Fufu flour cake production

Dissertation II Report

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CERTIFICATE

This is to that **Alimatu Ibrahim** (Registration No. 11717825) has personally completed M.Sc. dissertation II entitled **"Fufu flour cake production"** under my guidance and supervision. To the best of my knowledge, the present work is the result of her original investigation and study. No part of dissertation has ever been submitted for any other purpose at any University. The project report is appropriate for the submission and the partial fulfillment of the conditions for the evaluation leading to the award of Master of Nutrition and Dietetics.

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Chapter 1. INTRODUCTION

Fufu is a fermented cassava product commonly food found in West and Central Africa especially Nigeria, Ghana and Cameroon (Obadiah et al., 2006) and some other part of world such as Caribbean and in many nation with population of West Africa origin. Fufu is presented in different from for consumption. The sour taste, flavor, appearance and texture are generally recognized as the main factors that determines the acceptability of the product. Fufu should have a soft smooth texture, sour aroma and creamy white color. Fufu is locally a wet paste and it has a highly perishable short shelf life (Tomlins et al., 2007) Fufu is mainly prepared by pounding boiled cassava most often with unripen plantain in a wooden mortar using a pestle until the required texture is obtained. The pounding requires a lot of energy thereby making preparation of the food laborious task. In other to reduce the arduous task of pounding, the problem has been addressed with the production of fufu flour that can be easily reconstituted into a paste with hot water and this product has become increasable useful in and outside of Nigeria (Tomlins et al., 2007) A study (Jumah et al., 2006) indicates considerable scope for value addition in the cassava subsectors in Ghana is by far the most widely cultivated crop in Ghana in terms of output. It accounted for about 25% of the countries per capital calorific intake in 2003 (FAO, 2006) Cassava is the third most important source of calories after rice and maize [1, 2] in the tropics. About 60% of the world's cassava production is concentrated in five countries which are Nigeria, Brazil, Thailand, Indonesia and the democratic republic of Congo (DRC). Due to the bulkiness and perishable nature of cassava tuber, the bulk of worldwide cassava trade is in the form of pellets and chips which are used for animal feed. About 70% of the global trade in cassava product is in the form of pellets and chips and the rest are mostly processed into starch and flour for food processing and industrial use. The worldwide production of cassava reached 203.3million metric in 2005. Nigeria which is the leading producer with 19%. Hence, agriculture is considered as a viable option for the creation of missive employment opportunities. (Biofuels demand: opportunities for rural development in Africa, Nigeria case study). There are various potentials for the expending market for fufu which can improve the livelihoods of many rural small scale cassava processors.(Tomlins et al., 2007) Cake is not a new concept ,several flour like maize flour, rice flour, oat four gram flour etc. which are available in the market which are from combination with various flours. The addition of these flours changes the structural and the texture properties of baked cake (Lusas et al., 2001) Fufu cake will prepared with wheat and soy flour not pleasure only but for it nutritious purpose (Matz 1993). This investigation case, standardization of the process for cake production from fufu flour with the method of baking will studied. The investigation will be taken up for standardization for blend preparation of fufu flour with wheat and soy flour for the production of fufu cake.

Chapter 2. PROBLEM BACKGROUND

Cakes are made from various flours by the method of baking with various concentration and they famous all over the world.

However, cassava which is the main component of this flour for this cake have a history of mycotoxin and a very high cyanogenic plant toxins.

Large doses of cyanide prevent cells from using oxygen and eventually these cells die. The heart, respiratory system and central nervous system are most susceptible to cyanide poisoning.

This study is designed to develop how this toxins are removed or detoxified in the process of the flour production.

Chapter 3. REVIEW OF LITERATURE

Several cake products are there in the market which are made using different flours and using baking method and promotion of commercial availability of the product because it have a nutritional value for consumption.

The review will emphasis on the development of fufu flour for cake which is combination of cassava and plantain flour.

3.1 NUTRITIONAL COMPOSITION OF FUFU FLOUR

Cassava is a drought-tolerant staple food crop grown in the tropical and subtropical areas where many people are afflicted with undernutrition, making it a potentially valuable food source for developing countries.

Cassava is good source of energy, it also contains antinutritent that can have either positive or adverse effects on health depending on the amount ingested.

The nutrient contents of cassava depends on the specific plants part, geographic location and other environment condition (Morgan et al., 2016).

