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Proximate Composition and Storage Stability of Weaning Diet produced from Cereals fortified with Melon

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ABSTRACT

The assessment of millet and sorghum fortified with Melon in the formulation of weaning diet was investigated. Dehulled and whole grains were used for the study, and were compounded in the ratio 50:50; 70:30; 80:20; and 90:10 (Cereal grain: melon) respectively. The proximate composition analysis of the diets indicated an appreciable increase in the crude protein 15.96-27.75% which compared favourably with established commercial weaning diets. On set of rancid flavor and colour changes were observed after five days for formulations stored at room temperature, while there were no undesirable changes in the samples refrigerated, even after four weeks.

Key words: weaning diets, cereals, melon, proximate composition, storage ability.

INTRODUCTION

Weaning period is described as the period of transition from an exclusively milk diet to the complete range of foods taken by the adult section of the community. Weaning is derived from the word 'trying' i.e the baby is trying out foods of different tastes and textures. Weaning is an important stage in baby's life because it is a developmental, emotional, physiological and behavioural event. This period, which usually starts from four to six months of age, varies from one socioeconomic status to the other. In preparation for eating solid foods, one food should be offered at a time. This will allow the mother to ascertain whether or not the baby reacts against it. The wide spread problem of infant malnutrition in the developing world has stimulated efforts in research, development and extension by local and international organization (Guiro *et al*, 1987). As a result of emphasis on the provision of adequate nutrition for infants and young children through supplemental feeding, there is a vast array of baby

foods which are either in powdered or semi-solid forms (Ekpeyong, 1972; Somogyi, 1973 and Mc Williams, 1980). The use of canned baby food ranks high among nursing mothers in developed countries because of its conveniences. In Nigeria however, it is restricted to a low percentage of nursing

Mothers because of the poor economic status as most of these canned baby foods are very expensive and unaffordable by most mothers especially those in the rural areas. Traditional weaning foods in West African are known to be of low nutritive value because they are characterized by low protein energy and high bulk (Guiro *et al*, 1987 and Akinrele and Bashir, 1987).

In Nigeria, the usual first weaning food is called pap, akamu, Ogi, or Koko and is made from cereals like maize (*Zea mays*), millet (*Pennisetum americanum*), or guinea corn (*sorghum spp*) which has lower nutritional value than animal based weaning foods (Clerian, 1981; Oshusor, 1980; Naismith, 1973). Legumes are rarely used for weaning and are induced much later (after six months of age) because of indigestibility, flatulence and diarrhea associated with their consumption

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(Uwaeoghute and Ananyelugo, 1987). Cereal - legume combination have been researched extensively as a better source of nutrients (Fashakin and Ogunshola, 1982) several combinations have been formulated by various researchers (Akurele and Edward, 1971; Fashakin and Ogunshola, 1982) by combining cereals and legumes in different proportions. Except for two amino acids, (lysine and tryptophan), most cereals contain the essential amino acids required by man as well as vitamin and minerals (Ihekoronye and Ngoddy, 1985). A large variety of oil seeds and pulses including cowpea and melon seeds grow well in Nigeria, forming part of the traditional diet of the people. Melon contains a high quantity and quality protein 31-40% (Oyenuga, 1968) that can supplement the essential amino acids in the formulation of weaning diets. As a child continues to grow, more calcium and nutrients are needed. More importantly the child needs more of the B-complex vitamins and minerals like calcium, phosphorus and iron. A proper weaning diet must include these essential nutrients and others to satisfy the child's requirement for growth. Although, mother's breast milk is best for babies, it will not supply enough nutrients for growth, and as babies grow older, solid food has to be introduced into their diet in order to supply them the required energy and protein. This study therefore aimed at formulating weaning diets using local cereal grains (Sorghum and millet) and melon that will meet the need of the growing children.

MATERIALS AND METHODS

Sorghum and millet grains, and melon were purchased at Ipata market in Ilorin, Kwara state, Nigeria. Preparation of sample: The sorghum, millet and melon grains were sorted of dirt, stones and other unwanted materials by hand picking and

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winnowing. Each sample was weighed and sundried for 24 hours, reweighed and stored separately. The sorghum and millet were subjected to two operations- one portion was dehulled before dry milling and other portion was milled whole. The two types were milled into smooth and coarse textures and subsequently kept in air tight containers and refrigerated until needed.

The melon was roasted, milled and kept in air tight containers inside the refrigerator.

Diet Formulation and Preparation

The sorghum-melon and millet- melon combinations were made into 8 samples by combining them as shown in Table 1 and 2 respectively.

The formulated diets were prepared using a recipe procedure described as follows

1. Boil a small quantity of water
2. Make a paste of the dried sample with water in a boil
3. Pour the paste inside the boiling water and stir
4. Allow to cook on slow heat for 15 minutes before pouring inside a boil
5. Add salt sugar and flowering (optional)
6. Pour a little quantity of water to prevent drying of the surface

Proximate Composition Determination

Proximate analysis of the various sample were done. The moisture, protein, fat, and ash were analyzed using standard procedure, AOAC, (2006). Carbohydrate was determined by difference and energy by calculation.

