

Spirulina pudding for school meals in Brazil: Determination of nutritional composition

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Abstract

Spirulina is a microalga that has been widely studied and marketed in the recent years due to its nutritional composition. This photosynthetic microorganism presents in its composition proteins (up 70%), lipids, polyunsaturated fatty acids, vitamins (including B12), pigments and phenolic compounds. Aiming school meals nutritional improvement in Brazil, they developed spirulina chocolate pudding and evaluated its proximal composition. The ingredients were selected according to the literature and with similar products on the market. Tests with different concentrations of these ingredients were carried out until obtaining a product with the desirable characteristics. The content of proteins (Kjeldahl), lipids (soxhlet), ash and moisture (Association of Official Analytical Chemists ??? AOAC) and carbohydrate (by difference) was determined. These analyzes are being carried out in triplicate, in pudding formulations with or without spirulina addition. The results obtained are analyzed using Variance Analysis (ANOVA), followed by Tukey test for comparison between means, with a confidence level of 95% ($p < 0.05$). Subsequently, the nutritional composition of the finished pudding was determined. The best formulation contained sugar, cocoa powder, thickener, starch, flavoring, salt, dye, lecithin and spirulina dried biomass. The spirulina addition in the pudding formulation had improved the protein content of this product. In this way, it will be possible to increase nutritionally puddings for school meals in Brazil, which may help to reduce malnutrition cases.

the development of eating habits starts in pre-school and will reflect directly on children's growth and development¹. therefore, being aware of what is offered and how food choices are made during this phase of life are important, since eating habits incorporated in this phase will influence health in adulthood^{1,2}. Associated with family and environmental factors, the school has a key role in forming healthy eating habits because in school the child can acquire autonomy over what he or she eats primarily if associated with nutrition education programs¹.

the Programa Nacional de Alimentação Escolar (PNAE, National School Food Program) is characterized as one of the longest-lasting public policies in Brazil. It constitutes an important strategy for food and nutrition security, while promoting the "Human Right to Adequate Food"^{3,4}. It

This work is partly presented 22nd Euro-Global Summit on Food and Beverages February 28-March 01, 2019 | London, UK

ensures permanent and continuous access to quality foods and in adequate quantity without compromising other essential needs.

this policy covers 45.6 million students enrolled in basic education of the public networks of Brazil every day of the year⁴. One goal of the program is to provide free food to students, ensuring at least 20% of the students' daily nutritional needs, with a variety of foods prioritizing the children's dietary adherence and acceptability^{5,6}. It also seeks to prioritize respect for eating habits and the regional produce in order to promote local development^{5,7}. the incorporation of regional dishes in school menus can contribute to the preservation of the Brazilian food culture, bearing in mind the magnitude of the program.

therefore, it is possible to unify two major aspects of this program, a healthy and adequate diet with respect to regional habits, mainly because most regional dishes involve fruits and vegetables⁸. Despite the legal requirement that menus of school food programs must meet the local nutritional references, eating habits, food culture, and tradition⁷, a significant number of school food menus does not include regional foods, particularly in the country's North and Midwest regions⁹. Additionally, the menus in large Southern capitals contained few regional food items or regional dishes¹⁰.

Appreciation for dietary practices based on local characteristics and traditional foods has increased because the process of globalization is characterized by homogenization and standardization in various orders¹¹; however, this appreciation seems to be little explored by states and municipalities. the insertion of regional foods and regional dishes in school food programs can promote the local cultural identity and improve the acceptability of the menus¹⁰.

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