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ADDITION OF PUMPKIN SKIN FLOUR IN PIZZA CHANGES THE PHYSICOCHEMICAL AND SENSORY ACCEPTABILITY OF CHILDREN

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ABSTRACT

The aim of the study was to evaluate the sensory acceptability among children of pizzas in which different levels of pumpkin skin flour (PSF) were added. Additionally, we wanted to determine the physicochemical composition of the control product and of the one with a higher PSF level, and which formulations would have an acceptability level similar to the control product. Five pizza formulations were developed with the addition of different levels of PSF: F1 (0%), F2 (12%), F3 (18%), F4 (24%) and F5 (30%). Sixty-five untrained consumers, whose age varied between 7 and 10 years old, participated in the analysis. Greater scores for F1 ($p < 0.05$) were noticed for the look and colour attributes in comparison with F5. The F1, F2 and F3 formulations had superior scores in comparison with F5 regarding their smell. Similar results were noticed for the flavour and texture attributes, besides overall acceptance and purchase intent. The control pizza was the most accepted one in these evaluations ($p < 0.05$) in comparison with F4 and F5. Additionally, F2 and F3 got superior scores in comparison with F5. Therefore, we notice that addition levels superior to 18% of PSF in pizzas reduce their acceptability. There was no difference in the moisture and calorie levels between F1 and F3 ($p > 0.05$). However, greater levels of ash, protein, lipid and dietary fiber were noticed for F3. The F1 formulation presented greater levels of carbohydrate ($p < 0.05$). We may conclude that an addition level of up to 18% of PSF in pizza improves the product's nutritional profile and is well accepted by the children.

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INTRODUCTION

Currently, food waste reduction is becoming a goal in many countries. Damages caused during food production include the economic sphere up to the food insecurity situation, especially in underdeveloped and developing countries. According to the Food and Agriculture Organization of the United Nations (FAO, 2016), just in Latin America, more than 127 million tons of food are annually wasted. Actually, the calculations show that the amount of wasted food could feed around 300 million persons.

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Fruits and vegetables are among the foods that present the greatest waste numbers, around 55% of their production, especially regarding their skins, leaves, stems and seeds. However, studies showed the sensory and technological viability of reusing these unorthodox parts as ingredients in new formulations and/or in those that are usually consumed by the population. Examples of enriched foods are cakes, breads and pies, to which manioc, potato and carrot skins are added, respectively (Souza *et al.*, 2013; Fernandes, 2014; Gálvez *et al.*, 2016). Additionally, it is possible to notice an improvement in the nutritional profile of the products, especially regarding their levels of minerals and fiber.

The pumpkin (*Cucurbita sp.*) has a great genetic variability and belong to the Cucurbitaceae family. They are natives of the Americas and are used to prepare several dishes. The *Cucurbita máxima* species is popularly known as pumpkin. It is classified as a fruit and is one of the five species produced in Brazil (Barbieri, 2012), especially at the Southeast and Northeast regions. In 2006, the pumpkin production in the country, along with other species (pumpkin and *Cucurbita moschata*), was of 384.9 thousand tons (IBGE, 2006), which indicates its elevated economic importance. The pumpkin may be consumed in several ways, mostly, in the preparation of candies, purees and typical dishes (Peccini, 2013; Pimenta and Mello, 2014). However, their skin is usually discarded, although it has high levels of protein (1.65 $g.100g^{-1}$), carbohydrate (20.68 $g.100g^{-1}$), dietary fiber (2.23 $g.100g^{-1}$), lipid (0.87 $g.100g^{-1}$), carotenoids (β-carotene 12.32 $mg.100g^{-1}$; β-cryptoxanthin 0.66 $mg.100g^{-1}$) and tocopherol (α-tocopherol 0.96 $mg.100g^{-1}$; γ-tocopherol 0.35 $mg.100g^{-1}$) (Kim *et al.*, 2012). Considering this context, we underscore the importance of the development of new products that use alternative ingredients, such as the pumpkin skin.

Children of school age (7 to 10 years old) present an elevated consumption of processed food and low ingestion of fruits and vegetables. These factors are linked to the increase of overweight and obesity cases thereof (Sparrenberger *et al.*, 2015). Consequently, children require continuous interventions whose purpose is to improve and/or establish healthy food habits to reduce the development risk of future non-communicable chronic diseases (Ramos *et al.*, 2013; Wade *et al.,* 2016). In this subject, schools are a very favorable environment for learning, since children remain therein for a long period. Some interventionist actions related to nutritional education in school environments, such as workshops and theaters, for example, were already proven effective to increase their food knowledge, encouraging healthier habits. It happens because it can involve the participation of students, teachers and family, increasing their knowledge (Rito *et al.*, 2013; Moss *et al.*, 2013; Santana *et al.*, 2015).

