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Research Article

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Quality Evaluation of Weaning Foods Formulated from Some Local Cereals and Legume Blends

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ABSTRACT

Weaning foods were formulated using locally available cereals such as maize (Zeamays), millet (Pennisetum glaucum), sorghum (Sorghum bicolor), wheat (Triticum aestivum) and Legumes such as African yam bean (Sphenostylis stenocarpa), Bambara groundnut (Vigna subterranean), Pigeon Pea (Cajanus cajan) and Soybean (Glycine max). Twenty composite blends were formulated in different ratios (cereal:legume) ; 60:30:10, 70:20:10, 50:40:10, 40:50:10 in that order. The legumes were boiled for 45mins while the cereals were steeped in the water for 24hrs. The chemical analysis were carried out on their nutrient values and compared with those of commercial formula (Cerelac and Nutrend). The proximate composition, vitamins, minerals and sensory evaluation of the blends were evaluated. The results of ten selected three-blend weaning food formulations showed that the protein was highest in So50%: Bb40%: Sg10% with mean value of 21.71%. The carbohydrate ranged from 58.09% to 69.84%, fat 3.76% to 7.95%. The blend with highest energy was Pp70%:Ay20%:Ma10% with the mean value of 404.37KJ. Some of the weaning food formulations were high in protein, carbohydrate, energy, calcium, phosphorus, sodium, zinc, vitamin C and E but low in Iron, Potassium, Vitamins A, and B-vitamins. In spite of these shortcomings, most of the formulated weaning foods were nutritionally sound since they could provide reasonable percentage of the recommended daily allowance for protein, carbohydrate, energy, and some micro/macronutrient. The results of antinutritional levels showed that the tannin, trypsin inhibitor , saponin, phytate, alkaloid and HCN were significantly different at $p<0.05$ when compared with the commercial products (Cerelac and Nutrend). Equally, the results of sensory evaluation of weaning food formulations rated more than average for all sensory attributes. The results indicated that the overall tested weaning foods could be used to substitute the more expensive commercial products (Cerelac and Nutrend).

Key words: *Weaning foods, local cereals/ legumes, quality evaluation.*

INTRODUCTION

Cereals are grasses (members of the monocot, family *poaceae*) composed of the endosperm, germ and bran. They are rich in complex carbohydrate that provides energy. The cereal grains consist of wheat, corn, rice, grain sorghum, barley, oat, rye and millet[2]. Most of the cereals have abundant fibre especially barley, oat and wheat. Cereals also have soluble bran that aids in lowering blood cholesterol levels.

On the other hand legume is a plant in the family *Fabaceae* or a fruit of these plants. Legume seeds have the highest concentration of crude protein. They are good sources of B-group of vitamins but low in vitamin A[5].

Weaning is` the stage when an infant moves from a diet consisting exclusively of breast milk to one which resembles that of adult in the community. It is a process of introducing semi-solid food into the infant diet[6]. The American Academy of Pediatrics and the World Health Organisation recommended waiting until 6 months to introduce baby food.

The primary aim of this research is to formulate weaning foods using locally available and cheap raw materials based on cereals like maize, millet, sorghum, wheat and legumes like African yam bean, Bambara groundnut, Pigeon pea and Soybean.

MATERIALS AND METHOD

SOURCE OF MATERIALS

Healthy cereal grains (yellow maize, millet, red sorghum, wheat) and legumes (brown spotted African yam bean, Bambara groundnut, Pigeon pea and Soybean) were purchased from retailers at Ngwa road market (new market) Aba, Abia state. Two brands of commercial weaning foods Nutrend and Cerelac were purchased from the same market in Aba.

SAMPLE PREPARATION

The grains were hand picked to have uniform and non insect infested grains. The dirt, stones and foreign materials were also removed from the grains.

THE PREPARATION PROCESS FOR CEREAL GRAINS

The cereals (maize, millet, sorghum and wheat) were thoroughly washed and soaked for 24 hours in water separately. They were sun dried for 5 days and further oven dried at 60^{o}c for 1 hour. The cereals were milled and sieved to get flours of fine texture. The flours were separately packaged in a moisture free container and stored until use.

THE PREPARATION PROCESS FOR LEGUME GRAINS

The legumes (Africa yam bean, Bambara groundnut, Pigeon pea, and Soybean) were thoroughly washed with clean and boiled with water for 45 minutes. The seeds were sun dried and dehulled and further oven dried for 1 hour at 60^{o}c.The legumes were milled and sieved to get flour of fine texture. The flour were separately packaged in a moisture free container and stored until use.

