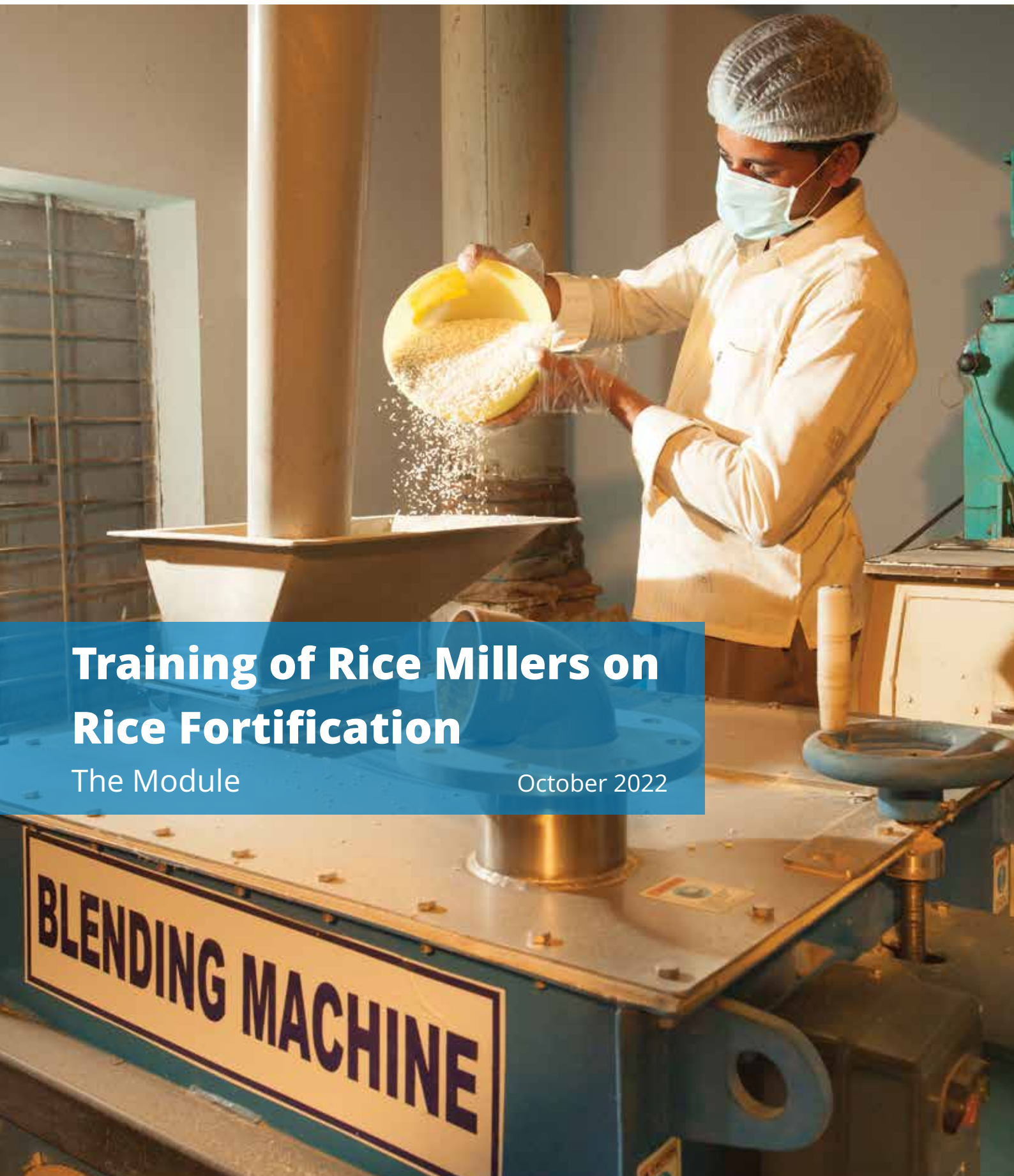




**Department of Food & Public Distribution**  
Ministry of Consumer Affairs, Food & Public Distribution  
Government of India



**World Food Programme**



# Training of Rice Millers on Rice Fortification

The Module

October 2022

**BLENDING MACHINE**



# **Training of Rice Millers on Rice Fortification**

The Module

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## FOREWORD

Fortification of staples with micronutrients is a scientifically proven, sustainable, and cost-effective complimentary strategy to address anaemia and other micronutrient deficiency disorders. In India, fortification of rice is being implemented under the 'food safety net programmes' across the country, wherein rice is fortified with three major micronutrients namely Iron, Folic Acid and Vitamin B12. The rice fortification initiative targets to reach over 800 million people including vulnerable groups of women and children with fortified rice through the social safety net programmes by 2024.

The rice millers play a crucial role in determining the success of this initiative and it is imperative to capacitate them with necessary knowledge in a structured and standardized manner. This Rice Millers' Training Module has been developed to enhance awareness and learning on rice fortification among rice millers and enable them to produce quality-assured fortified rice. This training module will be beneficial for rice millers in ensuring quality control of fortified rice produced and reached to the targeted beneficiaries. I hope, this module will be used by the Food Corporation of India (FCI), States and Development partners in building capacities of the rice millers.

I acknowledge the contribution of FCI, FSSAI and Testing labs for providing their valuable insights and United Nations World Food Programme for their dedicated efforts in developing this module. I am sanguine that this effort will help in building quality production ecosystem and ensure delivery of high-quality fortified rice to vulnerable groups. This unique effort will also ensure nutrition security and tangible health benefits to our citizens.

Dated: October 17, 2022

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(SUDHANSHU PANDEY)



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# Abbreviations

<b>BIS</b>	Bureau of Indian Standards
<b>DFFD</b>	Department of Food and Public Distribution
<b>DSME</b>	Department of School and Mass Education, Govt. of Odisha
<b>FCI</b>	Food Corporation of India
<b>FFRC</b>	Food Fortification Resource Centre
<b>FPS</b>	Fair Price Shops
<b>FRKs</b>	Fortified Rice Kernels
<b>FSSAI</b>	Food Safety Standards Authority of India
<b>ICDS</b>	Integrated Child Development Services Scheme (ICDS, also known as Anganwadi services)
<b>MoCAFPD</b>	Ministry of Consumer Affairs, Food and Public Distribution
<b>PM-POSHAN</b>	Pradhan Mantri Poshan Shakti Nirman Scheme (formerly Mid-Day Meal Scheme)
<b>PRI</b>	Panchayati Raj Institutions
<b>PDS</b>	Public Distribution System
<b>UNWFP</b>	United Nations World Food Programme
<b>VMP</b>	Vitamin Mineral Premix



# Glossary of Terms Used in Rice Fortification

- **Fortified Rice Kernels (FRK)** — Rice-shaped kernels containing vitamins and minerals produced through extrusion technology.
- **Fortified Rice** — Blend of fortified rice kernels and polished raw or parboiled rice in the ratio of 1:100 with a tolerance limit of  $\pm 10$  percent of the declared ratio.
- **Vitamin and Mineral Premix** — A combination of micronutrients (vitamins and minerals) in desired proportion ready for use as fortificant during the manufacture of fortified rice kernels.
- **Foreign Matter** — Any extraneous matter other than food grains, comprising of:
  - a. Inorganic matter, such as glass and metallic pieces, dust, sand, gravel, stones, dirt, pebbles, lumps or earth, clay, mud, animal filth, etc; and
  - b. Organic matter consists of husk, bran, chaff, straw, weed seeds, other inedible grains, etc.



# Purpose of the Training Module

The rice miller training module is intended to be used for the training of rice millers on rice fortification. Rice fortification as a technique is new to India and its rice millers. Further, Govt. of India is keen to scale up the distribution of “fortified rice” through its food safety net schemes as another weapon in its armory in its fight against malnutrition and to ensure optimal nutrient intake by the population. Hence, to ensure optimum knowledge, and its utilization by rice millers to enable them to produce quality-assured fortified rice, further for distribution under the food safety net schemes, WFP has developed this training module to enhance awareness, and learning on rice fortification among rice millers.

For purpose of convenience and easy learning, this module is divided in four chapters as below:

- Chapter One: Introduction to rice fortification
- Chapter Two: Pre-requisites to rice fortification
- Chapter Three: Roles and responsibilities of rice millers (Part-1)
- Chapter Four: Roles and responsibilities of rice millers (Part-2)

To facilitate better learning outcomes among the rice millers, each chapter is further divided into sub-sections as below:

- Key learning objectives
- Main learning content
- Summary section
- Questions
- Answers

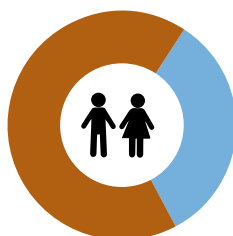
# Background

The Government of India with a focus on improving malnutrition and hunger prevalence among its population has launched multiple programs to address malnutrition, anemia, and micronutrient deficiencies. One such initiative is the introduction of fortified staple foods such as milk, oil, salt, wheat flour, and rice. Fortification of staple foods, when appropriately implemented, can be an efficient, simple, and an inexpensive strategy for supplying required vitamins and minerals to the diets of large segments of the population.

As evidenced from the recently released National Family Health Survey-5, 2019-2021; India has a high prevalence of anemia among all its population.

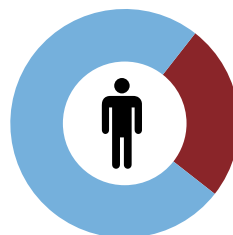
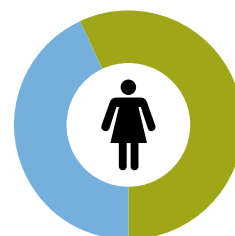
'Anemia' is a condition in which the number of red blood cells or the hemoglobin concentration within them is lower than normal. Hemoglobin is needed to carry oxygen and if you have too few or

abnormal red blood cells or not enough hemoglobin, there will be a decreased capacity of the blood to carry oxygen to the body's tissues which lead to symptoms such as fatigue, and shortness of breath etc.



