis, Brazil, 2020.

	Number of products (%)		
Food additive class	Local brands (n = 12)	National brands (n = 36)	International brands (n = 27)
Any class	7 (58.3%)	25 (69.4%)	27 (100%)
Acid	0	7 (19.4%)	7 (25.9%)
Antioxidant	0	8 (22.2%)	4 (14.8%)
Coloring	1 (8.3%)	8 (22.2%)	8 (29.6%)
Emulsifying agent	2 (16.6%)	7 (19.4%)	5 (18.5%)
Flavor enhancer	0	3 (8.33%)	11 (40.7%)
Flavoring	0	13 (36.1%)	19 (70.4%)
Preservative	4 (33.3%)	7 (19.4%)	3 (11.1%)
Raising agent	6 (50.0%)	10 (27.7%)	11 (40.7%)
Sequestrant	0	4 (11.1%)	1 (3.7%)
Stabilizer	0	6 (16.6%)	7 (25.9%)
Thickener	0	0	13 (48.1%)

Thirteen of the 75 "home-made" products were produced by local brands, 36 by national brands, and 27 by international brands. The term "home-made product" was identified in 58.3% of local products, and the term "home-made taste" was used in 37% of international products (Table 4).

All products from international brands contained food additives, whereas few products from local brands had additives. Local products had a lower variety of food additives. Flavoring was the most frequent additive in national and international products (36.1 and 70.4%, respectively) (Table 5).

Discussion

To our knowledge, this is the first study to analyze the presence of food additives inproducts labeled 'home-made'. In this study, 81% of the products marketed as 'home-made' contained food additives.

Müller (2016) assessed the perception of adult consumers from Florianópolis, Brazil, in relation to industrialized food products with the term home-made. The results of the focus groups showed that consumers perceive a food products that present the term home-made in their labels generally as to more natural products, with less processing, less food additives, that are made at home or in an artisan way. Additionally, this term may refer to a food product with flavors that remind consumers of the home-made product; with an artisanal appearance; and is normally considered healthier and tastier.

A study carried out in South Korea evaluated the attitude of adult consumers regarding additive-free claims on food packages. The results showed that consumers evaluate a product more positively when it is labeled 'additive-free' and that this positive impression extends to aspects of the product that are not related to the claim. Furthermore, consumers perceive additive-free products as being healthy even when they are not and have greater chances of choosing these products over products without the claim (Song & Im, 2018).

A systematic review conducted by Roman, Sanchez-Siles & Siegrist (2017) investigated consumers' definitions of a natural food. For the authors, a product is considered natural if it is free from additives and resembles a home-made, minimally processed food. For consumers, a food is not considered natural if it contains additives, irrespective of whether it is healthy or unhealthy Siegrist, 2017).

Lwin et al. (2015) have analyzed the presence of claims on the labels of packaged foods (n = 383) sold in large supermarkets in Singapore. The results showed that almost two-thirds of all food labels that used the "fresh" claim contained information about additives with 46% including information about emulsifiers and general-purpose food additives. Among the labels that used the "natural" claim, 20% had some type of emulsifier and 34% had general food additives. So, even using marketing claims as "natural" and "fresh", most packaged foods had additives in their composition that make the information potentially misleading to the consumer. For this authors previously mentioned, this scenario shows ambivalence among regulatory authorities regarding the definition and use these claims, in addition to the lack of harmonization among the regulations.

A study carried out in the United States of America analyzed the perception of adult and elderly consumers regarding food additives and found that most of the 183 participants used negative words to describe these substances, such as 'avoid', 'bad', 'cancer', 'chemicals', 'worried', 'harmful', 'artificial', 'not good', 'unnatural', 'poison', 'unnecessary', and 'unhealthy'. About 40% of consumers said it was 'extremely important' or 'very important' to avoid food additives. Some interviewees regarded food additives as' difficult to avoid' or 'common' and were aware that food additives are present in many products (Lull, 2018).

