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Utilizing Orange-Flesh Sweet Potato Loaf Bread; A Study on Sensory, Nutrition, and Consumer Acceptance

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ABSTRACT

By examining its sensory qualities, nutritional value, and consumer acceptability, this study sought to determine whether using orange-flesh sweet potatoes (OFSP) as a main ingredient in loaf bread was feasible. Three formulations with different contents of OFSP (50 percent, 75 percent, and 100 percent) were tested using an experimental-descriptive study design. The samples were evaluated by thirty respondents, including students and panellists with training, on the basis of appearance, texture, taste, and aroma. Additionally, microbial and proximate analyses were carried out. In terms of texture (8.17), aroma (8.00), and overall acceptability (4.58), the 75% OFSP formulation was deemed "Very Highly Acceptable." Nutritional analysis revealed improved moisture (31.51%), crude fat (7.55%), and protein (4.38%) values. Microbial analysis showed that the amounts of mold and yeast were within permissible bounds, guaranteeing the safety of the product. Significant variations in aroma and appearance were found by statistical analysis among formulations, but not in taste or texture. According to these results, adding 75% OFSP to loaf bread considerably enhances its nutritional content and sensory quality without sacrificing acceptability or safety. According to the study's findings, OFSP is a practical and useful ingredient for creating bakery goods that are healthier and more palatable to consumers.

Keywords: *Feasibility, Orange-flesh Sweet Potato, Sensory Evaluation, Proximate Analysis, Microbial Analysis*

INTRODUCTION

In order to make bread healthier and more enticing, this study investigates the use of orange-fleshed sweet potatoes (OFSP). With its abundance of vitamins (A, C, K, E, and B-complex), minerals, antioxidants, and beta-carotene, which gives it its unique color and health benefits, OFSP is a perfect fit for the growing demand for creative and nutritious bread options. Because of its high carotenoid content and appealing qualities, OFSP has drawn the attention of nutritionists and food experts in contrast to regular cream-fleshed sweet potatoes. This study's primary objective is to determine how bread's taste, nutritional content, and consumer preference are impacted by the addition of OFSP. The researchers hope to develop new and delicious bread products that not only satiate cravings but also encourage a healthier diet by researching these factors.

Objectives of the Study

The overall goal of this study is to ascertain whether adding sweet potatoes to a loaf bread recipe is feasible. The study specifically aims to evaluate the orange-flesh sweet potato loaf bread's sensory evaluation in terms of taste, texture, appearance, and aroma. Along with assessing the bread's acceptability, it also looks at its proximate composition, which includes ash, moisture, crude protein, and crude fat. Additionally, the study aims to ascertain the product's microbial count, particularly that of yeast and molds. Lastly, it will look into whether respondents' sensory evaluations differ significantly depending on the type of formulation they are grouped by.

MATERIALS AND METHODS

The process began with concept generation which the researchers discussed on how to come up with a new product utilizing the orange-flesh sweet potato which is always available to the market. The purpose of the study is to produce a new flavored traditional bread by adding orange-flesh sweet potato. For the development of the product, the ingredients are carefully selected to make sure that every ingredient has a special nutritive value to offer for every health-conscious consumer. The product to be develop will have 3 treatments and to be subjected to sensory evaluation in terms of aroma, taste, texture, color, and appearance. The sensory evaluation will participate by thirty (30) respondents.

Research Design

An experimental descriptive research design is used in this study. The formulation for a loaf of bread is developed through the use of the experimental method. The sensory assessment and the effects of sweet potatoes in addition to traditional bread are being described using the descriptive survey.

Sampling Technique

Participants were selected using stratified sampling.

Locale of the study

The study, which focused on product preparation and formulation, was carried out in Pengue Ruyu, Tuguegarao City, which is situated in Cagayan Province, Philippines. This particular location was selected because it has well-equipped facilities and easy access to the resources needed to carry out the research in question.