Storage Stability

The physical characteristics of the samples were observed when stored at room temperature and inside the refrigerator in air tight containers.

Table 1: Sorghum-Melon combination blend

SAMPLE	COMBINATION	SORGHUM	MELON %
1	Whole	80	20coarse
2	Whole	90	10coarse
3	Whole	80	20smooth
4	Whole	90	10smooth
5	Dehulled	80	20coarse
6	Dehulled	90	10coarse
7	Dehulled	80	20smooth
8	Dehulled	90	10 smooth

Table 2: Sorghum-Melon combination blend

SAMPLE	COMBINATION	SORGHUM	MELON %
1	Whole	50	50course
2	Whole	70	30course
3	Whole	50	50smooth
4	Whole	70	30smooth
5	Dehulled	50	50course
6	Dehulled	70	30course
7	Dehulled	50	50smooth
8	Dehulled	70	30 smooth

RESULT AND DISCUSSION

Tables 3 and 4 presented the data obtained for the proximate composition of the various combinations of the sorghum- melon and millet-melon formulations respectively. The protein content of the formulated diets ranged from 15.96 to 27.75%, which is considerably higher than that of most available weaning diets e.g. Cerelac contains 16.4% protein. According to the recommendations of the protein advisory group (PAG) guidelines for weaning foods, protein content should be at least 20% (on a dry basis), fat up to 10%, moisture 5-10% and total ash not more than 5% (PAG, 1971). The results indicated that the formulated diets fall within acceptable ranges of the recommendation given.

The high protein content of the diet blend agrees with similar work that has been done (Placher and Hyle, 1991, Takyi *et al.*, 1985), and could be attributed to the melon present as melon is known to be a very rich source of protein and lipid (Oloyede *et al.*, 2004; Nnamyelego, *et al.*, 1990), as well as the dry milling which has been reported to improve nutrient value conservation, as wet milling will cause nutrients to be lost in water (Nnanyelugo *et al.*, 1990). As the proportion

of melon increased, so the protein content increased. Protein content was also higher in the dehulled cereal combination which is an indication that the protein in the seed coat was conserved.

The low ash content in some of the combinations may call for fortification with minerals before their use as weaning diets. The incorporation of melon into the formulations may account for the high fat content and could be a contributing factor in the rancidity (deteriorative) of the diet. Therefore, the melon may be defatted before incorporation into the diet (Oloyede *et al.*, 2004).

The carbohydrate levels also falls within the acceptable range and will supply sufficient energy for the young child.

Onset of rancid flavor and colour changes started after five days at room temperature for combination that contains 50% melon and eight days for those with lower melon 10% combination. However, there were no physical undesirable changes in all the samples that were refrigerated even after four weeks.

Sensory evaluation of the diets by some nursing mothers indicated high acceptability especially the smooth texture combination.

Table 3: Proximate composition of sorghum melon combination

Nutrient %	80% sorghum melon whole	20% 50:20:10 dehulled	90:10 whole	90:10 dehulled
Moisture	5.00+0.02	5.48+0.01	6.25+0.02	6.98+0.03
Protein	20.34+0.01	17.80+0.01	18.60+0.03	15.96+0.01
Ash	2.00+0.01	1.82+0.03	1.75+0.02	1.52+0.02
Fat	11.05+0.02	10.25+0.02	9.28+0.02	9.09+0.01
Carbohydrate	61.61+1.21	64.65+1.33	63.58+1.08	66.45+1.16
Energy	427.25+2.74	422.05+2.63	417.10+2.14	411.45+2.08

Table 4: Proximate composition of millet- melon combination

Nutrient %	50:50 w	50:50 d	70:30 w	70:30 d
Moisture	7.00+0.04	7.92+0.08	8.20+0.02	9.10+0.01
Protein	27.75+0.02	24.35+0.01	21.00+0.01	19.95+0.01
Ash	5.00+0.01	3.90+0.01	4.00+0.02	2.00+0.03
Fat	15.30+0.01	14.63+0.02	14.50+0.01	12.25+0.01
Carbohydrate	59.95+0.98	69.20+1.67	52.30+1.06	56.70+1.17
Energy	488.50+2.67	505.87+2.98	423.70+2.13	416.85+2.09

Results are means of three determinations each

W- whole method

D - dehulled

CONCLUSION

Melon can effectively be used in traditional cereal- based weaning foods as an acceptable protein supplement. The formulations developed through this study successfully produced a high protein- energy weaning food with acceptable sensory characteristics as well as excellent nutritional quality.

The results of this study demonstrated the beneficial effects of adding melon to cereal foods. This technique can easily be adopted at both household and village levels to produce high protein-energy weaning food to help enhance the nutritional status of growing children.

It is essential to state that the formulated diet should be prepared under low heat to allow the mixture to cook thoroughly. The quantity of water should also be controlled and should be in the proportion of 1:4 w/v to make a good blend. However as the baby grows bigger the proportion of water can be reduced or the weight of formulation increased in order to ensure that the baby consume enough to satisfy the protein and energy needs. Further studies on the shelf life, standardization, physicochemical properties of these samples are recommended.

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