*Proceedings of the 4th International Conference, The Federal Polytechnic, Ilaro, Nigeria
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Sensory Evaluation of snacks (Meat Pie, Doughnut and Sausage Roll) Made from Flour Blends (Wheat Flour, Plantain flour)

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Abstract

In this research, the sensory evaluation of three different snacks—meat pies, sausage rolls, and doughnuts—made from flour mixtures—wheat flour and plantain flour—is assessed. The sensory evaluation had 30 panelists in total, and several methods of turning the flours into snacks were employed. On the data, a variance analysis was done. The results revealed that there was a significant difference (p0.05) between the treatments tested for a number of the analyzed parameters. The best tasting, most widely accepted, and most visually appealing flour was wheat flour (control). The study demonstrated the advantages of using wheat flours for making snacks. In conclusion, the greatest sensory ratings in terms of color, look, texture, flavor, taste, and overall acceptability go to wheat flour-based sausage, meat pies, and doughnuts. This suggests that the inclusion of whole wheat flour in meat pies, doughnuts, and sausage is generally regarded as acceptable. As a result, more whole wheat flour is likely to be used domestically, which could improve the nutritious value of the aforementioned foods. The government, it is said, can promote the consumption of wheat by enacting laws like trade embargos on imported wheat into Nigeria because wheat flour is more frequently approved by taste panels. Such initiatives would benefit Nigerians' consumption of wheat flour while also expanding the wheat market. Thus, private capital initiatives in the wheat industry will be encouraged.

Keyword: Flour, plantain, Wheat

Background to the Study

A common ingredient in baked products is flour, a name for finely ground cereal grains or other starchy plants. Wheat grain flour is the best alternative for baked goods that call for a spongy structure. According to Ade-Omowaye et al. (2008), wheat flour is the most common type of flour in Western countries and is commonly just called flour in modern usage. Different wheat cultivars are classified as "soft" or "weak" and "hard" or "strong" based on how much gluten they contain. Soft flour contains less gluten than hard wheat, giving bread a finer, crumblier texture (Chu, 2004).

A plantain plant can grow to a height of three to 10 meters. Its large, spirally arranged leaves measure 1.5 to 3 m in length and 0.5 m in width. The fruit is often green and larger than a banana. In certain cases, plantains have been categorized as subspecies of bananas, whereas in other cases it has been the other way around (Manzo et al., 2015). The Musa sapientum plantain variant belongs to the Musa genus (Mbida, et al., 2000). In the tropics, more than 50 taxa are suitable for use as food, fiber, or decoration. Currently, bananas and plantains are produced everywhere in the tropics. The Musa genus contains numerous species, such as the Musa textilis, Musa acuminata, and Musa balbisiana.

When creating food products, the flour mixtures' functional qualities are crucial. Mepba et al. (2007) assert that a blend's efficiency depends on its functional qualities in dishes like doughnuts and pancakes, where

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oil absorption is crucial and where hydration is sought to facilitate handling. This study assesses the acceptability and organoleptic qualities of snacks made with plantain and wheat flour.

Materials And Methods

The preparation, recipes, and steps for manufacturing flour from wheat and plantains are provided below.

Participants from The Federal Polytechnic in Ilaro, Ogun State, participated in the descriptive study. The federal polytechnic's demonstration kitchen was used for the investigation. Staffs who work in the demonstration kitchen for hospitality took part in the qualitative study. A sensory assessment sheet with a nine-point hedonic scale was utilized to collect data for the primary source from the study's 30 respondents/panellists. Next, a statistically significant difference between the samples was checked using analysis of variance (ANOVA).