Research Instruments

To collect data from the participants, the researchers created a printed questionnaire. There were two sections to the questionnaire. The first component of the sensory evaluation is a score sheet that includes the Hedonic Scale. Thirty (30) respondents will evaluate three (3) samples that the researchers prepared from the various sweet potato loaf bread treatments.

Data Gathering Procedure

The evaluation process in the study was divided into four stages. This covers every step of the product's formulation, from obtaining raw materials and preparing ingredients to conducting a sensory assessment.

Phase 1. Raw Materials and Ingredients

Phase 2. Preparation of Orange – Fleshed Sweet Potato Loaf Bread

Phase 3. Nutritional Analysis and Microbial Analysis

Microbial and nutritional analysis to evaluate the loaf bread's nutritional improvement in terms of moisture, ash, crude fat, and crude protein. Additionally, the Orange-fleshed Sweet Potato Loaf Bread's microbial count was assessed for hygienic quality. To check for yeast and mold in the bread product, a test was conducted at the Department of Science and Technology Carig Norte in Tuguegarao City, Cagayan.

Phase 4. Sensory Evaluation

The researchers conducted the assessment in a room with adequate ventilation and no odors to guarantee that it proceeds smoothly. One piece of each of the different formulations was placed in a small bowl and presented to the evaluators. To aid in palate clearing, the researchers provided water for each composition. To evaluate each formulation's sample products' sensory acceptability in terms of their appearance, flavor, texture, color, and overall acceptability, the assessors filled out the evaluation form that the researchers had supplied.

Analysis of the Data/ Statistical treatment

The following statistical tools were used in the study in order to analyze the data. A 5-point Likert scale was also used for the overall study of the impact of the best formulation of sweet potato loaf bread. The Hedonic Scale was used to assess the product's appearance, aroma, taste, and texture.

1. Weighted Mean and Descriptive Interpretation – This was also utilized to ascertain the degree of impact and the optimal recipe for sweet potato loaf bread. The tables used in this study are listed below.

SCALE	MEAN RANGE	DESCRIPTIVE INTERPRETATION
5	4.20-5.00	Very Highly recommended
4	3.40-4.19	Highly recommended
3	3.39-2.59	Moderately Recommended
2	1.80-2.59	Fairly recommended
1	1.00-1.79	Not recommended

SCALE	MEAN RANGE	DESCRIPTIVE INTERPRETATION
9	8.12-9.00	Like Extremely
8	7.23-8.11	Like Very Much
7	6.34-7.22	Like Moderately
6	5.45-6.33	Like Slightly
5	4.56-5.44	Neither Like nor Dislike
4	3.66-4.55	Dislike Slightly
3	2.78-3.65	Dislike Moderately
2	1.89-2.77	Dislike Very Much
1	1.00-1.8	Dislike Extremely

2. ANOVA (Analysis of Variance)- It was used to ascertain whether there was a significant difference between the impact of sweet potato loaf bread when categorized by profile and the impact of the product with the best formulation.

RESULTS AND DISCUSSION

This section provides a comprehensive understanding of the viability of using orange-flesh sweet potatoes in loaf bread by combining the results of the nutritional analysis, microbial analysis, and sensory evaluation.

Table 1. Acceptability of orange flesh sweet potato in loaf bread

Sensory	MEAN RANGE	DESCRIPTIVE INTERPRETATION
Formulation 1 (100%)		
Appearance	7.33	Like Very Much
Aroma	7.83	Like Very Much
Texture	7.67	Like Very Much
Taste	7.83	Like Very Much
Overall mean	7.67	Like Very Much
Formulation 2 (75%)		
Appearance	8.00	Like Very Much
Aroma	8.00	Like Very Much
Texture	8.17	Like Extremely
Taste	8.00	Like Very Much
Overall mean	8.04	Like Very Much
Formulation 3 (50%)		
Appearance	7.33	Like Very Much
Aroma	7.50	Like Very Much
Texture	7.50	Like Very Much
Taste	7.67	Like Very Much
Overall mean	7.50	Like Very Much

Formulations 1 (100% sweet potato inclusion), 2 (75% sweet potato inclusion), and 3 (50% sweet potato inclusion) were the three levels at which the study examined the viability of adding orange flesh sweet potatoes to loaf bread.