**67.1%**  
Children aged  
6-59 months  
suffer from  
anemia

**57%**  
Women aged  
15-49 years  
suffer from  
anemia



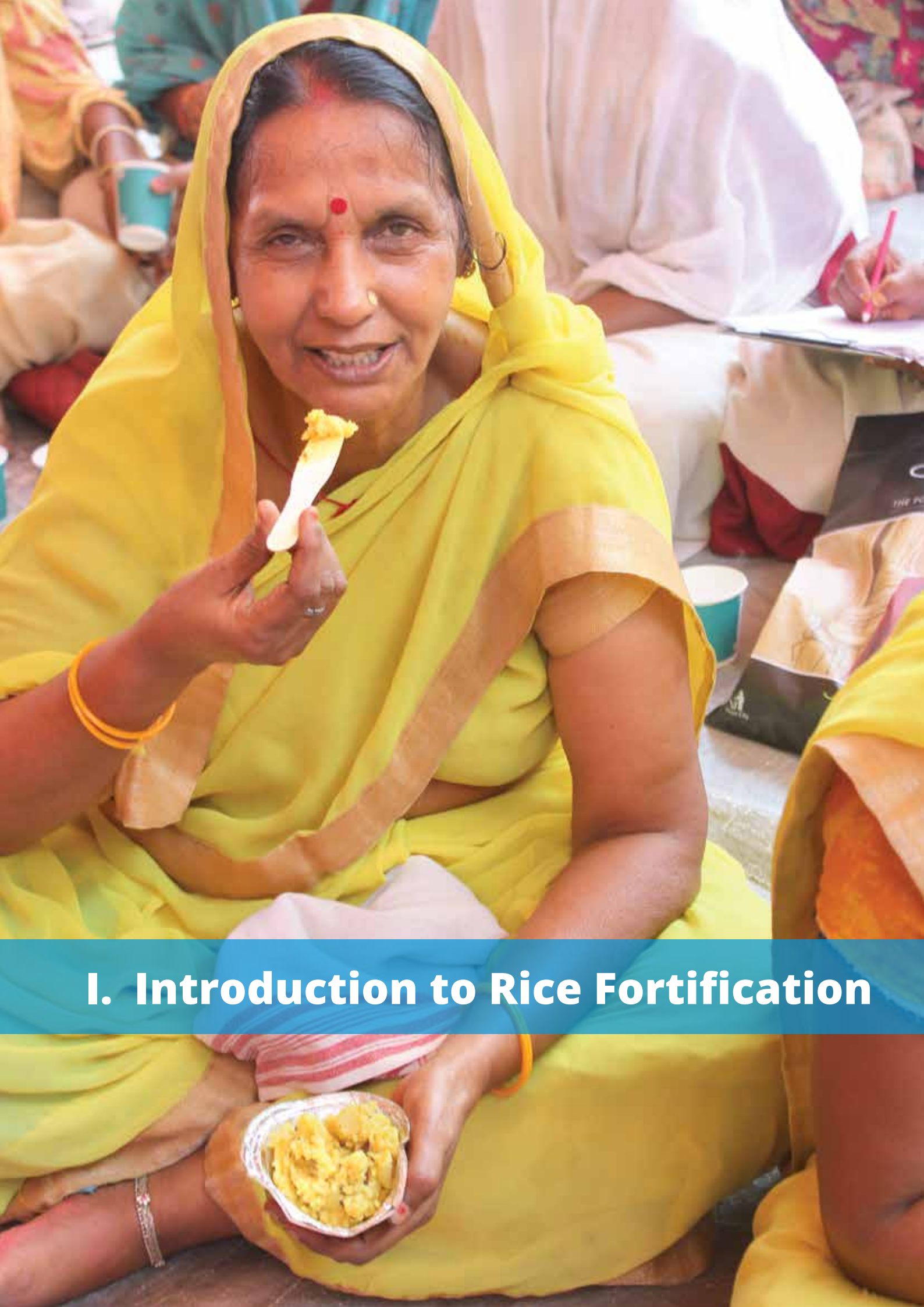
**25%**  
Men aged  
15-49 years  
suffer from  
anemia

## What is Food Fortification?

Food fortification is defined as the practice of adding vitamins and minerals to commonly consumed foods during processing to increase their nutritional value. It is a proven, safe, and cost-effective strategy for improving anemia and micronutrient deficiency, through diets fortified with vitamins and minerals.



India which has introduced "Iodized Salt" since the early 1970s as a 'public health strategy to address Iodine Deficiency Diseases and Goitre, is a classic example of fortified food. Rice fortification is the process of addition of micronutrients such as Iron, Folic acid, Vitamin B12, and other micronutrients to rice, thereby improving its nutritional content.



## I. Introduction to Rice Fortification

## Learning objectives

In this chapter, the rice millers will be able to understand:

- Why should we fortify rice?
- What is the process for rice fortification?
- What are key components of rice fortification?
- What are key policy support initiatives in the journey for rice fortification in the country?

## Why should we fortify rice?

**Rice - the key staple cereal:** As per the 68th round of the National Sample Survey, conducted in 2011-12, **65% of India's population consumes rice as a staple food.** Further, rural Indians eat more rice than urban Indians. On average, a rural Indian eats 6 kg of rice every month, as compared to around 4.3 kgs of wheat. An urban Indian consumes 4.5 kgs of rice per month, as compared to 4 kgs of wheat.



Under the Targetted Public Distribution System (TPDS), and Other Welfare Schemes (OWS) including Pradhan Mantri-Poshan Shakti Nirman (PM POSHAN scheme) and Integrated Child Development Services (ICDS) as well, **rice is the cereal of choice for distribution.** Milling and polishing of rice are commonly practiced in most developing countries including India, which leads to the loss of fat and micronutrient-rich bran layers to produce the commonly consumed starch white rice. Polishing further removes 75-90% of Vitamin B-1, Vitamin B-6, Vitamin-E, and Niacin. **Fortification of rice provides an opportunity to add the micronutrients lost during milling and polishing. It also provides an opportunity to add other micronutrients such as Iron, Zinc, Folic acid, Vitamin B-12, and Vitamin-A.**



## What are the benefits of different micronutrients?

Micronutrients	Role of different micronutrients and their benefits
Iron	Iron is needed for the formation of haemoglobin in red blood cells which transport oxygen around the body. It is also required for energy metabolism and has an important role in the immune system.
Vitamin B9 (Folic acid)	Folate is important for the formation of healthy red blood cells. It is also needed for the nervous system and specifically for the development of the nervous system in unborn babies. It can reduce the risk of neural tube defects in a fetus, e.g. spina bifida
Vitamin B12 (Cyanocobalamin)	Vitamin B12 is needed for the formation of red blood cells and the normal functioning of the nervous system. Vitamin B12 also helps to release energy from food. (prevents anaemia)
Vitamin A	Vitamin A is a fat-soluble vitamin needed for the normal structure and functioning of the cells in the skin and body linings, e.g. in the lungs. This vitamin also helps with vision in dim light, as well as keeping the immune system healthy
Vitamin B1 (Thiamine)	Thiamin is needed for the release of energy from carbohydrate. It is also involved in the normal functioning of the nervous system and the heart..
Vitamin B2 (Riboflavin)	Riboflavin is needed for the release of energy from carbohydrate, protein and fat. It is also involved in the transport and metabolism of iron in the body and is needed for the normal structure and function of skin and body linings
Vitamin B3 (Niacin)	Niacin is involved in many bodily processes and it's important to help our cells grow and function. Our bodies also use niacin to convert nutrients into energy, to make fats and cholesterol and to form and repair our genetic material (DNA).
Vitamin B6 (Pyridoxine)	Vitamin B6 is a vitamin that benefits the central nervous system and metabolism. Its roles include turning food into energy and helping to create neurotransmitters, such as serotonin and dopamine.
Zinc	Zinc is an essential mineral found naturally in some foods and in very small amounts in the body, mostly in muscles and bones. It is essential for optimum growth and reproduction. Its role in treatment of childhood diarrhea is well recognized

## What is the process for rice fortification?

Rice fortification is a two-step process, which involves the production of fortified rice kernels and their further blending with regular rice in a ratio varying between 0.5% - 2%. (Commonly used ratio 1:100)

Fortified Rice Kernels (FRKs) are manufactured by combining rice powder and micronutrients, using appropriate extrusion technology. Fortified Rice Kernels resemble milled rice in size, shape, and color but contain additional vitamins and minerals that retain their **maximum** micronutrient content when washed and boiled in water.

When these kernels are blended with non-fortified (regular) rice, typically at a ratio of 1:100, the result is Fortified Rice that is nearly identical to regular rice in aroma, taste, and texture. It is then distributed for regular consumption.

## Summary

- Food fortification is defined as the practice of adding vitamins and minerals to commonly consumed foods during processing to increase their nutritional value. “Iodized Salt” introduced since the early 1970’s as a ‘public health strategy’ to address Iodine Deficiency Diseases and Goitre, is a classic example of fortified food. Rice fortification is a similar initiative to improve nutritional value of rice.
- Low dietary diversity and poor intake of nutrient-rich food, with high prevalence of anemia (especially women and children) remain a challenge in India. Rice, which is one of the most widely consumed cereals in India (nearly 65% population consumes rice), offers an excellent opportunity to address anemia and other micronutrient deficiency concerns, if fortified.
- Milling rice which leads to the loss of fat and micronutrient rich bran layers to produce the commonly consumed starch white rice. Polishing further removes 75-90% of Vitamin B-1, Vitamin B-6, Vitamin-E and Niacin.
- Rice fortification is a two-step process, which involves the production of fortified rice kernels and their further blending with regular rice in a ratio varying between 0.5% - 2%. Fortification of rice provides an opportunity to add the micronutrients lost during milling and polishing. It also provides an opportunity to add other micronutrients such as Iron, Zinc, Folic acid, Vitamin B-12, and Vitamin A
- Rice fortification as a “policy initiative” is very well supported by Government of India, with the launch of standards for fortified foods by FSSAI in 2018, acknowledged by NITI Aayog in its National Nutrition Strategy, 2017; key element of Poshan Abhiyan and Poshan 2.0; and Department of Food and Public Distribution lead for implementing the centrally sponsored pilot scheme for distribution of fortified rice through PDS in select states / districts across the country.
- Govt. of India approved the supply of fortified rice through all its food safety net schemes such as Targeted Public Distribution System (TPDS) and Other Welfare Scheme including Integrated Child Development Services (ICDS) Scheme, PM-POSHAN (erstwhile mid-day meal scheme) in a phase-wise manner by March 2024.