Processing Of Wheat Into Flour

The method for milling wheat will then be described, including washing, conditioning, and milling. Cleaning eliminates impurities and minimizes contamination; conditioning increases the germ's ability to resist being cut loose from the endosperm.
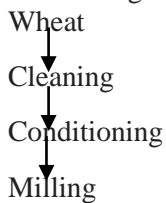
Wheat
↓
Cleaning
↓
Conditioning
↓
Milling

Fig 1: production flow chart of wheat flour

Processing Of Plantain Into Flour

Harvested plantain
↓
Sorting
↓
Peeling (with knife)
↓
Washing (Clean water)
↓
Slicing
↓
Oven Drying/sun drying
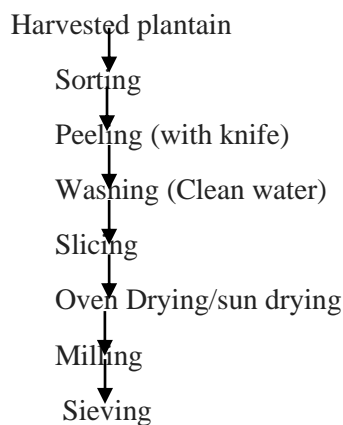↓
Milling
↓
Sieving

Fig 2. Production flow chart of plantain flour

RECIPES

wheat flour (meat pie)

- 500g wheat flour
- 250g Butter
- 1 teaspoon baking powder(optional)
- 1/4 cup (60ml) cold water
- For the filling:
- 3/4 pound (350g) Ground beef
- 1 Potato, peeled and diced into small cubes
- 1 Large Onion, chopped
- 1 Large Carrot, peeled and diced
- 1 cup water broth
- Salt to taste
- 1 teaspoon curry
- 1 teaspoon Thyme
- 2 tablespoons flour (for slurry)
- 2 tablespoons Oil
- 1 egg for brushing

Method Of Preparation Of Meatpie

500g of wheat flour and 250g of butter were rubbed together in a large stainless (mixing) bowl until the mixture resembled crumbles. The mixture was gradually infused with water. The mixture was blended, and then rested in the refrigerator for ten minutes.

Filling preparation: A big pan heating oil. Following the addition of the onion, which was cooked for 5–6 minutes, the beef was broken up and cooked for 4-5 minutes, or until it lost its pink colour. Salt, thyme, and other seasonings were also added, and the mixture was mixed for two minutes. Cubed potatoes were gradually added to the already cooked mixture before the addition of the carrots and another 3 to 4 minutes of boiling. Water was also added as the heat was then decreased to a simmer to let the mixture to cook more thoroughly, and finally, slurry was added to thicken the mixture for 15 minutes over a low heat. It was left out until the mixture had completely cooled. To prevent the meat pie from opening, the sides of the pastry were forked shut after it had been rolled out to a thickness of 1/8 inch (or 1/4 cm) and cut out into the required size of a circular shape. The pies were pierced with a fork, and the oven was preheated to 350°F (175°C) in order to produce a steam vent while baking. The top layer of the meat was then cooked for 25 to 30 minutes. To add luster, the meat pie's top layer was dusted with beaten egg. The pies were finally removed from the oven and permitted on a wire rack to cool.

WHEAT FLOUR (doughnuts)
RECIPE

- 500g wheat Flour.
- 50g Sugar.
- 2 tsp Yeast.
- 3/4 tsp of Salt.
- 50g Butter.
- 1/4 Cup) Milk

- 2 Large Eggs
- Oil for Frying.

Method Of Preparation Of Doughnuts

All of the dry ingredients—wheat flour, sugar, salt, and yeast—were put in a sizable stainless steel bowl and swirled together until well-blended. Before adding the milk and egg, the dough was thoroughly stirred to avoid lumps. After a thorough kneading until soft, the dough was cut into rounds and shaped into balls before being placed in a baking sheet or pan. The dough was placed outside to proof for 20–30 minutes, during which time it doubled in size. After that, it was fried till golden brown in medium-hot oil.

Wheat flour (sausage)

Recipe

500g wheat flour

250g butter

Sausage meat/beef

1 large egg, beaten

I tsp chilli pepper

I small bulb of onions (for taste)