Sensory Properties and Consumer Acceptance:

According to the sensory evaluation, all formulations received "Like Very Much" ratings for overall acceptability from respondents. Formulation 2 (75% sweet potato) was numerically the most preferred since it consistently obtained the highest numerical mean scores for overall acceptability as well as for the majority of sensory attributes (taste, texture, appearance, and aroma).

Table 2. Sensory Properties

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
Appearance	Between Group	11.667	2	5.833	4.685	.012
	Within Group	108.333	87	1.245		
	Total	120.000	89			
Aroma	Between Group	10.556	2	5.278	4.833	.010
	Within Group	95.000	87	1.092		
	Total	105.556	89			
Taste	Between Group	1.667	2	.833	.897	.412
	Within Group	80.833	87	.929		
	Total	82.500	89			
Texture	Between Group	3.889	2	1.944	2.281	.108
	Within Group	74.167	87	.852		
	Total	78.056	89			
Overall Acceptability	Between Group	5.417	2	2.708	3.107	.050
	Within Group	75.833	87	.872		
	Total	81.250	89			

The three formulations' appearance ($p=0.012$) and aroma ($p=0.010$) differed statistically significantly, according to the statistical analysis (ANOVA). In particular, Formulation 2 (75% OFSP) was much more favored for appearance than Formulation 1 (100% OFSP) and for aroma than Formulation 3 (50% OFSP). However, neither taste ($p=0.412$) nor texture ($p=0.108$) showed any statistically significant differences. The high numerical scores for all formulations show a strong overall potential for consumer acceptance of sweet potato loaf bread at these high inclusion levels, despite some subtle statistical differences in appearance and aroma. The 75% formulation clearly has an advantage in certain attributes.

Table 3. Nutritional Enhancement.

Sample code	Sample Description	Parameter	Result (g/100g)	Method Used
CHE - 0579	Sweet Potato Loaf Bread	Crude fat	7.55	Soxhlet Extraction
		Crude protein	4.38	Block digestion/steam distillation
		Moisture	31.51	Air over
		Ash	1.18	Gravimetric Method

The bread had a normal amount of protein (4.38 g/100g) and a moderate amount of crude fat (7.55 g/100g). The bread's desired soft texture was facilitated by a noteworthy moisture content of 31.51 g/100g. Its mineral composition was reflected in the ash content (1.18 g/100g). Crucially, adding orange-flesh sweet potatoes at these percentages of inclusion (50, 75, and 100%) naturally adds a substantial amount of dietary fiber and beta-carotene, a precursor to vitamin A, increasing the loaf bread's nutritional value in comparison to other bread products. This practical feature provides a route for dietary improvement and is in line with the rising consumer demand for healthier food options.

Table 4. Microbial Analysis

Parameter	Result	Interpretation/Standard
Yeast and molds	<10x10 CFU/g	Passed

According to the microbial analysis, the sweet potato loaf bread formulations meet safety and quality standards because the count of yeast and molds was very low (<10×10 CFU/g), indicating good microbial quality. Given that high moisture products can be vulnerable to microbial spoiling, this finding is crucial for product shelf-life and commercial viability. The low counts imply that, at least in the tested conditions, the addition of sweet potatoes had no detrimental effect on the loaf bread's microbial stability.

