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Customers Preference for Composite Orange-Fleshed Sweetpotato Bread over Wheat Bread in Anambra State, Nigeria

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Abstract
Breeding of orange-fleshed sweetpotato in any country of the world can contribute to a reduction of malnutrition because of its beta-carotene content and is highly appreciated by local consumers. Because of this, the study investigated customers' preference for orange-fleshed sweetpotato bread over wheat bread. The specific objectives of the study were to assess the factors that determine the customers' shift from wheat bread to orange-fleshed sweetpotato bread and the constraints working against orange-fleshed sweetpotato bread production. Multistage sampling techniques were used for the study. 120 customers were sampled using 5 different major cities in the state due to their consumption rate of bread. Data collected were analyzed using frequency, percentage, mean scores and regression analysis. Findings indicated that the majority (66.7%) of the customers were females while 33.3% of the rest were males. This implies that females dominated the activities of bread marketing in the study area. The mean age, years of business experience and household size were 32 years, 20 years, and 8 persons respectively. Out of the 13 variables investigated as regards the factors influencing customers' preference of orange-fleshed sweetpotato bread over wheat bread, six (6) variables were found to be statistically significant based on the factors influencing personal and socio-economic characteristics of the customers. Those variables were health benefits from the bread, colour of the skin, taste of the bread, cost reduction of the bread, aroma of the bread and meeting up with consumers' needs. However, the constraints working against orange-fleshed sweetpotato bread production were; the high cost of roots, transportation cost, low knowledge of OFSP bread by some customers, lack of capital to expand the production, inadequate processing equipment, limited number of farmers to produce OFSP root and inadequate storage facilities. This paper recommended that there should be a proper dissemination of information about OFSP bread and its health benefits to people through extension agents. Government at all levels should encourage OFSP processors thereby helping them to secure processing equipment that can boost OFSP bread production in the state and youths should engage themselves in sweetpotato farming to make roots available to the processors.
Keywords: acceptability, customer's preference, influence, OFSP bread, and wheat bread

Introduction

Sweetpotato is an important crop that is underutilized by farmers but has now attracted people's attention globally to feed low-income earners across the world (Adesina, Abdurrasheed, Okoye, Ekah, Anedo and Afuape, 2019). This is because there are special nutritional benefits with the adoption of Orange-flesh Sweetpotato for consumption due to its high content of Vitamin A. According to Udemezue (2019), Nigeria is the second largest producer of sweetpotato in the world after China with an annual output of 3.46 million metric tons per year). As a staple crop, sweetpotato has been fortified in key vitamins especially vitamin A and minerals whose deficiency in most rural diets continues to bring a very serious constraint to human health and economic development (Global Panel, 2015; Chah, Anugwa and Nwafor, 2020).

Globally, about 3 million preschool children have been reported to have signs of vitamin A deficiency (Mendu *et al*., 2019). In sub-Saharan Africa, it has been estimated that 43 million children under the age of 5 are vitamin A deficient (Stathers *et al*., 2018). In Nigeria, the prevalence of vitamin A deficiency (VAD) affects 29.5 % of its population, this has resulted in the World Health Organization (WHO) listing Nigeria as one of the

number one countries with the highest risk of vitamin A deficiency (eHealth Africa, 2016; Kuku-Shittu *et al*., 2016). In rural Nigeria, most households cannot afford to feed their children with food products rich in vitamin A and this gave birth to the introduction of bio-fortified agricultural products like orange-flesh sweetpotato varieties (Babatunde, Adeyemi and Adebanke,2019). In the 1990s, scientists at the International Potato Center (CIP) and National Root Crops Research Institute, Umudike Nigeria identified a group of orange-fleshed sweetpotato varieties (OFSVs) with high content of β-carotene (a chemical element used by the body to generate Vitamin A) and sufficient dry matter to satisfy consumer preferences and taste. Research indicated that the consumption of just small amounts of foods derived from the new OFSVs could greatly reduce Vitamin A deficiencies in both young children and pregnant and lactating women (HarvestPlus, 2003).

