



RICE



FORTIFIED
SAMPOORNA POSHAN
SWASTH JEEVAN



Food Safety and Standards (Fortification of Foods) Regulation 2016

FSSAI STANDARDS FOR FORTIFICATION OF RICE

Rice, when fortified, shall contain added iron, folic acid and vitamin B-12 at the level given in the table below:

<p>IRON</p> <ul style="list-style-type: none"> • Ferric pyrophosphate • Sodium Iron (III) Ethylene diamine tetra Acetate, Trihydrate (NaFeEDTA) <p>20 mg</p>	<p>FOLIC ACID - Folic Acid</p> <p>1300 µg</p>	<p>VITAMIN B12</p> <p>Cyanocobalamine, Hydroxycobalamine</p> <p>10 µg</p>
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In addition, it may also be fortified with following micronutrients, singly or in combination, at the level given in the table below:

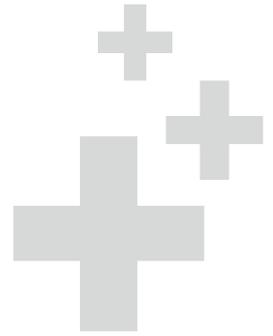
<p>ZINC - Zinc Oxide</p> <p>30 mg</p>	<p>VITAMIN A - Retinyl Palmitate</p> <p>1500 µg RE</p>	<p>THIAMINE (VITAMIN B1) - Thiamine hydrochloride, Thiamine mononitrate</p> <p>3.5 mg</p>	<p>RIBOFLAVIN (VITAMIN B2) - Riboflavin, Riboflavin 5'-phosphate sodium</p> <p>4 mg</p>
<p>NIACIN - Nicotinamide, Nicotinic acid</p> <p>42 mg</p>	<p>PYRIDOXINE (VITAMIN B6) - Pyridoxine hydrochloride</p> <p>5 mg</p>		



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Fortifying Rice

Rice fortified with the fortificant mix by dusting; or coated or extruded fortified kernels mixed with non-fortified rice in a ratio varying between 0.5%-2% is fortified rice.

Rice fortification is a cost effective, culturally appropriate strategy to address micronutrient deficiency in countries with high per capita rice consumption. India is a leading rice producing country, with 22% of the total global rice production and 65% of India's population consumes rice on a daily basis. The per capita rice consumption in India is 6.8 kilogram per month. Fortification of rice makes it more nutritious by adding vitamins and minerals, many of which are lost during the milling and polishing process.

Rice can be fortified using dusting, coating or extrusion technology. Extrusion is the preferred technology for rice fortification given the stability of micronutrients in the rice kernels across processing, storage, washing and cooking, also in view of cost considerations.

In extrusion technology, milled rice is pulverized and mixed with a premix containing vitamins and minerals. Fortified rice kernels (FRK) are produced from this mixture using an extruder machine. The kernels resemble rice grains. FRK is added to non-fortified rice in ratio ranging from 1:50 to 1: 200 resulting in fortified rice nearly identical to traditional rice in aroma, taste, and texture. It is then distributed for regular consumption.

The cost of fortification is determined by a multitude of context specific variables such as the structure and capacity of the rice industry, the complexity of the supply chain, the policy and regulatory environment and the scale of the relevant programme.





OIL



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FSSAI STANDARDS FOR FORTIFICATION OF VEGETABLE OIL

Vegetable Oil may be fortified with the following micronutrients, singly or in combination, at the level given in the table below:

VITAMIN A
25 IU per gm of oil
Retinyl acetate, retinyl palmitate
and retinyl propionate

