

**Determination of the naturalness index of gluten-free breads commercialized in brazilian supermarkets****Determinação do índice de naturalidade dos pães sem glúten comercializados nos supermercados brasileiros**

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**ABSTRACT**

Gluten-free bread is the preference of many consumers who seek to eat healthier and suffer from physiological disorders when consuming products made with wheat, rye, barley and oats. However, there are still no studies that have evaluated the naturalness of this product. The aim of this study was to determine the naturalness index of gluten-free breads from different brands sold on Brazilian store websites. Terms such as “whole gluten-free bread” and “multigrain gluten-free bread” were used. 10 samples of different brands were selected. The brands of gluten-free breads were evaluated according to the scoring criteria from 1 (not natural) to 5 (extremely natural) for each factor and compared to the reference values. Descriptive statistical analyzes of mean, standard deviation, as well as Pearson's correlation index (r) were performed. In general, gluten-free breads had a Natural Index of  $3.00 \pm 0.55$ , being classified as moderately natural. This result pointed to the challenges of making more natural gluten-free breads, with the use of less additives and processed ingredients in the formulations, in order to serve a more conscious and selective market in relation to its food choices.

**Keywords:** bakery technology, processed ingredients, food additives, cultivation practice, functional foods.

**RESUMO**

O pão sem glúten é a preferência de muitos consumidores que procuram comer mais saudável e sofrem de perturbações fisiológicas quando consomem produtos feitos com trigo, centeio, cevada e aveia. Contudo, ainda não existem estudos que tenham avaliado a naturalidade deste produto. O objectivo deste estudo foi determinar o índice de naturalidade dos pães sem glúten de diferentes marcas vendidos em websites de lojas brasileiras. Foram utilizados termos como "pão integral sem glúten" e "pão multigrão sem glúten". Foram seleccionadas 10 amostras de diferentes marcas. As marcas de pães sem glúten foram avaliadas de acordo com os critérios de pontuação de 1 (não natural) a 5 (extremamente natural) para cada factor e comparadas com os valores de referência. Foram realizadas análises estatísticas descritivas da média, do desvio padrão, bem como do índice de correlação de Pearson (r). Em geral, os pães sem glúten tinham um Índice Natural de  $3,00 \pm 0,55$ , sendo classificados como moderadamente naturais. Este resultado apontou para os desafios de fazer pães mais naturais sem glúten, com a utilização de menos aditivos e ingredientes processados nas formulações, a fim de servir um mercado mais consciente e selectivo em relação às suas escolhas alimentares.

**Palavras-chave:** tecnologia de panificação, ingredientes processados, aditivos alimentares, prática de cultivo, alimentos funcionais.

**1 INTRODUCTION**

Gluten-free bread is an alternative for people with celiac disease, sensitivity to gluten and also to those who are sensitive to FODMAP (fermentable oligo, di and monosaccharides that are poorly absorbed). Social media has contributed to forming increasingly demanding consumers, aware of nutritional labels and the presence of allergenic or toxic ingredients in products. This is a behavioral trend, marked by the search for healthiness. And that, therefore, makes the aspect of naturalness one of the concerns for the bakery industry and consumers.

The naturalness of foods evaluated by consumers subsidized the Food Naturalness Index (FNI) proposed by Sánchez-Siles et al. (2019). This index encompasses four factors, such as farming

practice, number of additives, number of unnecessary ingredients and number of processed ingredients, which are evaluated based on the information contained on the product label.

In place of wheat flour, vegetable fibers and grains with technological and functional properties are used. Quinoa, Chia, flaxseed, sesame and sunflower seeds are commonly found in gluten-free bread formulations. Qui et al. (2020) reports that these grains are good sources of protein, essential fatty acids, vitamins and minerals. In addition, Yang et al. (2020) reports that the consumption of fibers present in these grains is able to alleviate the metabolic syndrome.

The naturalness and healthiness of gluten-free breads seems to be associated with consumer choice, these products have greater added value when they are incorporated with natural ingredients. In order to contribute with safe information for industry and consumers, the objective of this study was to determine the naturalness index of gluten-free breads from different brands commercialized in Brazilian supermarkets.]

## **2 MATERIALS AND METHODS**

10 samples of gluten-free breads added with flaxseeds from different brands were selected on purchase sites in the Brazilian market. In the research, the following words were used, “bread without gluten integral” and “bread without gluten multigrain”. Traditional gluten-free breads were excluded from the survey. The labels were evaluated according to the scoring criteria from 1 (not natural) to 5 (extremely natural) for each factor (farming practice, exemption from additives, exemption from unnecessary ingredients and degree of processing) and compared to reference values. Thus, the Food Naturalness Index (FNI) was calculated. Mean and standard deviation were calculated. Additionally, the Pearson correlation degree ( $r$ ) between the factors of the Naturalness Index was calculated. Statistical analyzes were performed in Excel Office 365.

## **3 RESULTS AND DISCUSSION**

The grains most commonly found in the composition of gluten-free breads were: flaxseed, sesame, soy, chia, sunflower seeds and quinoa. The calculation of the Naturalness Index of gluten-free breads of different brands (A, B, C, D, E, F, G, H, I, J) is described in Table 1. The Naturalness Index of gluten-free breads was classified as moderately natural ( $3.0 \pm 0.55$ ). The “I” brand stood out for having the highest Naturalness Index, 4.25 (Very natural), probably because it used ingredients with organic cultivation and also gave preference to natural ingredients for the manufacture of gluten-free bread. 8 brands contained ingredients with conventional cultivation practice. The “A” and “I” marks were free of additives. All gluten-free breads were evaluated as free from unnecessary ingredients, which contributed positively to the Naturalness Index. 8 brands had more than three processed ingredients, classified as unnatural in relation to this factor. Although these different brands of gluten-free breads were added with functional grains, in general, this did not give them a high

naturalness index. The farming practice the ingredients, the number of additives and ingredients processed in the formulations were the factors most strongly related to the average Naturalness Index, as shown in Table 1.

Table 1 – Calculation of the Naturalness Index of different brands of gluten-free breads, as Sánchez-Siles et al. (2019).

Brands	Farming practice	Number of additives	Number of unnecessary ingredients	Number of processed ingredients	Naturalness index
A	2	5	5	1	3.25
B	2	2	5	1	2.5
C	2	4	5	1	3
D	3	4	5	1	3.25
E	2	2	5	1	2.5
F	2	1	5	1	2.25
G	2	4	5	1	3
H	2	3	5	2	3
I	4	5	5	3	4.25
J	2	4	5	1	3
<b>Mean</b>	2.30	3.40	5	1.30	3.00
<b>Standard deviation</b>	0.67	1.35	0	0.67	0.55

In relation to the factors evaluated, a good correlation was identified between farming practice and the number of processed ingredients ( $r = 0.76$ ), which demonstrates industry coherence in the elaboration of products in relation to aspects associated with naturalness.

#### 4 CONCLUSION

The determination of the Naturalness Index of gluten-free breads highlighted the challenges that still permeate the manufacture of these products. In addition to the incorporation of functional ingredients in the production of gluten-free breads, the bakery industry still needs to reduce the amount of additives and ingredients processed in the formulations. In this way, to meet the demand of consumers who are increasingly demanding in terms of naturalness.

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