The new orange-fleshed sweetpotato varieties (OFSVs) available in Nigeria are Solo Gold (*UMUSPO4*). This was officially released in July 2018 making the total number of OFSP varieties in Nigeria three. The other two are *UMUSPO3* referred to locally as 'Mothers Delight', and *UMUSPO1*, which is known as 'King J'. "Solo Gold has special characteristics preferred by farmers such as a higher dry matter when compared to Mothers Delight and much higher beta carotene content when likened to King J. Also, it's tolerant to sweetpotato weevil and resistant to sweetpotato viral disease. It matures in three to four months". These characteristics make Solo Gold a good candidate for farmer and consumer adoption across Nigeria. It is commonly consumed as a vegetable (boiled, fried or roasted) as well as in different products through processing and value addition for improved household food intake. These foods include amala (swallows), puff-puff, chips, cake, gari, vegetable soup, doughnuts, pottage, bread, chin-chin, juice and kunu. OFSP products can be commercialized for income generation, job and wealth creation for all, especially women and youth (sweetpotato knowledge portal, 2020).

Bread is a staple food in much of Africa, particularly in cities. Incorporating OFSP puree into bread would significantly increase the number of OFSP consumers and reduce VAD (Awuni *et al*. 2018; Owade *et al*. 2018). Puree with a high amount of B-carotene processed from OFSP roots is currently incorporated in baked products like bread, cakes, biscuits and buns (Wafula *et al*,2022).OFSP puree can replace up to 50% of the wheat flour in bread while reducing sugar (90%) and fat (50%) and eliminating artificial colourings (egg yellow). The baked bread retains over 50% of the β-carotene, and the OFSP puree improves the texture of wheat products, making them easy to chew and digest (Wanjuu *et al*. 2018). Consumer satisfaction is very crucial for repeat purchases of any product (Wanjuu *et al*.2019). Therefore, studying consumer acceptance of a product plays a significant role in the food industry. Consumer perception is an essential aspect of defining food product quality and attributes. A product may be proven to have health benefits but may not be accepted if it is unattractive to consumers or if its sensory properties do not meet consumers' expectations. A novel food product will be acceptable to consumers if it is appealing, safe, and nutritious and meets quality standards (House 2016). Given this, the study investigated customers' preference for orange-fleshed sweetpotato bread over wheat bread. The specific objectives of the study were to assess the factors that determine the customers' shift from wheat bread to orange-fleshed sweetpotato bread and the constraints working against orange-fleshed sweetpotato bread production.

Methodology

The study area for this research is Anambra State. The State is presently located in the South-East of Nigeria. The State is bounded by Delta State to the West, Imo State to the South, Enugu State to the East and Kogi State to the North. It has an estimated population of 4, 177, 828 million people which stretches over about 60 kilometres between the surrounding communities. The State lies on the longitude 6^0 35E and $7^0$21E and latitude of 5.38N and 6^0 47E. Anambra State comprises 21 local governments and is predominantly occupied by Igbo people who are farmers and business incline. Multistage sampling techniques were used for the study. However, 120 customers from North and South were sampled randomly using five different major cities (Newi, Ukpo, Ekwuluobia, Igboukwu and Awka Etiti) in the state due to their consumption rate of the OFSP bread. Data collected were analyzed using frequency, percentage, mean scores, and regression analysis.

Results and Discussion

Table 1 shows that 66.7% of the OFSP bread sellers were female while 33.3% of them were male. This implies that female-dominated business activities in the study area. Majorities (50%) of the bread sellers were married, 21.7% of them were widowed while 12.5% of the bread sellers were single. This implies that the vendors are more likely to have children that might have been helping them in their business. The average mean age, years of business experience and household size of the bread vendors were 32 years, 20 years and 8 persons respectively. The indication is that the vendors were predominantly in their active productive age and this could increase their stamina for marketing options. In terms of educational qualification, 7.5% of the bread sellers had no formal education, 58.3% of them completed secondary school while 16.7% of them completed primary education. High levels of literacy among bread vendors could help them to adopt the current trends in their business activities. According to Wanjuu, *et al.*(2019), the level of education attained by bread consumers not only increased the rate of OFSP bread consumption but also enhanced the ability to know and evaluate more about the new technologies. However, the majority (37.5%) of the bread sellers sourced their capital through "issue contribution" while 29.2% sourced capital from micro-finance banks. On the other hand, 37.5% of the vendors did not belong to social organizations while the majority (62.5%) of them

belonged to social organizations.

Factors influencing customers' preference for orange-fleshed sweetpotato bread

Table 2: shows that the factors influencing customers' preference for orange-fleshed sweetpotato bread were sweet taste ($p<0.004$), health benefit ($p<0.002$), soft texture ($p<0.001$), bread colour($p<0.003$) and bread aroma($p<0.005$). They were significantly related to the customers' preference for orange-fleshed sweetpotato bread. The proportion of variance in preference of OFSP bread (0.87) explained by this variable was very high. The decision of the finding was based on the value R^2(0.863) and adjusted R^2(0.845) that supported the behaviour of the dependent variable at a 95% level of confidence.

