

# Production and Quality evaluation of biscuits made from cowpease and wheat flour blend.

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AFFILIATION

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## TABLE OF CONTENT

## ABSTRACT

Cowpea, an indigenous legume to sub-Saharan Africa, is mainly grown in the dry savanna areas as an intercrop with millets, sorghum, groundnut and maize. Cowpea grains rich in protein are consumed in different forms in several parts of the tropics. The average grain yield of cowpea in West Africa is approximately 492kg/ha, which is much lower than its potential yields. Wheat on the other hand is the world’s most important food grain. It provides about 20% of the total food calories and proteins to the people of the world. It is the main staple in 43 countries for at least 35% of the world’s population. Dependence upon wheat varies widely with geographic region: in Europe over 30% of the food calories are derived from wheat, while in some South-East Asian countries, where rice is the staple, less than 10% of the calories would be derived from wheat. Effect of blending 50 to 250 g kg−1 cowpea flour in wheat flour on rheological, baking and sensory characteristics of biscuits was studied. The prevalence of protein energy malnutrition is increasing in developing economies especially in Kenya owing to poverty and consumer’s reliance on plant sources to meet their energy requirements. The food diversification is one tool to eliminate the protein energy malnutrition and pulses holds potential for their utilization in cereal-based products to improve the protein quality. For the purpose, wheat variety (Inqulab-91) and mungbean variety (NM-2006) were used for preparation of flour blends that were further evaluated for their quality and their potential application in baked products. The results regarding the farinographic characteristics indicated that water absorption capacity (60.8%) and mixing tolerance index (120 BU) were higher in 15% and 25% mungbean flour blend, respectively. Moreover, mungbean addition improved some chemical attributes e.g. protein from 5.40-9.30%) fat from 21.3-23.7% and fiber from 0.40-0.95%. Similarly, calorific value also increased from 485-501.1 kcal/100 g. Results pertaining to mineral profile portrayed the increasing tendency for sodium, potassium, iron, magnesium, zinc and manganese with gradual increase in mungbean flour. Sensory characteristics of the product were also improved significantly. In the nutshell, mungbean is an ideal candidate for improving the protein contents of cereal-based products. In this research, wheat flour in a standard biscuits formulation was partially blended with cowpea flour at levels of 5%, 10%, 15% and 20% (wt/wt). Composite flours were analysed for Ash, proteins, gluten contents as well as colours, farinograph and extensograph characteristics. Biscuits baked from composite flours was analysed for loaf volume and weight, texture, crumb-grain structure and colour. Increasing levels of cowpea flour in the blends resulted in changed flours characteristics. Introducing cowpea blended with wheat flour into the complementary diet has the potential to improve childhood growth by improving diet quality through improvements in macro- and micronutrients and also by reducing gut inflammation.

KEY WORDS

***Wheat Flour, Cowpea, Composite flour, Legumes, Sweateners, Shortenings, Emulsifiers, Antioxidants, Leavening Agents.***

## CHAPTER ONE

### Introduction/literature review

Biscuits are unleavened pastries made mainly from wheat flour, shortening, sugar, egg, milk and little or no baking powder. Wheat flour is well suited for making pastry products because of its unique protein called gluten. The gluten forms an elastic network which is essential for dough development. Although wheat is a good source of calories and other nutrients, its protein content is lower in nutritional quality when compared to cowpea. Kenya has been self-sufficient in cowpea production over the last decade with the production of outstripping consumption. Cowpea contributes a significant amount of protein and water-soluble vitamins to most of the African diet. The cowpea seed is a nutritious component in the human diet. Cowpea is major importance to the livelihoods of the millions of people in developing countries particularly in Asia and Africa.

Cowpea, also known as black-eyed pea, is a leguminous crop of many tropical and subtropical areas and is an important grain legume in developing countries. It contains 24–26% crude protein and is rich in glutamic acid, aspartic acid and lysine, but low in sulphur amino acids. Cowpeas are low in fat and contain no cholesterol. The lipid content ranges from 0.7% to 3.5% and unsaturated fatty acids constitute more than two thirds of the total fatty acids. Considerable interest has been generated in fortifying wheat flour with high protein, high lysine material to increase the protein content and improve the essential amino acid balance of baked products, especially bread. The high lysine content (486 mg/g nitrogen) makes cowpeas an excellent enhancer of protein quality when combined with cereal grain proteins, which are low in lysine but rich in sulphur amino acids. Also, the low crude fat content of cowpeas removes the need for a defattening step at flour production.

The constraint has also been the presence of indigestible oligosaccharides in cowpeas, particularly raffinose and stachyose. They can be hydrolysed by intestinal anaerobic micro-organisms to produce flatulence or intestinal gas. In addition to these, anti-nutritional factors such as trypsin and chemotrypsin inhibitors, responsible for reducing the digestibility of protein by inhibiting protease activity, and haemagglutinins, have been detected .

Basically, In this study, the effect of blending different levels of wheat flour with cowpea flour on the physical and nutrition properties of biscuits were studied. Different blending levels (0, 5, 10, 15, 20 and 30)% of wheat flour with cowpea flour represented as (C, B1, B2, B3, B4 and B5) respectively were evaluated and the produced bread were exposed to sensory evaluated. The chemical compositions results of the flour presented there was a significant variances among a flour treatments compared to the control (100% wheat flour). In addition, as the replacing of wheat flour with cowpea flour increased the protein and ash content increased while the carbohydrates decreased significantly. The sensory evaluation results shown there was a significant variances among the control bread treatment and additional bread treatments for most of the bread attributes and the best replacing level was using 10% cowpea flour with 90% wheat flour. Moreover, the amino analysis results showed that wheat dust had smallest amino acid containing and as the flour replacing increased the amino acids content increased.