VITAMIN D
4.5 IU per gm of oil
Cholecalciferol, Ergocalciferol



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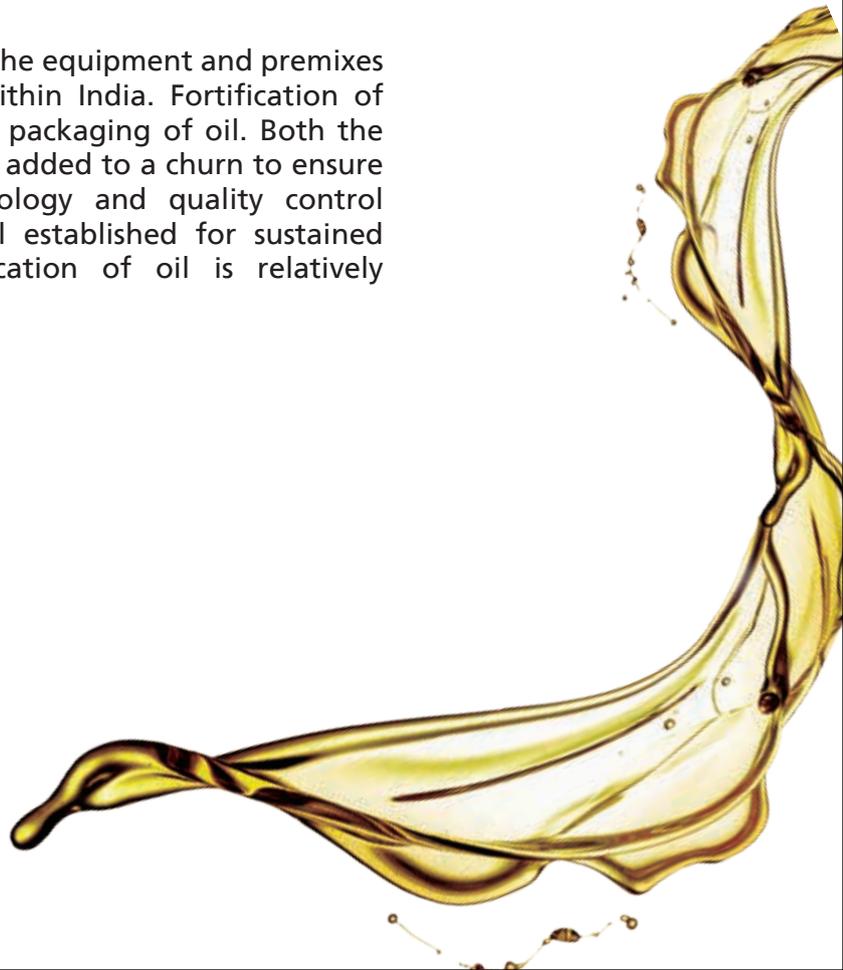
OIL
+
+
+

Fortifying Vegetable Oil

Multiple micronutrient deficiencies are rampant in India, and continue to be significant public health problems, which adversely impact the health and productivity of all the population groups. More than 57% of children suffer from vitamin A deficiency, which may be symptomatic or present at the sub-clinical level. In addition, a high proportion of pregnant women and their newborns suffer Vitamin D deficiency. Vitamin D is also considered to play an important role in decreasing the risk of many chronic illnesses, including common cancers, autoimmune diseases, infectious diseases, diabetes and cardiovascular disease. Thus public health problems warrant public health intervention.

As per Household Consumer Expenditure (HCE) Survey in India, NSSO report 2011, consumption of oil is reasonably high, about 20-30g / person / day and is consumed by all population groups. Since vitamin A and D are fat-soluble vitamins, fortification of edible oils and fats with vitamin A and D is a good strategy to address micronutrient malnutrition and fortified oil is known to provide 25%-30% of the recommended dietary allowances for vitamins A&D.

Oil fortification technology is simple and the equipment and premixes for fortification are readily available, within India. Fortification of edible oil usually takes place just before packaging of oil. Both the vitamin pre-mix and the processed oil are added to a churn to ensure uniform blending. The concept, technology and quality control procedures for oil fortification are well established for sustained production across the country. Fortification of oil is relatively inexpensive and affordable.





SALT



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Food Safety and Standards (Fortification of Foods) Regulation 2016

FSSAI STANDARDS FOR FORTIFICATION OF SALT

Salt shall be fortified with iodine* and may also be fortified with iron, in combination with iodine**, at the level given in the table below:

IODINE

- **Manufacture level**
Not less than 30 parts per million on dry weight basis
- **Distribution channel including retail level**
Not less than 15 part per million on dry weight basis.

IRON (as Fe)

850-1100 parts per million

*The total matter insoluble in water where an anticaking agent has been added shall not exceed 2.2 per cent. and Sodium Chloride content on dry basis shall not be less than 97.0 per cent. by weight. As mentioned under sub-regulation 2.9.30.2 of the Food Safety and Standards (Food Product Standards and Food Additives) Regulations, 2011.

