EFFECT OF ADDITION OF RICE BRAN ON THE PHYSICO-CHEMICAL AND SENSORY PROPERTIES OF WHEAT BREAD

KUFORIJI, A. OLUSENGUN (Ph. D.)
Dean School of Agricultural Technology,
Federal Polytechnic, Ekowe,
Bayelsa State, Nigeria.
oakuforiji@yahoo.com

JOHN SAMUEL
Department of Food Science Technology,
Rivers State University,
Nigeria.

ABDULAI BABATUNDE SULE
Department of Agricultural Technology,
Federal Polytechnic, Ekowe,
Bayelsa State, Nigeria.
sbabdulah123@gmail.com

ABSTRACT

The study looked into the Effect of Addition of Rice Bran on the Physico-Chemical and Sensory Properties of Wheat Bread. Composite flour from rice bran/wheat flour blends at 10%, 15% and 20% levels of rice bran. Substitution was used to bake bread and their effects on the baking qualities of wheat bread were determined and compared with 100% wheat bread. Proximate analysis of the 100% wheat and the composite showed that, the protein increased from 2.38-5.12 indicating that protein and dietary fiber increases with rise in rice bran. Some functional properties equally increased with increase in rice bran addition, such as fats and water absorption, ranging from 1.0 – 1.22 and 1.5-1.89 for fats and water respectively. The major ingredients used for the baking were flour, sugar, yeast, salt and water. Sensory evaluation for color, texture, flavor, taste and general acceptance of products by 10 panelists drawn from among staff and students were done using a 5-point hedonic rating scale. The results showed that, products with 10% and 15% levels of substitution were acceptable.

KEYWORDS: *Rice Bran, Physico-Chemical and Wheat Bread.*

INTRODUCTION

Cereals are a group of cultivated plants belonging to the family of gramineae. Their grains are of major interest for human animal feeding due to their abundance and nutrient composition. The food grain belongs to about ten plant species. In this part of the world, the most commonly used are wheat, rice and maize (Alais & Linden, 1999). All varieties of rice are available throughout the year, supplying as much as half of daily calories for half of the world's population (Anderson et al, 2000).

Rice (especially brown rice) is described to be high in nutrient composition due to the presence of bran compared to other staple foods such as tubers. The difference between brown rice and white rice is not just color; a whole grain of rice has several layers. Only the outer most layer; the hull is removed to produce what we call brown rice. This process is the least damaging to the nutritional value of the rice and avoid the unnecessary loss of nutrients that may occur with further processing (Jensen et al, 2004).

The removal of the hull ends up with brown rice which is rich in protein, vitamins, mineral and oil. If brown rice is further milled to remove the bran most of the germ layers, the result is the whiter rice, but also a rice that has lost many more nutrients. At this point, however, the rice is still unpolished, and it takes polishing to produce the white rice we are used to seeing. Polishing removes the aleurone layer of the grain, a layer filled with health supportive essential. In facts, our food ranking system qualified brown rice as an excellent source of manganese and a good source of minerals selenium and magnesium. The complete milling and polishing that converts brown rice into white rice destroys 67% of vitamin B_3, 80% of vitamin B_1, 90% of vitamin B_6, half of the manganese, half of phosphorus, 60% of the iron, and all of the dietary fiber and essential fatty acids. For this reason, United States enacted a law that, fully milled and polished rice must be enriched with vitamin B_1, B_3 and iron. But the form of these nutrients when added back into the processed rice is not the same as in the original unprocessed version, and at least 11% of the lost nutrients are not replaced in any form even with rice 'enrichment' (Anderson et al, 2000).

LITERATURE REVIEW

THE PHYSIO-CHEMICAL PROPERTIES OF FLOUR

The water binding ability of flour is of interest, microbial growth in a particular food depends upon water activity (Okaka, 2001). Binding of water to protein and carbohydrates constituent of flour or defatted rice bran results in decreased water activity which brings about change in microbial growth, and it also influences the water absorption rate. Water absorption without protein dissolution results in swelling (expansion) and will affect such characteristics as viscosity and adhesion of product. Food foams are usually dispersion of gas bubbles in continuous liquid or semi solid phase that contains a soluble surfactant. A large variety of food foam exists with widely different textures such as whipped cream, whipped topping and so on. In most cases the gas is air, but in few occasions it is carbon dioxide, and protein.

QUALITY OF WHEAT FLOUR IN BREAD BAKING

The baking quality of wheat flour besides starch is the reserved protein which is water insoluble. In wheat, these proteins belong to two families; the gliadin and the glutenin which are not found elsewhere. When they are present in the right proportion, they make it possible to obtain a dough which is extensible (gliadin property) and elastic (glutenin property). There are two types of wheat flour which are; soft and hard wheat. Soft wheat has the best proportion of protein for bread baking while hard wheat is used in noodles and semolina (Alais, 1999). The levels of substitution of wheat flour with the respective blends of defatted rice bran addition were 10%, 15%, and 20% while 100% wheat flour was used as control.

THE USES OF RICE BRAN

The outer layer of the grain (bran) and the oil made from bran are used for medicine. Rice bran is used for treating diabetes, high blood pressure, high cholesterol, alcoholism, obesity and so on (Web MD, 2017). Rice bran might help to lower cholesterol because the oil it contains has substances that might decrease cholesterol absorption and increase cholesterol elimination. One of the substances in rice bran might decrease calcium absorption; this might help reduce the formation of certain types of kidney stones.