CASSAVA

Variables (gms)	Raw cassava	Cassava leaves	Cassava root
Food energy	160	110-149	91
Moisture	59.68	45.9-85.3	64.8-88.6
Protein	1.36	0.3-3.5	1-10
Lipids	0.28	0.3-0.5	0.2-2.9
Carbohydrates	39.06	25.3-35.7	7-18.3
Dietary fibre	1.8	0.4-1.7	0.7-4.5
VITAMIN (mgs)			
Riboflavin	0.087	0.03-0.08	0.06-0.31
Thiamine	0.048	0.03-0.06	0.021-0.7
Niacin	0.854	0.6-1.09	1.3-2.8
Vitamin C	20.6	14.9-50	60-370
Vitamin D	-	5.0-35.0	8300-11800
MINERAL(mgs)			
Phosphorus	27	6-152	27-211
Iron	0.27	1.6-5.48	0.4-8.3
Potassium	-	0.3-14	0.35-1.23
magnesium	-	0.25-0.72	0.12-0.42
Copper	-	0.03-0.08	3-12

Zinc	-	2-6	71-249
Sodium	-	14-14	51-177
Manganese	-	3-10	72-252

Source: value were obtained from the USDA Natl. Nutrient database for standard references. Nutrient values and weighs for the edible portion "Bradbury and Hollowey (1998).woot-Tsuen et al., (1968), Favier (1977), cancaster et al., (1982)

PLANTAIN

Energy	122kcal
Carbohydrate	31.89gms
Protein	1.30gms
Fats	0.37ms
Dietary fibre	2.30gms
VITAMINS	
Niacin	0.686mg
Riboflavin	0.054mg
Vitamin A	1127IU
Vitamin C	18.4mg
Vitamin E	0.14mg
Vitamin K	0.7mg
Sodium	4mg
Calcium	3mg
Magnesium	27mg
Phosphorus	34mg
Zinc	0.14mg
Iron	0.64mg
Potassium	499mg

Source: Zakpaa et al., (2010)

Chapter 4. PROPOSED RESEARCH OBJECTIVES

1. To standardize the process for production of fufu cake.
2. To standardize the process for gluten free fufu cake.
3. To analyze the shelf life of the developed fufu cakes.

Chapter 5. PROPOSED RESEARCH METHODOLOGY

5.1 Detailed plan work

5.1.1 Objective 1

To standardize the process for production of wheat flour for fufu cake

Standardization of this cake development of fufu and wheat flour cake .this cake will be made with wheat flour and fufu flour. This cake will be baked at temperature condition of 180 for 35 minutes. The following analyses will be performed to optimize fufu cake as responses

A. Sensory properties

The cake will be evaluated using the nine (9) point hedonic scale Sensory attribute such as color and appearance, flavor and sweetness body and texture, mouthful and overall acceptability will be shuddered using a trained panel

B. Physical properties

Texture profile analysis will be studied An Aluminum cylindrical probe with 25mm diameter and TA-XT2 texture analyzer will be used. (Gomez et al., 2007)

C. Chemical properties

The nutritional profile of the fufu cake will be analyzed

i. Protein(Sarkar et al., 2015)
ii. Carbohydrate (Mehrjardi et al., 2012)
iii. Fat (Ranganna et al ., 2012)
iv. Minerals(Mehrjardi et al., 2012)
v. Moisture(Tereke et al ., 2003)
vi. Hydroxymethlfurfural(Capuano et al., 2009)
vii. Free fatty acids (Balogun et al,. 2012)
viii. Dietary fiber (AACC,2000)
ix. Prolamin (Gujral and Rosell,2004)

D. Functional properties

i. Antioxidant content (Azizah et al., 2009)
ii. Total phenolic acid (Raganna, 2012)
iii. Carotenoid content (Raganna, 2012)
iv. Flavonoids (Tharasen and Lawan 2014)

5.1.2 **Objective 2:**

To standardize process for production of gluten free fufu cake

Fufu flour will be blended with other flour such as soy flour for the production of fufu cake. This cake will be baked at the temperature condition 35minute at 180C the baking variance will be studied for the following responses the following analyses will be performed to optimize fufu cake as responses

A. Sensory properties

The cake will be evaluated using the nine (9) point hedonic scale Sensory attribute such as color and appearance, flavor and sweetness body and texture, mouthful and overall acceptability will be shuddered using a trained panel (Oliete et al., 2010)

B**. Physical properties**

Texture profile analysis will be studied. An aluminum cylindrical probe with 25mm diameter and TA-XT2 Texture analyzer will be used (Gomez et al., 2007)

