

## **Development and quality evaluation of weaning mix using popping technique**

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### **ABSTRACT**

The present study aimed to prepare a weaning mix using popped pearl millet and popped wheat. To find out the acceptability of weaning mix sensory evaluation was done. The acceptability scores ranged from 7 to 8 for different sensory characteristics. Bulk density, wettability, water absorption capacity, swelling capacity, solubility was found to be 0.71 g/ml, 29.33 seconds, 70%, 6.2 g per cent, 10.66 respectively. Proximate composition of weaning mix revealed 2.61 g/100 g, 7.17 g/100 g, 5.33 g/100g, 2.23 g/100g, 0.22 g/100g, 82.43 g/100g and 406.42 Kcal/100g for moisture, protein, fat, ash, fiber, carbohydrate and energy respectively. Total iron content was found to be 12.24 mg/100 g and bio available iron was 5.66 mg/100 g. The per cent availability of iron was found 46.24 per cent. Phytic acid content was found to be 52.10 mg/100g while Vitamin C content of weaning mix was 9.34 mg/100g. The microbial count was also found in safer limit less than 50,000 per g of sample according to Indian Standard Value safe for consumption. Peroxide value was also found in safe limit no rancid taste was found during organoleptic evaluation of weaning mix at 0<sup>th</sup> day and 30<sup>th</sup> day of storage.

**Key Words :** Popping technology, Vitamin C, Weaning mix. Iron deficiency anaemia

### **INTRODUCTION**

Iron Deficiency Anaemia (IDA) is common among children in developing countries. At the age of 4 to 6 months, infants are at a risk that are fed only human milk for developing a negative iron balance and may deplete their reserve by 6 to 9 months. Therefore, there is a need to implement weaning after four to six months to overcome related complications. The poor bioavailability of iron from plant foods is a major factor for the wide spread deficiency of these mineral. Children with chronic iron deficiency in infancy demonstrated long term development deficits. This deficiency creates motor or cognitive defects. This is the case with children whose mineral requirements are particularly critical. During the weaning period, the diet of an infant is based upon cereal flours. Therefore, the negative properties of phytates, particularly on bio availability of minerals, may have an adverse effect on health during the infancy. Hence, the present study was planned with the objective to develop a instant iron rich weaning mix and to assess its quality.

## METHODOLOGY

For the preparation of weaning mix wheat, pearl millet, sugar and milk powder were procured in a single lot from the local market of Udaipur. Pure ascorbic acid of Chemistry Limited lab was purchased from local market. Popping was done by standard method suggested by (Murlikrishan *et al.*, 1986) using common salt as heating medium in an open iron pan (grain to salt in ratio of 1:10) at 240°C to 260°C for 15-25 seconds. Salt was removed by sieving, and then the grains were separately milled in a flour mill. Popped grains were converted to flour. Combination of (Popped pearl millet flour + popped wheat flour) flour along with milk powder, sugar and ascorbic acid in different combinations were used for product development. Weaning mix was then reconstituted by boiling water and cooking time, cooked weight and cooked volume was recorded. A panel of ten judges was selected on the basis of threshold test as suggested by Griswold (1962) and scores cards were developed. Nine point hedonic scale (Williams, 1989) was used for sensory evaluation of prepared weaning mix. Cost of weaning mix was also calculated. Physical characteristics like bulk density (Singh *et al.*, 2005), wettability (Okezie and Bello, 1988), water absorption capacity (Sosulski *et al.*, 1976.), Swelling capacity (Ukpabi and Ndimele, 1990) and Solubility (Leach *et al.*, 1959) were determined. Proximate composition of weaning mix was determined by described method of NIN, (2003). Iron and phytic acid was calculated using method compiled by Jain and Mogra, (2006). Vitamin C content of weaning mix was determined by NIN (2003). One month shelf life examination was also done, peroxide value (Nielson, 2010), microbial count (Speck, 1984) and sensory evaluation was also examined to check the keeping quality of weaning mix up to one month.

**Table 1 : Different ratios for preparing weaning mix**

Combination	Ratios				
	R1	R2	R3	R4	R5
Popped pearl millet+ popped wheat	1:1	1:2	2:1	4:5	5:4

## RESULTS AND DISCUSSION

For the development of the popped weaning mix different combination were tried. The scores for different ratios for overall acceptability were ranged from 5.10 to 8.27 for R1, R2, R3, R4 and R5 respectively (Table 2). In R1 ratio of weaning mixes the taste of wheat and pearl millet was dominated which reduced the flavour of milk powder hence it was unacceptable by the panel members. In R2 ratio of weaning mixes was unacceptable as the taste was not good. Dominating taste of pearl millet was found in R3 ratio of weaning mixes, which made it of unacceptable. Lumps were formed in R4 ratio which reduced the acceptability by panel members. In R5 ratio of weaning mix was found most acceptable by panel members because of their pleasant aroma, flavour, smooth texture and very good taste and overall acceptability.