FLOUR BLENDING

Composite blends comprising the steeped cereal flours and boiled dehulled legume flours were blended in the following ratios: 60:30:10, 70:20:10, 60:30:10, 50:40:10 in that order. Twenty composite blends were formulated.

Formulated Weaning Food Blends and their Codes

S/No	CODE	BLENDS	RATIO (W/W %)
1.	Pp Bb Mi	Pigeon Pea: Bambara: Millet	70:20:10
2.	Ay So Sg	AYB: Soybean: Sorghum	60:30:10
3.	Pp Ay Sg	Pigeon Pea: AYB: Sorghum	50:40:10
4.	So Bb Wh	Soybean: Bambara; Wheat	70:20:10
5	Wh Mi Pp	Wheat: millet: pigeon pea	60:30:10
6	Sg Mi So	Sorghum: Millet:Soybean	60:30:10
7.	Pp Bb Wh	Pigeon Pea: Bambara: Wheat	60:30:10
8.	Pp Bb Ma	Pigeon Pea: Bambara: Maize	80:10:10
9.	Wh Sg Ay	Wheat: Sorghum: AYB	70:20:10
10.	Ay So Mi	AYB: Soybean: Millet	60:20:20
11.	Ay So Ma	AYB: Soybean: Maize	70:10:20
12.	Pp Bb Ma	Pigeon Pea: Bambara: Maize	50:40:10
13.	Pp Ay Ma	Pigeon Pea: AYB: Maize	70:20:10
14.	So Bb Sg	Soybean: Bambara: Sorghum	50:40:10
15.	Pp Ay Wh	Pigeon Pea: AYB: Wheat	60:30:10
16.	So Bb Ma	Soybean: Bambara: Maize	70:20:10
17.	So Bb Mi	Soybean: Bambara: Millet	60:30:10
18.	Sg Mi Wh	Sorghum: Millet: Wheat	40:50:10
19.	Pp Bb Sg	Pigeon Pea: Bambara: Wheat	50:40:10
20.	Pp Ay Mi	Pigeon Pea: AYB: Millet	80:10:10

CHEMICAL ANALYSIS

PROXIMATE ANALYSIS

The proximate composition of food is a compilation of data of the level of moisture, ash, crude protein, crude fat, crude fibre, and carbohydrate. The proximate composition of the boiled legume flours and

steeped cereal flour blends and two commercial weaning foods were determined using the standard procedures of Association of Official Analytical Chemists[1].

Calorific value determination[11]. This was determined by calculation method.

Calorific value = 4 X %CHO + 4 X %protein + 9 X %fat.

MINERAL ANALYSIS

Iron and zinc were determined by atomic absorption spectrophotometer, potassium and sodium were determined by flame photometry and calcium by EDTA complexometric titration.

VITAMIN ANALYSIS

Vitamins were determined by the method of the association of vitamin chemists as described by Pearson[12]. Vitamins A, B Vitamins and E were determined by UV/Visible spectrophotometer at different absorbances and vitamin C was determined by titration.

DETERMINATION OF ANTINUTRIENTS

The methods of Harbone[4] were used to determine the presence of alkaloid, saponin, tannin, phytic acid, HCN and trypsin inhibitor in the weaning food formulations.

SENSORY EVALUATION

A Sensory evaluation was carried out to access the colour, taste, flavor and general acceptability of all the three-blend weaning food formulations. The panelists were made up of twenty students of Santana Rhetoric International Schools, Aba. The results obtained were analysed to determine the ranking of the products. Each attribute of interest was scored on a nine (9) point hedonic scale as stated by Ihenkoronye and Ngoddy[5].

STASTICAL ANALYSIS

Data obtained was subjected to analysis of variance (ANOVA) using SPSS statistical package version (17.0). A difference was considered to be significant at $p< 0.05$ (steel and Torrie, 1980)

RESULTS AND DISCUSSION

The result in Table1 showed the proximate composition of ten selected three-blend weaning food formulations. The moisture content was highest in Pp 70: Ay 20: Ma10 with the mean value of 5.71 %. The moisture content of the whole blends was high compared with the commercial products (2.5% for Cerelac and Nutrend)). The high moisture content would affect the storage quality of the weaning foods.

