

Infant Formulas: Weaning Babies

Key Findings

- Overall all tested brands of infant foods are safe to give to babies.
- Farex performed top followed by Dexolac in Follow-up formula – complementary food. Zerolac in Infant Milk Substitutes and Easum in Processed cereal based complementary foods also performed well. Cerelac was the only variant in this category showing up as very Good
- Easum was found least acceptable in its flavour. Dexolac was least tasty among all the brands.
- Easum (11.54g/100g) and Nestum (8.57g/100g) were unable to meet the minimum requirement for total protein content.
- Tin content (6.88mg/kg) of Nestum was found beyond the maximum permissible limit.
- Lactogen was found most acceptable in sensory tests.
- All the brands were properly packed with adequate information on their label with all necessary instructions.

The difference between formula based diet and natural food is that a natural food is the choice made by parents based on traditional knowledge. But in a formula based food it is the market that decides how and what the baby should be fed. *Consumer VOICE* tested 10 popular as well as regular selling brands of Baby Foods.

Mother's milk nurtures naturally, unlike the infant formulas which provides the parents choice and convenience; and allows the mother to leave the 'feeding' at regulator intervals to someone else. Parent (consumers) have the option of feeding and plumping up the baby right from its birth. You have the milk substitutes, in case the mother is unable to feed due to some reasons. And you have a wide

range of substitutes for natural food that include cereals, pulses, vegetables and fruits that can be fed according to the growth period of the child.



Adulteration and standards

Infant foods are very sensitive food product available in market. Since these replace mother's milk or add on to the diet of infant for his/her proper growth, these products are necessary to meet the required quality and safety standards. In recent past many cases of adulteration have been reported, for example adulteration of Melamine in infant foods in China. In context of this *Consumer VOICE* tested various brands of infant foods of different categories being sold in Indian markets to judge their overall quality from safety, quality and organoleptic point of view. We had included the categories of infant foods named Follow-up Formula – Complementary Foods, Infant Milk Substitutes, Processed Cereal Based Complementary Foods, Milk-Cereal Based Complementary Foods in our study. The test programme of infant foods was purely based on the related Indian Standards IS 15757:2007, IS 14433:2007, IS 11536:2007 and IS 1656:2007.

What we tested?

We considered infant food for babies from the age of 6 months and onwards. The main parameters

Brand	Protein Per 100g	Fat Per 100g	Sensory Tests Score
Follow-up Formula – Complementary Foods			
Dexolac	16.69	26.59	6.98
Farex	16.63	20.16	9.04
Lactodex	16.57	20.26	8.84
Lactogen	15.39	19.75	9.57
Nan	14.73	20.20	9.38
Infant Milk Substitutes			
Amul Spray	22.0	18.22	6.44
Zerolac	15.11	20.70	6.07
Processed Cereal Based Complementary Foods			
Easum	11.54	NA	8.62
Nestum	8.57	NA	9.55
Milk-Cereal Based Complementary Foods			
Cerelac	17.5	9.07	10.43

for which different brands of infant food was tested were, Protein, Fat, Carbohydrate, Vitamins, Minerals, Organoleptic Properties and Microbiological requirements. Since infant foods replace the mother milk, these are expected to be rich in protein, fat and micronutrients like vitamins and minerals. Almost all the brands of different categories tested were found to be aligning with the requirements prescribed in Indian standards. But in Processed cereal based complementary foods category both Easum and Nestum failed to meet the requirement for protein content. This is the only flaw we found in our study.

Organoleptic properties of the infant foods also play an important role in the acceptance of particular product.

Sensory Tests

We conducted sensory tests for colour, appearance, flavour/odour, taste and after taste feel to observe the organoleptic properties of these infant foods, because a new born baby also react to these properties of foods which matter for its acceptance. Lactogen was found most acceptable in Sensory Tests. Easum was found least acceptable in its flavour. Dexolac was least tasty among all the brands. Overall all tested brands of infant foods are safe to give to babies.

Breast feeding universally recommended

Breast feeding is universally regarded as the most appropriate form of nourishing the infant. However, when breast feeding is not possible, reliance has to be placed upon alternate sources of nutrients for infant feeding. It is imperative that infant milk substitutes should be properly formulated so that nutritional requirements for optimal growth are met adequately, and that is minimum of physiological stress





on the developing organs and enzymatic system of the infant. It is equally important to promote correct feeding practices, so that appropriate use of the infant milk substitute could be made for protecting the health of the infant.