C. Chemical properties

The nutritional profile of the fufu cake will be analyzed

i. Protein (Ahlborn et al., 2005)
ii. Carbohydrate (Moore et al., 2006)
iii. Fat (Biligci , 2007)
iv. Minerals (AACC et al., 2000)
v. Moisture (Tereke et al., 2003
vi. Hydroxymethlfurfural(Capuano et al., 2009)
vii. Free fatty acids (Balogun et al., 2012)
viii. Prolamin (Gujral and Rosell, 2004)
ix. Dietary fibre (AACC, 2000)

D. Functional properties

i. Antioxidant content (Azizah et al., 2009)
ii. Total phenolic acid (Ranganna et al., 2012)
iii. Carotenoid content (Ranganna et al., 2012)
iv. Flavonoids (Tharasen and Lawan 2014)

5.1.3 Objective 3

To analyze the shelf life of the developed fufu cakes

A group of people who are a regular consumers of cake will be there for the sensory evaluation. This will be done after seven days to analyze the acceptability. OS/EE/High packaging will be use at the temperature 20 ,25 and 35℃ to prolong the shelf life of cake to at least 42 days.

The following responses will be studied during the shelf life analysis

a. Organoleptic evaluation:
The color and appearance, taste, texture, aroma, mouth feel and acceptability of the developed cakes will be evaluate using a 9 point hedonic scale. (Mehrjardi et al., 2012).

b. Chemical analysis:

i. Protein content(Sarkar et al ., 2015)
ii. Fat content(Ranganna , 2012
iii. Free fatty acid content (Balogun et al ., 2017)
iv. Hydroxymethlfurfural content(Capuano et al .,2009)
v. Peroxide value (Yelboga et al ., 2017)
vi. Dietary fiber content(Mehrjardi et al., 2012)
vii. Moisture content(Tereke et al., 2003)

c. Antioxidant potential:

i. Antioxidant activity (Azizah et al., 2009)
ii. Free radical activities (Prakash et al., 2009)
iii. Metal chelation (Fournier et al., 2015)
iv. Reducing power (Prakash et al., 2009)

d. Functional properties

I. Antioxidant content (Azizah et al., 2009)

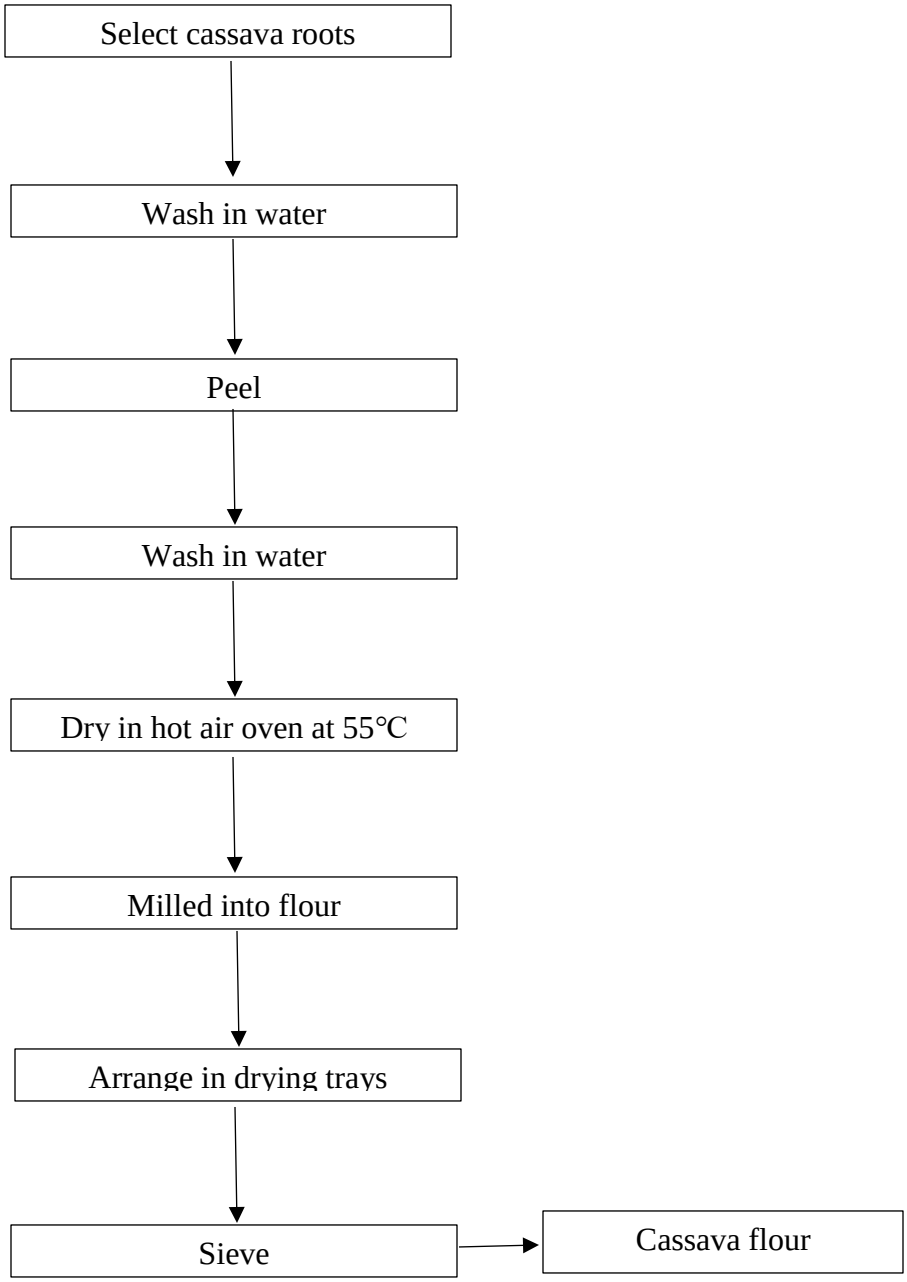
II. Total phenolic acid (Ranganna et al., 2012)

