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# COMPARATIVE ANALYSIS OF SENSORY EVALUATION OF LOCAL FOODS PREPARED FROM FRESH AND PROCESSED YAM (POUNDO) AND AVOCADO SMOOTHIES TO MAYONNAISE

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**Abstract**
The study aimed to access the comparative analysis of sensory evaluation of local foods prepared from fresh yam and processed yam (Poundo yam) in selected Polytechnic in Ondo State. A total of twenty (20) panellists were selected for the sensory evaluation of the product which was prepared from two different yams and avocado smoothies to mayonnaise to assess the appearance, flavour (aroma), texture, colour, taste and overall acceptability of the two yams (fresh pounded yam unpeeled and processed yams called poundo yam) and also avocado smoothies to mayonnaise). Data obtained were subjected to analysis using one-way analysis of variance (ANOVA). The result showed that pounded yam cooked unpeeled has the highest nutrients and fibre more than poundo yam that was preserved with food addictive and also avocado smoothies to mayonnaise with aroma, taste and appearance being selected by consumers. In conclusion, the study recommends that consumers should endeavour to consume local foods that have health benefits and also catering industry should cherish local foods in their menu list for production, this will make the community or Nigeria feel at home.

**Keywords:** Sensory Evaluation, Local Foods, Fresh Yam, Processed Yam, Avocado Smoothies, Mayonnaise.

## Introduction

Yam is the most important staple food in West Africa after cereals which belongs to the Dioscorea family. Yam with its appreciable content of essential dietary nutrients has nutritional superiority when compared with other tropical root crops. About 94% of the world population of yam is in Africa and Nigeria is the leading producer in the continent (Agulanna, 2020). Yams are monocots, yam tubers vary in size from that of a small potato to over 58kg.

There are varieties of yam and over 75% such as *Dioscorea esculenta*, *D. alata*, *D. rotundata* and *D. cayenesis* many other names species of yam, a tuberous root vegetable of these crops are grown in Africa and Nigeria. The nutritional facts in fresh yam tubers are good for human consumption and animal feeding. Yam is the common name for plant species in the genus Dioscorea that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, and Central and South America. Yam is one of the major starchy food crops having an edible tuber found in Rwanda (Courtesy, 1997).

Yam is an important source of carbohydrates (starchy) for Rwandan people after Irish potatoes, sweet potatoes and cassava Its principal nutritional function is the supply of calories to the body (Courtesy, 1997). These characteristics contribute to the sustaining of food supply, especially in the scarcity periods at the start of the wet season (Diop, 1998). *Dioscorea*

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*rotundata*, the white yam and *D. cayenensis*, the yellow yam is native in Africa. White yam is widely cultivated in Africa. It is one of the most important yams. Yams are perishable and spoil rapidly in the presence of pathogens, insects, rodents and other pests found in soil and during storage. The flesh of yam species can be white, purple and slightly dark while the processed flour colour ranges from cream white to dark brown. A major proportion of yam is eaten as fried yam, roasted yam, boiled yam, pounded yam, flour ships and amala which is still glutinous dough. The most processed local yam product is yam flour (poundo yam) which contains protein, carbohydrates, and trace amounts of minerals and vitamins (Brunschwetier, 2004). Deterioration following the harvesting of fresh roots and tubers and the consequent losses are caused by mechanical damage, physiological changes within the plant infectious caused by decay organisms and pest infestation. The edible matured yam does not contain any compounds however; bitter components tend to accumulate in immature tuber tissues of *D. rotundata* and *D. cayenensis*. These are water-soluble alkaloids which on ingestion produce severe and distressing symptoms. This yam phytochemical is poisonous and is boiled before use so that alkaloid is leached from the tuber yam boiling without peeling conserves the vitamin content, where 93% of ascorbic acid is retained (AOAC, 2000). Yam boiling without peeling contains dietary fibre which aids digestion, supports gut health, and helps prevent constipation. Pounded yam is a source of vitamins like vitamins C, vitamins B6, and minerals such as potassium, magnesium and phosphorus.