Another study carried out in South Korea assessed the safety perceptions of 430 adult and elderly consumers regarding food additives. The authors found that 76% of the consumers considered that government-approved food additives are not safe. The main reason for this belief was the lack of sufficient data on the safety of additives. This perception suggests distrust toward the food industry (Shim et al., 2011).

'Fruits, juices, syrups, and drink mixes' was the group that contained the greatest number of additives in our study. We highlight that, in our sample, all products included in this group were fruit nectars. Nectars are prepared by diluting the edible parts of a fruit or its extract with water and sugars (Brazilian Ministry of Agriculture, Livestock and Supply, 2009). Food additives such as acids, antioxidants, acidity regulators, flavorings, and sweeteners can also be added to fruit nectars (World Health Organization, 2005). Therefore, because of their preparation method and the presence of various classes of additives, the term home-made does not seem to be the most appropriate to describe these products.

The group 'Oils, fats, and nuts', in which all products were found to contain additives, included mayonnaise and salad dressings. Traditional mayonnaise contains 70–80% fat and is therefore susceptible to lipid oxidation. Mayonnaise products contained antioxidants, emulsifiers, and stabilizers, which provide the beneficial effect of increasing product shelf life; when the stability of an emulsion is increased, rancification occurs at a slower rate (Depree & Savage, 2001). Nevertheless, home-made mayonnaise and salad dressings do not contain any of these additives.

The most frequent classes of additives were flavorings, followed by acids, colorings, and raising agents. These results corroborate those of Lorenzoni, Oliveira, and Cladera-Olivera (2012), who observed that flavorings were the major class of food additives in products commercialized in Brazil (n = 468), present in 79% of foods.

Baking powder was the most common additive in 'Baking goods, breads, cereals, vegetables, roots, tubers, and related products'. The presence of baking powder is already expected in these products, as

it is commonly used in the preparation of home-made bread and cake. Thus, this was the only food additive among those analyzed that is characteristic of home-made foods.

There was no significant difference in the total number of additives and in the number of classes of food additives between products labeled 'home-made' and comparable conventional products. These results suggest that, despite bearing the term 'home-made' on the label, these products did not differ significantly from conventional products in terms of quantity of food additives. We also noted that several classes of additives are used in products with the 'home-made' claim.

A study conducted in Australia investigated which factors influenced the perception of 153 dieticians regarding the healthiness of packaged foods based on information presented on food labels. The authors found that 55.1% of the participants agreed and 35.8% strongly agreed that the number of ingredients in the ingredients list of a product influenced their healthiness ratings, that is, this parameter influenced 90% of the participants. The presence of additives was also taken into account by dieticians when deciding if a food was healthy (Thurecht, Pelly, & Cooper, 2018).

There are specific regulatory requirements for the packaging and sale of "traditional" foods. Narayana and Johnson (2020) highlighted that it is crucial for food manufacturers to have knowledge on these aspects to support healthy eating. Because there are no laws on the use of home-made claims, these terms can represent an obstacle to food producers and consumers. International companies, which sell their products in various countries, may find it difficult to use labels that comply with all labeling regulations, especially when the laws are not clear regarding the use of claims. Narayana and Johnson (2020) found that manufacturers must be aware of local laws on the use of additives (colorings, flavorings, stabilizers, and preservatives) in "traditional" foods before exportation. Some countries specify the food additives that cannot be included in products labeled traditional. To meet such requirements, food producers must sometimes reformulate products or alter food labels, leading to increased production costs. Food safety and shelf-life stability are also important factors to be considered in the commercial preparation of traditional products (Vlontzs et al., 2018); however, in doing so, manufacturers should bear in mind that it is important to not lose the identity and concept of the traditional food. Consumers agree that food safety is highly important and can be achieved through certification and appropriate packaging.