Sweet taste

Taste is one of the socio-economic variables that influence the acceptance of orange-fleshed sweetpotato bread in the study area. There was a strong positive correlation coefficient between consumer acceptance of the sensory attributes of OFSP puree bread and their purchase practices as well as their willingness to pay. This implies that consumers were willing to pay more and make purchases of the OFSP puree bread based on their high preference for its sensory taste attributes. According to Wanjuu, *et al* (2019), the predominant sensory attributes for consumer acceptance were softness, colour, and taste which had the most impact on the acceptability of the product. This implies that people accept the consumption of the bread in as much as the taste is palatable. Therefore, as people consume the bread, their interest in consumption becomes aroused and their rates would be significantly increased.

Health benefit

This has a positive influence on the customers' preference for OFSP bread over wheat in the study area. There was a significant relationship between consumer demographics and willingness to pay for OFSP puree bread provided health benefits are concerned. Consumers will be willing to pay more for the OFSP bread based on potential nutritional benefits (Wanjuu, *et al*,2019). This positive influence implies that as the number of health status increases from eating the bread, the more preference of the improved OFSP bread production technologies and this could be the reason the population of the wheat bread vendors skewed to OFSP bread in the study area. This result suggests that the OFSP roots should be available at all times to make the production easy and this implies that different means should be adopted to engage youths in orange-fleshed sweetpotato farming. This finding agrees with that of Wanjuu, *et al*,(2019), that the attributes of OFSP bread encompass nutritional values, functional aspects, sensory properties (appearance, texture, taste, and aroma) and chemical constituents. Therefore, it is concluded that nutrition information is an important factor influencing the acceptance and willingness to pay for OFSP bread.

Soft texture

The coefficient of texture was found to be negative and statistically influenced the acceptance of improved OFSP bread consumption in the state. This implies that as the soft texture increases, the preference for acceptance of OFSP bread consumption also increases. The texture of bread has a bearing on the capacity of consumers to prefer improved technologies such as OFSP bread. According to one of the respondents, the quality of bread is determined by its texture, OFSP bread has a soft texture and this could be the reason people prefer it to other bread in the study area. The result is in line with that of Ouro-Gbeleou (2018), that determinants of OFSP bread preference in Ghana are its sweet taste and soft texture.

Colour of the bread

Clour of the bread is one of the socio-economic variables related to acceptance of improved OFSP variety in the study area. As this study has shown, people have to be predisposed to take part in acceptance as far as the colour is attractive to people and this will make them "early adopters" in the stages of adoption categories. Therefore, the colour of the technology (OFSP) is positively related to and influences the preference for OFSP bread in the study area. In light of this, the finding disagrees with that of Ouro-Gbeleou (2018) that the most important determinants of OFSP bread preference are its sweet taste and soft texture.

Perceived aroma

Bread aroma is one of the positive variables in the preference for improved orange-fleshed sweetpotato bread production technology. The aroma of the bread usually attracts consumers and leads them to accept OFSP bread technologies more readily to increase their consumption than bread that lacks an aroma. According to Bocher *et al.* (2019), the gender of the consumer, product buying frequency, aroma, the taste of the product, and vitamin A knowledge were positively associated with willingness to pay and product choice. Therefore, the perceived aroma of OFSP bread products can trigger consumers to consume the product more frequently, provided that there is available income.

Constraints militating against orange-fleshed sweetpotato bread production

Data in Table identified the constraints working against the production of OFSP bread in the study area including; the high cost of sweetpotato roots ($\overline{x} = 3.76$), high perishability of the roots ($\overline{x} = 3.62$), inadequate storage facility ($\overline{x} = 3.56$), disease infestation ($\overline{x} = 3.45$), high cost of transportation ($\overline{x} = 3.42$), low knowledge of orange-fleshed sweetpotato bread production by the consumers ($\overline{x} = 3.33$), inadequate processing facility($\overline{x} = 2.46$) and inadequate capital to expand the business. This finding is in line with Udemezue *et al* (2018), which saw disease infestation and farmers' low knowledge of the crop as the obstacles to sweetpotato production expansion in Anambra State, Nigeria. Also, Omoor et *al* (2017), observed that the major constraints confronting the farmers concerning sweetpotato production and processing were inadequate finance for sweetpotato farming, farmers' low knowledge of the crop, high cost of sweetpotato processing equipment and the perishability of sweetpotato roots respectively. Because of the above, there is a need to encourage more

research work on the above-mentioned constraints working against the production of OFSP bread in the study area, if the goal of food security is to be attained.