Pizzas are simple baked goods, prepared with fermented dough made of wheat flour and water. They usually present a circular shape and toppings made of several ingredients, sweet and salty, such as sauces, cheeses, meats, ice cream, etc (Morais *et al.*, 2015; Bernklau *et al.*, 2017). Pizzas may also be consumed in restaurants or even sold in supermarkets, frozen or cold, which are then cooked by the consumer (Dantas *et al.,* 2016). According to the United Pizzeria Association of the State of São Paulo (APUESP, 2016), one million pizzas are daily consumed in Brazil and its internal market circulates around 22 billion Brazilian reais annually. Pizzas are a food enormously enjoyed by all kinds of persons. Researchers have proven that pizza consumption is elevated among adults (1.7 kg/year) (IBGE, 2011), while 22% of children report this food as one of their most favorite fast foods (Powell *et al*., 2015). It happens because pizzas are easy to prepare, have several flavours, and are largely sold, which ensure a quick and tasty snack for consumers. However, they also present high levels of fats and sodium (Hur *et al*., 2014), being one of the foods that most contribute for caloric strengthening (IBGE, 2011). In this context, the introduction of healthier ingredients in pizzas could encourage healthier food consumption.

The introduction of new products in the market requires a rigorous evaluation of their characteristics, especially of those related to technological, chemical and sensory aspects. Sensory evaluations, for example, enable us to evaluate if the food will be accepted or chosen by consumers (Custódio *et al.*, 2015). As for the physicochemical analyses, they help us to characterize the nutritional quality and safety of the foods that will be sold. They also help us in food product technological innovations (Instituto Adolfo Lutz, 2008). In this context, the purpose hereof was to evaluate the sensory acceptability of pizzas made with different levels of pumpkin skin flour (PSF) among children. Additionally, we wanted to determine the physicochemical composition of the control product and of the one with a higher PSF level, and which formulation would have an acceptability level similar to the control product.

MATERIALS AND METHODS

Raw material: The ingredients were acquired in supermarkets of the city of Guarapuava, PR. We used pumpkins (*Cucurbita maxima*) that presented a better visual appearance, firm consistency, smooth surface, no imperfections and orange colour.

Flour preparation: One hundred and ten kilos of pumpkin were cleaned under running clean water, sanitized (plunged into a sodium hypochlorite solution for 15 minutes) and cleaned again under running water. The skins (16.6 kg) were manually extracted (estimated thickness of 5 mm) and chopped. Then they were dried in a dehydrator (Pardal®, Brazil) with air circulation (65 °C) for 48 hours. After dried, they remained at room temperature (22 °C) until their complete cool down. The skins were shredded in a domestic blender (Britânia®, Brazil) and sieved through a sieve of 32 mesh/Tyler openings (Bertel®, Brazil) until we got the PSF, whose yield was of 1.7 kg.

Formulations: We prepared 5 pizza formulations: F1: control (0% of PSF) and in all others 12% (F2), 18% (F3), 24% (F4) and 30% (F5) of PSF were added. There percentages were defined through preliminary sensory tests performed with the product. Besides the PSF, the others ingredients used in the formulations were: enriched wheat flour (F1: 55%, F2: 43%, F3: 37%, F4: 31%, F5: 25%), water (21.2%), egg (14.03%), olive oil (3.75%), fresh biological baking powder (2.81%), granulated sugar (1.68%) and salt (1.68%). For the toppings, the following ingredients were used: tomato sauce (35.3%), mozzarella (35.3%), ham (28%) and oregano (1.4%). The pizzas were prepared by mixing wheat flour and PSF, according to the already described levels, biological baking powder, eggs, olive oil, sugar and salt. Water was gradually poured at a temperature of 40 °C. The dough was manually kneaded until the ingredients were completely homogenized. The pizzas were open with the assistance of a rolling pin and corn flour (10 g) sprinkled over a smooth surface. Then they were shaped into discs (14 cm of diameter and 0.5 cm of thickness) and laid into circular aluminum baking pans (35 cm), where they rested (30 minutes) at room temperature (22 °C) until their volume doubled. The formulations were pre-baked in a semi-industrial oven (Venâncio®, Brazil), preheated at 250 °C for 7 minutes. Then they were covered with tomato sauce, cheese, ham and oregano and baked again at 250 °C for 7 additional minutes. After this process, they rested until they cooled down to room temperature (22 °C). Each formulation was cut into 8 triangular pieces (4 cm x 7 cm) and stored in an airtight plastic container until the moment of the analysis.