However, pounded yam and poundo yam have a similar mild aroma (Jenkins, 2000). They also hold up well in soups like vegetable soup, and melon soup. Avocado smoothies with mayonnaise are also proteinaceous as a result of milk added to them. The study is designed to assess the production and sensory evaluation of local foods yam boiled without peeling versus processed yam called poundo yam have been recorded that the majority of people have neglected the consumption of pounded yam boiled without peeling not considering the nutrient embedded and its health benefits to human. Also, avocados are nutritious and beneficial to humans while comparing them with mayonnaise that was preserved with food addictive or chemicals (Sara and Lúcia, 2022).

## METHODOLOGY

The research was conducted in the Hospitality Management Demonstration kitchen in Rufus Giwa Polytechnic, Owo, Ondo State. The research was qualitative and involved selected staff. In this study, a total of twenty (20) panellists were invited to give accurate information about the local foods prepared in the kitchen using a sensory evaluation sheet. Fresh white yam (*D. rotundata*), poundo yam, avocado and mayonnaise were purchased locally from Oja-Oba market in Owo.

**Recipe for the production of fresh yam boiled without peeling.**

| **Ingredients** | **Quantity** |
|---|---|
| Tuber of yams | 2 big |
| Water | 1 litre |

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**Equipment**
Mortar and pestle - 1
Cooking pot - 1
Washing bowl - 2pcs
Knives - 2pcs
Portioning spoon - 1

**Method of preparation**
Yam tubers were sorted and washed with clean water to remove soil or sand. The yams were not peeled and sliced into small sizes. Wash the cooking pot place it on fire, pour water of a measurable amount into the pot and pack the cleaned yam into boiling water at 100ºC for 15/20 minutes until it attains a soft texture. Then wash the mortar and pestle thoroughly and remove the yam from the pot in a small quantity, remove the back and begin to pound with mortar and pestle until it has attained a fine smooth and elastic texture. Then portion the pounded yam with a portioning spoon in a suitable and acceptable package for serving.
Ready to serve with boiled beef in vegetable soup.

**Vegetable soup recipe**
- 400g red pepper, chilli pepper, tomatoes and onion
- ½ cup of diced ponmo
- ½ cup of crayfish
- 1/8 cup of chopped onion 2 sachets of stockfish
- 2 unwraps of blended locust beans
- 4 bunches of vegetable leaf and ugwu leaf (shredded)
- Salt
- 4 Maggi cube
- ½ bottle of palm oil

**Equipment**
- Knives - 2pcs
- Washing bowls - 2pcs
- Chopping board - 2pcs
- Cooking pots - 2pcs
- Kitchen spoon - 1
- Perforated spoon - 1
- Blender - 1 (electric/ manual)

**Method of preparation**
Red pepper, chilli pepper, red tomatoes and onions were washed and blended, a cleaned pot was placed on the fire to heat up and Palm oil was added, sweat the chopped onions and mixture was added then Maggi, salt, beef, stock fish, Crayfish, ponmo, and stock were added as well for better taste. It was allowed to cook for 30 minutes.
While still on cooking gas, the shredded vegetable leaves were added for a few minutes to simmer. Thereafter, pack the soup inside the glass dish for presentation and ready to serve.

**Ingredient:** 2kg of poundo yam flour and water – 2 litres

**Equipment:** Turning stick and cooking pot

**Method of preparation**
Wash the pot, pour clean water and place it on fire to boil, then poundo yam flour was poured into a boil and a little water was added to form a smooth paste. Then, the paste was added to the hot water and stirred gradually and thoroughly with a turning stick to avoid lumps. Then allow it to simmer for 5 minutes until it becomes a fine smooth and elastic texture. Ready to serve So it can also be served with vegetable soup.

**Ingredients for Avocado smoothies:** 5pcs of avocado peers, Creamy milk, Sugar, and Salt to taste

**Equipment:** Blender, Knife, and Chopping board

**Method of preparation of avocado smoothies**

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The avocado was washed, peeled and the stone was removed, then diced into cubes and as well put inside the blender, pour milk, and a little salt. Then, the ingredients were blended into a paste sprinkled with lemon (lime) and mixed thoroughly. Then the mixture was poured inside a sauceboat and covered with a flimsy and the smoothies were put in the refrigerator to maintain their normal temperature. Ready to serve.

**Method of preparation of mayonnaise**

It is already processed and purchased from the market. It could be in the form of a sachet or bottle with a lid.