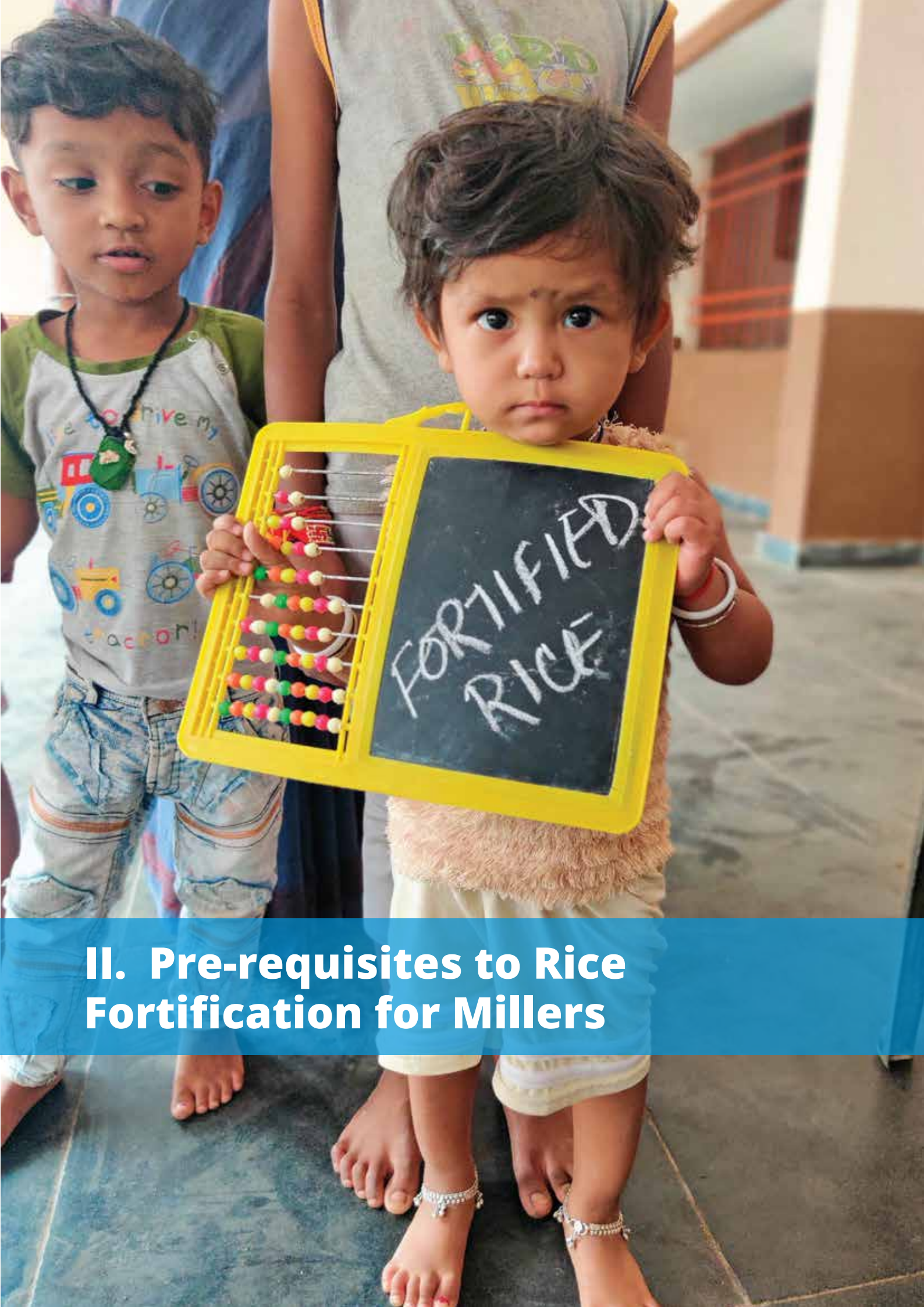


## Questions

1. Rice fortification is a two-step process, which involves the production of \_\_\_\_\_ and their further blending with regular rice in a ratio varying between 0.5% - 2% (Commonly used ratio 1:100).  
Select the correct answer:
  - a. Fortified rice
  - b. Rice flour
  - c. Fortified rice kernels (FRKs)
  - d. Vitamin-Mineral Premix
2. The key reasons to include fortified rice in the strategy to address anemia and micronutrient deficiencies are:  
Select the incorrect options:
  - a. High Prevalence of anemia
  - b. High rice consumption
  - c. Low dietary diversity and poor intake of micronutrients
  - d. Commonly consumed rice is rich in vitamins and minerals
3. Rice fortification as a strategy to address anemia is acknowledged in  
Select all correct options:
  - a. Poshan Abhiyan and Poshan 2.0
  - b. National Nutrition Strategy
  - c. AnemiaMukt Bharat
  - d. All the above
4. Milling of rice leads to the loss of fat and micronutrient-rich bran layers to produce the commonly consumed starch white rice. Polishing further removes 75-90% of Vitamin B-1, Vitamin B-6, Vitamin-E, and Niacin  
Select the correct option for the above statement:
  - a. True
  - b. False
5. Food fortification is defined as the practice of adding vitamins and minerals to commonly consumed foods during processing to increase their nutritional value. It is a proven, safe, and cost-effective strategy for improving diets and for the prevention and control of micronutrient deficiencies.

Select the correct option for the above statement:

- a. Incorrect
  - b. Correct
6. Following are few of the key components of rice fortification: (select the correct options)
- a. Production of fortified rice by rice millers
  - b. Quality Control and Quality Assurance
  - c. Capacity building and training
  - d. All the above
7. Iodized salt is an example of fortified food?
- a. No
  - b. Yes
8. The Government of India plans to scaleup fortified rice through all its food safety net schemes such as Integrated Child Development Services Scheme (ICDS), PM-Poshan (formerly mid-day meal scheme), and Targeted Public Distribution System (TPDS) in a phase-wise manner till 2024. To ensure, the delivery of quality assured fortified rice so that, the desired impact on anemia prevalence is observed, the capacity building of rice millers on rice fortification is a very important factor in its success.
- Is the above statement true or false?
- a. True
  - b. False
9. FSSAI has already developed and operationalized standards for fortified rice in the country?
- a. Yes
  - b. No
10. Rice fortification is a scientifically proven, evidence-based nutrition intervention?
- a. No
  - b. Yes



## II. Pre-requisites to Rice Fortification for Millers

## Learning objectives

In this chapter, we shall discuss the pre-requisites such as infrastructural and legal requirements for rice millers to produce fortified rice:

- Introduction and basics of the raw materials
  - Fortified rice kernels, rice flour, Vitamin-mineral premixes, additives, water
  - Fortified rice kernel specifications
- What are the mandatory license requirements required by rice millers to produce fortified rice?
  - Valid FSSAI License (under Category 6.1)
  - Endorsement of +F Logo
- What are the changes / upgrades required by rice millers to the mill infrastructure?
  - Integration of step on fortification in the rice milling process
  - Setting up blending unit for fortification

## Introduction and basics of the raw materials

Fortified Rice Kernels (FRK) are rice-shaped kernels produced through extrusion technology with a mixture of rice flour and vitamin and mineral premix. Fortified rice kernels are prepared using the following ingredients which must comply with the specifications given below:

**Rice Flour:** Rice flour used for preparation of fortified rice kernels shall be white to off-white powder. It shall be free flowing with characteristic odour and no off odour. It shall be free from foreign matter and must conform to the following standards:

Particle size (%) not less than	90% passes through 60 mesh
Moisture (%) by mass, not more than	14.0
Acid Insoluble ash (%) by mass (on dry basis), not more than	0.15
Alcoholic acidity, (%) not more than	0.18
Uric acid, mg/kg, not more than	100.0
Yeast and Mould count (cfu/g)	1 x 10 <sup>2</sup>
Aerobic plate count (cfu/g)	1 x 10 <sup>4</sup>

**Vitamin and Mineral Premix:** It is a combination of micronutrients (vitamins and minerals) in desired proportion ready for use as fortificant in the manufacturing of fortified rice kernels. The vitamin and mineral premix should conform to the recommended specifications given as per the **Draft Food safety and standards amendment regulations, 2022 w.r.t. fortified rice kernels dated 23<sup>rd</sup> June 2022.**

- Vitamin and mineral premix shall be free flowing powder without any lumps, made from food grade form of Vitamins and minerals and shall contain vitamins and minerals in specified proportions.
- Vitamin and mineral premix shall be white to off white in colour with faint odour. It shall be easy to use and free from any objectionable or undesirable colour, odour and foreign matter
- Vitamin and mineral premix shall be manufactured in premises built and maintained under hygienic conditions.
- Vitamin and mineral premix shall conform to the following physico chemical requirements

Moisture (%) by mass, not more than	11.0
Particle size of micronized ferric pyrophosphate (D90 particles), $\mu\text{m}$	1 – 3
Yeast and Mould Count (cfu/g)	$1 \times 10^2$
Aerobic plate count (cfu/g)	$1 \times 10^4$

- Vitamin and mineral premix shall contain the following micronutrients, which shall be minimum 95% of the stated value on the label in case of premix concentrate:
  - a. Micronized ferric pyrophosphate or sodium iron (III) ethylene diamine tetraacetate trihydrate (sodium ferredetate NaFeEDTA)
  - b. Folic acid; and
  - c. Cyanocobalamine or hydroxocobalamin.
- Vitamin and mineral premix may also contain the following micronutrients, which shall be minimum 95% of the state value on the label in case of premix concentrate.
  - a. Zinc Oxide (ZnO)
  - b. Retinyl palmitate
  - c. Thiamine hydrochloride, or thiamine mononitrate
  - d. Ribflavin or Riboflavin 5-phosphate sodium
  - e. Nicotinamide or Nicotinic acid and
  - f. Pyridoxine hydrochloride



In addition to the above, vitamin and mineral premix shall comply with the provisions of the Food Safety and Standards (Contaminants, Toxins and Residues) Regulation, 2011.

In addition, the Bureau of Indian Standards (BIS) has also published gazette standards for vitamin mineral premix IS 17781 : 2021, which may be referred.

**Additives:** Permitted food-grade emulsifiers/ hydrocolloids/ binding agents)/acid regulators/ antioxidants should be used as per the allowances prescribed under Food Safety and Standards (Food Products Standards and Food Additives) Regulation, 2011.

**Water:** Potable water as per IS 10500 should be used for the preparation of fortified rice kernels.

**Fortified rice kernels (FRKs)** are rice shaped kernels containing vitamins and minerals produced through extrusion. The FRKs shall resemble rice as closely as possible in final attributes and shall be free from off odour. FRKs and shall be manufactured in premises built and maintained under hygienic conditions following GMP/GHP protocols as specified in the **Draft Food safety and standards amendment regulations. 2022 w.r.t. fortified rice kernels dated 23<sup>rd</sup> June 2022** and shall conform to the following physico-chemical requirements.