**Table 2 : Sensory scores of weaning mixes (Mean± SE)**

Ratios	Color	Flavour	Texture	Consistency	Taste	Aroma	Overall acceptability
R1	5.37±0.67	4.79±0.72	4.72±0.59	4.82±0.60	5.06±0.79	5.44±0.78	5.20±0.81
R2	5.65±0.55	5.24±0.83	4.93±0.84	4.96±0.82	5.10±0.77	5.03±0.73	5.10±0.77
R3	5.31±0.66	5.55±0.90	5.20±0.86	5.20±0.67	5.13±0.78	5.34±1.07	5.24±0.73
R4	6.65±0.85	6.27±0.75	5.96±0.90	5.75±0.63	6.10±0.97	6.65±0.61	6.68±0.54
R5	8.20±0.61	8.41±0.56	8.41±0.56	8.34±0.61	8.37±0.62	8.44±0.57	8.27±0.75

Hence, R5 was finally selected for standardization of weaning mix with ascorbic acid. Different amount (5mg, 10 mg, 15 mg and 20 mg) of ascorbic acid was added to the mix and was evaluated organoleptically. Results revealed that the mixes with 15-20 mg of ascorbic acid were acceptable by the panel members. The requirement of ascorbic acid for an infant is 25 mg (NIN, 2011) which can be fulfilled in two servings a day. Hence, 13 mg of ascorbic acid was added to the mixes. Sensory scores were found 7.86, 7.9, 7.96, 7.96, 8.1, 7.83 and 8.03, for color, flavour, texture, consistency, taste, aroma and overall acceptability respectively after addition of ascorbic acid.

After reconstitution of weaning mix; cooked weight, cooked volume and cooking time was found to be 164 g, 120 ml and 3.52 minutes, respectively. Cost of one serving was Rs. 5.02/46 g. Bulk density was found to be 0.71 g/ ml, wettability was 29.33 seconds, water absorption capacity was 70%, Swelling capacity was 6.22 g per cent and solubility per cent was found to be 10.66. Proximate composition of weaning mix revealed that it contained moisture (2.61 g/100 g), protein (7.17 g/100 g), fat (5.33 g/100g), ash (2.23 g/100g), fiber (0.22 g/100g), carbohydrate (82.43 g/100g) and energy (406.42 Kcal/100g). Total iron content was found to be 12.24 mg/100 g with 5.66 mg/100 g bio available iron and 46.24 per cent availability. Phytic acid content was found to be 52.10 mg/100g while Vitamin C content of weaning mix was 9.34 mg/100g.

**Table 3 : Standardized recipe of weaning mix**

Ingredients	Amount (g)	Method
Water	150 ml	Water boiled
Malted wheat	8	Different powder were mixed and cooked till the mixture is prepared.
Malted pearl millet	10	
Sugar	18	
Milk powder	10	
Ascorbic acid	13 (mg)	Ascorbic acid was added in mix, stirred well and served hot.

**Table 4 : Proximate composition of weaning mix (Mean±SE)**

Moisture (g/100g)	Crude protein (g/100g)	Fat (g/100g)	Ash (g/100g)	Crude fiber (g/100g)	Carbohydrate (g/100g)	Energy (Kcal/100g)
2.61±0.81	7.17±0.19	5.33±2.30	2.23±0.22	0.22±0.01	82.43±2.60	406.42±10.59

At 0<sup>th</sup> day Total viable count was found 36,333 cfu/g. Indian Standard values (1973) reported as upper limit of 50,000 colonies per gram of sample, colonies count was in the safe limit. After one month of storage TVC was found to be nil it may be due to the packaging of the weaning mix in HDPE polythene, is stronger, thicker and less flexible. Because of these properties there was a shortage of air, due to this reason bacterial growth retard. Developed weaning mix was microbiologically safe for infants. Yeast and mould count was found to be nil at 0<sup>th</sup> day and 30<sup>th</sup> day of storage. Peroxide value of weaning mix was 2.03 and 3.17 meq/kg at 0<sup>th</sup> day and 30<sup>th</sup> day of storage. According to (www.medlabs.com ), PV of greater than 5 should not be used in the manufacture of mix products, as it will significantly decrease the shelf life of the product but still in safe limit. It is safe to consume for an infant.

### Conclusion:

Pearl millet is called nutri-cereal as it contained fair quality of protein, fat, energy, vitamins and

minerals. Pearl millet contains the highest amount of iron among all the cereals it is also a rich source of calcium and dietary fiber, phytochemicals and micronutrients. The developed weaning mix was found nutrient rich, free from microbial load and based on traditional practices which can be easily done at home by using the traditional grain (pearl millet and wheat) in instant weaning mix the acceptability can be generated among infants. Popping was found better option to prepare iron rich weaning mix using wheat and pearl millet.

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