

# Acceptability and Nutrient Composition of Three Dishes of Northern Nigeria

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**ABSTRACT:** The study was conducted as an attempt to produce empirical data on the nutritive composition and general acceptability of three traditional dishes from Northern Nigeria (Steamed Wheat Grits/Dashishi (SWGD), Hungry Rice Porridge/Fatenacha (HRPF) and Steamed Wheat Dough/Alkubus (SWDA)). Multiple research designs were adopted, which involved laboratory analysis and sensory evaluation of the dishes by a panel of 60 semi-trained students. Proximate composition was determined using standard assay methods while minerals and vitamins estimate were done using wet extraction and the values were read in air atomic absorption spectrophotometer. Survey data collected were statistically analyzed using one way analysis of variance (ANOVA) and Tukkey's test was further used to determine the level of significant difference. The result of laboratory analysis showed that all the three dishes have high lipid (9.90 – 24.20%) and protein (3.50 – 7.00%) contents. The dishes are excellent sources of vitamins A (6.48 - 17.10mg), B<sub>1</sub>(72.15 - 161.01mg), B<sub>2</sub>(19.78 - 380.62mg), B<sub>3</sub>(3.51mg), B<sub>6</sub>(119.63 - 368.71mg), and E (46.22 - 186.15mg). The result also showed appreciable amount of K (2.5066 – 2.5846ppm), Fe (0.238 - 1.28ppm), Ca (0.098 – 0.3644ppm), Cr (0.0046 – 0.0261ppm). Results of sensory evaluation revealed general acceptability of all three dishes.

**Key Words:** Acceptability, Nutrient composition, Traditional dishes and Northern Nigeria

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## INTRODUCTION

Nigeria, a multicultural society with more than 470 ethnic groups is located on the west coast of Africa (Aregheore 2009). The diverse ethnic groups are clustered around what use to be referred to as the defunct four regions of the country; Eastern, Northern, Southern, and Western regions. The regional boundaries are reflected in the cultural variation amongst the four regions of the country. Ethnic groups clustered within the same region share similarities in culture, food production, availability and consumption patterns, thus, giving rise to regional diversity in the people's pattern of food habits.

The people of the defunct Northern region are predominantly farmers and are the major producers of grains consumed in the country. Some of the grains produced in the region include maize, millet, guinea corn (Sorghum), rice, wheat and hungry rice

(*acha* in Hausa). These grains also double-up as the staple foods of the people. Traditionally, these grains are processed and prepared into a variety of dishes such as *Tuwo* (rolled solid paste/swallow), *Fankaso* (local wheat pan cake), *Masa/Waina* and *Sinasir* (local cake from rice, maize, or millet), *fate* (porridge), *Dambu/Dashishi* (steam coarse grits), *Kunu* (Pap/Gruel) etc. (Dikko 1995) These dishes can be made from any of the grains earlier listed above.

In the good old days, these dishes were common menus at meal times in most homes. This practice has however, fast faded away in most homes and especially in the homes of the elites. The change in consumption pattern may be attributed to a number of reasons. The increased participation of women in the labor market limits the amount of time and energy expended on meal preparation, which has forced most women to opt for less time and

energy consuming dishes. Secondly, the awareness that diet is related to health has resulted into changing patterns of food habits (Brown, 2005). Thirdly, technology and globalization has made it easy to adapt dishes from other cultures to the neglect of the traditional dishes especially when they are much easier to prepare. Fourthly and most importantly is the dearth of empirical evidence on the nutritive value and acceptability of most Nigerian traditional dishes, those from the Northern region not excluded. Martinez et al (2010) confirms that empirical evidence is insufficient to determine whether local food availability improves diet quality or food security. All these have probably raised skepticism amongst home makers about the health implications of consuming traditional dishes and have consequently limited their consumption, choices or diet options available to family members at meal time, thus, creating monotony in food consumption patterns and the consequent health implication. Kuhnlein (2003) suggested the need to research into the local food, as a way of recognizing and promoting their contributions to micronutrient consumption.

This paper is therefore an attempt to produce empirical evidence on the nutritive values of three traditional dishes from Northern Nigeria; *Dashishi* (steamed coarse wheat grits), *Alkubus* and *taushe* (steamed wheat dough and vegetable soup) and *Fatenacha* (hungry rice porridge).