#### Fortified Rice Kernels Specifications

S. No.	Parameter	Specification
1	Moisture content, percent by mass, Max	12.0
2	Broken fortified rice kernels, percent by mass, Max	1.0
3	Foreign matter, percent by mass, Max	0.001
4	Damaged kernels including heat damaged	Absent
5	Discoloured grains	Absent
6	Chalky grains	Absent
7	Admixture with any other grains including non-fortified rice	Absent
8	Uric acid (mk/kg) on mass basis, not more than	100.00
9	Yeast and mould count (cfu/g)	1 x 10 <sup>2</sup>
10	Aerobic plate count (cfu/g)	1 x 10 <sup>4</sup>

Fortified rice kernels shall also conform to the following requirements of fortificants

No.	Micronutrient	Chemical Form of Micronutrient	Fortification Level as per 1: 50 Blending Ratio	Fortification Level as per 1: 100 Blending Ratio
1	Iron, mg/100g	Micronized ferric pyrophosphate Or	140 – 212.5	280 to 425
		Sodium iron ethylenediamine tetraacetate trihydrate (sodium feredetate- NaFeEDTA)	70 – 106.25	140 to 212.5
2	Folic acid, µg/100g	Folic acid	375 – 625	750 to 1250
3	Vitamin B12, µg/100g	Cyanocobalamine or Hydroxocobalamin	3.75 – 6.25	7.5 to 12.5

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

No.	Micronutrient	Chemical Form of Micronutrient	Fortification Level as per 1: 50 Blending Ratio	Fortification Level as per 1: 100 Blending Ratio
1	Zinc mg/100 g	Zinc Oxide	50 – 75	100 – 150
2	Vitamin A, µg RE / 100 g	Retinyl palmitate	2500 – 3750	5000 – 7500
3	Thiamine (Vitamin B1) mg/100 g	Thiamine hydrochloride or Thiamine mononitrate	5 – 7.5	10 – 15
5	Riboflavin (Vitamin B2) mg/100 g	Riboflavin or Riboflavin 5-phosphate sodium	6.25 – 8.75	12.5 – 17.5
5	Niacin (Vitamin B3), mg/100 g	Nicotinamide or Nicotinic acid	62.5 – 100	125 – 200
6	Pyridoxine (Vitamin B6) mg/100 g	Pyridoxine hydrochloride	7.5 – 12.5	15 – 25

In addition to the above, fortified rice kernels shall comply with the provisions of Food Safety and Standards (Contaminants, Toxins and Residues) Regulation, 2011 as specified.

Fortified rice kernel shall **ONLY BE SOLD FOR INDUSTRIAL PURPOSES FOR MANUFACTURING FORTIFIED RICE**. It shall neither be sold in loose form nor to be sold directly to the consumer.

Each package of fortified rice kernel shall carry the following statements:

- The ratio in which FRK is to be blended with rice kernels – 1:50 or 1:100

- “NOT TO BE CONSUMED AS AN INDEPENDENT PRODUCT”
- NOT TO BE CONSUMED AS SUBSTITUTE FOR RICE OR RICE FLOUR”

In addition, the Bureau of Indian Standards (BIS) has also gazetted standards for vitamin mineral premix IS 17782 : 2021, which may additionally be referred.

## What are the mandatory license requirements required by rice millers to produce fortified rice?

### Valid FSSAI License (under Category 6.1)

As an authorized rice miller partaking in the production (milling) of rice, the miller is expected to be registered and licensed by FSSAI for the production of milled rice. If the concerned rice miller already holds a valid FSSAI license under category 6.1 (refer to image below), then – no additional changes are required to the existing valid FSSAI license.

0.6 - Cereals and cereal products, derived from cereal grains, from roots and tubers, pulses, legumes and pith or soft core of palm tree, excluding bakery wares of food category 7.0	06.1 - Whole, broken, or flaked grain, including rice	Rice (0.6.1)	2.4.6 (24)
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Refer to the link below for more details about FSSAI License registration:

Suggested link: <https://foscoss.fssai.gov.in/>

### Endorsement of “+ F” (plus F) Logo

The Food Safety and Standards Authority of India (FSSAI) in its Food Safety and Standards (Fortification of Foods), First Amendment Regulation 2020 has mandated the +F (plus F) logo on packets of fortified food staples such as milk, rice, oil, wheat, and double fortified salt to help people identify fortified products.

The fortification logo has been designed as a, “+ sign” and “F” surrounded by a circle, the significance of which is as below:

- Square in this symbol means **completeness**.
- Plus (+) sign indicates **micronutrients added** to daily meals.
- Ring around F means ring of **protection of good health**
- The blue color symbolizes **purity, health, and active life**.



आयरन, फोलिक एसिड और  
विटामिन बी१२ से फोर्टिफाइड

संपूर्ण पोषण  
स्वस्थ जीवन



**Fortified with Iron, Folic  
acid and Vitamin B12**

**SAMPOORNA POSHAN  
SWASTH JEEVAN**



The logo essentially is a **visual symbol** that will enable people to identify that a certain food is fortified. Dimensions of the logo and color codes must follow schedule II of FSSAI Gazette Notification on Standards for Food Fortification; dated 2nd August 2018, **more details can be accessed here at the link provided below:**

*Suggested Link: [https://fssai.gov.in/upload/uploadfiles/files/Compendium\\_Food\\_Fortification\\_Regulations\\_04\\_09\\_2021.pdf](https://fssai.gov.in/upload/uploadfiles/files/Compendium_Food_Fortification_Regulations_04_09_2021.pdf)*

### **Important Note**

Printing of **+ F** logo on the labels / gunny bags after successful endorsement by FSSAI is a **statutory requirement, and the manufacturer must strictly adhere to it.** The concerned state authorities while performing the random checks on the manufacturers of fortified food products will take the necessary action in case any deviation is found.

Fortified rice manufacturer must endorse for fortified rice on existing FSSAI licence and registration system on FSSAI **website (refer Annexure-II for more details)**. Upon successful endorsement and validation of the plus F logo, the manufacturer is allowed to print the endorsed logo on the label / gunny bags of fortified rice. It must be noted that, **+F Logo will only be given to rice millers and not to FRK manufacturers.**

While applying for endorsement, the manufacturer is required to upload the **latest (not older than 6 months)** test reports showing the levels of fortificants in the fortified food product from a FSSAI notified, NABL accredited laboratory against product for **+F** endorsement to substantiate the claim made for fortification.

**“The +F endorsement certificate is valid, only till license (FSSAI License No.) is valid or the product in license is endorsed”**

The grant of **+F** endorsement certificate by the concerned Designated Officer (DO) or Registering Authority (RA) is based on the verification of the application submitted by the manufacturer.

**What are the changes/upgrades required by rice millers to the milling infrastructure for production of fortified rice?**

It is important to note that, **rice millers are only required to procure fortified rice kernels (FRKs) and blend them locally within their rice mill premises.** To produce fortified rice, rice millers shall only setup the necessary blending facility for uniform mixing of fortified rice kernels (FRKs) with regular rice. Fortified rice kernels (FRKs) are readily available in the open market for sale by FSSAI registered/ licensed FRK manufacturers as per the custom requirement of rice millers. **The list of such FSSAI Licensed Fortified rice kernel (FRK) manufacturers can be accessed at the link provided here:**

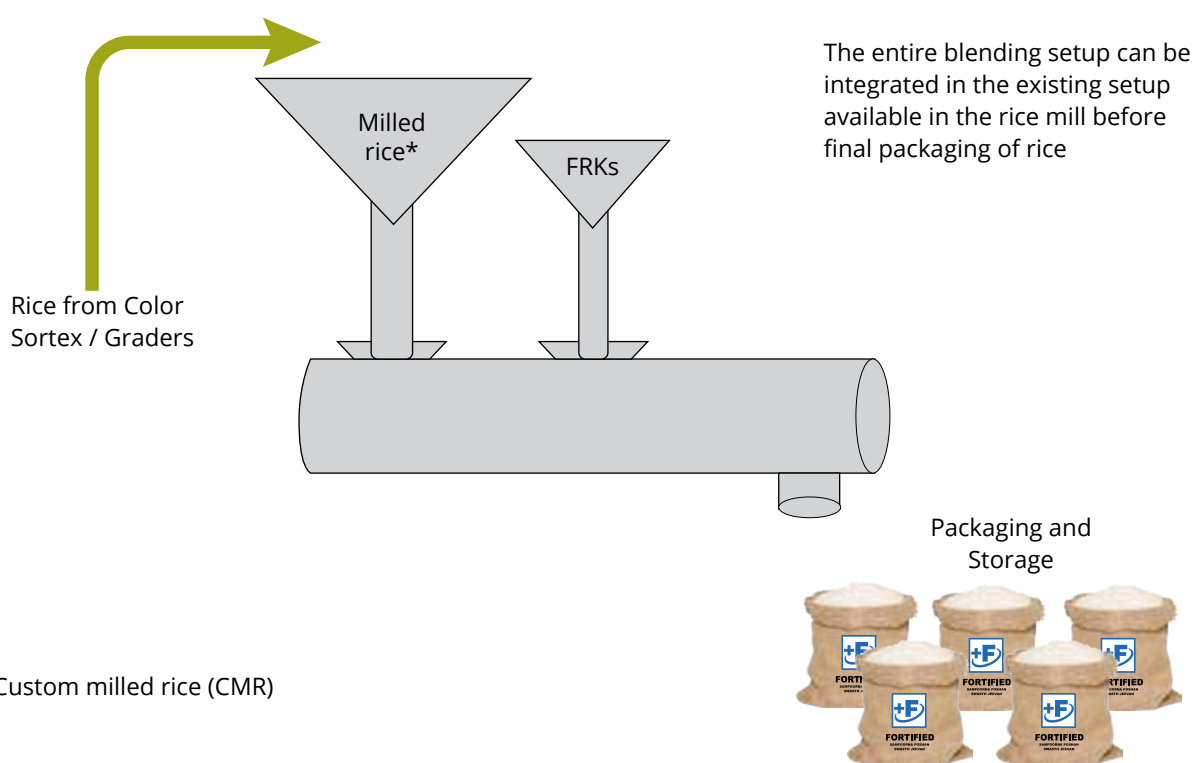
*<https://ffrc.fssai.gov.in/register>*

Rice millers, although can upgrade their premises to fortified rice kernel (FRK) manufacturing, as per their respective capacities, this is not a pre-requisite to producing fortified rice.

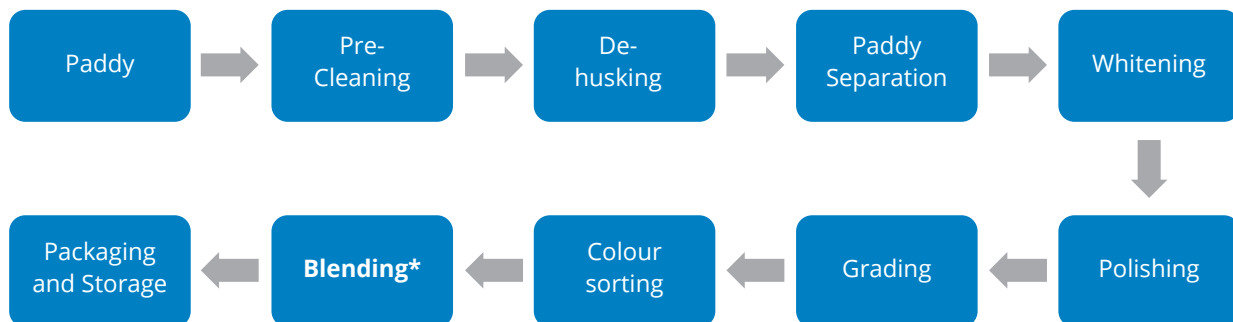
**Infrastructure changes: Integration of the step on fortification in the rice milling process.**

A stepwise indication of the usual processes involved during the post-harvesting of paddy in a rice mill is indicated in the figure alongside.

The step of fortification i.e., feeding rice and FRKs to the blending machine must be introduced after the material (processed rice) passes the color sortex machine (or the grader in case sortex is absent), followed by bagging and storage of fortified rice.



