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Development and Sensory Evaluation of Low Cost Weaning Food Formulations

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ABSTRACT Low cost weaning foods namely panjiri, kheer, halwa and dalia were developed in the laboratory using germination, malting, roasting and pressure cooking processes. The experimental formulations were based on germinated wheat, pulses (Bengal gram, green gram and lentil) and roasted groundnut in the ratio of 75:25:25. All the formulations were evaluated thrice for their acceptability by a panel of 12 judges using a hedonic scale. All the formulations were found to be organoleptically acceptable obtaining moderately to extremely good scores ranging from 7.23 to7.93. Germinated and supplemented grain flour weaning food formulations were more acceptable as compared to control products made from ungerminated grain flour.

Under nutrition is one of the major problems confronting infants and young children in the developing countries. The rates of childhood malnutrition in India are among the highest in the world (UNICEF, 1998). Infant feeding and rearing practices have a major effect on short term and long-term nutritional status of children, as most of under nutrition is associated with faltering practices that occur in weaning period. Faulty feeding practices as well as lack of suitable weaning foods are responsible for under nutrition (Hoffman and Martin, 1994). Weaning foods currently manufactured and used to meet the needs of growing children are made by roller drying or extrusion cooking of pastes of cereal and legumes and are too costly to be afforded by the majority of the target population in the developing countries (Desikachar, 1979). Simpler methods of making weaning foods using diverse and locally available raw materials which could be made available at low cost are necessary. Keeping in view, development and sensory evaluation of low cost weaning food formulations was carried out in the laboratory.

MATERIALS AND METHODS

Processing of Samples: The samples of wheat, whole green gram, Bengal gram and lentil were purchased in bulk from the local market. These were washed and separately soaked in tap water for 10 hours. Excess water was drained off and soaked grains were tied in wet muslin cloth separately for germination. The grains were allowed to germinate at room temperature in wet muslin cloth. The wheat, green gram and lentil took 24 hours while Bengal gram took 48 hours to germinate. Germinated grains were dried at 60^0C for 7-8 hours. Germinated and ungerminated dried grains of wheat, Bengal gram, green gram and lentil were milled into flour in chakki and for dalia in 'cemotec-1090' sample mill.

Preparation of Weaning Foods: Foods namely Dalia, Kheer, Halwa and Panjiri were formulated in the laboratory. The experimental formulations were based on germinated cereal (wheat), pulses (Bengal gram, green gram and lentil) and roasted groundnut in the ratio of 75:25:25 while ungerminated wheat formulations were treated as control. Developed recipes are given in table 1.

Sensory Evaluation: Developed products were evaluated thrice for their acceptability by a panel of 10 judges selected at random from Department of Food and Nutrition, College of Home Science, Punjab Agricultural University Ludhiana. Judges were asked to score the products for appearance, color, flavour, taste and overall acceptability using a scorecard of Hedonic Rating Scale.

Statistical Analysis: From the data obtained the mean values and standard error for each was calculated. The significant differences between the samples were tested using the F-test (one way analysis of variance).

RESULTS AND DISCUSSION

The results of sensory evaluation have been presented in table 2.The results revealed non-significant differences for the appearance, color and texture of panjiri prepared from various combinations. Panjiri prepared from germinated

Table 1: Ingredients and methods for preparation of various products

Name of recipe		*Description of recipe*	*Ingredients used*	*Weight of ingredients (g)*	*Cooked weight (g)*	*No. of serving*
1.	*Panjiri*	Oil was heated in a *karahi*, flour was added and roasted. Then powdered sugar and groundnuts were added and finally removed from the fire	Wheat flour either alone orsupplemented with three pulses Ghee Groundnut (roasted & powdered) Sugar	40 (30:10) 20 10 30	100	4
2.	*Kheer*	At the time of serving 150 ml milk was heated on the flame and 30 g of ready to use mixture comprising of roasted flours, sugar and powdered groundnuts was added to milk and cooked till desired consistency	Wheat flour either alone orsupplemented three pulses Sugar Groundnut (roasted & powdered) Milk	40 (30:10) 40 10 150 ml	150	1
3.	*Halwa*	Sugar syrup was prepared. Oil was heated in a *karahi*. Flour was added and roasted. Then powdered sugar and groundnuts were added and finally sugar syrup was added with continuous stirring and cooked till done.	Wheat flour either alone or supplemented with three pulses Sugar *Ghee* Groundnut (roasted & powdered) Water	40 (30:10) 40 40 10 120 ml	200	4
4.	*Dalia*	*Dalia* was roasted for 4 minutes on low flame in a pressure cooker. Then water was added and pressure cooked for 8 minutes. Contents were then cooked for 1 minute after opening of pressure cooker. Finally sugar and powdered groundnuts were added	*Dalia* (either broken wheat alone or with supplemented with three pulses) Groundnut (roasted & powdered) Sugar Water	10 (7.5:2.5) 10 10 125 ml	115	1

wheat obtained highest scores (8.10) for taste followed by lentil-supplemented panjiri (7.90) and Bengal gram supplemented as (7.60). Germinated wheat panjiri obtained significantly higher scores for its taste as compared to control. Gopaldas et al. (1982) observed that in a feeding trial in 3 to 4 years children demonstrated significantly higher intakes for malted over roasted mixes indicating the better taste of malted mixes.