Packaging of baby foods

Baby foods should be packed in hermetically sealed, clean and sound containers or in a flexible pack made from film or combination of any of the substrates made of board paper, polyethylene, polyester, metallised films or Aluminium foil so as to protect it from deterioration. In case plastic material is used for flexible packaging, only food grade plastic shall be used.

It shall be packed in quantities as stipulated under Rule 5 and 'The second Schedule' of the Standards of the Legal Methodology (Packaged Commodities) Rule 2011 as well as in accordance with requirement under Food Safety & Standard

Act,2006.

All the tested brands of 4 categories of infant foods were suitably packed and adequately sealed. The packing material ranged from tins to pouches in paper board boxes.

Easum and Nestum not BIS marked

All brands of baby food were labelled adequately with required information. All tested brands, across the 4 categories met the BIS requirements. Easum and Nestum of processed cereal based complementary foods category were not marked with ISI mark even though it is mandatory.

Some brands were underweight

All the brands were found with proper quantity. Farex, Nan and Easum were found slightly under weight but under permissible limits.

Baby foods free of starch

Starch is a polysaccharide carbohydrate. As an additive for food processing, food starches are typically used as thickeners and stabilizers in food products. As per the Indian Standards, it should be absent in baby foods. Our test found all the brands to be starch free.

All infant food contained minerals as per the requirements

A mineral is a naturally occurring solid chemical substance formed through biogeochemical processes, having characteristic chemical composition, highly ordered atomic structure, and specific physical properties. We tested different categories of baby food for the minerals named *Iron, Calcium, Phosphorous, Iodine, Sodium, Potassium, Chloride, Magnesium, Copper, Manganese, Zinc & Selenium*. All the brands of baby foods met the requirements prescribed in Indian Standards.

Infant formula supplies vitamins

A vitamin is an organic compound required as a nutrient in tiny amounts by an organism. We tested all categories of baby food for the vitamins named *Vitamin A, Vitamin D, Thiamine, Niacin, Riboflavin, Vitamin B6, Vitamin B12, Folic Acid, Panthothenic Acid, Biotin, Vitamin C, Vitamin k, Nicotinic Acid & Vitamin E*. All the brands met the requirements prescribed in Indian Standard for Vitamin Content.

Total Protein

Protein is an essential nutrient in diet. They play an important role in the cellular maintenance, growth, and functioning of the human body. As per the Indian Standards, Protein in Follow-up

Categories of Baby food that we tested

- **Follow-up Formula – Complementary Foods:** Prepared by spray drying of the milk of cow or buffalo or a mixture thereof. It may contain vegetable protein. Suitable for use either directly or diluted with water before feeding, as appropriate. In powdered form it requires water for preparation and it shall be free from lumps and shall be uniform in appearance.
- **Infant Milk Substitutes:** The food which replaces the breast feeding for nutrition and proper growth of infant. Various types of foods for infants being marketed in two categories; Infant milk substitute and Infant foods.
- **Processed Cereal Based Complementary Foods:** Commonly called as weaning food or supplementary food based on cereals and/or legumes (Pulses), soyabean, millets, nuts and edible oilseeds and so fragmented as to permit dilution with water, milk or other suitable medium. Nutritionally, this category of foods serves as an important source of calories to meet the energy requirements due to increased physical activity of infant
- **Milk-Cereal Based Complementary Foods**



Why breast feed?

Mother's milk is a generous supply of Immunoglobulin A (IgA), a protective antibody which the infant bowel lacks. This antibody helps to protect the infant from bacterial infection and probably reduces the entry of antigenic food protein fragments, reducing the incidence of food allergy.

One ounce (oz) of breast milk is about 20 Kcal/oz. Infants begin consuming about 20 oz/day in Month 1 and progress to about 40 oz/day in Month 6. Experts say that Breast feeding is recommended because it provides optimal nutrition for most babies.

The infant's energy needs can be supplied by an average intake of 100-120 Kcal/Kg/day in the first four months, decreasing, as growth slows, to about 100 Kcal/Kg/day for the last six months of the first year.

Formula – Complementary Foods should be between the range of 13.5 to 24.7 g/100g. In Infant Milk Substitutes, it should not be less than 12g/100g. In the Processed Cereal Based Complementary Foods, it should be minimum 15g/100g and in Milk-Cereal Based Complementary Foods, It should not be less than 12 g/100g. Except Easum (11.54) and Nestum (8.57) all the brands met the requirement for protein in baby foods.

Milk/Total Fat

Fat component adds richness of flavour, contributes to a smooth texture. As per the Standards, it should be in the range of between 18.0 to 27.7 g/100g in Follow-up Formula – Complementary Foods. In Infant Milk Substitutes, it should not be less than 18g/100g and in Milk-Cereal Based Complementary Foods it should not be less than 7.5 g/100g. All the brands we tested have met the minimum requirement prescribed in Indian Standards.