\*Custom milled rice (CMR)

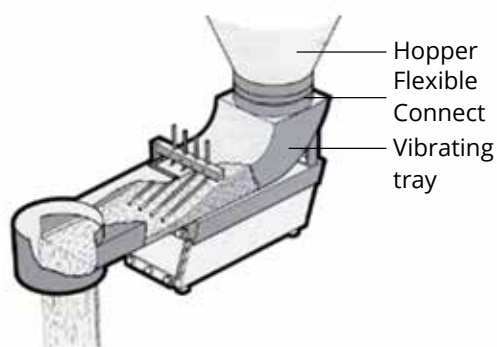


\*Blending FRKs with regular rice to produce fortified rice

### Basic concepts and types of blenders:

To produce fortified rice, rice millers need to equip themselves with a blending system with components as follows:

1. The blending unit shall contain the hopper, lid, and screw/ribbon/paddle of suitable capacity, with an agitator capable of uniform mixing. The agitator should not damage FRK and raw rice. The blender should have a magnet to trap metal impurities and a suitable size electric motor installed to provide the required 'RPM' to operate the Blender.
2. Control system for feeding the FRK and regular rice at a predefined rate. The feeding rate should be declared by the manufacturer. The blending unit shall have a control system for FRK feeding, rice feeding, and mixer with an LCD/LED/HMI screen to control process parameters. It may also have supervisory control and data acquisition (SCADA) system to record FRK and rice feed rate, output capacity, etc.
3. The output of the blending unit (FRK: rice) shall be in a ratio of 1: 100. This shall be confirmed/verified at the periodic interval through appropriate procedures. The output of the blending unit shall be free from metal or other foreign impurities.



Blending equipment may be of the following types:

- a. Continuous screw/ribbon blender
- b. Drum blender
- c. Continuous drum blender
- d. Paddle blender and
- e. Octagonal blender

When selecting the blenders, available blenders should be evaluated based on several criteria, including existing set-up of the operations, production output where the fortification needs to be integrated:

- Choice of continuous/batch blending depends on the ease to integrate the equipment to current settings and choice of operations
- Rice mill capacity/ output
- Cost of equipment

- Operational ease
- Effectiveness of blend (homogeneity achieved), precision mixing, time of blending
- Gentle mixing (low broken percentage).
- Suitability to grain blending (potential damage to kernel or product loss)
- Maintenance and operational costs
- Space available in the rice mill

As per the Bureau of Indian Standards (BIS) IS 17854: 2022 – Equipment for manufacture of fortified rice, the material of construction for parts of the blending equipment must conform to the below standards:

Component	Grade of material	Conforming to Indian standard
Hopper	Stainless steel grade X04Cr19Ni9	IS 6911
Lid	Stainless steel grade X04Cr19Ni9	IS 6911
Screw / Ribbon	Stainless steel grade X04Cr19Ni9	IS 7283
Paddle	Stainless steel grade X04Cr19Ni9	IS 6911
Containers	Stainless steel grade X04Cr19Ni9	IS 6911
Agitator	Stainless steel grade X04Cr19Ni9	IS 6911

*Note 1) Other materials for different components may also be used subject to agreement between the manufacturer and purchaser, and the same shall be declared by the manufacturer. 2) For continuous operations suitable conveying system shall be provided with food-grade material wherever the FRK, fortified rice, and rice are in contact.*

Few commonly used blenders are described below:

1. **Twin Shaft Paddle Batch Mixer (E.g., Forberg type):** Twin Shaft Paddle Mixer is a Batch Mixer with two parallel drums, each with counter-rotating shafts that are equipped with paddles fixed at a predetermined angle. It is the most common and effective batch blending system suitable for medium-capacity rice mills and can produce fortified rice in small batches ranging from 100 kg to 500 kg per hour or more. The blending system includes a horizontal mixing drum with paddle arrangement, vibratory dozer, bucket elevator, and conveyor. This is a fully automatic system though requires limited intervention from the manual labor to feed the FRK at regular intervals but requires special training to execute the operation using the PLC panel.



2. **Rotary blender:** The simplest combination of industrial rice length grader (as Blender) and electronic dozer to handle the uniform feeding as per the gravity flow of the rice mill. Blending is carried out with existing rice graders in the traditional rice-milling system. FRK is fed to the grading cylinder using a pre-calibrated vibratory feeder (dozer). Likewise, the flow rate of rice is also adjusted with a pre-calibrated vibratory feeder, such that, the ratio of 1:100 required for fortified rice is achieved. The mixture of rice and FRK stirs inside the length grader several times before discharge.



The length grader, by its grading mechanism, churns out the mix separating the broken grains from the mix, and this churning helps in the uniform distribution of FRK in the final fortified rice obtained at the outlet of the length grader. The vibratory feeder should be synchronized with the flow of regular rice (1:100 ratio) in the inlet bucket elevator. It is recommended to pre-calibrate the vibratory feeder and assess the quality of the blend (with blending efficiency tests) regularly during operation to verify the blending homogeneity.

#### **Use of modified cylindrical graders for blending**

Cylindrical grader already available with the rice mills could be modified to a rotary blender by replacing the mesh of the grader with the solid non-porous metal (Mild steel/Galvanised Iron/Stainless Steel) sheet at the outer circumference and should be placed after the sortex step (or others as appropriate in case sortex is not available) of the milling process.

#### **Cleaning and maintenance of blender and other equipment**

All the equipment used for blending operations in a rice mill should always be maintained clean, dry, and hygienic. The cleaning should be done as explained below:

- i. Hoppers, silos, feeders, and blenders should be cleaned using compressed air produced by a compressor with an electric motor of around 2-3 HP. Further, the cleaning should be done using a clean and dry duster.
- ii. All the equipment should be kept in the "OFF" position before starting the cleaning process.
- iii. The cleaning should be done twice a day, one before starting the blending operations and another at the end of the day once the work has finished.
- iv. The rice mills should prepare an equipment cleaning schedule and train their operators to follow the same.
- v. The rice miller should ensure an annual maintenance contract with the vendor and get the maintenance of this equipment done once in 6 months by the engineer.
- vi. After fumigation, the equipment should not be used for at least 48 hrs and the rice miller should ensure to do the deep cleaning of the equipment before using it for production of fortified rice.

## Summary

- To produce fortified rice, rice millers are only required to procure fortified rice kernels (FRKs) and blend them locally within their rice mill premises. For blending, the millers shall setup the necessary blending facility within their premises. The step of fortification i.e., feeding rice and FRKs to the blending machine must be introduced after the material (processed rice) passes the colour sortex machine (or the grader in case sortex is absent), followed by bagging and storage of fortified rice.
- Mandatory License Requirements:
  - **FSSAI License (Food Category, 6.1):** As an authorized rice miller partaking in production (milling) of rice, the miller is expected to be registered and licensed by FSSAI for production of milled rice. If the concerned rice miller already holds a valid FSSAI license under category 6.1 (refer image below), then – no additional changes are required to the existing valid FSSAI license
  - **Endorsement of “+F” (plus F) Logo:** Printing of + F logo on the labels / gunny bags after successful endorsement by FSSAI is a statutory requirement, and the manufacturer must strictly adhere to it. “The +F endorsement certificate is valid, only till license (FSSAI License No.) is valid or the product in license is endorsed”
- To produce fortified rice, rice millers need to equip themselves with a blending system with components as follows:
  - The blending unit shall contain the hopper, lid, and screw/ribbon/paddle of suitable capacity, with agitator capable of uniform mixing. The agitator should not damage FRK and raw rice. Blender shall be provided with a magnet to trap metal impurities and suitable size of electric motor installed to provide required ‘RPM’ to operate Blender.
  - Control system for feeding the FRK and regular rice at a predefined rate. The feeding rate shall be declared by the manufacturer. The blending unit shall have control system for FRK feeding, rice feeding and mixer with LCD/LED/HMI screen to control process parameters. It may also have supervisory control and data acquisition (SCADA) system to record FRK and rice feed rate, output capacity, etc.
  - Blending equipment may be of the following types: a) Continuous screw/ribbon blender b) Drum blender c) Continuous drum blender d) Paddle blender and octagonal blender. Alternately, an existing cylindrical grader (spare) can also be converted into a rotary blender and used for rice fortification operations.