It is hoped that the result of this study will help sensitize people on the nutritive values of these traditional dishes, thereby promoting and improving food choices and formation of better food habits. Thus, the objectives of the study were to:

1. determine the nutritive values of the three traditional dishes; and
2. determine the general acceptability of the three traditional dishes.

## **Hypothesis of the Study**

One null hypothesis was formulated for the study;

1. There is no significant difference in the general acceptability of the dishes.

## **Materials and Methods**

**Area of Study:** The study was conducted in Northern Nigeria at the Food Laboratory of the Home Economics Section, Department of Vocational and Technical Education, Ahmadu Bello University, Zaria, Kaduna state, Nigeria.

**Research Design:** Multiple research designs were adopted, which involved laboratory analysis of samples and sensory evaluation to determine general acceptability of the dishes.

**Raw materials:** These include mainly wheat (*Triticum aestivum*) grain, hungry rice (*Digitaria exilis/white fonio*) (*acha*), condiments and spices. All purchased at the Samaru local market in Zaria, Kaduna State, Nigeria.

**Processing of raw materials:** Two kilograms of wheat grain was hand-picked and winnowed to remove any unwanted matters. The wheat grain was washed and sun dried for about 6 hours until completely dry and divided into two equal portions. One part was milled into fine flour for the preparation of *alkubus* and the second part was milled into medium size coarse wheat grits for the preparation of *Dashishi*. One quarter kilogram hungry rice (*Acha*) was hand-picked and winnowed to remove all unwanted materials. The processed grains were packaged in air tight plastic containers prior to the experiment.

**Preparation of Dishes:** Recipes were adapted from Dikko (1995), pre-tested and used in the preparation of the dishes. The dishes were assigned four digit letter codes; SWGD (Steamed Wheat Grits/*Dashishi*), SWDA (Steamed Wheat Dough/*Alkubus*) and HRPF (Hungry Rice

Porridge/*Fatenacha*). The dishes were allowed to cool at room temperature to a serving state before serving.

**Evaluation Panel:** panel of 60 semi-trained students were randomly selected from the Department of Vocational and Technical Education of Ahmadu Bello University, Zaria, Kaduna State, Nigeria to carry out the sensory evaluation of the dishes.

**Instrument for Data Collection:** A nine-point hedonic scale (9= like extremely/perfect and 1 = dislike extremely/not acceptable) was used to test for appearance, taste, flavor and texture (Lim, 2011). Dishes were further ranked in order of preference by panelists to determine the general acceptability of the dishes.

**Data Collection:** Samples of the three dishes were taken to the Food Science Department laboratories of Institute for Agricultural Research (IAR), ABU and National Research Institute for Chemical Technology (NARICT), Zaria, Kaduna State, Nigeria, within three hours after the preparation of the dishes for chemical analysis. The sensory evaluation was conducted in one day in a well-lit, ventilated room with comfortable seating arrangement. The dishes were served on similar white background ceramic plates, clearly labeled based on product code as marked on the instrument for data collection (SWGD, SWDA and HRPF) and panel members were properly instructed to score the products for appearance, flavor, taste, texture and general acceptability. Each panel member had a glass of water to rinse his/her mouth after tasting a product before testing another one.

### **Experimental Analysis**

**Nutrient analysis:** The three samples of dishes: SWGD, HRPF and SWDA were analyzed for energy, carbohydrate, fat, protein, moisture, fiber, minerals and vitamins using standard AOAC Methods (2002). All analyses were performed in

triplicate. Crude protein was determined by micro Kjeldahl method while crude fat was estimated by Soxhlet extraction method. Total ash was determined by dry ash method. Moisture content was estimated using hot air method and the carbohydrate content was obtained by difference. Mineral and vitamins estimate were done using wet extraction and the values were read using UV visible absorption spectrophotometer (wave length of 280- 900nm).

**Statistical Analysis:** Out of the total of 60 score cards distributed to panelists, only fifty-five were duly completed. Therefore the statistical analysis was based on the fifty-five score cards retrieved. Sensory properties were presented as mean and standard deviation. The statistical significance of treatment effect was determined by one way analysis of variance (ANOVA)  $p < 0.05$ . Tukey test was further used to determine the level of significant difference.

