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Comparison of sensory evaluation and storage properties of weaning food formulated by locally available raw materials with commercial cerelac

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ABSTRACT

The sensory evaluation of weaning food is an important factor for the children worldwide. To evaluate the sensory attributes and storage properties an experiment was conducted using various formulations of weaning food using different proportions of locally available raw materials such as potato, soyabean supplement with whole milk powder. For this, seven groups of food were considered, such as, Group A (Cerelac-wheat+milk), Group B (Cerelac-wheat+3 fruits), Group 1-5 (various combinations of potato, soyabean supplement with whole milk powder). The aforesaid raw materials and various formulations of weaning foods were analyzed accordingly. Results revealed that the colour, flavour, texture and overall acceptability of different samples were significantly ($p < 0.01$) affected. There was no significant difference in colour and flavour for the commercial products (cerelacs) and prepared product sample No. 5 (66% potato+26% soyabean + 8% whole milk powder). There was no significant difference in samples 1, 2 and 4 (66% potato + 34% soyabean or 66% potato+ 32% soyabean +2% whole milk powder or 66% potato + 28% soyabean + 6% whole milk powder). The overall acceptability of weaning food samples was not equally acceptable. The commercial products had the best overall acceptability as compared to the other samples. The sample No. 3 (66% potato + 30% soyabean + 4% whole milk powder) was the worst among the others in that regard. The other samples were equally acceptable by the judges. The storage properties were not significant. However, the other samples were equally acceptable by the judges.

Key Words: Sensory attributes, storage properties, Weaning food and Cerelac.

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I. Introduction

Weaning refers to the change from breast feeding to artificial or mixed feeding. It is the process in which an infant's diet pattern is gradually changed from liquid foods like breast milk and preparation to solid foods. By common usage, however, it is taken to mean the changes from milk feeding either breast or bottle to mixed feeding. Any how it is an important stage in that of a baby and could dangerously affect its health if not properly handle. Infant nursed at the breast usually do well provided the mother is sufficiently supplied with milk, and the baby is fed at proper intervals. Failure to do well is more likely to be due to the presence of infections or to congenital anomalies than to the character of the food if the quantity of food is satisfactory. In Bangladesh, the period of weaning begins from the fifth month and may go on even up to eighteen months, during which period; the child is partially on breast milk or bovine milk and partially on solid foods (Chimanage, 1974). Weaning foods, based on groundnut flour and other pulses have been tested and found satisfactory from both organoleptic and nutritional point of view. Pre-cooked roller and weaning foods are prepared by blending edible groundnut flour, pulse flour. Bengal gram flour, green gram flour. In addition salt, sugar and mineral fortification are added and the blend cooked and dried on hot roller. Addition of sesame cake or synthetic dimethionine has been shown to improve nutritive value (Chandrashekhara et al., 1970).

Traditional weaning foods around the world are generally based on a porridge or gruel made from the local staple. For example, maize, banana, rice, plantain, cassava and wheat. In rural areas where refrigeration is not an option, gruels made in the morning are left to stand all day with an increased danger of the growth of food poisoning micro-organisms (pathogens) and contamination by dust and flies. In addition, in order to make-gruels more palatable, mothers often water them down, sometimes after preparation with contaminated water although easier to eat. Diluted gruels are low in energy and so have to be consumed in large amounts to meet the nutritional needs of the infant (Dijkhuizen, 1993). These children, malnourished now, will if they survive to adult ages fall into population segment having chronically poor health, which in turn, seriously handicap the social and economic development of the country (Sipple, 1968).

A normally growing child doubles its birth weight by the time it is six months old and triples its birth weight by the time it is one year. A rapid growth and tissue build up is very necessary during this period and unless proper type of protein rich foods are provided during this period, protein malnutrition and under nutrition will develop, which when unattended will lead to Kwashiorkor (Scrimshaw and Amer, 1967). Studies reported from many areas of the world indicate that the growth pattern of the breast fed infant in the developing countries during the first four months of life is fairly satisfactory. But after this period, many children fail to grow in proper nutrition. The weaning foods produced from locally available food stuffs have the added advantages of being adaptable for household consumption and acting as good substitute for commercial formulae. Therefore the objectives of the present study were i) To evaluate the sensory attribute of weaning food made by available raw materials and ii) To evaluate the storage study for 5 months at room temperature (day temperature: lowest to highest: 12.32°C-30.12°C) in double polyethylene bags).