Conclusion

Orange fleshed sweetpotato (OFSP) bread is a baked product with wheat flour composites and can be a source of health benefits like pro-vitamin A to mankind. Although; information about OFSP puree bread consumer profile is limited in the study area. Based on this, Out of the 9 variables investigated as regards the factors influencing customers' preference for orange-fleshed sweetpotato bread over wheat bread, five (5) variables were found to be statistically significant based on the factors influencing personal and socio-economic characteristics of the customers. Those variables were sweet taste, health benefits from the bread, colour of the skin, soft texture and perceived aroma of the bread. However, the constraints working against orange-fleshed sweetpotato bread production were; the high cost of roots, transportation cost, low knowledge of OFSP bread by some consumers, lack of capital to expand the production, inadequate processing equipment, limited number of farmers to produce OFSP root and inadequate storage facilities. This paper recommended that there should be proper dissemination of information about OFSP bread and its health benefits to people through extension agents and bread marketers. Government at all levels should encourage OFSP processors thereby helping them to secure processing equipment that can boost OFSP bread production in the state and youths should also engage themselves in sweetpotato farming to make roots available to the processors. The existing research centres established by the government for sweetpotato research such as the National Root Crops Research Institute, Umudike and outstations of the NRCRI should be strengthened to achieve their mandate on root crops. There is a need to support the collaboration of relevant organizations to reverse the areas of weakness and boost awareness creation of the importance of sweetpotato as an important energy source and above all a hidden treasure in the world.

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Table 1: Socio-economic characteristics of OFSP bread Consumers

Variables	Frequency	Percentage	Mean
Sex			
Male	40	33.3	
Female	80	66.7	
Age			
18-25	20	16.7	
26-35	50	41.7	32 years
36-45	30	25.0	
46 and above	20	16.7	
Household size			
1-2	40	33.3	
3-4	50	41.7	8 persons
5-6	10	8,3	
7-8	15	12.5	
9 and above	5	4.2	
Years of business experience			
1-10	38	31.7	
11-20	40	33.3	20 years
21-30	10	8.3	
31-40	16	13.3	
41 and above	16	13	
Marital status			
Single	15	12.5	
Married	60	50.0	
Divorced	10	8.3	
Separated	9	7.5	
Widowed	26	21.7	
Educational level			
Non-formal education	9	7.5	
Primary school	20	16.7	
Secondary school	70	58.3	
OND/HND	11	9.2	
First-degree and above	10	8.3	
Sources of capital for investment			
Local money lender	30	25.0	
Isusu contribution	45	37.5	
Microfinance bank	35	29.2	
Personal savings	10	8.3	
Members of social organizations			
Yes	75	62.5	
No	45	37.5	

Fieldwork, 2022

Table 2: Factors influencing customers' preference for orange-fleshed sweetpotato bread.

Unstandardized coefficients	**Standardized Coefficients**				
Variables	**B**	**Standard error**	**Beta**	**T**	**Significant**
Constant	3.841	1.068		5.490	0.002
Sweet taste	0.0531	0.245	0.162	1852	0.004
Health benefit	0.005	0.014	0.013	4.061	0.002
Marital status	0.027	0.042	0.042	0.485	0.821
business size	0.023	0.023	0.067	0.872	0.387
Soft texture	0.2120	0.035	0.355	5.387	0.001
Knowledge gain	0.230	0.257	0.080	0.877	0.378
Training received	0.858	0.295	0.402	-4.695	0.537
Colour of bread	1.087	0.163	0.679	6.251	0.003
Perceived Aroma of the bread	0.1220	0.031	0.345	3.806	0.005
Social participation	0.018	0.048	0.038	0.498	0.721

Source filed survey, 2022. R = 0.875, R^2 = 0.863, Adjusted R^2 = 0.845

Table 3: Constraints to orange-fleshed sweetpotato production

Constraints	$\bar{}$ (Mean)
High cost of sweetpotato roots	3.76
High perishability of the roots	3.56
Inadequate storage facility	3.56
Disease infestation on roots	3.45
High cost of transportation	3.42
low knowledge of orange-fleshed sweetpotato bread by the consumers	3.33
Inadequate processing facility	2.46
Inadequate capital to expand the business	2.39
Government policies and taxation	1.46
Inadequate finance	1.43
The short life cycle of the crops	1.39
Poor marketing outlet	1.25
Inadequate supply of good quality seed	1.24
High cost of information	1.22
Poor income from the variety	1.21

Source: Field Survey, 2021.