Bran is one of the main products in processing paddy rice; it is produced in the pearling (scouring) process. Rice bran comprises of the pericarp, aleurone layer, embryo and some of the endosperm and contains most of the vitamins and protein of grain (Juliana, 1993).

PURPOSE OF THE STUDY

The aim of the study is to look into the Effect of Addition of Rice Bran on the Physico-Chemical and Sensory Properties of Wheat Bread. Specifically, the study intend to:

1. Show the nutritional composition of wheat and defatted rice bran.
2. Determine the proximate compositions of composite breads in percentage.

RESEARCH QUESTIONS

The following research questions guided the study.

1. What is the nutritional composition of wheat and defatted rice bran?
2. What are the proximate compositions of composite breads in percentage?

SCOPE OF THE STUDY

The study is limited to addition of rice bran on the physico-chemical and sensory properties of wheat bread.

METHODS

About 500g of the sample was carefully weighed, and 1000ml of straight –run gasoline solvent was added and stirred together and ensure uniform spread of the solvent throughout the sample. It was stirred at 20-30 min intervals for about 3-4 times, allowed standing overnight and decanting. The oil/solvent mixture was filter and dried in the oven at 100 degree C to remove the solvent. It was then dried, sieved for the analysis.

PROXIMATE ANALYSIS (Defatted Rice bran, wheat flour and their composite)

MOISTURE CONTENT: Moisture content was determined in accordance with standard procedure. Cleaned flat dish made of Silica material was dried on the oven and cooled in desiccators.

The cooled dish was weighed (w_1) and 5g of the sample was accurately weighed (w_2) into the dish and spread uniformly and was transferred into an air oven at 130^{o}c to dry for 1hour. Pairs of tongs were used to transfer the dish into desiccators, allowed to cool and weighed; the dish was return to the oven for half an hour and again cooled in the desiccators and weighed. Repeated to constant weight (w_3), this is done in duplicate.

$$\%\text{moisture} = \frac{w_2 - w_3}{w_2 - w_3} \times 100 \quad 1$$

ASH CONTENT

Ash was estimated in accordance with the method of A.O.A.C. (1990). Porcelain crucibles were thoroughly washed, cleaned and placed in a muffle furnace for about 1 hour and cooled at room temperature in the desiccators and reweighed (w_1) 2g of the samples were accurately weighed into the crucibles and weighed giving a total weight (w_2). The samples were charged on a Bunsen flame until smoking ceased. (This process is known as de-carbonization) and the transferred to muffle furnace and ash for 3hrs at 600^{o}c in duplicates and labeled to avoid confusion. At the end, the crucibles were cooled in desiccators and reweighed (w_3).

$$\%\ \text{ash} = \frac{w_3 - w_1}{w_2 - w_1} \times 100$$

DATA ANALYSIS

TABLE 1:

Nutritional Composition of Wheat and Defatted Rice Bran

NUTRIENT	WHEAT FLOUR	RICE BRAN
Protein	8-10%	10.6-13.4
Starch	65-75%	39.5-50.3
Moisture	10-14%	8.9-12.5
Fats	1-2%	10.1-22.4
Fiber	1.5-2.5%	9.6-14.1
Ash	0.4-1.0%	9.3-14.3

Table 1 showed in percentage different composition of protein, starch, moisture, fats, fiber and ash in wheat flour and rice bran. Starch has the highest percentage composition and range in rice bran and wheat flour, while ash has the lowest composition in wheat flour and rice bran.

Table 2:
Proximate Compositions of Composite Breads In Percentage.

Samples	Protein	Lipid	Moisture	Ash	Carbohydrate	Fiber
100% Wheat	9.77±0.2	2.20±0.1	13.22±0.1	1.20±0.8	21.23±0.3	9.77±0.2
10% Rice Bran	9.80±0.5	2.29±0.9	13.02±0.4	1.9±0.4	69.70±0.2	3.78±0.4
15% Rice Bran	10.05±0.9	2.39±0.4	12.92±0.2	2.43±0.2	65.94±0.5	4.98±0.1
20% Rice Bran	10.4±0.3	2.46±0.4	12.81±0.4	2.84±0.1	64.22±0.2	5.12±0.3
100% Rice Bran	13.02±0.9	4.50±0.2	11.28±0.6	9.40±0.6	39.38±0.2	22.43±0.3

Table 2 show that the average protein content of rice bran is appreciably higher than that present in wheat flour. Although rice bran is low in carbohydrate and higher in dietary fiber, wheat serves as a good source of carbohydrate in the supplementary process.

DISCUSSION OF FINDINGS

Based on the result of table 1, it showed that percentage different composition of protein, starch, moisture, fats, fiber and ash in wheat flour and rice bran. Starch has the highest percentage composition and range in rice bran and wheat flour, while ash has the lowest composition in wheat flour and rice bran. Defatted rice bran contains higher proteins and

other nutrients. It has a good amino acid profit for monogastric animals and good protein and phosphorus contents for ruminants. It is low in fatty acids.

Table 2, also revealed that the average protein content of rice bran is appreciably higher than that present in wheat flour.

RECOMMENDATION

Based on the findings of the study, it is therefore recommended that composite flour of 10% to 15% blends are generally accepted for rice bran and for providing roughage for bowels, and assigning intestinal transit.

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