The study revealed non-significant differences for appearance and colour of kheer prepared with various combinations. As regard to overall acceptability, kheer prepared from germinated wheat received highest scores of 7.93 ± 0.10 followed by germinated wheat supplemented with germinated Bengal gram whereas control received minimum scores of 7.63±0.11. Kheer as a weaning food was also prepared by Kaur (1977) who reported that acceptability trials with infants (6 to 18 months) showed all the children who were served with kheer liked it.

The mean scores for the preparation of halwa ranged from7.00±0.14 to 7.70±0.20 being lowest for lentil-supplemented halwa and highest for control showing a significant difference between the two. The results revealed non-significant differences for the colour and taste of halwa

Table 2: Organoleptic evaluation of developed weaning food formulations

	Appearance	*Color*	*Texture*	*Taste*	*Overall acceptability*
Panjiri					
W	7.30±0.15	7.10±0.17	7.30±0.15	7.20±0.13	7.23±0.13
GW	7.30±0.15	7.80±0.24	7.40±0.15	8.10±0.17	7.65±0.15
GW+ GB	7.30±0.15	7.50±0.21	7.40±0.15	7.60±0.15	7.45±0.11
GW+ GG	7.30±0.15	7.20±0.19	7.40±0.15	7.30±0.15	7.28±0.14
GW + GL	7.30±0.15	7.80±0.27	7.30±0.15	7.90±0.22	7.58±0.17
F Ratio	0^{NS}	1.99^{NS}	0.12^{NS}	4.76*	1.53^{NS}
C.D at 5%				0.50	
Kheer					
W	7.50±0.16	7.90±0.09	7.80±0.13	7.5±0.21	7.63±0.11
GW	7.90±0.09	7.90±0.09	7.90±0.09	8.0±0.14	7.93±0.10
GW+ GB	7.80±0.13	7.90±0.09	7.90±0.09	8.0±0.14	7.85±0.10
GW+ GG	7.70±0.15	7.90±0.09	7.60±0.15	7.60±0.20	7.65±0.10
GW + GL	7.80±0.13	7.90±0.09	7.60±0.15	7.70±0.20	7.70±0.11
F Ratio	1.19^{NS}	0^{NS}	1.26^{NS}	1.40^{NS}	1.36^{NS}
C.D					
Halwa					
W	7.70±0.20	7.20±0.13	7.80±0.19	7.70±0.20	7.58±0.15
GW	7.30±0.15	7.30±0.20	6.90±0.09	7.60±0.16	7.33±0.09
GW+ GB	7.50±0.16	7.30±0.15	7.30±0.15	7.60±0.16	7.43±0.12
GW+ GG	7.50±0.21	7.20±0.24	7.70±0.15	7.40±0.20	7.55±0.10
GW + GL	7.00±0.14	7.00±0.12	7.70±0.15	7.60±0.16	7.33±0.13
F Ratio	2.07^{NS}	0.39^{NS}	5.92*	034^{NS}	0.92^{NS}
C.D at 5%			0.44		
Dalia					
W	7.50±0.21	7.40±0.15	7.30±0.15	7.40±0.15	7.40±0.09
GW	7.90±0.09	7.90±0.09	7.70±0.15	7.80±0.13	7.83±0.08
GW+ GB	7.90±0.09	7.80±0.13	7.60±0.15	7.90±0.09	7.80±0.09
GW+ GG	7.50±0.16	7.60±0.15	7.30±0.15	8.00±0.09	7.60±0.10
GW + GL	7.50±0.16	7.70±0.15	7.30±0.15	7.90±0.09	7.60±0.08
F Ratio	1.91^{NS}	1.77^{NS}	1.58^{NS}	4.27*	3.06*
C.D at 5%				0.32	0.28

W = Ungerminated wheat flour
GW = Germinated wheat flour
GW+GB = Germinated wheat + Germinated Bengalgram flour (3:1) ratio
GW+GG = Germinated wheat + Germinated greengram flour (3: 1) ratio
GW+GL = Germinated wheat + Germinated lentil flour (3:1) ratio
* Significant at 5% level
NS - non significant

prepared from various combinations. The mean score for the texture of halwa ranged from 6.90 ±0.09 to 7.80 ±0.19 being minimum for germinated wheat halwa and maximum for control. The texture of control differed significantly from other combinations. Over all acceptability score was also lowest for germinated wheat halwa and highest for control but non-significant difference was observed between control and other combinations. Srivastava et al. (2001) formulated halwa from malted proso millet, which was organoleptically acceptable obtaining well to very good scores.

The scores for appearance and texture of dalia revealed a non- significant difference among different combinations. The lowest score of colour was obtained for control and the highest for germinated wheat there by showing a significant difference between the two. The mean value for taste of dalia ranged from 7.70 ±0.15 to 7.90±0.09. The value for control differed significantly from other combinations revealing improvement in taste due to supplementation. Overall acceptability score was lowest for control and highest for germinated wheat. There was a significant difference among values of control

and other combinations there by showing that germinated and supplemented products were more acceptable. Arora (1999) formulated same preparation and reported that ungerminated dalia received less scores in comparison to germinated preparations.

To conclude germinated and supplemented grain flour weaning food formulations were more acceptable as compared to control products prepared from ungerminated wheat flour.

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