Table 1. Sensory scores (mean ± standard deviation) and Acceptability Index (AI) of the pizzas with addition of different levels of pumpkin skin flour

Parameter	F1	F2	F3	F4	F5
Appearance	6.07±0.12[a]	5.69±0.13[ab]	5.61±0.13[ab]	5.55±0.14[ab]	5.29±0.17[b]
AI (%)	86.71	81.28	80.14	79.28	75.57
Aroma	5.81±0.14[a]	5.70±0.13[a]	5.69±0.16[a]	5.55±0.18[ab]	5.04±0.17[b]
AI (%)	82.85	81.45	81.28	79.28	72.00
Flavour	6.36±0.11[a]	6.16±0.13[ab]	6.04±0.16[ab]	5.73±0.18[bc]	5.32±0.18[c]
AI (%)	90.85	88.00	86.28	81.85	76.00
Texture	6.29±0.11[a]	5.96±0.14[ab]	5.89±0.14[ab]	5.69±0.15[bc]	5.18±0.18[c]
AI (%)	89.85	85.14	84.14	81.28	74.00
Colour	5.89±0.12[a]	5.41±0.14[ab]	5.33±0.16[ab]	5.49±0.14[ab]	5.21±0.15[b]
AI (%)	84.14	77.28	76.14	78.42	74.42
Overall acceptance	4.80±0.05[a]	4.56±0.10[ab]	4.55±0.10[ab]	4.26±0.12[bc]	3.89±0.16[c]
AI (%)	96.00	91.20	91.00	85.20	77.80
Purchase intent	4.80±0.06[a]	4.49±0.12[ab]	4.33±0.13[ab]	4.04±0.16[bc]	3.70±0.18[c]

Distinct letters in row indicate significant differences by Tukey's test ($p < 0.05$). Values are mean of three replicates. Addition of pumpkin skin flour: F1: control (0%); F2: 12%; F3: 18%; F4: 24%; and F5: 30%.

Table 2. Physicochemical composition (mean ± standard deviation) of the pumpkin skin flour (PSF), of the control pizza (F1) and with PSF 18% addition (F3)

Parameter	PSF	F1	DRV (%)*	F3	DRV (%)*
Moisture ($g.100g^{-1}$)	5.99±0.05	38.81±0.05[a]	NA	39.39±0.04[a]	NA
Ash ($g.100g^{-1}$)	6.62±0.02	3.00±0.03[b]	NA	3.79±0.04[a]	NA
Protein ($g.100g^{-1}$)	11.11±0.08	11.88±0.04[b]	12.61	12.58±0.06[a]	13.36
Lipid ($g.100g^{-1}$)	6.42±0.06	8.29±0.04[b]	8.36	9.37±0.07[a]	9.45
Carbohydrate ($g.100g^{-1}$)**	69.86±0.24	38.02±0.21[a]	10.31	34.86±0.24[b]	9.46
Total energy value ($kcal.100g^{-1}$)	383.87±0.78	271.61±0.98[a]	10.04	270.41±0.87[a]	10.00
Soluble fiber ($g.100g^{-1}$)***	1.34±0.07	0.13±0.08[b]	NA	0.36±0.05[a]	NA
Insoluble fiber ($g.100g^{-1}$)***	31.07±0.08	1.58±0.03[b]	NA	6.74±0.07[a]	NA
Total fiber ($g.100g^{-1}$)***	32.41±0.03	1.71±0.07[b]	9.29	7.10±0.08[a]	38.68

Distinct letters in row between F1 and F3 indicate significant difference by the Student's t-test ($p < 0.05$). **DRV (Daily Reference Values): nutrients evaluated by DRI (2005) mean, based on a diet of 1893.63 kcal/day and a portion mean of 70 g; Values expressed in wet base; **Includes dietary fiber; ***Dietary fiber; NA: not available.

Sensory analysis: Sixty-five untrained consumers participated in the research. They were children enrolled in a Municipal School of Guarapuava, PR, of both genders, whose age varied between 7 and 10 years old. The products were submitted to sensory analysis in a classroom. Each test was made individually, as the consumer was oriented by the researchers to fill the answers. The attributes of appearance, aroma, flavour, texture and colour were evaluated through a mixed structured facial hedonic of 7-points scale, varying from 1 ("super bad") to 7 ("super good"). Additionally, overall acceptance and purchase intent questions were also applied and evaluated through a 5-point mixed structured scale (1, "dislike extremely"/"definitely would not buy it" to 5, "like extremely"/"definitely would definitely buy it", respectively). Each sample (about 15 g) was served to consumers in white plates coded with randomly selected 3-digit numbers in monadic form and using balanced design (Macfe *et al*., 1989). Sensory evaluations were performed by consumers under fluorescence lighting. After consuming each sample, consumer was instructed to drink water for palate cleansing. Samples were evaluated in triplicate in separate session. The Acceptability Index (AI) was calculated through the multiplication of the mean score informed by the consumers to the product by 100, dividing the result by the maximum mean score given to the product (Teixeira *et al*., 1987).