## Questions

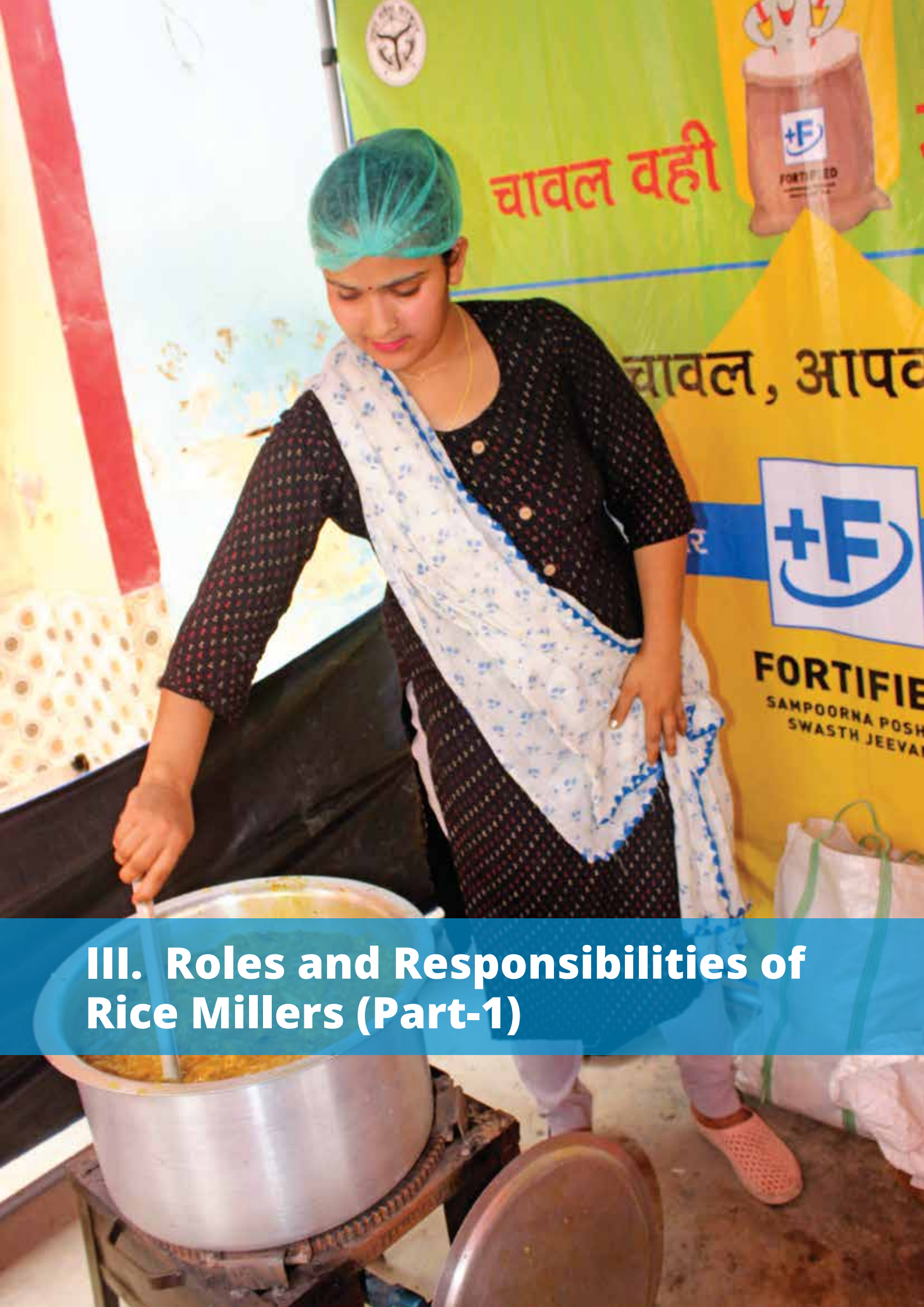
1. Ms/ Padmashri Rice Mills in Chandauli district of Uttar Pradesh intends to start production of fortified rice and supply to the Govt. of Uttar Pradesh. The rice miller has a valid FSSAI License for production of rice under category 6.1. What are other License requirements (mandatory) that, the miller must undergo, choose all correct options from below:
  - a. Apply for a new license to produce fortified rice
  - b. No action needed, the miller can produce fortified rice without any further action
  - c. Apply for endorsement for use of **+F** (fortified) logo based on the existing valid FSSAI license
  - d. None of the above
2. To produce fortified rice, rice millers are only required to procure fortified rice kernels (FRKs) and blend them locally within their rice mill premises. FRKs can be purchased from FSSAI Licensed FRK suppliers.  
Select the correct option for the above statement:
  - a. True
  - b. False
3. A rice miller with an existing valid FSSAI License for rice milling (under Food Category 6.1.) can start production of fortified rice by setting-up blending equipment and applying for endorsement of **+F** logo upon submission of independent **FSSAI's notified** NABL accredited laboratory report on the FSSAI website.  
Select the correct option for the above statement:
  - a. Correct
  - b. Incorrect
4. As per the Bureau of Indian Standards (BIS), all contact surfaces for FRK, rice or fortified rice must be made with food grade material (preferable Stainless Steel).  
Select the correct option for the above statement:
  - a. Correct
  - b. Incorrect
5. The step of fortification i.e., feeding rice and FRKs to the blending machine must be introduced after the material (processed rice) passes the colour sortex machine (or the grader in case sortex is absent), followed by bagging and storage of fortified rice.  
Select the correct option for the above statement:
  - a. True
  - b. False

6. Following statements are correct about the Fortified Logo (+F):
- Square in this symbol means **completeness**. Plus (+) sign indicates **micronutrients fortified to daily meals**.
  - The logo essentially, is a visual symbol that will enable people to identify that a certain food is fortified.
  - Printing of + F logo on the labels / gunny bags after successful endorsement by FSSAI is a **statutory requirement**, and the manufacturer must strictly adhere to it.

Answer the below questions:

- All statements (i. ii and iii) are correct
  - Use of fortified logo on fortified rice bags is not statutory but is optional., while other statements (i. and ii.) are correct
  - Only Statement i. is correct
  - None of the statements are correct.
7. Cylindrical grader already available with the rice mills could be modified to a rotary blender by replacing the mesh of the grader with the solid non-porous metal (Mild steel/Galvanised Iron/ Stainless Steel) sheet at the outer circumference.  
Select the correct option for the above statement:
- Correct
  - Incorrect
8. Key parameters, which determine the type of blending machine to be installed are mentioned below, select the correct options:
- Effectiveness of blend (homogeneity achieved), precision mixing, time of blending,
  - Gentle mixing (low broken percentage), and suitability to grain blending (potential damage to kernel or product loss)
  - Choice of continuous/batch blending depends on the ease to integrate the equipment to current settings and choice of operations
  - All the above
9. "The +F endorsement certificate is valid, only till license (FSSAI License No.) is valid or the product in license is endorsed"  
Select the correct option for the above statement:
- Correct
  - Incorrect
10. It is mandatory for Gunny bags / Labels for fortified rice bags to carry the fortified logo (+F) logo.  
Select the correct option for the above statement:
- False
  - True





### III. Roles and Responsibilities of Rice Millers (Part-1)

## Learning objectives

In this chapter, we shall discuss the key roles and responsibilities of rice millers towards different aspects of rice fortification as below:

- How can rice millers procure fortified rice kernels (FRKs)?
- What is the guidance for receipt and storage of fortified rice kernels and fortified rice?
- What are specific measures for the storage area in the rice mill?
- What are measures to be taken during production of fortified rice?
- What are specific instructions for packaging and labelling of fortified rice?

## How can rice millers procure FRKs?

Fortified rice kernels (FRKs) can be directly procured by rice millers from FSSAI Licensed FRK suppliers, spread across the country. As of 15th Nov 2022, there are 533 FRK suppliers available across all parts of the country. **The list of such FSSAI Licensed Fortified rice kernel (FRK) manufacturers can be accessed at the link provided here: <https://ffrc.fssai.gov.in/register>**

The modality for procurement of fortified rice kernels (FRKs) may differ by state, with rice millers bearing the cost of FRKs (either way adjusted in the final payment to millers). However, **the concerned State Government / Government counterparts must have an oversight of the entire procurement process for fortified rice kernels (FRKs)**, whether initiated via an official tender or led by the rice miller's consortium.

### Quality testing of raw materials (fortified rice kernels and milled rice):

In this section, we will talk about quality testing of fortified rice kernels (FRKs) since these are the key raw materials used during the production of fortified rice. Below are a few pointers to ensure the appropriate quality of procured FRKs:

- The FRK manufacturer must ensure that **the fortified rice kernels (FRKs) match the base rice (milled rice in which FRKs will be blended) in terms of length, width, color, and cooking qualities**. If required, samples of milled rice can be shared in advance with the manufacturers along with the production schedule
- Before dispatch of the consignment, the supplier shall share a **500-gram sample of the FRK** from the consignment under production before dispatch to the rice miller
- After receiving the FRK, the bags should be stored either on pallets or tarpaulin and away from the wall. Approx. 10% of the bags should be sampled and the standard kernel count test should be performed and recorded for future reference i.e., for comparing the results of the blending efficiency test in fortified rice

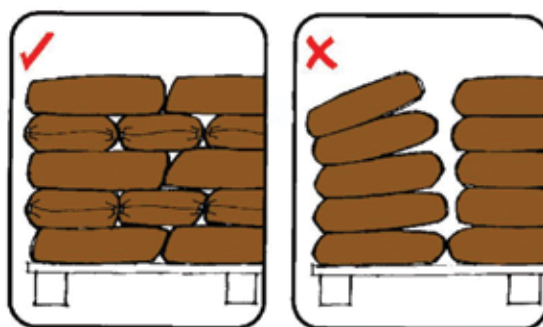
- The rice miller shall maintain a reference sample, properly labeled, and stored in a sterile, hygienic, transparent container for reference and measure the standard FRK count as well as per the procedure explained later.
- The rice miller should ask the vendor to dispatch the lot/batch of FRK only after an approved Certificate of Analysis (CoA) which covers the physical/ chemical, micronutrient, and microbiological parameters.
- The rice miller may also verify, and cross-check the results received via the CoA for FRKs submitted by the vendor, by retesting a sample from an independent, third-party FSSAI's notified NABL accredited laboratory for required parameters.

**Important to note that, FRK must be procured by rice millers as per requirement only, and not stocked in advance ahead of the paddy season. FRK is a product with limited shelf-life (12 months or more), hence procurement of FRK must be need based, and a well planned activity. Only recently procured FRK (produced 15 - 45 days earlier, not more than 2 months) must be used in production (blending) of fortified rice**

For milled rice, it is equally important for the rice miller to produce the milled rice which complies with UNIFORM SPECIFICATION FOR GRADE 'A' & 'COMMON' RICE as issued by the Government of India, Ministry of Consumer Affairs, Food & Public Distribution, Department of Food & Public Distribution

## What is the guidance for receipt and storage of fortified rice kernels and fortified rice?

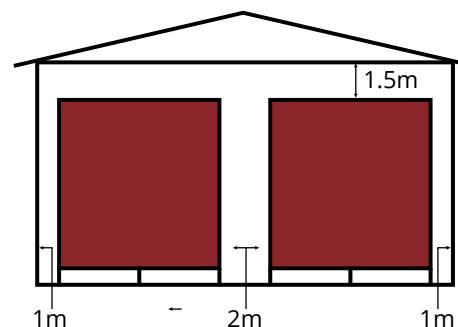
- Check all bags of fortified rice kernels (FRKs) received for any signs of wear and tear, leakage, etc. The bags should be intact and should not be torn from any side.
- Match the no. of FRKs bags received as mentioned in the waybill, and against the requirement (ordered quantity). Make a record of the batch no., date of production, expiry details, and quantity (no. of FRK bags) received in the register available in the bill.
- Match the approved Certificate of analysis with the batch no. of FRK lot received. (Note: If FRK from more than one batch no. are received, corresponding certificate of analysis for the batches of FRKs received should be available, in case not already shared by the vendor, such batch of FRKs with no certificate of analysis, should be stacked separately and not used for the production of fortified rice).
- The bags should not be stacked directly on the floor because there is a risk of moisture from the ground rising into the bags. It should be stacked on a moisture-proof floor cover, such as tarpaulin sheeting, or on wooden pallets at least 9 inches above the floor level, as appropriate.
- The vertical stack height for FRK bags should be restricted to 12 or 14 bags only as these bags tend to slip off when stacked beyond a certain height.





- For fortified rice bags, if made from jute/gunny, the vertical height can be stacked up to 18 – 20 bags, while for polypropylene, bags can be stacked upto a height of 12 bags, and then pyramid thereafter.

- The bags should be stacked such that they are clear of all walls (approx. 1 foot away) and roof (approx. 1.5 meters) to allow access all around for inspection, pest control, and physical audit, and to permit free circulation of air. The stack should be built to give a firm bonded or interlocked stack (brick-layer pattern). The material should be labeled as “Fortified rice Kernels”.



- Strictly adhere to the “First Expiry First Out (FEFO) / First in First Out (FIFO) principle for use of FRK bags received. The FRK bags once opened, should be stored by tightly closing the noose around the neck of the bag after drawing out any excess of air. The stock register should be maintained and updated as per use.
- Rusted iron equipment or dirty vessels should not be used while measuring and drawing out FRKs from the respective bags.
- The empty HDPE bags should be secured separately in tied bundles and should not be discarded in the open or used for any other purpose. If possible, these bags must be recycled.