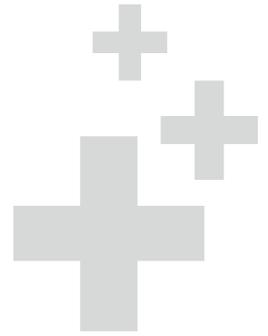
**Double fortified salt may contain Hydroxypropyl Methyl Cellulose, Titanium dioxide full Hydrogenated Soybean oil and Sodium Hexameta-phosphate (all food grade) and anticaking agent not more than 2.0 per cent. On dry weight basis, and the water insoluble matter wherein anticaking agent is used shall not exceed 2.2 per cent.



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SALT



Fortifying Salt

Double Fortified Salt (DFS) is an innovative new fortified food product - delivering small but crucial amounts of iodine and iron to human beings through their diet. In general, DFS formulations are intended to provide 100% of daily dietary iodine requirement, and 30 to 60% of daily dietary iron requirement.

DFS is produced by mixing iodized salt with either/or ferrous sulphate/ encapsulated ferrous fumarate. While producing DFS with ferrous sulphate, sodium hexametaphosphate (SHMP) is used as a stabilizer, ferrous fumarate has been encapsulated with soya stearin to prevent interaction between iodine and iron. DFS as a product is stable in both formulations, is indistinguishable in taste, color, and smell from regular salt and has been proved efficacious in addressing IDA (Iron Deficiency Anemia) and IDD (Iodine Deficiency Disorder).

The salt iodization process involves very little technology of using a drip feed equipment to dose potassium iodate (KIO₃) solution to the raw salt to a very sophisticated dewatering, drying and packing system. DFS technology can be easily integrated with little modifications in existing iodized salt processing facilities by adding a ribbon blender to blend the iron compound to iodized salt to produce DFS.

Given limited commercialization of the product, the incremental cost per kilogram of salt on account of addition of iron remains unclear. However it is anticipated that the increase in cost of DFS could be 20-50% higher than iodized salt per kilogram.

Universal Salt Iodization (USI) Program in India: A public health success story

IDD was recognized as a public health problem and a national control program was launched in 1962. Government of India through National Iodine Deficiency Disorder Control Program (NIDDCP) promotes consumption of adequately iodized salt for direct human consumption. Universal Salt Iodization was adopted as the primary strategy to control IDD in the year 1985. There has been a significant increase in the coverage of iodized salt at the household level over the past 25 years. Currently 78% household are consuming adequately iodized salt¹. However, in spite of this progress, the country is yet to achieve the USI target of greater than 90% household coverage and there is need to accelerate, achieve and most importantly sustain the progress towards optimal iodine status and elimination of IDD in India.

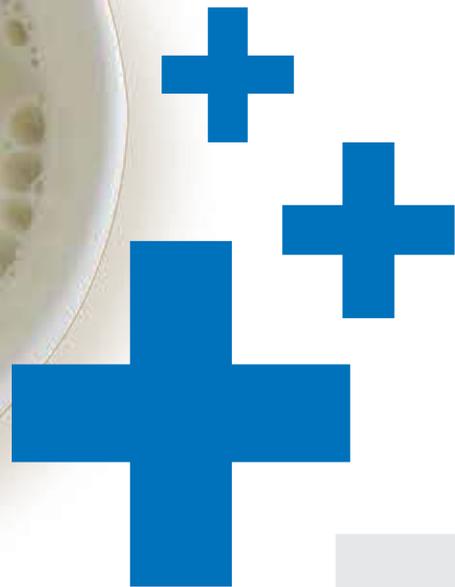
¹National Iodine and Salt Intake Survey 2014-15



MILK



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Food Safety and Standards (Fortification of Foods) Regulation 2016

FSSAI STANDARDS FOR FORTIFICATION OF MILK

Toned, double toned, or skimmed milk may be fortified with the following micronutrients, singly or in combination, at the level given in the table below:

VITAMIN A

770 IU

Retinyl acetate, Retinyl palmitate
and Retinyl propionate

VITAMIN D

550 IU

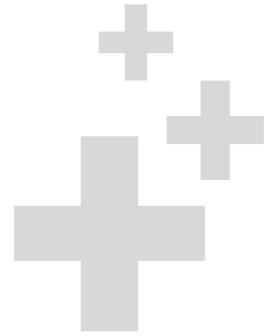
Cholecalciferol, Ergocalciferol



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MILK



Fortifying Milk

Milk is one of the most nutritious foods. Vitamins A and D though important for various bodily functions and naturally present in milk are removed along with fat when the milk is processed to produce toned, double-toned and skimmed milk.