Physicochemical characterization

All analyses were performed in triplicate in the PSF, in the control formulation and in the one with greatest PSF level and whose sensory acceptability was similar to the control formulation. The moisture, ash, protein and lipid content were determined by the AOAC methods (2011). The moisture content was determined through the drying-in-oven method (105 ± 2 ºC). The lipid content was determined through the cold extraction method (Bligh and Dyer, 1959). The protein content was analyzed through to the Kjeldahl method. The factor 6.25 was used for the nitrogen conversion into crude protein. The ash was obtained by muffle. The soluble and insoluble fibers were determined through the enzymatic method (AOAC, 2011). The total dietary fiber was calculated by the difference of the soluble and insoluble fiber results. The carbohydrate content was evaluated through theoretical calculation (by difference) in the triplicates' results, according to the formula: *% carbohydrate = 100 – (% moisture + % protein + % lipid + % ash + % fiber)*. The total energy value (kcal) was theoretically calculated using the following factors: lipid (8.37 kcal/g), protein (3.87 kcal/g) and carbohydrate (4.11 kcal/g) (Merrill and Watt, 1973). The Daily Reference Values (DRV) was calculated for 70 g of the sample, based on the average values recommended for children of 7 to 10 years old (DRI, 2005), resulting in: 1893.63 kcal/day, 258.07 g/day carbohydrate, 65.95 g/day protein, 69.40 g/day lipid and 12.85 g/day dietary fiber.

Statistical analysis

The results were analyzed using the analysis of variance (ANOVA). The means were compared through Tukey's test and Student's t-test at a significance level of 5% ($p < 0.05$). The Statistical Package for Social Sciences software (SPSS, Chicago, IL, USA) was used to perform the statistical calculations.

Ethic issues: This paper was approved by the Research Ethics Committee of UNICENTRO, ruling no 608.950/2014. The