Solubility

Solubility is the property of a solid substance in liquid to form a homogeneous solution of the solute in the solvent. As per the Indian

Standard, Solubility percentage of Follow-up Formula – Complementary Foods & Infant Milk Substitutes should be minimum 98.5% by mass.

All the brands we tested met the requirement for solubility.

Total Carbohydrate

Carbohydrate is the source of energy. The requirement for carbohydrate content is only for the category of Processed Cereal Based Complementary Foods & Milk-Cereal Based Complementary Foods. As per the Standard, it should not be less than 55g/100g. All the brands met the minimum requirement. Nestum (85.29) from processed cereal based complementary foods was found with higher carbohydrate content, however Cerelac (67.89) was found with lower carbohydrate content.

Aflatoxin

Aflatoxin is a kind of toxin or poison produced by the mold *Aspergillus flavus*. When animals or humans consume these compounds, they may produce severe undesirable health effects. The requirement for Aflatoxin is only for the category of Processed Cereal Based Complementary Foods and it was not detected, hence tested brands got full weightage.

Sensory Tests

This is very important parameter where subjective Panel tests were conducted based on their critical examination and opinion since consumer is very critical on selection of product from retail stores that makes that brand most acceptable/least acceptable in respect of price. During





this test, we determine the overall organoleptic (sensory) quality of the product in term of consumption. We conducted the sensory tests against colour & appearance, odour/flavour, taste and after taste feel. These tests were conducted in the lab involving panel members under the supervision of trained experts. In the category Follow-up Formula – Complementary Foods, Lactogen was the best among all. In Infant Milk Substitutes, Amul Spray performed well and in the category of Processed Cereal Based Complementary Foods, Nestum came on top.

Microbiological Tests

Microbiological contamination is a very serious issue for food products. Microorganisms are responsible for many foods borne disease. We conducted this test for *Bacterial count*, *Coliform count*, *Staphylococcus aureus*, *Salmonella*, *Shigella*, *E. coli* and *Teast & Mould*. The entire range of microorganisms we tested were found either absent or within the permissible limit.

Heavy Metals

We have tested all brands of baby foods for the presence of heavy metals as *Lead*, *Arsenic*, *Tin*, *Cadmium* and *Copper*. All the brands of all categories of baby foods were found within the required limit prescribed in Indian Standards. Tin (6.88) content in Nestum was found more than the maximum limit.

Conclusion

Based on the results of all test parameters and observations Farex performed top followed by Dexolac in Follow-up formula – complementary food, Zerolac in Infant Milk Substitutes and Easum in Processed cereal based complementary foods also performed well. Cerelac was the only variant in this category showing up as very Good in our rating.

Risks of infant formula:

Infant formulas are regulated manufactured substance that must comply with certain standards. It is easily accessible in a wide variety of convenient retail locations, although at a cost that may not be affordable to many.

The risks of infant formula include

Higher risk of wide variety of health such as

- Middle ear infections
- Eczema
- Gastrointestinal infections
- Lower respiratory tract diseases
- Asthma
- Type 1 diabetes
- Type 2 diabetes
- Childhood leukemia
- Sudden infant death syndrome

Possible contamination of infant formula during the manufacturing process (despite regulations that are in place), e.g.

- Substances sneaking into formula that should not be there, such as melamine or beetles.
- *E.zakazakii* infections, which can result in neonatal meningitis and has caused the death of infants, is considered to be significantly under-reported in all countries. *E.zakazakii* outbreaks linked to infant formula has been reported as causing deaths in infants in developed countries as recently as 2004 in France (see WHO's Guidelines in the Safe Preparation, Storage and Handling of Powdered Infant Formula – p.3).
- *Salmonella* outbreaks associated with infant formula have been recorded in Canada, France, Korea, Spain, the UK and the United States since 1995 (see WHO's Guidelines in the Safe Preparation, Storage and Handling of Powdered Infant Formula – p.3).
- Tampering with infant formula, such as the recent tampering with Nestle Good Start formula cans in Canada.
- Use of toxic chemicals such as BPA in the packaging for infant formula.

In susceptible families, breastfed babies who are supplemented with formula can be sensitized to cow's milk protein, resulting in allergic reactions.

Risks in the water that is used to prepare infant formula, including:

- Possible bacteria in the water (this risk can be minimized by boiling water).
- Flouride in municipal water systems, which can cause dental flourosis, may damage the developing brain, can act as an "endocrine disrupter" thereby disrupting thyroid function, and may be linked to bone cancer.