**Health Benefits of Yam (cooked with back)**

1) Pounded yam is a source of Vitamins like B6 and Minerals such as Potassium, Magnesium and Phosphorus.
2) It enhances brain function. Eating yams may boost the brain.
3) It contains cancer-fighting properties that help to reduce colon tumour growth with the antioxidants present in yam.
4) Dietary fibre helps reduce constipation.
5) It reduces inflation which leads to various diseases like heart disease, diabetes and obesity.
6) It improves blood sugar control.
7) It improves digestive health.
8) It enhances weight loss.
9) Low in fat and cholesterol (Brunschwetier, 2004)

**Health Benefits of Avocado**

1) Avocado is rich in monounsaturated fats. Avocado has a smooth and creamy texture which makes it higher in fats than other fruits.
2) Avocados have a unique nutrition profile. It contains a lot of fibre and is rich in vitamins and minerals; Vitamin B6, Vitamin K, Vitamin C, Vitamin E, Potassium, Magnesium and Copper.
3) Avocado lowers the risk of cardiovascular diseases and heart disease.
4) Avocados are high in antioxidants which help to minimize system damage, including from ultraviolet light.
5) It reduces blood cholesterol.
6) It improves gut health.
7) It enhances brain function.
8) It helps to keep the eyes healthy.
9) It promotes a healthy weight.
10) It boosts the immune system.
11) It has anti-inflammatory properties.
12) It keeps the heart healthy (Agulanna, 2020).

**Health Benefits of poundo Yam**

1) Yam flour is a rich source of fiber which is good for weight loss.
2) It helps to reduce menstrual pain for women.
3) It is also rich in micronutrients like Vitamin C which is a strong antioxidant that helps to boost the immune system.
4) It contains potassium and manganese which are important for bone health and growth.
5) Dietary fibre helps reduce constipation and decrease bad cholesterol levels.
6) Helps to lower blood pressure.
7) It enhances good brain functioning (Brunschwetier, 2004)

**Health Benefits of Mayonnaise**

- It boosts the immune system.
- It is a good source of calories, and micronutrients like calcium, magnesium, vitamins A and E.


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- Mayonnaise has health-promoting properties such as the nutrients Vitamins E, which improves heart health and Vitamin K, which is important for blood clotting.
- It is high in saturated fat.
- It prevents the occurrence of a stroke.
- It improves hair condition.
- It promotes healthy nails.
- It enhances the health of the skin (Fisher and Bender, 1985).

**Presentation of Samples to Taste Panellists**

The experimental samples of local foods were labelled Ai, Aii and Bi, Bii.
Sample Ai = pounded yam
Sample Aii = poundo yam
Sample Bi = Avocado smoothies
Sample Bii = Mayonnaise.

The taste panellists were the staff of Rufus Giwa Polytechnic, Owo. Twenty panellists were used. The panellists were given a bottle of potable water to rinse their mouths after each tasting. Sample Ai and Aii were served at the same temperature (15℃) each with forks and knives. While samples Bi and Bii were served at room temperature and eaten with teaspoons thereafter gave their observation on the agreed parameters of the food for flavour, taste, appearance and general acceptability a scale rating format (5-point hedonic scale) was used (Makanjuola and Coker, 2019). ANOVA method was used to analyse the data obtained from the panellists and there the hypothesis was tested using a simple factor (Makanjuola and Coker, 2019).

**Results and Discussion**

Table 1(a): Comparison of the acceptability of local foods (Fresh pounded yam and poundo yam)

| **Sample Ai and Aii** | **Pounded Yam VS Poundo Yam** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Taste Panelists** | 1 Ai: Aii | 2 Ai: Aii | 3 Ai: Aii | 4 Ai: Aii | 5 Ai: Aii | 6 Ai: Aii | 7 Ai: Aii | 8 Ai: Aii | 9 Ai: Aii | 10 Ai: Aii | Total Ai:Aii | Average Score Ai:Aii |
| **Colour** | 5:4 | 5:4 | 5:4 | 5:5 | 5:4 | 5:4 | 5:5 | 5:5 | 5:4 | 5:4 | 50:43 | 5.0:4.3 |
| **Taste** | 5:5 | 5:4 | 5:5 | 5:4 | 5:4 | 5:5 | 5:5 | 5:4 | 5:4 | 5:4 | 50:44 | 5.0:4.4 |
| **Flavor** | 5:4 | 5:4 | 5:5 | 5:4 | 5:5 | 5:4 | 5:5 | 5:4 | 5:4 | 5:4 | 50:43 | 5.0:4.3 |
| **Texture** | 5:5 | 5:5 | 5:5 | 5:5 | 5:5 | 5:5 | 5:5 | 5:5 | 5:5 | 5:5 | 50:50 | 5.0:5.0 |
| **Overall Acceptability** | 5:4 | 5:4 | 5:5 | 5:5 | 5:4 | 5:4 | 5:5 | 5:5 | 5:4 | 5:4 | 50:44 | 5.0:4.4 |