Ash content of the various blends in Table 1 ranged from 2.73% to 3.68%. They compared well with that of Cerelac (3.0%) and Nutrend (2.3 %). The fat content of the same Table 1 ranged from 4.31 % to 7.95 %. They were not comparable with the commercial formulae Cerelac (10%) and Nutrend (9.0%). FAO/WHO[13] suggests that vegetable oils should be included in the food meant for infant and children[7]. The fibre content of Wh 70:So20: Ay 10 with the mean value of (3.4 %) and Ay70:So10: Ma20 (3.35%) compared favourably well with the Nutrend (3.4 %).

The various three-blend weaning food formulations were high in crude protein. The mean value ranged from 16.76% to 21.71%. The protein content was higher when compared with 15% for Cerelac and Nutrend. Thus, the various blends could provide adequate nutrition as such would not predispose the test child to protein-energy malnutrition if the blends are solely used to wean a child.

The carbohydrate content in the same Table 1 ranged from 58.09% to 69.84 %. The formulations have high carbohydrate content and they were comparable with the commercial weaning foods except Pp 70: Ay 20: Ma 10 with the mean value of 58.09%. The high carbohydrate content imparts the weaning food blends with a property of high calorific value, ideal for such foods since babies require energy for the numerous metabolic processes in the body resulting in rapid development and growth. A detailed look at the Table 1 showed that Sg 40: Mi: 50 : wh10 had the highest value of 69.84 %, so to formulate a weaning foods with carbohydrate as a reference this three-blend should be adopted.

The same Table 1 showed that the mean energy value of So70: Bb20:Wh10 (40 1.37k cal) and Pp70:Ay20:Ma10 with the mean value of (404.3kcal) were comparable with that of Nutrend (398 kcal). The energy content of the various three-blend formulations fall

within the recommended daily dietary allowance (RDA) for infants. The high energy requirement for the infant is due to the fact that growth is rapid at this stage (Onimawo, 2001).

Table 2 showed the Vitamin content of the various selected three-blend formulations.

The Vitamins were lower than commercial products except vitamin C content which was higher than Cerelac and Nutrend. Vitamin C helps to fight common colds, assists wound healing and prevents infection. Vitamin E contents of Pp70%: Ay20%:Ma10% and S050%: Bb40%:Sg10% were higher than the other formulations with the mean value of (6.43IU/100g) and (6.49IU/100g).

The results in Table 3 showed that the macronutrients were comparable with the commercial products except for potassium. The iron content of So70%:Bb20%:Wh10% (7.3mg/100g) and So50%:Bb40%:Sg10% (7.18mg/100g) was comparable with Cerelac (7.50mg/100g). Iron is important for young babies because breast milk does not contain enough quantities of Iron. Iron is needed as a component of haemoglobin found in the red blood cells. Onimawo[10] the zinc content was not comparable with Cerelac and Nutrend but compared with the recommended daily dietary allowance for infants.

The results of the antinutritional composition of the selected three-blend weaning food formulations and two commercial weaning foods (Nestle Cerelac and Nutrend) are shown in Table 4. The result showed that the tannin content ranged from 0.32-1.12%. The tannin content of all the weaning foods was lower than Ay60%:So30%:Sg10% with average mean of 1.12%. There was a significant difference when compared with the commercial products. ($P<0.05$)

The values of trypsin inhibitor in Tables 3.5 ranged from 2.58-7.28Tu/g.

Equally, the same Table 4 showed that the saponin content ranged from 0.27-1.26% with Nutrend and Cerelac showed lower contents of 0.10% and 0.20%. There was a significant difference between the weaning food formulations and commercial products ($P<0.05$).

The phytate content ranged from 0.32 to 1.20%.The phytate content of the weaning food formulations was higher and significantly difference at ($P<0.05$) when compared with the Cerelac and Nutrend. Soaking, Sprouting, fermenting and slow cooking all help to reduce the phytate levels found in the whole grains, legumes and Seeds. Those methods will not completely remove phytates but will keep the levels down. Keeping some phytates in the diet has some benefits. Phytates also attract and bind to unbeneficial compounds like heavy metals in the digestive tract; therefore it makes sense to leave some phytates in the diet[8].

Alkaloid content of the weaning food formulations ranged from 0.43-1.45%. The weaning food formulation with the least alkaloid content was Sg40%:Mi50%:Wh10% with the mean value of 0.43%. The alkaloid content of the weaning food formulations was significantly higher than the commercial products, Cerelac and Nutrend at ($P<0.05$).