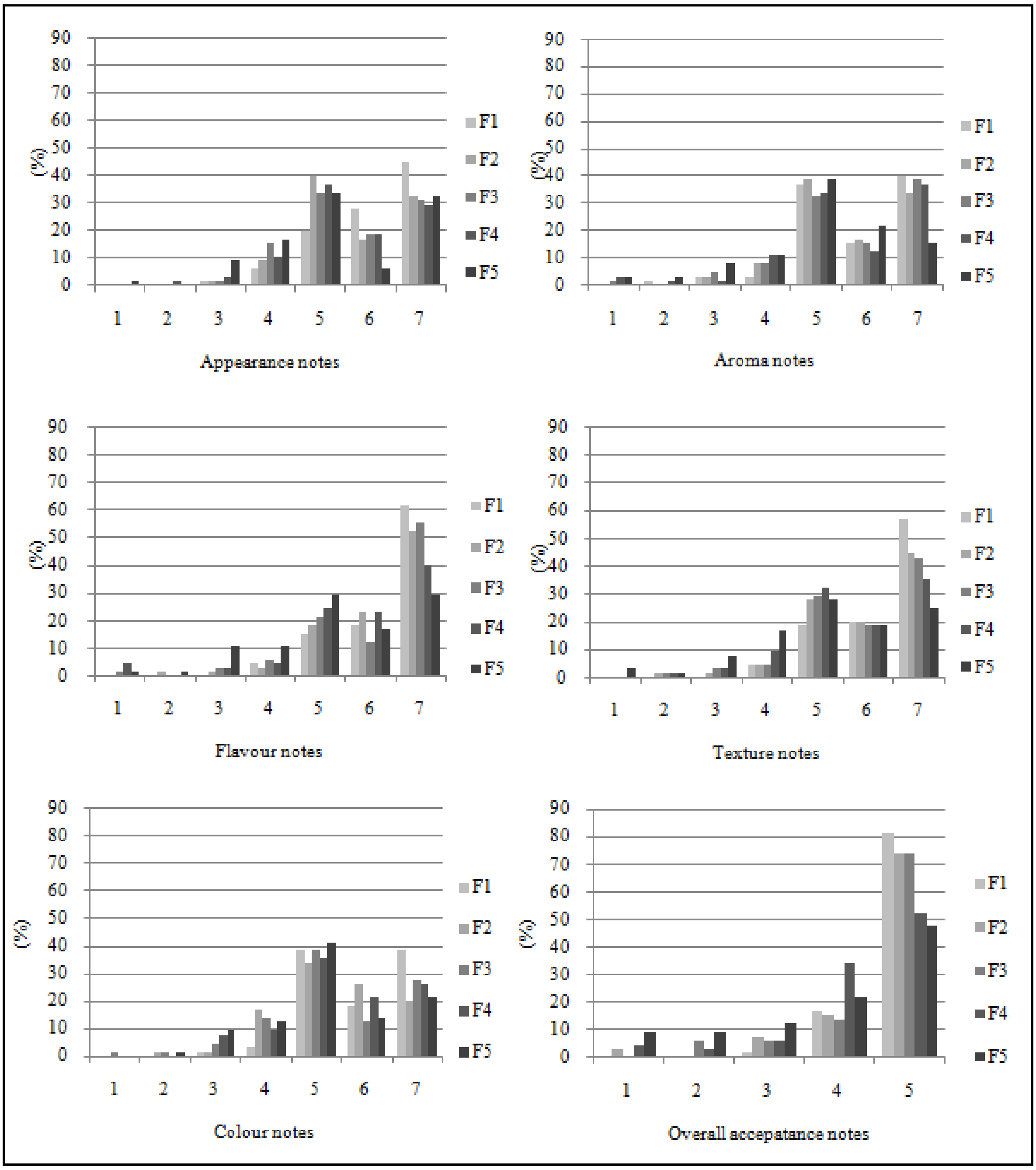

Figure 1. Distribution of the consumers by the hedonic values obtained in the pizza sensory evaluation with addition of different levels of pumpkin skin flour: F1 (0%, control), F2 (12%), F3 (18%), F4 (24%) and F5 (30%)

following exclusion criteria were considered: allergies to some ingredients used in the pizzas' preparation or failing to present the Term of Free and Clarified Consent signed by the person responsible.

RESULTS AND DISCUSSION

Sensory analysis: The sensory evaluation results of the pizzas prepared with different level of PSF are described in Table 1. Greater scores for F1 ($p < 0.05$) were noticed for the appearance and colour attributes in comparison with F5. The formulations F1, F2 and F3 got greater scores in comparison with F5 regarding their smell. There was no significant difference between all other samples for these attributes. Similar results were noticed for flavour, texture, overall acceptance and purchase intent. The control pizza was the most accepted one in these evaluations ($p < 0.05$) than F4 and F5. Additionally, F2 and F3 got superior scores in comparison with F5.

Therefore, we notice that addition levels superior to 18% of PSF in pizzas reduce their acceptability. Teixeira *et al.* (2016) noticed similar results while evaluating the addition of PSF (1.75, 3.5, 5.25 and 7%) in croquettes. The PSF has an orange colour due to their high levels of carotenoids present in its skin (3.94 $mg.100g^{-1}$) (SESI, 2008). Consequently, the colour of the pizzas changed, which may have caused a lower acceptance of the formulations containing more PSF. However, carotenoids, especially the β-carotene, have an antioxidant function in the organism, which may reduce the risk of heart diseases and cancer (Moraes and Colla, 2006). Many plants, including those of the *Cucurbitaceae* family, are composed by Cucurbitacians, which makes the dishes have a bitter flavour (Paris *et al.*, 2017). This fact may explain the lower scores for the pizza containing a higher PSF level.

All formulations had an AI superior to 70% in every evaluated attributes and in overall acceptance, which proves that they were well accepted (Teixeira *et al.*, 1987). During the pizza preparation, we noticed that higher PSF levels made the dough more brittle and less elastic. This happens because the pumpkin's skin is gluten free; gluten is a protein that is present in wheat flour and is responsible for the growth, softness, viscosity and elasticity of the dough and dough-based products (Costa *et al*., 2008). Additionally, the PSF has high fiber levels (32.86%) (Santos, 2013), which increase its water retaining capability and solubility. This can make the dough more brittle and hard to manipulate (Brennan, 2005). The distribution of the consumers by hedonic values for each sensory attribute is presented in Figure 1. Most scores attributed to the formulations for their attributes and overall acceptance are above 5 ("good") and 5 ("like extremely"), respectively.