Incorrect storage practice – Fortified rice bags placed directly on the floor



Correct storage practice for FRK fortified rice on pallets



Correct storage practice – FCI rice on tarpaulin sheets

## What are specific measures for storage area in a rice mill?

- The area of storage should be well ventilated and cleaned periodically. During humid days, ventilation can be avoided to restrict the airflow and prevent moisture elevation.
- Walls and ceilings surrounding the bags should be free from seepage and should be well painted without any scratches, bruises, or cement flakes.
- No Pesticides, cleaning chemicals or other harmful substances in proximity. However proper measures should be taken to prevent the infestation of FRK from insects and rodents and their droppings.
- Food & Non-Food material should not be stored in the same area. Storage of fuel, disinfectants, cleaning agents, stationary or other items should be strictly away from the stored raw and finished material.

## What are measures to be ensured during the production of fortified rice?

- Clean the vibratory feeders /or any dozers, and hoppers with a clean and dry cloth before and after use. Check the level of milled rice and FRK in respective hoppers. If required, add the desired quantity of FRK to the hopper, while milled rice will be collected in the hopper/silo designated for collection of milled rice.
- Standardize the rate of output from both feeders for milled rice as well as FRK to deliver an output of 100:1 (or other as appropriate) as per the settings and instructions for use conveyed by the equipment supplier for feeders.
- Collect samples of fortified rice every 1 – 2 hours from the discharge point of blending equipment/ conveyer and check the efficiency of blending by performing the kernel count test.
- Prepare the gunny bags for the packaging of fortified rice as prescribed by FCI. The gunny bags may be sealed using manual / automatic sealing technique with a double thread stitching method with a sufficient distance from the edge.
- The cloth / rexin labels stitched on bags must have the “plus F (fortified) logo” and details such as “batch no.”, “date of manufacturing”, “Expiry/Use by” with indelible ink or same details can be embossed on the gunny bags using a stencil (with indelible ink). (Refer sample image for the label design)
- Perform random checks for weight and labels of at least 5 bags of fortified rice before stacking and record the same during each production day. Stack the sealed / stitched bags in brick layer pattern on pallets /tarpaulin sheet placed away from wall as per the defined storage instructions for fortified rice.

## What are specific instructions for Packaging and Labelling of fortified rice?

As per the current guidelines, fortified rice should be packed in the same gunny bags as regular FCI rice. The net weight of fortified rice in each bag should be adjusted to 50 kg, based on the weight of empty gunny bag should be done using calibrated weighing balance. The bags should be sealed with double thread stitch method, with the cloth label along the stitch line and leaving sufficient space from the edge. The label must have the “plus F (fortified) logo” printed with the appropriate dimension and shade of blue colour.

Note: Only those rice millers with a valid FSSAI License and approved endorsement to use the **+F** (fortified logo) by FSSAI after submission of the necessary documents are authorized to use print and use the fortified logo on bags of fortified rice.

Provisions of the Food Safety and Standards (Packaging and Labelling) Regulations, 2011, shall also apply to the fortified rice.

More details on packaging and labeling design can be accessed here:

1. Food safety and standards (packaging and labeling) regulations, 2011 [https://www.fssai.gov.in/upload/uploadfiles/files/Packaging\\_Labelling\\_Regulations.pdf](https://www.fssai.gov.in/upload/uploadfiles/files/Packaging_Labelling_Regulations.pdf)
2. Food Safety and Standards (Fortification of Foods) Regulations, 2018 [https://www.fssai.gov.in/upload/uploadfiles/files/Compendium\\_Food\\_Fortification\\_Regulations\\_30\\_09\\_2021.pdf](https://www.fssai.gov.in/upload/uploadfiles/files/Compendium_Food_Fortification_Regulations_30_09_2021.pdf)
3. Gazette Notification dated 27th August 2021, Food Safety and Standards (Fortification of Foods) Amendment Regulations, 2020, Section 92, Food safety standards act 2006 [https://fssai.gov.in/upload/notifications/2021/09/61306b1fbd6f6Gazette\\_Notification\\_Fortification\\_Food\\_02\\_09\\_2021.pdf](https://fssai.gov.in/upload/notifications/2021/09/61306b1fbd6f6Gazette_Notification_Fortification_Food_02_09_2021.pdf)

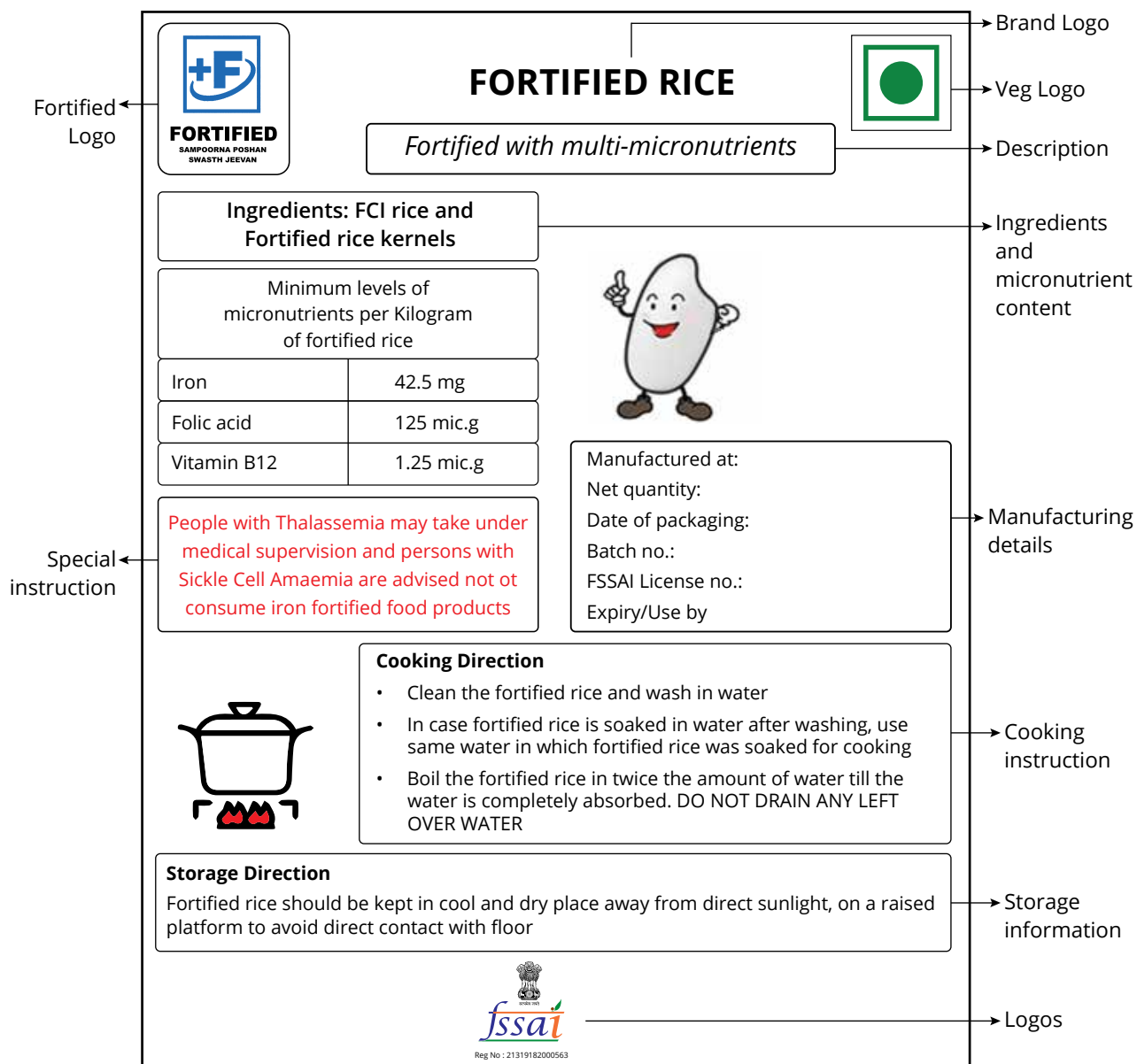
**Note:**

- Each bag shall be printed in indelible ink with legible letters giving the information regarding Date of Packaging and Batch No.
- Batch would be defined for one day's production. For example: For a production done on 1st day, the batch code will be as follows:
- Batch No: 001M or 001A ('M' represents morning production, i.e., before 2pm and 'A' represent afternoon production, i.e., after 2pm)
- Date of manufacturing should be printed on every batch along with the batch no. The same method of labeling will be done for Fortified rice and Fortified wheat flour.

Manufactured at:  
Net quantity:  
Date of packaging  
Batch no.:  
FSSAI license no.:  
Expiry/Use by



# Sample Label Design



## Summary

- Procurement of fortified rice kernels should be done by rice millers from FSSAI licensed / registered FRK suppliers only. The list of such suppliers is available on the FSSAI website. Government (central / state/ district) counterparts shall have a complete oversight on the entire process of procurement of fortified rice kernels.
- FRK suppliers shall provide a “valid’ certificate of analysis from an independent NABL accredited laboratory for the concerned batch of fortified rice kernels prior to their dispatch to the rice miller premises.
- Upon receipt of quality assured fortified rice kernels, rice millers shall record complete details of the FRK such as batch no., date of manufacture, best before, quantity, etc
- Storage of fortified rice kernels and fortified rice must strictly adhere “First in First Out (FIFO) or First Expiry First Out (FEFO) principle”
- Storage of FRKs and fortified rice must be arranged in such a manner that, they are stacked away from the walls (atleast 1 ft) and the roof (atleast 1.5 mtrs.), must be stacked in a brick-later pattern, over pallets or tarpaulin sheets and not directly on the ground.
- The vertical stack height for FRK bags should be restricted to 12 or 14 bags only, while for fortified rice bags, if made from jute / gunny, the vertical height can be stacked up to 18 – 20 bags, while for polypropylene, bags can be stacked up to a height of 12 bags, and then pyramid thereafter.
- As per the current guidelines, fortified rice should be packed in the same gunny bags as regular FCI rice. The net weight of fortified rice in each bag should be adjusted to 50 kg, based on the weight of empty gunny bag should be done using calibrated weighing balance. The bags should be sealed with double thread stitch method, with the cloth label along the stitch line and leaving sufficient space from the edge.
- Each bag (or label) shall be clearly printed in indelible ink with legible letters giving the information regarding fortified rice as below:
  - Batch no.
  - Date of manufacture
  - Net quantity
  - FSSAI License No.
  - Best before
  - Vegetarian Logo
  - Fortified Logo
  - Storage instructions
  - Cooking guidance
  - Ingredients and micronutrient contents