### Problem Statement

Cowpea is mostly underutilized in complementary feeding in Kenya due to its strong taste, long processing time, and high energy requirements for processing. Effective utilization of cowpea in complementary feeding requires processing which may affect chemical composition as well as sensory quality.

Due to the prevalence of protein energy malnutrition in developing economies especially in Kenya owing to poverty and consumer’s reliance on plant sources to meet their energy requirements, there was a great need to focus on this study.

Despite the high protein content of cowpea, it’s use as a food source has not been utilised to its full potential, particularly in the industrialised countries, mainly due to preparatory difficulties. Since cereals are staple foods for human nutrition and their incorporation into various products is of great economic importance due to the scrupulous properties of proteins in flour which accelerate rheological properties of dough related to baking quality, there was need to undertake this study involving the blended wheat flour with cowpea.

### Objectives

Main objective

To analyze and determine the nutritional composition, Production and Quality evaluation of biscuits made from cowpea and wheat flour blend.

Specific objective

1. To devise the strategy to curtail protein malnutrition of biscuits through composite flour technology.
2. To reduce the nation's higher expense on wheat importation by adopting the utilization and development of other flour products such as cowpea by blending it with wheat flour for baking pastries purposes such as in the case of biscuits.
3. To study the effects of blending different levels of wheat flour with cowpea on the physical and nutritional properties of the end product.
4. To analyze the ash, Protein, gluten contents and alfa-amylase activity as well as colour, farinograph and extensograph characteristics of blended wheat flour with cowpea.

### Research hypothesis

## CHAPTERTWO

### MATERIAL AND METHODOLOGIES

Basically, the wheat flour (*Triticum aestivum*) and cowpea beans (*Vigna unguiculata*) will be used to develop the composite/blended wheat-cowpea mixture. The raw materials will be purchased from a source supplier at a local market in Nairobi. The cowpea beans will then be sorted to remove the foreign materials and stored in a cool, dry place prior to its use for production of the flours. Other important ingredients to be purchased will include margarine, eggs, nutmeg, vanilla essence and sugar.

### 1. Preparation of Cowpea Bean Flour

The cowpea beans will be sorted to remove the unwholesome ones and the foreign materials. The sorted beans will be parboiled for 5 minutes for easy removal of skin and the black eyes. The parboiled cowpea beans will thereafter be dehulled to remove the outer covering including the black eye. The dehulled beans will be dried in convention oven at a temperature of 1500c for 3hours. The oven-dried cowpea beans will thereafter be milled into a refined bean flour referred to as supreme quality bean flour and finally stored in an airtight container.

### 2. Experimental Design

A 3 by 2 factorial design will be employed and the factors will be as follows;

a). percentage of cowpea flour-wheat flour (50:50, 75:25 and 100 cowpea flour).

b). Baking Temperatures( 150 and 200oC).

-The biscuits of 100% wheat flour baked at 200oC was used as a control experiment.

A 3x2 full factorial design was employed, and the factors were; a) percentage of cowpea flour (SQBF)-wheat flour (50:50, 75:25 and 100 cowpea flour) and b) the baking temperatures (150 and 200 oC). Cake of 100% wheat flour baked at 200 oC was used as control.

## CHAPTER THREE

### DATA ANALYSIS AND COLLECTION.

All results are presented as means of three replicates and the data are conveyed as means ± standard deviations. In addition, the results were imperiled to one way ANOVA and individual sample T Test using SPSS (version17). The treatments means were separated by comparing the means at

p ≤ 0.05.

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## APPENCES

### WORK PLAN

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| TASK/  DURATION | SEPT | OCT | NOV | DEC | JAN | FEB | MAR | APR |
| Production of blended cowpea and Wheat Flour |  |  |  |  |  |  |  |  |
| Report writing and presentation |  |  |  |  |  |  |  |  |
| Harvesting and drying of Wheat flour and Cowpea |  |  |  |  |  |  |  |  |
| Report writing and presentation |  |  |  |  |  |  |  |  |
| Protein analysis of blended cowpea with wheat flour |  |  |  |  |  |  |  |  |
| Report writing  and presentation |  |  |  |  |  |  |  |  |
| Moisture content and ash content analysis |  |  |  |  |  |  |  |  |
| Report writing and presentation |  |  |  |  |  |  |  |  |

### BUDGET

|  |  |  |  |
| --- | --- | --- | --- |
| ITEM | QUANTITY | COST | TOTAL |
| Stationary | 3 pen  3writing pad | 20/=  50/= | 60/=  150/= |
| Cultured Wheat Flour and Cowpea | 3000ml | 4000/= | 4000/= |
| Transportation Fee | 1 person | 2000/= | 2000/= |
| Troughs | 4 | @250/= | 1000/= |
| Nutrients | 100 grams | 800/= | 800/= |
| chelated iron | 500ml | 500/= | 500/= |
| TOTAL= 8510/= | | | |