These data agree with the literature (Silva and Silva, 2012). Enriching dishes with unorthodox products may contribute for the environment because the amount of food waste disposed into the nature is reduced. Additionally, it can help to reduce the risk of non-communicable chronic diseases. It may happen because byproducts like skins, stems and leaves have high levels of dietary fiber, which accelerate the gastric emptying, increase satiety, reduce the cholesterol synthesis and the absorption of carbohydrate, resulting in the reduction of the glycemic level (Marlett *et al*., 2002). The F3 sample was the one with the greatest PSF level and whose acceptance was similar to the control (F1) in all attributes and for overall acceptance and purchase intent (Table 1). Consequently, both formulations were considered for physicochemical characterization purposes herein.

Physicochemical characterization

The physicochemical characterization of the PSF, of the control pizza and of the one with PSF 18% addition is presented in Table 2. Inferior results of ash (5.3%), carbohydrate (38.2%) and calories (292.9 kcal), superior results of moisture (7.7%) and protein (19.9%), and similar results of lipid (6.7%) were noticed in the literature (Santos, 2013) for the PSF. The variation in the nutrient level is related to different growing methods, fertilizer use and the genetic enhancement of food (Rocha *et al*., 2008). Additionally, the processes employed for the production of flours, such as skin thickness and the weather/temperature binomial may influence the nutritional composition (Chisté and Cohen, 2011). The PSF's ash level indicates high mineral concentrations in the pumpkin skin. Some examples are iron (225.7%), potassium (66%), zinc (55.3%) and calcium (11%) (Pigoli, 2012).

There was no difference in the moisture and energy levels between F1 and F3 ($p > 0.05$). However, greater ash, protein and lipid contents were noticed for F3. It happens because wheat flour has lower levels of these nutrients in its composition (4.3 $g.100g^{-1}$, 9.9 $g.100g^{-1}$ and 1.0 $g.100g^{-1}$, respectively) (USDA 2016). The F1 formulation presented higher levels of carbohydrate, which agrees with the literature (Teixeira *et al*., 2016). Higher levels of insoluble dietary fiber (6.74 $g.100g^{-1}$) and total dietary fiber (7.10 $g.100g^{-1}$) noticed in F3 (18% of PSF) in comparison with F1 should be underscored because they express a significant increase of 326.6% and 315.2%, respectively. In this aspect, the F3 sample may be considered as a high dietary fiber level product because it has a minimum level of 6% of fiber in its composition (Brazil, 2012).

Conclusion

A PSF addition level of up to 18% in pizzas is well accepted by child consumers, resulting in a sensory acceptance level similar to the control product. It also increases the intake of ash, protein, lipid and dietary fiber, but reduces the carbohydrate levels, improving the product's nutritional profile. Consequently, the PSF may be considered as a potential ingredient to be added in pizzas, with the possibility of being offered to children and with high commercialization expectations.

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REFERENCES

Associação das Pizzarias Unidas do Estado de São Paulo (APUESP). 2016. *1 milhão de pizzas são consumidas todos os dias no Brasil*. Available online at: http://www.jb.com.br/cultura/noticias/2016/06/25/1-milhao-de-pizzas-sao-consumidas-todos-os-dias-no-brasil/.

Association of Official Analytical Chemistry (AOAC). 2011. *Official methods of analysis of AOAC international.* 18 ed. Gaithersburg: AOAC.

Barbieri, R. L. 2012. *A diversidade de abóboras no Brasil e sua relação histórica com a cultura*. Available online at: http://www.slowfoodbrasil.com/textos/alimentacao-e-cultura/501-aboboras-e-cultura.

Bernklau, I., Neuber, C., Moroni, A. V., Gysler, C., Spagnolello, A., Chung, W., Jekle, M. and Becker, T. 2017. Structural, textural and sensory impact of sodium reduction on long fermented pizza. *Food Chemistry*, 234(1): 398-407.

Bligh, E. G. and Dyer, W. J. 1959. A rapid method of total lipid extraction and purification. *Canadian Journal of Biochemistry and Physiology*, 37(8): 911-917.

Brasil. Agência Nacional de Vigilância Sanitária (ANVISA). 2012. Resolução *RDC nº 54*, de 12 de novembro de 2012. Regulamento Técnico sobre Informação Nutricional. Diário Oficial União: Brasília (DF), Brasil.

Brennan, C. S. 2005. Dietary fibre, glycaemic, and diabetes. *Molecular Nutrition e Food Research*, 49(6): 560-570.

Chisté, R. C. and Cohen, K. D. E. O. 2011. Influência da fermentação na qualidade da farinha de mandioca do grupo d'água. *Acta Amazonica*, 41(2): 279-284.