### **RESULTS AND DISCUSSION**

Three traditional dishes from Northern-Nigeria (photograph of sample of dishes are shown in (Appendix 1, Plates 1-3) were analyzed for nutritive composition and general acceptability. The result of proximate analysis on Table 1 reveals high moisture content for all three dishes which range between 60.10 – 71.50%. The high moisture content may be attributed to the cooking methods used. This supports the results of Al-Kanhal et al (2010) who reported moisture content of some wheat based dishes from Saudi Arabia ranging between 49.3 – 81.2%. High moisture content of food is an indication of freshness and probable shelf life of the dishes. The results further reveal ash content ranging between 3.05 - 4.65%. This is indicative of the probable mineral load of the dishes (Adeolu and Enesi, 2013). It further shows lipid content of 9.90 – 24.20%; protein content of 3.49 – 7.00% ; carbohydrate content of 2.10% to 19.95% and fiber content of 1.90 -2.75% of edible portion. Based on the results, SWDA recorded

highest moisture and ash content, but the least protein, fiber and carbohydrate content. HPRF recorded the highest lipid and fiber content. SWGD recorded the highest protein and carbohydrate but was lowest on ash and lipid content. The higher protein content of SWGD may not be unconnected to the garnishing added to the

dish. The high lipid in the HPRF and SWDA maybe due to the palm oil contained in the dishes. Generally, the results revealed higher ash and lipid content compared to Al-Kanhal et al (2010) study, but similar ranges on moisture, protein and fiber contents.

**Table 1:- Proximate Composition (%) Edible Portion of the Dishes.**

Samples	Moisture	Ash	Lipid	Protein	Fibre	CHO
SWGD	60.10	3.05	9.90	7.00	2.65	19.75
HPRF	66.10	4.10	24.20	3.50	2.75	2.10
SWDA	71.50	4.65	19.10	3.49	1.90	1.26

Key

**SWGD:** Steamed Wheat Grit (Dashishi)

**HPRF:** Hungry Rice Porridge (Fatenacha)

**SWDA:** Steamed Wheat Dough (Alkubus&taushe)

**Table 2: Vitamin Content (mg /l) Edible Portion of the Traditional Dishes**

Samples	Vit-A	B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	B <sub>6</sub>	B <sub>9</sub>	C	E
SWGD	17.10	161.01	380.62	3.51	358.71	0.304	1.96	186.15
HPRF	6.48	72.15	19.78	3.51	119.63	0.304	1.38	46.22
SWDA	9.45	161.01	380.60	3.51	146.57	0.304	2.28	55.83

Key:

**SWGA:** Steamed Wheat Grits (Dashishi)

**HPRF:** Hungry Rice Porridge (Fatenacha)

**SWDA:** Steamed Wheat Dough (Alkubus& taushe)

Table 2 presents the vitamin content of the traditional dishes. The vitamin A content range between 6.48 - 17.10mg which is more than RDA for males and females aged 19 -30 years respectively. The results also revealed high vitamin B<sub>1</sub> (72.15mg–161.01mg), B<sub>2</sub>(19.78-380.62mg), B<sub>3</sub> (3.51mg), B<sub>6</sub>(119.63mg – 358.71mg), vitamin C (1.38-2.28) and vitamin E (46.22mg – 186.15mg) which are all by far above the following ranges recommended for males and females 19-30 years: vitamin B<sub>1</sub> 1.2 vs 1.1; B<sub>2</sub> 1.3 vs 1.1; B<sub>3</sub> 16mg vs. 14 mg; B<sub>6</sub> 1.3 mg and vitamin E 15mg for both sexes respectively (Brown et al 2005). The dishes are also excellent sources of vitamin B<sub>9</sub> and E. The results of this study however differed greatly when compared to the studies of Al- Kanhal et al (2010), as vitamin A content of the Northern Nigerian dishes were lower than that of the dishes reported by Al-Kanhal's studies but higher in vitamin B<sub>1</sub> and B<sub>2</sub> while the

vitamin C content of 1.38mg – 2.28mg fell within the same range of 0.89mg – 2.89mg as revealed by Al-Kanhal's studies. According to Brown et-al (2005), all these vitamins play critical roles as co-enzymes in metabolism. Additionally, vitamins A and E also double-up as antioxidants that neutralize free radicals. Foods rich in antioxidants are particularly beneficial to health due their roles in preventing diseases (Hark and Deen, 2007).