COMPARATIVE TEST PERFORMANCE SCORE OF INFANT (BABY) FOODS

Brand	Wt. %*				(A) Follow-up Formula - Complementary Foods						(B) Infant Milk Substitutes		(C) Processed Cereal Based Complementary Foods		(D) Milk-Cereal Based Complementary Foods	
	(A)	(B)	(C)	(D)	Farex	Dexolac	Nan	Lactogen	Lactodex	Zerolac	Amul Spray	Easum	Nestum	Cerelac		
Parameter																
Pack Size, gm					500	500	450	475	500	400	500	400	375	375		
MRP in ₹					249	279	287	227	215	213	132	157	101	133		
Physico-chemical Tests																
Milk/Total Protein	12	10	10	12	9.97	10.03	8.26	8.89	9.91	6.89	10	6.15	4.6	9.57		
Milk/Total Fat	8	6	NA	6	6.73	5.84	6.75	6.48	6.78	6	4.27	NA	NA	5.96		
Total Carbohydrate	NA	NA	15	7	NA	NA	NA	NA	NA	NA	NA	14.98	15	5.6		
Linoleate	2	NA	NA	NA	1.36	2	1.36	1.26	1	NA	NA	NA	NA	NA		
Dietary Fibre	NA	NA	NA	3	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.84		
Solubility	2	3	NA	NA	1.75	1.74	1.78	1.48	2	2.31	1.89	NA	NA	NA		
Crude Fibre	NA	NA	3	3	NA	NA	NA	NA	NA	NA	NA	2.94	2.91	2.94		
Starch	2	1	NA	NA	2	2	2	2	2	1	1	NA	NA	NA		
Scorched Particle	2	2	NA	NA	1.67	1.67	1.67	1.67	1.67	1.67	1.67	NA	NA	NA		
Moisture	2	2	2	2	2	1.77	1.81	1.66	1.93	1.82	1.83	2	1.29	1.75		
Total Ash	2	1	2	2	1.96	1.92	1.95	1.88	1.84	1	0.82	2	1.91	1.67		
Acid Insoluble Ash	2	1	2	2	1.85	1.71	2	1.57	1.85	0.78	0.92	1.71	1.71	1.42		
Aflatoxin	NA	NA	3	NA	NA	NA	NA	NA	NA	NA	NA	3	3	NA		
Net Weight	2	2	2	3	2	2	2	2	2	2	2	1.98	2	3		
Vitamins	15.6	24	14	16	13.88	13.55	11.85	11.16	10.65	22.1	17.15	11.53	10.8	13.53		
Minerals	14.4	16	6	2	11.69	11.67	11.63	11.77	11.53	12.36	13.69	5.32	4.73	1.81		
Heavy Metals	6	6	10	8	5.94	5.8	5.98	5.97	5.8	5.89	5.98	9.39	8.36	8		
Microbiological Tests	10	10	10	10	8.78	9.64	9.63	9.81	8.78	9.87	9.83	9.92	9.57	9.61		
Sensory Tests	12	10	15	16	9.04	6.98	9.38	9.57	8.84	6.07	6.44	8.62	9.55	10.43		
General Parameters																
Packing	2	2	2	3	2	2	2	2	2	2	2	2	2	3		
Marking	4	4	4	5	4	4	4	4	4	4	4	4	4	5		
Overall Score	100				86.62	84.32	84.05	83.17	82.58	85.76	83.49	85.54	81.43	56.13		

Rating: >90 – Excellent *****; 71-90- Very Good ****; 51-70- Good ***; 31-50- Average **, upto 30 – Poor * * Assigned weightage is different for each category, which are mentioned. Vitamin - Tested Vitamins are Vitamin A, Vitamin D, Thiamine, Niacin, Riboflavin, Vitamin B6, Vitamin B12, Folic Acid, Panthothenic Acid, Biotin, Vitamin C, Vitamin k, Nicotinic Acid & Vitamin E. Minerals - Tested Minerals are Iron, Calcium, Phosphorus, Iodine, Sodium, Potassium, Chloride, Magnesium, Copper, Manganese, Zinc & Selenium. Heavy Metals - Lead, Arsenic, Tin, Cadmium and Copper. Microbiological tests are conducted for the presence of Bacterial count, Coliform count, Staphylococcus aureus, Salmonella, Shigella, E. coli and Yeast & Mould. Sensory tests consist of colour & appearance, odour/ flavor, taste and after taste feel. NA – Not Applicable