Previous studies have shown that terms such as home-made and traditional can lead to confusion or mistakes at the point of purchase. As previously mentioned, consumers expect such foods to be healthier, prepared on a small scale, and lack additives or ingredients that are not available in their homes (Almli et al., 2011; Bryla, 2015; Chambers et al., 2007; Chousou & Mattas, 2019; Contine et al., 2016; Fibri & Frøst, 2019; Guerrero et al., 2009; Pieniak et al., 2010; Vanhonacker et al., 2010). However, we found that foods with these claims are ultra-processed and may be unhealthy.

The results demonstrate the need to either define criteria for the use of terms such as home- made on packaged food labels or establish effective control measures to ensure that such terms are not used. Information on how consumers understand home-made claims can assist the food industry, policy-makers, and regulatory agencies in defining how these claims can be presented on food labels in a manner that guarantees the consumers' right to adequate information.

A limitation of this study is that data were collected in only one supermarket. Nevertheless, we took great care in selecting the supermarket to ensure that our database consisted of products found in any other part of the country, products that pertained to brands sold nationwide. Other surveys have been conducted investigating different aspects of all food product labels within a single supermarket in Brazil (Figueiredo, Scapin, Fernandes, & Proença, 2017; Kliemann, Veiros, González-Chica, & Proença, 2014, 2016; Kraemer, Machado, Kliemann, Gonzalez-Chica, & Proença, 2015b; Machado et al., 2016, 2018; Martins, Sousa, Veiros, Gonzalez Chica, & Proença, 2014; Nishida, Fernandes, Veiros, Gonzalez-Chica, & Proença, 2016; Rodrigues et al., 2016; Scapin et al., 2018; Silveira et al., 2013).

Conclusions

The majority of the packaged foods analyzed in this study contained food additives. Comparison of packaged food products labeled 'home-made' with conventional food products indicates that there are no differences between these foods. Contrary to what consumers expect, products with the claim 'home-made' on the label did not present fewer additives than those without the claim. Considering this fundamental divergence between the ingredients a home-made food is expected to contain and those present in the ingredients lists of the 'home-made' products analyzed, many of which were ultra-processed foods, our results reveal a contradiction in the use of the claim 'home-made' in packaged foods.

Because ultra-processed foods contained a higher number and variety of additives, we suggest that future studies be conducted to evaluate the presence and classes of food additives in packaged foods according to the degree of food processing and recommendations of the Dietary Guidelines for the Brazilian Population (2014) to limit the consumption of ultra-processed foods. Studies focused on marketing efforts should investigate the presence and types of food additives in food products of different brands. These findings might represent important information for marketers.

Although it portrays the reality of a country, it can contribute globally to the reflection and the creation of public policies for the elaboration of criteria for the use or prohibition of the use of "home-made" claims on labels, since these claims are being used in foods with various additives food that would not be used at home.

Authorship

We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed. We further confirm that the order of authors listed in the manuscript has been approved by all named authors. We confirm that we have given due consideration to the protection of intellectual property associated with this work and that there are no impediments to publication, including the timing of publication, with respect to intellectual property. In so doing, we confirm that we have followed the regulations of our institutions concerning intellectual property. We understand that the corresponding author is the sole contact for the Editorial process. She is responsible for communicating with the other authors about progress, submissions of revisions, and final approval of proofs.

We confirm that we have provided a current, correct email address that is accessible by the corresponding author and has been configured to accept email from the editorial office of *Journal of Food Products Marketing*.

LRAK was responsible for collecting, analysing and interpreting data, and drafting the manuscript. JM and CFC helped in the statistical analysis and revision of the manuscript. RKF and TS were responsible for collecting data and revision of the manuscript. RPCP, ACF and GLB were responsible for revision of the manuscript. RPCP were responsible for revision of the final manuscript. PLU was responsible for the design of the original study, planning the research, research orientation and revision of the manuscript.

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Conflicts of interest

None of the authors has any conflicts of interest.

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