Table 3 reveals the presence of minerals in all the three dishes. Potassium is known to help maintain fluid volume inside and outside cells and help control blood pressure, (Hark and Deen, 2007), this makes it valuable for people with heart problems.

The Table 3 reveals the mineral elements contained in the three traditional dishes. The three dishes revealed appreciable amounts of k (2.5066-2.5846ppm) and Fe (0.238-

1.28ppm), but with only trace amounts of Ca (0.098-0.3644ppm), Mg (0.0104-0.0463ppm) and Cr (0.0045 – 0.0261). These minerals are generally essential for maintaining body metabolism and health. The amount of potassium present in the dishes makes them especially good for people with heart problems. Potassium is essential for the normal functioning of muscles, nerve cells, the heart and heart valves, the kidneys and adrenal glands and

also helps to lower and control blood pressure (Hark and Deen, 2007). Although the dishes prepared in this study differed from those prepared by Ghosh-jerath et al (2016), they share similar ingredients, thus, the findings of this study supports the study by Ghosh-jerath, et al (2016), who documented the presence of similar nutrients such as iron, zinc, calcium and chromium though in higher quantities than those of this study.

**Table 3: Mineral Elements composition (PPM) Edible Portion of three Traditional Dishes**

Sample	Fe	Zn	Ca	K	Mg	Cr
SWGD	1.027	0.0002	0.121	2.5846	0.0463	0.0046
HRPF	1.28	-0.0001	0.3644	2.5066	0.0121	0.0261
SWDA	0.238	-0.011	0.098	2.5294	0.0104	0.0216

Key:

**SWGD:** Steamed Wheat Grit (Dashishi)

**HRPF:** Hungry Rice Porridge (Faten acha)

**SWDA:** Steamed Wheat Dough (Alkubus and taushe)

**ppm:** Parts per million

**Table 4: Mean Rating of Sensory Evaluation and General Acceptability of the Three Traditional Dishes**

	*Appearance	*taste	*flavor	*texture	General acceptability
SWGD	7.04 ± 0.79	7.05 ± 0.83	7.07 ± 1.00	6.98 ± 0.08	7.36 <sup>a</sup>
HRPF	6.71 ± 1.00	6.91 ± 1.10	6.91 ± 0.99	6.89 ± 1.14	7.07 <sup>a</sup>
SWDA	7.11 ± 0.09	6.62 ± 1.06	6.91 ± 1.10	6.64 ± 1.14	7.07 <sup>a</sup>

Key:

**SWGD:** Steamed Wheat Grits (Dashishi)

**HRPF:** Hungry Rice Porridge (fatenacha)

**SWDA:** Steamed Wheat Dough (alkubus and taushe)

\* =mean ± SD of 55 panelist

± =means standard deviation of triplicate sample p=0.229

a =all values with same letter are not significantly different

Table 4 presents the mean rating of sensory evaluation and general acceptability of the three traditional dishes. For appearance, HRPF had the highest mean value of 7.11± 0.90 while SWGD recorded the highest mean value for taste, flavor, texture, and general acceptability of 7.05± 0.83, 7.07 ±1.00, 6.98 ± 0.85 and 7.36 respectively. The result of sensory attributes of HRPF and SWDA on taste, flavor, texture and general acceptability are lower than that of SWGD. All dishes were equally acceptable

as indicated by Tukkey’s test of significant difference p=0.229.

### CONCLUSIONS

As revealed by the results, the three traditional dishes of Northern Nigeria evaluated were generally accepted by respondents and serve as good sources of food nutrients. The high vitamin content especially vitamin E and the B complex make these dishes an attraction for improving nutrient quality of family meals.

Thus, sensitizing communities about their nutritive value will promote continued utilization among families and contribute to addressing food security challenges for general health.

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**APPENDIX 1**

**Three dishes from Northern Nigeria**



Plate 1: SWGD: Steamed wheat grit (*Dashishi*)



Plate 2: HRPF: Hungry rice porridge (*Fatenacha*)



Plate 3: WDA: Steamed wheat dough (*Alkubus* and *taushe*)