Table 1(b)2

| **Sample Ai and Aii** | **Pounded yam VS Poundo yam** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Taste Panelists** | 11 Ai :Aii | 12 Ai: Aii | 13 Ai: Aii | 14 Ai: Aii | 15 Ai: Aii | 16 Ai: Aii | 17 Ai: Aii | 18 Ai: Aii | 19 Ai: Aii | 20 Ai: Aii | Total Ai:Aii | Average Score Ai:Aii |
| **Colour** | 5:4 | 5:4 | 5:5 | 5:4 | 5:5 | 5:4 | 5:5 | 5:5 | 5:4 | 5:4 | 50:44 | 5.0:4.4 |


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| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Taste** | 5:4 | 5:4 | 5:4 | 5:4 | 5:4 | 5:4 | 5:4 | 5:5 | 5:5 | 5:4 | 50:42 | 5.0:4.2 |
| **Flavor** | 5:5 | 5:4 | 5:4 | 5:4 | 5:4 | 5:4 | 5:5 | 5:5 | 5:4 | 5:4 | 50:43 | 5.0:4.3 |
| **Texture** | 5:5 | 5:5 | 5:5 | 5:5 | 5:5 | 5:5 | 5:5 | 5:5 | 5:5 | 5:5 | 50:50 | 5.0:5.0 |
| **Overall Acceptability** | 5:4 | 5:4 | 5:4 | 5:4 | 5:4 | 5:5 | 5:4 | 5:4 | 5:4 | 5:4 | 50:41 | 5.0:4.1 |

Table 2(a) Comparison of the Acceptability of Avocado Smoothies VS Mayonnaise

| **Sample Bi and Bii** | **Avocado Smoothies VS Mayonnaise** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Taste Panelists** | 1 Bi:Bii | 2 Bi:Bii | 3 Bi:Bii | 4 Bi:Bii | 5 Bi:Bii | 6 Bi:Bii | 7 Bi:Bii | 8 Bi:Bii | 9 Bi:Bii | 10 Bi:Bii | Total Bi:Bii | Average Score Bi:Bii |
| **Colour** | 4:5 | 5:5 | 4:5 | 5:5 | 5:5 | 5:5 | 4:5 | 4:5 | 5:5 | 5:5 | 46:50 | 4.6:5.0 |
| **Taste** | 4:5 | 5:4 | 5:4 | 4:5 | 4:5 | 4:5 | 4:5 | 4:5 | 5:5 | 4:5 | 44:46 | 4.4:4.6 |
| **Flavor** | 5:4 | 5:4 | 5:4 | 4:5 | 4:5 | 4:5 | 4:5 | 4:5 | 4:4 | 4:5 | 49:47 | 4.9:4.7 |
| **Texture** | 5:5 | 5:5 | 5:5 | 5:5 | 5:5 | 5:5 | 5:5 | 5:5 | 5:5 | 5:5 | 50:50 | 5.0:5.0 |
| **Overall Acceptability** | 4:5 | 4:5 | 4:5 | 4:5 | 4:5 | 4:5 | 4:5 | 4:5 | 4:5 | 4:5 | 40:50 | 4.0:5.0 |