Method Of Preparation Of Sausage

500g of wheat flour and 250g of butter were rubbed together in a large stainless (mixing) bowl until the mixture resembled crumbles. The mixture was gradually infused with water. The mixture was blended, then rested in the refrigerator for ten minutes. Unwrapped sausage meat was seasoned with red pepper flakes and onions. The sausage meat combination was neatly distributed in the pastry along each strip's length. Rolling the sausages will be challenging if you add too much sausage meat at this stage. The flesh was around the thickness of one normal sausage and covered between a quarter and a third of the breadth without being heaped too high. Before the pastry was wrapped over the sausages, each sausage strip had one side egg-brushed. To make sure that the two sides of the pastry stick together, a fork or the side of a knife was used to create a decorative pattern. Seven sausage rolls were cut from each pastry strip after a few small incisions around the top. A baking sheet was then added, and the dish was baked for an additional 15 to 20 minutes, or until the pastry was golden and crisp and the sausage flesh was fully cooked. Eventually, the sausages were taken fresh from the oven and placed on a wire rack to cool fully.

Recipes
Plantain flour (meat pie)
- 500g wheat flour
- 250g Butter
- 1 teaspoon baking powder(optional)
- 1/4 cup (60ml) cold water
- For the filling:
- 3/4 pound (350g) Ground beef
- 1 Potato, peeled and diced into small cubes
- 1 Large Onion, chopped

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- 2 tablespoons Oil
- 1 egg for brushing

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Plantain flour (doughnuts)
Recipe
- 500g wheat Flour.
- 50g Sugar.
- 2 tsp Yeast.
- 3/4 tsp of Salt.
- 50g Butter.
- 1/4 Cup) Milk
- 2 Large Eggs
- Oil for Frying.

Method Of Preparation Of Doughnuts

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Plantain Flour (Sausage)

Recipe For Fillings

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250g butter

 Sausage meat /beef

1 large egg, beaten

I tsp chilli pepper

I small bulb of onions (for taste)

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Results And Discussion

Table 1: Sensory properties of samples made from wheat flour

Treatment	Colour	Taste	Appearance	Flavor	Aroma	Texture	Overall acceptability
A1	7.40 ± 1.19^b	6.58 ± 1.49^b	6.98 ± 1.07^b	6.20 ± 2.26^a	6.66 ± 1.53^b	6.56 ± 1.50^b	6.84 ± 1.58^a
A2	6.84 ± 1.25^a	6.84 ± 1.73^b	$7.02\pm.93^b$	6.24 ± 1.31^a	6.94 ± 1.57^b	6.68 ± 1.76^b	7.10 ± 1.07^a
A3	6.84 ± 0.99^a	5.68 ± 1.59^a	5.82 ± 1.90^a	5.58 ± 1.29^a	5.54 ± 1.77^a	5.82 ± 1.90^a	6.98 ± 0.84^a

 A1(Meatpie), A2 (Doughnuts), A3(Sausage)

The same superscripted mean values in each column do not differ from one another significantly (P< 0.05).
According to the analysis of variance (ANOVA) results, there were significant differences between the treatments tested for each of the study's parameters (P <0.05).

Colour

Across every treatment, all values were significantly different. (*P < 0.05)*. A_1 recorded the highest value (7.40±1.19) and the lowest value of 6.84±0.99 was recorded by A_3

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Taste

All values across all treatments were significantly different. ($P < 0.05$). From this result, A_2 recorded the highest value (6.84±1.73) with A_1 having a value of 6.84±1.73. However, A_3 with the value of 5.68±1.59 recorded the lowest value.

Appearance

Across all treatments, all values were noticeably different. ($P < 0.05$). A_2 recorded the highest value (7.02±.93) while A_3 recorded the lowest value of (5.82±1.90).

Flavour

Across all treatments, all values were noticeably different. ($P < 0.05$). A_2 recorded the highest value of 6.24±1.31 while A_3 recorded the lowest value of 5.58±1.29.

Aroma

All values across all treatments were significantly different. ($P < 0.05$). A_2 recorded the highest value 6.94±1.57while A_3 recorded the lowest value of 5.54±1.77.

Texture

Across every treatment, all values were significantly different. ($P < 0.05$). In this study, A_2 recorded the highest value of (6.68±1.76). A_3 recorded the lowest value of 5.82±1.90.

Overall acceptability

All values were not significantly different across all treatment ($P < 0.05$). A_2 with the mean value of (7.10±1.07) compare favourably with A_3 with the mean value of (6.98±0.84). B_1 recorded the lowest value of 6.84±1.58.