III. Carotenoid content (Ranganna et al., 2012)

IV. Flavonoid (Thrasena and Lawan, 2014)

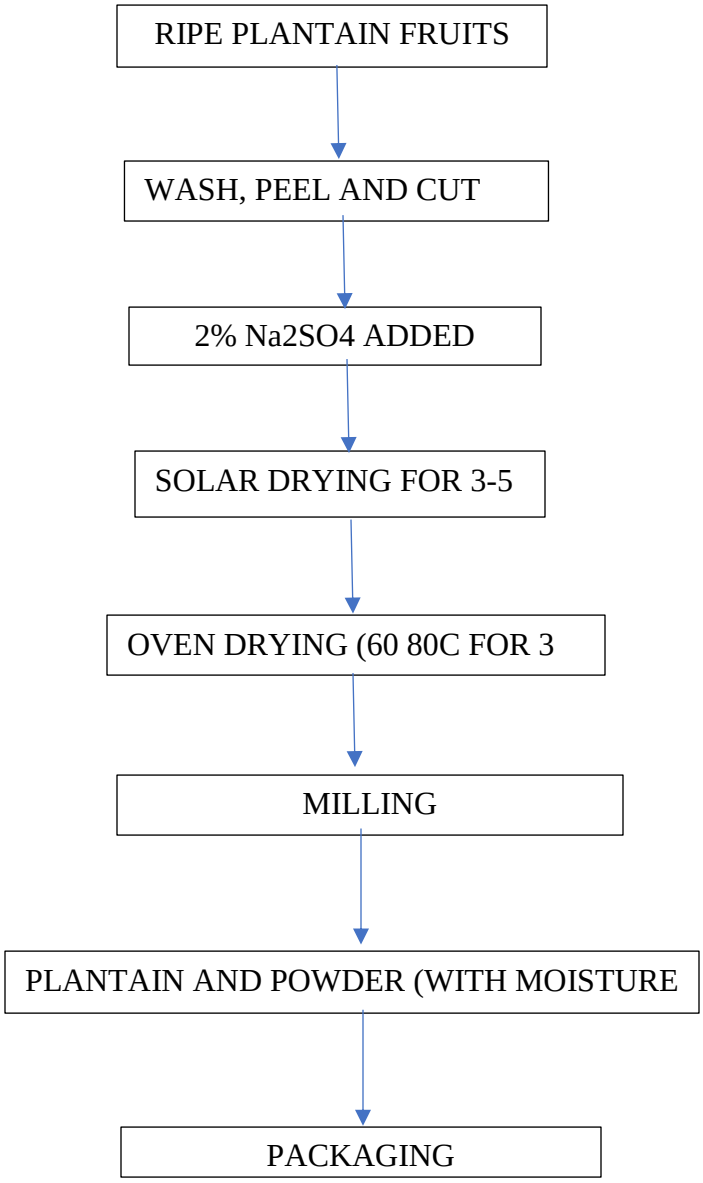
The flour which will be used in the preparation of fufu cake is made up of cassava root and unripen plantain.