Costa, M. G., Souza, E. L., Stamford, T. L. M. and Andrade, S. A. C. 2008. Qualidade tecnológica de grãos e farinhas de trigo nacionais e importados. *Ciência e Tecnologia de Alimentos*, 28(1): 220-225.

Custódio, Y. N., Lara, J. E., Vasconcelos, M. C. R. L. and Locatelli, R. L. 2015. Análise sensorial: aplicação a um evento gastronômico. *Podium*, 4(1): 32-47.

Dantas, M. N., Ramos, B. F. M. R. and Boulhosa, R. S. S. B. 2016. Teor de sódio identificado na rotulagem nutricional de pizzas congeladas comercializadas em hipermercados de Salvador-Bahia. *Ciência (In) Cena*, 1(3): 27-34.

Dietary Reference Intakes (DRI). 2005. *Dietary Reference Intakes for energy, carbohydrate, fiber, fat, fatty acids, cholesterol, protein and amino acids.* Washington: The National Academies Press.

Fernandes, A. F. 2006. *Utilização da farinha de casca de batata inglesa (Solanum tuberosum L.) na elaboração de pão integral*. Dissertação (Mestrado em Ciências dos Alimentos). Universidade Federal de Lavras, Lavras (MG), Brazil.

Food and Agriculture Organization of the United Nations (FAO). 2016. *Food losses and waste in Latin America the Caribbean*. Available online at: http://www.fao.org/home/en/.

Gálvez, J. S., Carrillo, P. E., Reyes, H. H. V., Zevallos, L. C. and Velázquez, D. A. J. 2016. Application of wounding stress to produce a nutraceutical-rich carrot powder ingredient and its incorporation to nixtamalized corn flour tortillas. *Journal of Functional Foods*, 27(1): 655-666.

Hur, I. Y., Marquart, L. and Reicks, M. 2014. Nutrient intakes among children and adolescentes eating usual pizza products in school lunch compared with pizza meeting HealthierUS School Challenge Criteria. *Journal of the Academy of Nutrition and Dietetics*, 114(5): 768-773.

Instituto Adolfo Lutz. 2008. *Normas Analíticas do Instituto Adolfo Lutz: métodos físico-químicos para análise de alimentos*. 4. ed. São Paulo: Instituto Adolfo Lutz.

Instituto Brasileiro de Geografia e Estatística (IBGE). 2006. *Produção Agrícola Municipa*l. Available online at: http://www.sidra.ibge.gov.br/.

Instituto Brasileiro de Geografia e Estatística (IBGE). 2011. *Pesquisa de orçamentos familiares 2008-2009: Análise do consumo alimentar pessoal no Brasil.* Available online at: https://biblioteca.ibge.gov.br/visualizacao/livros /liv50063.pdf.

Kim, M. Y., Kim, E. J., Kim, Y. N., Choi, C. and Lee, B. H. 2012. Comparison of the chemical compositions and nutritive values of various pumpkin (*Cucurbitaceae*) species and parts. *Nutrition Research and Practice*, 6(1): 21-27.

Macfie, H. J., Bratchell, N., Greenhof, K. and Vallis, L. V. 1989. Designs to balance the effect of order presentation and first-order carry-over effects in hall tests. *Journal of Sensory Studies*, 4(2): 129-148.

Marlett, J. A., McBurney, M. I. and Slavin, J. L. 2002. Position of the American Dietetic Association: Health Implications of Dietary Fiber. *Journal of the American Dietetic Association*, 102(7): 993-1000.

Merrill, A. L. and Watt, B. K. 1973. *Energy values of foods: basis and derivation.* Agricultural Handbook, n.74, Washington: USDA.

Moraes, F. P. and Colla, L. M. 2006. Alimentos funcionais e nutracêuticos: definições, legislação e benefícios à saúde. *Revista Eletrônica de Farmácia*, 3(2): 109-122.

Morais, B. A., Lemos, L. S., Iunes, M. F., Miguel, S. and Rodrigues, M. C. P. 2015. Elaboração e análise sensorial de massa de pizza com farinha de amêndoas da castanha de caju. In: XX Congresso Brasileiro de Engenharia Química, 2014, Florianópolis. *Anais...* Associação Brasileira de Engenharia Química. Out 19-22. p.3924-3930.

Moss, A., Smith, S., Null, D., Roth, S. L. and Tragoudas, U. 2013. Farm to school and nutrition education: positively affecting elementar school-aged children's nutrition knowledge and consumption behavior. *Childhood Obesity*, 9(1): 51-56.

Paris, H. S., Tadmor, Y., Schaffer, A. A. 2017. Horticulture Production and Quality: Cucurbitaceae Melons, Squash, Cucumber. In: Thomas, B., Murphy, D. J. and Murray, B. G. *Encyclopedia of Applied Plant Sciences*. 2 ed. Oxford: Academic Press.