Table 2(b)

| **Sample Bi and Bii** | **Avocado Smoothies VS Mayonnaise** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Taste Panelists** | 11 Bi:Bii | 12 Bi:Bii | 13 Bi:Bii | 14 Bi:Bii | 15 Bi:Bii | 16 Bi:Bii | 17 Bi:Bii | 18 Bi:Bii | 19 Bi:Bii | 20 Bi:Bii | Total Bi:Bii | Average Score Bi:Bii |
| **Colour** | 5:4 | 5:5 | 5:5 | 5:5 | 4:5 | 4:5 | 4:5 | 4:5 | 4:4 | 5:4 | 40:47 | 4.0:4.7 |
| **Taste** | 4:5 | 4:5 | 4:5 | 4:5 | 5:5 | 4:5 | 4:5 | 4:5 | 5:4 | 5:4 | 43:48 | 4.3:4.8 |
| **Flavour** | 4:4 | 4:4 | 4:4 | 5:4 | 5:4 | 5:4 | 5:4 | 5:4 | 5:4 | 5:4 | 47:47 | 4.7:4.7 |
| **Texture** | 5:5 | 5:5 | 5:5 | 5:5 | 5:5 | 5:4 | 5:5 | 5:5 | 5:5 | 5:5 | 50:49 | 5.0:4.9 |
| **Overall Acceptability** | 4:5 | 5:5 | 4:5 | 4:5 | 4:5 | 4:5 | 5:5 | 5:5 | 5:5 | 5:5 | 45:50 | 4.5:5.0 |

From table 1(a) and 1(b)

$$Mean\ Ai = 50 + 50 + 50 + 50 + 50 + 50 + 50 + 50 + 50 + 50 = \frac{500}{20} = 25.0$$

$$Mean\ Aii = 43 + 44 + 43 + 50 + 44 + 44 + 42 + 41 + 50 + 41 = \frac{442}{20} = 22.1$$

From Table 2(a) and 2(b)


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$$Mean\ Bi = 46 + 44 + 49 + 50 + 40 + 40 + 43 + 47 + 50 + 45 = \frac{454}{20} = 22.7$$

$$Mean\ Bii = 50 + 46 + 47 + 50 + 50 + 47 + 48 + 47 + 49 + 50 = \frac{478}{20} = 23.9$$

Results from Table 1 showed that most of the panellists preferred Ai which is pounded yam with a mean value of 25.0 to Aii which is poundo yam with a mean value of 22.1. It can be deduced from this study that pounded yam (Ai) is highly acceptable by the respondents and also has a great colour, taste, and flavour, Aii which is poundo yam has a fine texture, colour and taste. So, Aii can therefore be used as a substitute in preparation of yam for human consumption.

In terms of the colour of Ai is 5.0, the texture is 5.0, the taste is 5.0 and the flavour is 5.0, however, the overall acceptability is (5.0). The analysis showed that pounded yam with fresh yam tubers is more acceptable to the respondents in terms of the sensory attributes. Hence, the average score was 25.0 and 5.0 in overall acceptability.

Results from Table 2 showed that most of the panellists preferred Bii which is mayonnaise with a means value of 23.9 to Bi which is Avocado smoothies with a means value of (22.7) can also deduced from the study that mayonnaise (Bii) is highly acceptable by the respondents and also has a great colour or appearance, taste and flavour, so Bi can therefore be used as a substitute in preparation of local food avocado smoothies for human consumption especially the children, youngsters and also adults which loved to be eating healthy food rather than go for processed food for their health benefits.

In terms of colour, Bii is 4.9, the taste is 4.8, the texture is 5.0 and the flavour is 4.2, however, the overall acceptability is (5.0). The analysis showed that mayonnaise with food additives is mostly preferred in terms of colour, taste and texture. Hence, the average score was 23.9 and 5.0 in overall acceptability.

**Conclusion**

Based on the findings above, the researcher thus concluded that some of the liked samples pounded yam and mayonnaise were highly acceptable foods by the respondents with average scores of 5.0 and 5.0 in overall acceptability. Thus, giving credence to the general belief that local foods like pounded yam are highly acceptable because it is natural, have no preservatives, contain a healthy amount of carbohydrates, minerals, vitamins, and fibre are more satisfying and have a healthy benefit than the poundo yam which is not 100% natural, contains preservatives and also lack the satisfying feel and it has an industrial taste attached to it. Then followed by mayonnaise liked very much in terms of colour, taste and overall acceptability food additives that were added not avocado smoothies were rejected as well but slightly liked by the respondents for their sensory attributes.

**Recommendation**

Based on the findings, the following recommendations were made in this study. Therefore, catering and food outlets should be encouraged to embark on boiled yams without peeling and increase the rate of consuming local foods for indigenous people's consumption on their menu list. The preparation should be done hygienically both in and out of the premises to avoid any contamination along the way.


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Finally, the indigenous people should be consuming indigenous foods for their health benefits.

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