The production of fufu flour involve peeling the cassava root, then washing them , grating them, dewater, pulverize ,sun dry ,milling and finally CASSAVA FLOUR



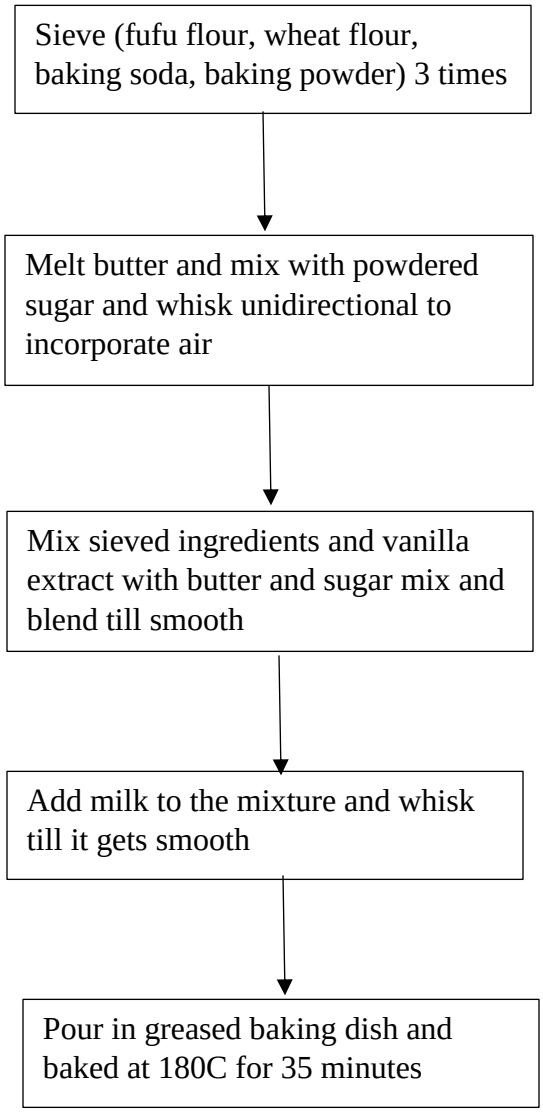
The plantain were washed, peeled and sliced to about 5mm diameter using a slicer. The slices were then steamed for 15 minutes to inactivate enzymes. The pulp was drained in a cabinet drie at 60C for 24 hours, after which it was milled into a flour, the flour were screened through a 0.25 mm sieve (Model BS 410)

FLOWCHART FOR GREEN PLANTAIN FLOUR

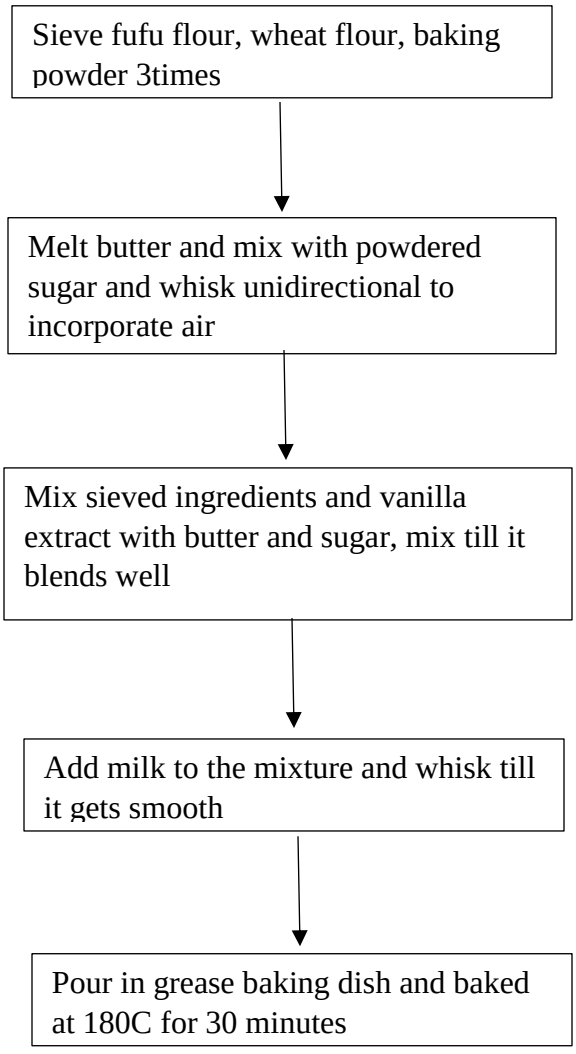


Source: (Zakpaa et al ,.2010)

Flowchart for preparation of fufu cake



Flowchart for the preparation of soy flour for fufu cake



Chapter 6. EXPECTED RESEARCH OUTCOMES

1. Standardized process for the production of wheat flour for fufu cake
2. Standardized process for the production of gluten free for fufu cake
3. The final product will be having good sensory characteristics and high shelf life

Chapter 7. **REFERENCES**

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