II. Materials and Methods

The experiment was conducted in the laboratories of the Department of Food Technology and Rural Industries, Bangladesh Agricultural University, Mymensingh using various formulations of weaning food using different proportions of locally available raw materials such as potato, soyabean supplement with whole milk powder during June 1999 to June 2000. For this, seven groups of food were considered, such as, Group A (Cerelac-wheat+milk), Group B (Cerelac-wheat+3 fruits), Group 1-5 (various combinations of potato, soyabean supplement with whole milk powder). The aforesaid raw materials and various formulations of weaning foods were analyzed accordingly. The combinations are

| Sample No | Combinations |
|-----------|--|
| 1 | 66% potato + 34% soyabean |
| 2 | 66% potato + 32% soyabean + 2% whole milk powder |
| 3 | 66% potato + 30% soyabean + 4% whole milk powder |
| 4 | 66% potato + 28% soyabean + 6% whole milk powder |
| 5 | 66% potato + 26% soyabean + 8% whole milk powder |

Samples of the weaning food

The raw materials for this experiment used were peeled potato (P), soyabean (S) and whole milk powder (M).

Sensory evaluation of weaning food

Weaning foods were tasted by a panel of 10 judges. The panelists' were untrained and selected from the students and staffs of the Department of Food Technology and Rural Industries, Bangladesh Agricultural University, Mymensingh. All the judges consisting the panel were conversant with the factors governing the quality of the products. The products were served to each judge who independently examined the following characteristics:

(a) Colour, (b) flavour, (c) Texture and (d) Overall acceptability.

The relative importance of each factor was compared numerically on a scale of 8.

| | |
|---------------------|-----------------------------|
| 8= like extremely | 4= neither like nor dislike |
| 7= like very much | 3= dislike slightly |
| 6 = like moderately | 2= dislike very much |
| 5 = like slightly | 1= dislike extremely |

Each judge gave a score for the individual factor and recorded his/her observation in the score sheet. The average score of each product was then calculated. To ascertain uniformity of judgment among the total score assigned by each of them for the same product was calculated by adding up the scores for the various individual characteristics. AMOVA (Analysis of variance) and DMRT were adopted to select the best samples (Gomez and Gomez, 1984).

Storage study

The samples were stored in the laboratory for 5 months in double polyethylene bags at room temperature (day temperature: lowest to highest: 12.32-30.12°C). Properly settled plastic bags are good moisture barriers (Goddard, 1980). The observations were made at every month for properties.

III. Results and Discussion

The weaning foods were subjected to sensory evaluation. All the judges constituting the panel were made conversant with the factors governing the quality of the products. The samples were served to each of the judge who independently examined the contents from each of the samples and assigned scores for the characteristics (a) colour (b) flavour (c) texture and (d) overall acceptability. Overall acceptability of the weaning foods was evaluated by a panel of 10 judges. The mean scores for colour, flavour, texture and overall acceptability preference are presented in Table 1.

A two way analysis of variance ANQVA was carried out and the results revealed that there was significant ($p<0.01$) differences in colour acceptability. This indicated that the colour of the weaning food samples were not equally acceptable. As shown in Table 1 (DMRT for colour) there were less significant differences in control products A, B and sample 5. They were equally acceptable in terms of colour.

In case of flavour preference among the products of weaning food a two way ANOVA showed that the samples were significantly ($p<0.01$) affected flavour acceptability. Table 1 also (with DMRT) showed that the flavour of products A and B were most preferred and sample 2 was less preferred for flavour. It was also noticed that there was no statistically significant difference among the products of A and B. Statistical analysis showed that the sample 5 was the best among these five samples (excluding A & B).

Significant texture difference ($p<0.01$) were revealed among the sample of weaning food as in the Table 1 (with DMRT) which indicated that the samples A, B and 5 were not significantly different but A, B and samples 1, 2, 3 and 4 were not equally acceptable. It was apparent from the results of the ANOVA that there was significant ($p<0.01$) difference in overall acceptability among the products of weaning foods. This indicated that the overall acceptability of the weaning food samples is not equally acceptable. As shown in Table 1 (with DMRT) the sample A and B had the best overall adaptability as

compared to the other samples. It was also noticed that there was no statistically significant difference among the products of A, B and 5. Sample 3 was the worst among the samples where samples 1, 2, and 4 were equally acceptable by the judges. Similar results were obtained by Chimanage (1974) and Dijkhuizen (1993).