CONCLUSION

A good balance between cost-effectiveness, nutritional value, and sensory quality was shown in the creation of Sweet Potato Loaf Bread using Formulation 3 (50% Sweet Potato). Formulation 3 achieved high overall acceptability with an average score of 7.50, classified as "Like Very Much." In addition, it demonstrated desirable qualities in taste, aroma, and texture while making more economical

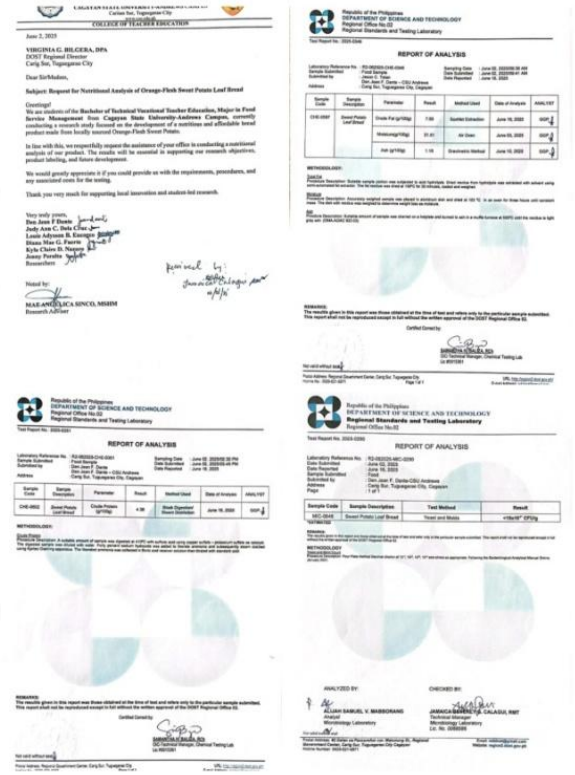
use of sweet potato and other ingredients, even though Formulation 2 (75% Sweet Potato) obtained the highest mean scores in some sensory parameters. Formulation 3 stands out as a viable and scalable choice in light of its positive customer reviews and cost-effectiveness, particularly in areas or companies where affordability and nutrition must be given equal priority. According to the results, adding 50% orange flesh sweet potato to loaf bread is a practical way to make a healthier, more affordable baked good without seriously sacrificing flavor or customer acceptance.

RECOMMENDATION

The development and possible commercialization of Formulation 3 (50% Sweet Potato) should be given top priority because of its low production costs and high consumer acceptability. This formulation is particularly well-suited for low-income markets, community feeding programs, and small bakeries because it strikes a balance between economic viability, nutritional value, and sensory appeal. Future research is urged to investigate this formulation's cost-benefit analysis in greater detail and to carry out a more thorough consumer market test to gauge its long-term acceptability. Furthermore, using micronutrient analysis—more especially, beta-carotene content—can make the product's health advantages more obvious. Purchasing sweet potatoes that are grown nearby should also be prioritized in order to boost regional agriculture and lower production costs.

Appendix A. Research Instruments

Appendix B. Inform consent



REFERENCES

Belay dereje, Alemu Girma, Daniel Mamo, & Teklu chalchisa (2020) "Functional properties of sweet potato flour and its role in product development"

Hongwei meng, chong xu, Meiying wu, & Yinng feng (2022) "Effects of potato and sweet potato flour addition on properties of wheat flour and dough, and bread quality"

Joshua Ombaka Owade, George Ooko Abong, Michael Wandayi Okoth, Simon Heck, Jan, Daniel Mbogo, Derrick Malavi, Tawanda Muzhingi* (2018) "Sensory Attributes of Composite Breads from Shelf Storable Orange-Fleshed Sweetpotato Puree"

Laura Mkabili Mwakamu, George Ooko Abong, Michaek Wandayi Okoth, Mukani Moyo, Lucy Mwauraa, Derick Malavi, Tawanda Muzzhingi (2022) "Effects of sweetpotato (Ipomoea batatas) puree on bread shelf-life"

Orange-fleshed sweet potato for nutritious food products https://cipotato.org/cip-50/orange-fleshed-sweetpotato/

Satheesh Neela & Solomon F Fanta (2019) "Review on nutritional composition of orange-fleshed sweet potato and its role in management of vitamin A deficiency**"**https://pmc.ncbi.nlm.nih.gov/articles/PMC6593376/

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