Table 2: Sensory properties of samples made from plantain flour

Treatment	Colour	Taste	Appearance	Flavor	Aroma	Texture	Overall acceptability
B1	4.54±1.51[b]	4.80±1.77[a]	4.52±1.54[a]	4.22±1.46[a]	4.22±1.72[a]	4.24±1.51[a]	5.08±1.52[a]
B2	3.96±1.22[a]	4.66±1.22[a]	4.38±1.62[a]	4.50±1.75[a]	4.36±1.74[a]	4.36±1.82[a]	4.94±1.37[a]
B3	5.10±1.38[c]	4.24±1.20[a]	4.38±1.22[a]	4.08±2.14[a]	3.66±1.86[a]	4.08±1.93[a]	4.82±1.97[a]

B1(Meatpie) , B2(Doughnuts) B3(Sausage)

Note: Mean values with the same superscript in each column are not significantly different from each other (P > 0.05)

The result of the analysis of variance (ANOVA) conducted showed that there was significant difference in the treatments measured for all the parameters considered in this study (*i.e. P < 0.05*).

Colour

All values were significantly different across all treatment ($P < 0.05$). B_3 recorded the highest value of (5.10±1.38) and B_1 with a mean value 4.54±1.51. The lowest value of 3.96±1.22 was recorded by B_2

Taste

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All values were not significantly different across all treatment ($P < 0.05$). From this result, B_1 recorded the highest value (4.80±1.77) with B_2 having a value of 4.66±1.22. However, B_3 with the value of 4.24±1.20recorded the lowest value.

Appearance

All values were not significantly different across all treatment ($P < 0.05$). B_1 recorded the highest value (4.52±1.54) while B_2 and B_3 recorded the mean value of (4.38±1.62) and (4.38±1.22)

Flavour

All values were not significantly different across all treatment ($P < 0.05$). B_2 recorded the highest value of 4.50±1.75 while B_3 recorded the lowest value of 4.08±2.14.

Aroma

All values were not significantly different across all treatment ($P < 0.05$). B_2 recorded the highest value 4.36±1.74 while B_3 recorded the lowest value of 3.66±1.86.

Texture

All values were not significantly different across all treatment ($P < 0.05$). B_2 recorded the highest value of (4.36±1.82). B_3 recorded the lowest value of 4.08±1.93

Overall acceptability

All values were not significantly different across all treatment ($P < 0.05$). B_1recorded the highest mean value of 5.08±1.52. this was followed by B_2 with a mean value of 4.94±1.37. The lowest acceptability mean value of 4.82±1.97 was recorded by B_3

Discussion

The study looks at the sensory evaluation of three different snacks: meat pies, sausage rolls, and doughnuts prepared from a flour mixture of plantains and wheat. Data were examined using descriptive analytics, statistics like mean and standard deviation. Additionally, Completely Randomized Design (CRD), commonly known as a 5% level of significance, was carried out to verify if there was significant difference in the treatments for any of the parameters. When the findings of the sensory evaluation were compared, it was found that there was a significant difference between the treatments for some research parameters (P 0.05). According to the results of this study, wheat flour and all-purpose flour have colours that are remarkably similar and are thus highly regarded by the respondents. This investigation also revealed that Sample B (plantain flour), which was used in the flour mixtures for this research, has a fine texture when used to manufacture doughnuts. All taste-related parameters varied considerably across all treatments. Respondents are more likely to permit the use of wheat flour, or sample A in this study, in the creation of snacks meant for human consumption because it has the greatest and best value. The taste of the wheat flour used to represent sample A in this study tends to be better and finer when compared to sample B (plantain flour), which is consistent with Kihlberg (2004)'s findings.

Last but not least, respondents typically accepted wheat flour in all situations; this data suggests that wheat flour is the preferred alternative in all sensory aspects (Bibiana et al., 2019).

Conclusion& Recommendations

Finally, foods made with wheat flour have the highest levels of acceptability in terms of look, colour, texture, taste, and flavour. Therefore, farmers should focus more on producing wheat for mass consumption, increasing its use in bakeries and other consumer-facing industries.

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