Peccini, R. 2013. A gastronomia e o turismo. *Rosa dos Ventos*, 5(2): 206-217.

Pigoli, D. R. Alterações nutricionais em hortaliças decorrentes de diferentes métodos de cozimento. 2012. Dissertação (Mestrado em Agronomia). Universidade Estadual Paulista Faculdade de Ciências Agronômicas, Botucatu (SP), Brazil.

Pimenta, C. A. M. and Mello, A. S. 2014. Entre doces, palhas e fibras: experiências populares de gerações de renda em cidades de pequeno porte no sul de Minas Gerais. *Estudos de Sociologia*, 1(20): 1.

Powell, L. M., Nguyen, B. T. and Dietz, W. H. 2015. Energy and nutrient intake from pizza in the United States. *Pediatrics*, 135(2): 322-330.

Ramos, F. P., Santos, L. A. S. and Reis, A. B. C. 2013. Educação alimentar e nutricional em escolares: uma revisão de literatura. *Cadernos de Saúde Pública*, 29(11): 2147-2161.

Rito, A. I., Carvalho, M. A., Ramos, C. and Breda, J. 2013. Program Obesity Zero (POZ) a community-based intervention to address overweight primary-school children from five Portuguese municipalities. *Public Health Nutrition*, 16(6):1043-1051.

Rocha, S. A., Lima, G. P. P., Lopes, A. M., Borguini, M. G.; Ciccone, V. R. and Beluta, I. 2008. Fibras e lipídios em alimentos vegetais oriundos do cultivo orgânico e convencional. *Revista Simbio-Logias*, 1(2): 1-9.

Santana, R. F., Oliveira, A. P., Araújo, D. E., Miranda, A. S. and Santos, R. N. 2015. Intervenções de educação alimentar e nutricional para crianças de uma fundação pública em Vitória da Conquista-BA: construindo novos hábitos alimentares. *Revista Extendere*, 3(1): 8-19.

Santos, D.A.M. 2013. Formulação de biscoito tipo *Cookie* a partir da substituição percentual de farinha de trigo por farinha de casca de abóbora (*Cucurbita* maxima) e albedo de maracujá amarelo (*Passiflora edulis flavicarpa*). Dissertação (Mestrado em Alimentos e Nutrição). Universidade Federal do Estado do Rio de Janeiro, Rio de Janeiro (RJ), Brazil.

Serviço Social da Indústria (SESI). 2008. *Programa Alimente-se Bem: tabela de composição química das partes não convencionais dos alimentos*. 1 ed. São Paulo: SESI.

Silva, E. B. and Silva, E. S. 2012. Aproveitamento integral de alimentos: avaliação de bolos com coprodutos da abóbora (*Cucurbita moschata*, *L.*). *Revista Verde de Agroecologia e Desenvolvimento Sustentável,* 7(5): 121-131.

Souza, T. A. C., Soares Júnior, M. S., Campos, M. R. H., Souza, T. S. C., Dias, T. and Fiorda, F. A. 2013. Bolos sem glúten a base de arroz quebrado e casca de mandioca. *Semina: Ciências Agrárias*, 34(2): 717-128.

Sparrenberger, K., Friedrich, R. R., Schiffner, M. D., Schuch, I. and Wagner, M. B. 2015. Consumo de alimentos ultraprocessados entre crianças de uma Unidade Básica de Saúde. *Jornal de Pediatria*, 91(6): 535-542.

Teixeira, E., Meinert, E. and Barbetta, P. A. 1987. *Análise sensorial dos alimentos*, Florianópolis: UFSC.

Teixeira, F., Nunes, G. Z., Rodrigues, B. M., Santos, N. M., Candido, C. J., Santos, E. F. and Novello, D. 2016. Consumo de alimentos não convencionais entre adolescentes: elaboração e análise de produto. *Veredas*, 9(3): 94-115.

United States department of Agriculture Agricultural Research Service (USDA). 2016. *Food Composition Databases. National Nutrient Database for Standard Reference.* Release 28 slightly revised Washington: USDA.

Wade, K. H., Kramer, M. S., Oken, E., Timpson, N. J., Skugarevsky, O., Patel, R., Bogdanovich, N., Vilchuck, K., Smith, G. D., Thompson, J. and Martin, R. M. 2017. Prospective associations between problematic eating attitudes in midchildhood and the future onset of adolescent obesity and high blood pressure. *The American Journal of Clinical Nutrition*, 105(1): 306-312.

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