Hydrocyanide content ranged from 0.26-2.34mg/kg Cerelac and Nutrend showed no hydrocyanide activity. However, Cyanide content of some of the weaning food formulations was generally low and fell within the standard recommendation by Codex alimentarius commission of FAO/WHO, 2004.

Table 5 showed the results of the sensory evaluation of the selected three-blend weaning food formulations. The results showed that more than half of selected three -blend weaning food formulations were highly acceptable and could compete favourably well with the high priced commercial weaning foods.

Table 1: Proximate Composition of the Selected Three-blend Weaning Food Formulations and Commercial Weaning Foods

Various blends	Moisture Content (%) Mean+ SD	Ash(%) mean ±SD	Crude Fat (%) mean ±SD	Crude fibre (%) mean±SD	Dry matter(%)mean±SD	Crude Protein(%) mean ±SD	CHO(%) Mean ±SD	Energy (Kcal) Mean ± SD
Ay60%:So30%:	4.34	2.725*	6.925	3.57	95.66	19.035*	65.96*	383.18
Sg10%	±0.21	±0.06	±0.21	±0.02	±0.11	±0.01	±0.13	±0.01
So70%:Bb20%:	4.31	3.45*	7.825	2.87	95.66	19.69*	65.96*	401.37
Wh10%	±0.00	±0.03	±0.11	±0.01	±0.23	±0.01	±0.11	±0.00
Wh60%:Mi30%:	4.84	2.875*	3.76	3.07	95.16	18.07*	64.36	378.36
Pp10%	±0.12	±0.06	±0.13	±0.03	±0.18	±0.02	±0.24	±0.23
Wh70%:So20%:	3.41	3.365*	5.335	3.4	96.70	18.175*	67.30*	385.15
Ay10%	±0.11	±0.02	±0.18	±0.02	±0.25	±0.01	±0.15	±0.11

Ay70%:So10%:	3.52	3.39*	4.37	3.35	96.48	18.6*	66.29	378.7
Ma20%	±0.18	±0.01	±0.17	±0.01	±0.21	±0.12	±0.10	±0.14
Pp50%:Bb40%:	3.78	3.435*	5.56	3.07	96.22	17.71*	66.28*	382.89
Ma10%	±0.19	±0.00	±0.13	±0.11	±0.01	±0.13	±0.12	±0.12
Pp80%:Ay10%:	3.27	3.45*	7.385	2.865	96.73	17.625*	63.67	389.23
Mi10%	±0.21	±0.02	±0.22	±0.22	±0.02	±0.12	±0.11	±0.13
Pp70%:Ay20%:	5.71	3.61*	7.95	2.8865	94.29	20.09*	58.09	404.37
Ma10%	±0.01	±0.03	±0.11	±0.14	±0.03	±0.11	±0.13	±0.44
So50%:Bb40%:	4.30	3.68*	6.34	2.88	95.70	21.71*	68.22*	383.2
Sg10%	±0.02	±0.11	±0.19	± 0.23	±0.04	±0.01	±0.02	±0.02
Sg40%:Mi50%:	3.13	2.81	4.31	3.07	96.87	16.76*	69.84*	385.17
Wh10%	±0.03	±0.12	±0.14	±0.11	±0.01	±0.03	±0.04	±0.45
Cerelac	2.5	3.0	10	4.3	97.50	15	65.00	410
	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Nutrend	2.5	2.3	9	3.4	97.50	15	64.20	398
	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

*mean above recommended standard (P<0.05)

LSD (least significant difference) a statistical tool of SPSS was used to test for the statistical difference between the standards and test sample

Table 2: Various Vitamin levels of the selected three-blend weaning food formulations and commercial weaning foods