Table 1. Sensory evaluation of the foods

| Samples | Sensory attributes | | | |
|---------|--------------------|----------------------|------------------|-----------------------|
| | Colour | Flavour | Texture | Overall acceptability |
| A | 7.9 ^a | 7.6 ^a | 7.8 ^a | 7.7 ^a |
| D | 7.6 ^a | 7.3 ^a | 7.7 ^a | 7.6 ^a |
| 1 | 6.5 ^b | 6.7 ^b | 6.9 ^b | 6.8 ^b |
| 2 | 6.6 ^b | 6.4 ^b | 6.8 ^b | 6.5 ^b |
| 3 | 6.8 ^b | 6.5 ^{b>} | 6.7 ^b | 6.4 ^b |
| 4 | 6.9 ^b | 6.5 ^b | 6.0 ^d | 6.6 ^b |
| 5 | 7.1 ^b | 0.9 ^{'bi} | 7-0 ^d | 7.1 ^b |
| SD | 0.646 | 0.493 | 0.557 | 0.662 |

The means with different superscript within the column are significantly different at $p < 0.01$

- A = Commercial weaning food, cerelac (wheat + milk)
- B = Commercial weaning food, cerclac (wheat + fruits)
- 1= Sample No. 1
- 2= Sample No. 2
- 3= Sample No. 3
- 4= Sample No. 4
- 5= Sample No. 5

Storage study

The prepared samples of weaning food were stored in the laboratory of the Department of Food Technology and Rural Industries, at ambient temperature (day temperature: lowest to highest: 12.32-30.12°C) from November 1999 to March 2000. They were stored in double polyethylene bags. The stored samples were examined in every month for the organoleptic properties. The colour and texture of the products did not change much during the period of storage of 5 months.

Table 2. Storage study of weaning foods at ambient temperature (12.32 to 30.12°C)

| Storage period | Sample | Colour | Flavour | Texture |
|----------------|--------|-----------|-----------|-----------|
| 1 month | 1 | No Change | No Change | No Change |
| | 2 | | | |
| | 3 | | | |
| | 4 | | | |
| | 5 | | | |
| 2 month | 1 | No Change | No Change | No Change |
| | 2 | | | |
| | 3 | | | |
| | 4 | | | |
| | 5 | | | |
| 3 month | 1 | No Change | No Change | No Change |
| | 2 | | | |
| | 3 | | | |
| | 4 | | | |
| | 5 | | | |
| 4 month | 1 | No Change | No Change | No Change |
| | 2 | | | |
| | 3 | | | |
| | 4 | | | |
| | 5 | | | |
| 5 month | 1 | No Change | No Change | No Change |
| | 2 | | | |
| | 3 | | | |
| | 4 | | | |
| | 5 | | | |

For the first two months some quantity (about 100 mg) of each sample was kept in glass bottle. Cerelacs (brought from local market) opened and was also kept in glass bottle. It was done to examine the acceptability of the samples after opening (*i.e.* after cutting the polyethylene bags). They were examined at every week. The cerelacs and the samples were fresh for the first four weeks then they became clogged in the sixth week and at the seventh week they became unacceptable. So it might be concluded that after opening the container (culling bags) the weaning foods should be consumed within four weeks from the date of opening.

The colour and texture of the products changed to some extent but the products were acceptable throughout the storage period until the packet was opened. The weaning samples remained acceptable in terms of colour and texture in opened condition (in glass bottle) up to 4 weeks. Storage study of five samples are tabulated in [Table 2](#). This study is consistent with the research done by [Goddard \(1980\)](#) but partly different from others.

IV. Conclusion

The organoleptic properties such as colour, flavour, texture and overall acceptability were evaluated by a panel of 10 judges. The statistical analysis on the response of taste panel on the sensory properties of prepared weaning food samples revealed that the colour, flavour, texture and overall acceptability of different samples were significantly ($p < 0.01$) affected. There was no significant differences in colour and flavour for the commercial products (cerelacs) and prepared product sample No. 5 (66% potato + 26% soyabean + 8% whole milk powder). There was no significant difference in samples 1, 2 and 4 (66% potato + 34% soyabean or 66% potato + 32% soyabean + 2% whole milk powder or 66% potato + 28% soyabean + 6% whole milk powder).

The overall acceptability of weaning food samples was not equally acceptable. The commercial products had the best overall acceptability as compared to the other samples. The sample No. 3 (66% potato + 30% soyabean + 4% whole milk powder) was the worst among the others in that regard. The other samples were equally acceptable by the judges. The products were stored for 5 months at room temperature (day temperature: lowest to highest: 12.32-30.12°C) in double polyethylene bags and the organoleptic properties (colour and texture) were observed in every month and some quantity were subjected to acceptability test in every week.

The colour and texture of the products were changed to some extent but the products were acceptable throughout the storage period until the packet was opened. All the weaning food samples remained acceptable up to 4 weeks. This study had demonstrated that using potato, soyabean and whole milk powder at a ratio of 66:34:0 or 66:32:2 or 66:30:4 or 66:28:6 or 60:26:8 may be used as weaning foods. The samples produced from locally available foodstuffs have the added advantages of being adaptable for household consumption. More detailed investigation such as feeding programme of the weaned infants for some months, health status after feeding are necessary before coming into conclusion.

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Chicago

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Harvard

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