At the processing level, three types of fluid milk are commonly produced in India: Fortifying toned (Fat - 3%), double toned (Fat - 1.5%) and skimmed milk (Fat < 0.5%) with vitamin A and vitamin D will ensure that these will also reach consumers who purchase low-fat milk and provide them with significant amounts of their daily needs of these vitamins.

The technology to fortify milk is simple. All the vitamins and minerals that can be added to milk are available in dry powder form as well as in the liquid form. The fat-soluble vitamins are also available in an oily form as well as in the water soluble form. The fortification process does not require any sophisticated equipment,

- **Liquid milk fortification:** Liquid milk is fortified just prior to pasteurization or ultra-heat treatment, and it is essential to ensure a good distribution of the nutrients in milk prior to any heat treatment.
- **Dried milk fortification:** The simplest way to fortify dried milk is to blend dry forms of vitamins and minerals with the dried milk powder, although oily forms can also be added. Unlike liquid milk, dried milk can be fortified either prior to or after the heat treatment.





WHEAT FLOUR



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Food Safety and Standards (Fortification of Foods) Regulation 2016

FSSAI STANDARDS FOR FORTIFICATION OF ATTA (WHOLE WHEAT FLOUR) AND MAIDA (REFINED WHEAT FLOUR)

Atta or Maida, when fortified, shall contain added iron, folic acid and vitamin B-12 at the level given in the table below:

IRON

Atta

Sodium Iron (III) Ethylene diamine tetra Acetate, Trihydrate (NaFeEDTA) **20 mg**

Maida

(a) Ferrous citrate, Ferrous lactate, Ferrous sulphate, Ferrous pyrophosphate, electrolytic iron, Ferrous fumarate; **60 mg**

(b) Sodium Iron (III) Ethylene diamine tetra Acetate, Trihydrate (NaFeEDTA); **20 mg**

FOLIC ACID
1300 µg

VITAMIN B12

Cyanocobalamine, Hydroxycobalamine

10 µg

In addition, it may also be fortified with following micronutrients, singly or in combination, at the level given in the table below:

ZINC - Zinc Sulphate
30 mg

VITAMIN A -
Retinyl acetate,
Retinyl Palmitate,
Retinyl Propionate

1500 µg RE

THIAMINE (VITAMIN B1) -
Thiamine hydrochloride,
Thiamine mononitrate

3.5 mg

RIBOFLAVIN (VITAMIN B2) -
Riboflavin, Riboflavin 5'-
phosphate sodium

4 mg

NIACIN -
Nicotinamide,
Nicotinic acid

42 mg

PYRIDOXINE (VITAMIN B6) -
Pyridoxine hydrochloride

5 mg



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WHEAT FLOUR⁺⁺⁺

Fortifying Wheat Flour

Fortification of wheat flour is a cost-effective public health intervention that can reduce Micro Nutrient Deficiencies (MNDs) and prevent birth defects such as Neural Tube Defects (NTDs) due to folic acid deficiency. Wheat flour fortification can potentially reduce iron deficiency and iron deficiency anaemia. Iron helps children develop physically and mentally, and improves the health of pregnant women. Adequate intake of vitamin B12 through fortified flour can improve mental growth and development of children. Therefore, the health impact of fortifying wheat flour with iron, folic acid and vitamin B12 is immense.

Wheat flour fortified as per the recommendations from FSSAI will provide one third of the recommended dietary allowance (RDA) of various essential vitamins and minerals.

The technology for fortifying wheat flour is simple and cost effective. This would require a premix feeder to add vitamins and minerals into flour and a blender to ensure uniform mixing of the micronutrients. Mills planning to undertake wheat flour fortification must also ensure adherence to internal and external quality control systems.