S/N	Various Blends	Vitamin A (IU/100g)	Vitamin C (IU/100g)	Vit E (IU/100g)	Vit B1 (mg/100g)	Vit B2 (mg/100g)	Vit B3 (mg/100g)
1	Ay60%:So30%:Sg10%	237.2±0.02	79.20±0.00	4.41±0.00	0.15±0.01	0.08±0.02	1.08±0.00
2	So70%:Bb20%:Wh10%	194±0.00	71.40±0.00	6.25±0.02	0.40±0.01	0.22±0.01	1.24±0.00
3	Wh60%:Mi30%:Pp10%	249.6±0.00	109.00±0.03	4.93±0.01	0.15±0.00	0.165±0.00	0.98±0.1
4	Wh70%:So20%:Ay10%	234±0.00	96.00±0.01	4.41±0.00	0.17±0.00	0.11±0.00	0.84±0.10
5	Ay70%:So10%:Ma20%	206.8±0.02	74.40±0.00	4.57±0.01	0.17±0.01	0.13±0.02	1.155±0.02
6	Pp50%:Bb40%:Ma10%	194±0.00	73.80±0.00	4.92±0.00	0.18±0.02	0.15±0.03	1.22±0.01
7	Pp80%:Ay10%:Mi10%	208±0.00	73.00±0.01	4.41±0.00	0.14±0.02	0.08±0.02	1.06±0.01
8	Pp70%:Ay20%:Ma10%	290.8±0.04	71.40±0.02	6.43±0.01	0.19±0.01	0.14±0.02	1.08±0.03
9	So50%:Bb40%:Sg10%	193.2±0.00	64.40±0.03	6.49±0.01	0.23±0.00	0.13±0.02	1.128±0.01
10	Sg40%:Mi50%:Wh10%	172±0.00	116.40±0.00	4.74±0.01	0.29±0.01	0.05±0.02	1.075±0.02
11	Cerelac	1300±0.00	50±0.00	6.7±0.00	0.6±0.00	0.75±0.00	3.0±0.00
12	Nutrend	1500±0.00	50±0.00	6.8±0.00	0.8±0.00	0.75±0.00	4.00±0.00

*mean above recommended standard

LSD (least significant difference) a statistical tool of SPSS was used to test for the statistical difference between the standards and test sample

Table 3: Mineral content of the selected three-blend weaning food formulations and commercial weaning foods

S/N	Various Blends	Calcium (mg/100g)	Zinc (mg/100g)	Phosphorus (mg/100g)	Iron (mg/100g)	Sodium (mg/100g)	Potassium (mg/100g)
1	Ay60%:So30%:Sg10%	61.45±0.01	4.72±0.02	218.5±0.03	5.61±0.00	174.81*±0.02	134.28±0.01
2	So70%:Bb20%:Wh10%	72.79±0.01	5.12±0.01	348.42±0.01	7.13±0.01	183.525±0.00	140.76±0.02
3	Wh60%:Mi30%:Pp10%	42.19±0.03	3.61±0.02	318.525±0.03	5.525±0.02	163.41±0.01	132.435±0.03
4	Wh70%:So20%:Ay10%	42.719±0.01	4.61±0.03	316.81±0.02	6.865±0.01	167.625*±0.02	135.41±0.01
5	Ay70%:So10%:Ma20%	56.75±0.02	4.72±0.01	320.525±0.01	5.79±0.01	175.425±0.03	134.81±0.02
6	Pp50%:Bb40%:Ma10%	62.81*±0.02	4.25±0.00	314.29±0.02	5.26±0.01	174.62*±0.03	134.29±0.01
7	Pp80%:Ay10%:Mi10%	140.76*±0.01	4.91±0.02	319.3±0.03	5.755±0.02	180.31*±0.00	135.61±0.02
8	Pp70%:Ay20%:Ma10%	58.76±0.03	4.58±0.01	235.17±0.02	5.28±0.01	172.34*±0.00	130.835±0.01
9	So50%:Bb40%:Sg10%	60.835±0.02	5.17±0.02	218.50±0.02	7.18±0.02	184.61*±0.00	142.61±0.02
10	Sg40%:Mi50%:Wh10%	73.51±0.02	3.81±0.02	285.285±0.03	3.84±0.02	176.3*±0.00	127.525±0.03
11	Cerelac	49.61±0.00	6.00	400.00	7.50	145±0.00	635±0.00
12	Nutrend	32.50	6±0.00	260±0.00	10±0.00	210±0.00	570±0.00

*mean above recommended standard (P<0.05)

LSD (least significant difference) a statistical tool of SPSS was used to test for the statistical difference between the standards and test sample

Table 4: Anti-nutritional Composition of Selected Three- blend Weaning Food Formulations and Commercial Products

S/N	Various blends	Tannin(%)	Trypsin(Tu/g)	Saponin(%)	Phytate (%)	Alkaloid(%)	HCN(mg/kg)
1	Ay60%:So30%:Sg10%	1.12±0.01	7.28±0.00	1.26±0.01	1.19±0.00	1.45±0.04	2.34±0.00
2	So70%:Bb20%wh10%	0.82±0.01	5.60±0.00	0.76±0.01	0.85±0.00	1.20±0.00	1.32±0.00
3	Wh605:Mi30:Pp10%	0.93±0.00	2.74±0.02	0.30±0.01	0.36±0.00	0.56±0.00	0.32±0.01
4	Wh70%:So20%:Ay10%	0.49±0.00	2.86±0.05	0.31±0.00	0.36±0.02	0.59±0.01	0.36±0.00
5	Ay70%So10%Ma20%	1.06±0.03	7.16±0.00	1.19±0.00	1.17±0.04	1.45±0.01	2.28±0.04
6	Pp50%:Bb40%Ma10%	1.02±0.02	5.80±0.01	1.09±0.00	1.06±0.01	1.28±0.00	1.94±0.02
7	Pp80%:Ay10%Mi10%	1.05±0.00	6.24±0.00	1.12±0.02	1.20±0.01	1.38±0.00	2.25±0.02
8	Pp70%:Ay20%Ma%	0.86±0.01	5.70±0.00	1.02±0.02	0.90±0.00	1.12±0.00	1.28±0.00
9	So%:Bb40%Sg10%	0.94±0.00	5.62±0.00	1.05±0.03	0.92±0.00	1.16±0.00	1.43±0.00
10	Sg40%:Mi50%:Wh10%	0.32±0.01	2.58±0.00	2.70±0.01	0.32±0.01	0.43±0.03	2.26±0.01
11	Cerealc	0.40±0.00	0.00±0.00	0.10±0.00	0.00±0.00	0.10±0.00	0.00±0.00
12	Nutrend	0.00±0.00	0.00±0.00	0.30±0.00	0.00±0.00	0.10±0.00	0.00±0.00

LSD (least significant difference) a statistical tool of SPSS was used to test for the statistical difference between the standards and test sample

Table 5: Summary Table of sensory evaluation of the selected three-blend weaning food formulations

S/NO	Various blends	COLOUR (MEAN±SD)	TASTE (MEAN±SD)	FLAVOUR (MEAN±SD)	GENERAL ACCEPTABILITY (MEAN±SD)
1	Ay60%:So30%:Sg10%	6±0.33	6±0.19	7±0.12	6±0.11
2	So70%:Bb20%:Wh10%	8±0.34	8±0.12	8±0.10	8±0.11
3	Wh60%:Mi30%:Pp10%	7±0.30	6±0.13	5±0.19	6±0.12
4	Wh70%:So20%:Ay10%	7±0.39	8±0.16	4±0.14	7±0.12
5	Ay70%:So10%:Ma20%	8±0.32	5±0.15	7±0.13	7±0.13
6	Pp50%:Bb40%:Ma10%	7±0.30	5±0.14	6±0.12	8±0.11
7	Pp80%:Ay10%:Mi10%	5±0.35	6±0.13	6±0.18	6±0.10
8	Pp70%:Ay20%:Ma10%	7±0.33	7±0.10	5±0.10	8±0.11
9	So50%:Bb40%:Sg10%	8±0.35	8±0.12	8±0.11	8±0.11
10	Sg40%:Mi50%:Wh10%	5±0.32	7±0.19	4±0.12	5±0.10

LSD (least significant difference) a statistical tool of SPSS was used to test for the statistical difference between the standards and test sample

CONCULSION AND RECOMMENDATION

The study revealed that some of the weaning food formulations were rich in protein, carbohydrate, energy, fat, iron, calcium, zinc, phosphorus, sodium, vitamin C and vitamin E. Even though they were low in potassium, B-vitamins and vitamin A, they are good formulae for infant weaning foods. Understandably, the higher mineral/vitamin contents of Cerelac and Nutrend could be attributed to fortification practices normally carried out on such products.

Equally, from the results it became clear that the local formulations compared favourably well with the commercial products like Cerelac and Nutrend as well as recommended daily dietary allowance for infants[9].

The process of cooking used in the pre- formulation was beneficial since heat treatment reduces or eliminates some antinutritional factors present in legumes. From the results it has been concluded that weaning foods formulated with some local cereals and legumes could be used to substitute the more expensive proprietary products (Cerelac and Nutrend). Frequent feeding on these foods is also recommended to increase daily intake of these nutrients.

From the discussions of the results, it is obvious that food commodities which are intended to be used in the preparation of dry weaning foods should be properly dried and then only small quantities are prepared at a time to avoid prolonged storage.

It is suggested that more efforts must be directed toward increasing the concentration of vitamins and minerals in the locally made weaning foods through supplementation or fortification with food rich in vitamins and minerals like crayfish, shrimp, plantain, carrot etc.

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