## Questions

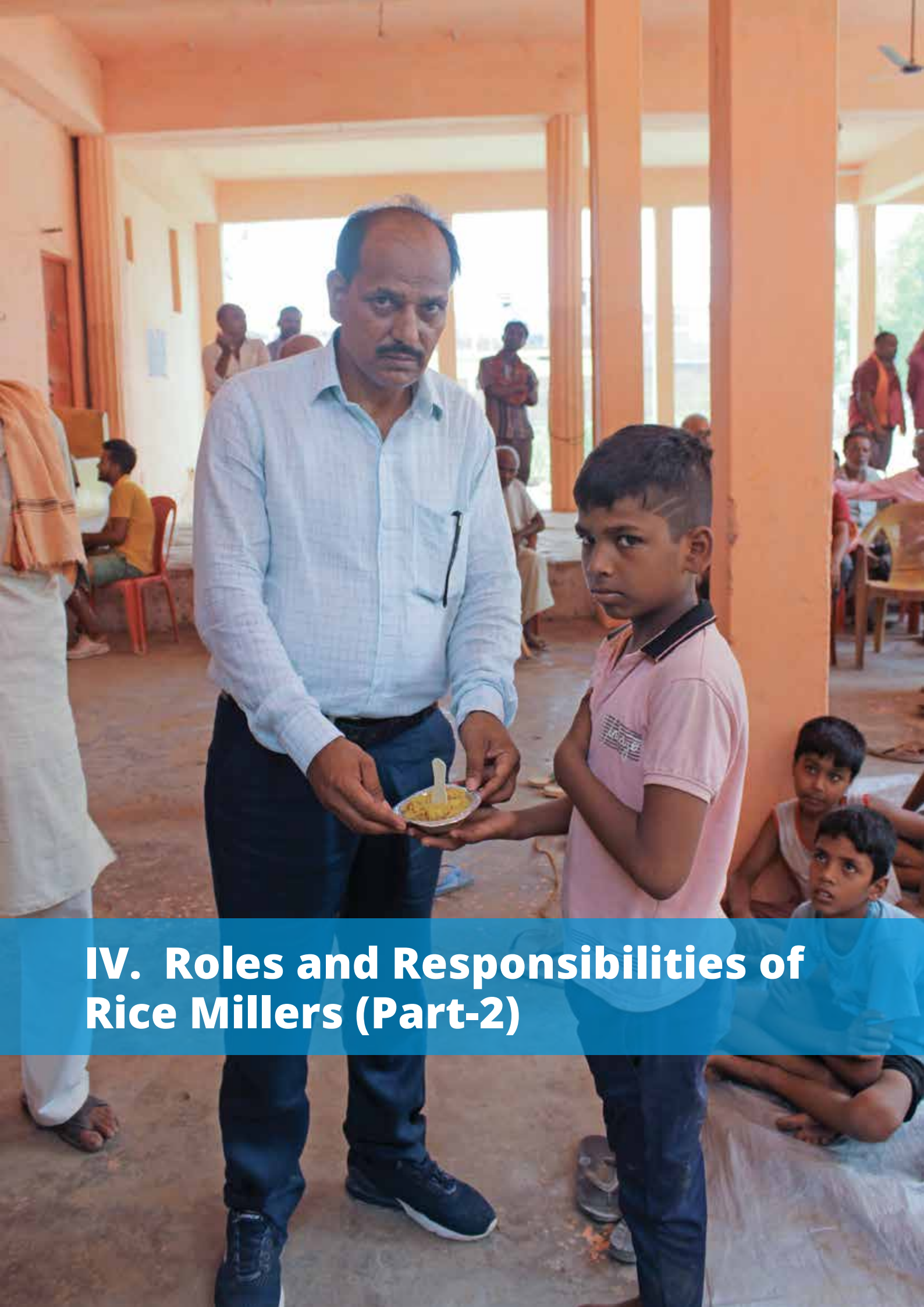
1. With regards to procurement of fortified rice kernels by rice millers, select the correct answer from the below choices provided:
  - a. Each individual batch of FRKs must be accompanied by a Certificate of analysis (COA) from an independent FSSAI's notified NABL accredited laboratory
  - b. Fortified rice kernels (FRKs) must match the base rice (milled rice in which FRKs will be blended) in terms of length, width, colour, and cooking qualities.
  - c. A reference sample for the FRKs must be shared by the supplier prior to dispatch of the batch of FRKs
  - d. All the above
  
2. "It is necessary that Government counterparts (State or District) have an oversight in the procurement of fortified rice kernels".
  - a. Select the correct option for the above statement
    - a. True
    - b. False
  
3. Storage of Fortified rice must be \_\_\_\_\_
  - i. Done in a brick-layer pattern, so that the bags of fortified rice do not collapse
  - ii. Arranged in the "First-In-First-Out" method
  - iii. Stored directly on the ground, but not on pallets
  - iv. Stored at least 1 ft. away from walls and 1.5 metres. From the roofThe following options are correct with regards to the above statements
  - a. Statement i., ii., and iii. Are correct
  - b. Statement i., ii, and iv. Are correct
  
4. Storage area must be \_\_\_\_\_

Select the correct option from the below statements:

  - a. Well ventilated and cleaned periodically
  - b. Free from fuel, pesticides, disinfectants, and other chemicals
  - c. The storage area must be free from pests, insects, rodents, and stray animals
  - d. All the above
  
5. Packaging and labelling of fortified rice on gunny bags should \_\_\_\_\_
  - i. have the vegetarian logo
  - ii. have the fortified logo

The following options are correct with regards to the above statements

- a. Only option "i" is correct
  - b. Only option "ii" is correct
  - c. Both options are correct
  - d. None of the options are correct
6. Packaging and labelling of fortified rice on gunny bags should have \_\_\_\_\_
- a. Batch No. and Date of manufacture
  - b. Net quantity and best before date
  - c. FSSAI License No., Fortified logo, and Vegetarian logo
  - d. All the above
7. Storage of fortified rice gunny bags must be done in a \_\_\_\_\_ pattern
- a. Gingerbread pattern
  - b. Honeycomb pattern
  - c. Brick-layer pattern
  - d. None of the above
8. Procurement of fortified rice kernels (FRKs) by rice millers should be done from:
- a. Private registered companies
  - b. BIS empanelled suppliers
  - c. FSSAI empanelled suppliers
  - d. None of the above
9. Fortified rice must be stored in the bags as Custom milled rice?
- a. Yes
  - b. No
10. The cloth labels with information on fortified rice must be stitched in a "double stitch method"?
- a. Yes
  - b. No



## **IV. Roles and Responsibilities of Rice Millers (Part-2)**

## Learning objectives

In this chapter, we shall discuss the key aspects of rice fortification as below:

- How to ensure Quality Assurance and Quality Control (QA/QC) for fortified rice?
- What are good hygiene and good manufacturing practices during production of fortified rice?
- What is the guidance for pest control by rice millers producing fortified rice?
- What is essential record keeping measures for fortified rice?

## How to ensure Quality Assurance and Quality Control (QA/QC) for fortified rice?

Quality control (QC) in essence is a set of activities for ensuring quality in food products by identifying defects in the actual products produced. It is a reactive process and aims to identify (and correct) defects in finished products. Quality Assurance (QA), on the other hand, is a set of activities for ensuring quality in the processes by which products are developed. It's a proactive process and aims to prevent defects by concentrating on the process used to make the product.

QA & QC is one the most crucial elements in the entire value chain for fortified rice and rice millers have a very critical role in ensuring the same. To ensure appropriate quality control, rice millers have the following responsibilities:

During production of fortified rice

- To ensure receipt and use of appropriately quality assured fortified rice kernels (FRKs),
- To ensure appropriate blending with milled rice in the defined ratio,
- To ensure appropriate packaging and labelling,

After production of fortified rice

- Random testing of fortified rice samples (from storage and current batch under production) prior to dispatch by an independent **FSSAI's notified** NABL accredited laboratory.

In the earlier sections, we have already described the quality control aspects regarding receipt and use of appropriately quality assured fortified rice kernels (FRKs) as well as packaging and labelling guidelines. In this section, we shall discuss in detail, quality control aspects regarding appropriate blending with milled rice.

## Blending with milled rice in the defined ratio

Blending efficiency test: There are two steps for performing the blending efficiency test as follows:

- i. Standardization of FRK counts
- ii. Blending efficiency.

### Step 1: Standardization of FRK Counts

This is a one-time activity for each new batch / lot of fortified rice kernels received by the rice miller, which involves defining / standardizing the no. of FRK (grains) in each 1 gm sample by weight.

- Open approximately 10% of the FRK bags received from the supplier. The sampler must wear complete PPE including face mask, head cover, etc and draw a sample of FRK using a clean ladle in a clean container.
- Mix the sample well with the help of ladle, while taking due precautions that kernels are not broken while mixing and weigh approx. 1g of sample and place it on a clean paper or plate, count the no. of kernels and record your observations.
- Repeat the count for atleast five times and take atleast 5 readings. The average no. of kernels in each 1 gm of FRK is the “standard FRK count”.
- Use this as Standard till this concerned lot of FRK lasts and compare this “standard FRK count” with the kernel count obtained in fortified rice sample and follow the above procedure for every new consignment of FRK received and record the results in a separate register maintained for this purpose.

### Step 2: Blending efficiency test (Homogeneity of blending)

Blending of fortified rice kernels with the milled rice is the most crucial step of rice fortification and needs regular monitoring. It is the prime responsibility of the rice miller to maintain records for blending of FRK and milled rice in the ratio of 1:100. A designated staff in the mill may be assigned this responsibility

- Use a clean and dry, non- rusted container for collecting the sample of fortified rice.
- Separate out and weigh 100g fortified blended rice in a bowl (food grade, clean and dry).
- Separate fortified rice kernels from the sample by hands manually
- Count the no. of kernels (FRK) in the sample and record.
- Compare the results with the “standard FRK count” as described above from the lot of FRK used for production
- The kernel (FRK) count from the sample of fortified blended rice must ideally be within + / - 10% range of the “standard FRK count”, which indicates good blending efficiency. If the kernel (FRK) count in fortified blended rice is not within the range as defined, then there is a need to adjust the frequency / settings for the dozer and appropriate action must be taken.



- Blending efficiency test must be repeated every 1 – 2 hours during production and for stored bags of fortified rice. Records of such tests must be noted in the register maintained for this purpose.



**Step 1:** Collect the sample from 4-6 nos. of bags for fortified rice over every 2 hours.



**Step 2:** Clean the balance in switch-off position with dry cloth. Tare the weighing balance to zero.



**Step 3:** Place the clean and dry food grade plastic bowl over the weighing balance. Tare the weight of bowl to zero.



**Step 4:** Weigh 100 g of fortified rice.



**Step 5:** Manually segregate FRK from Blended rice by using hands.



**Step 6:** Count the segregated FRK and record the no. of FRK in register and weigh them.



Segregated fortified rice kernels

Sr. No.	Batch No.	Wt. of fortified rice (g)	Wt. of FRK (g)	FRK Count (in no's)

**Register format is given below**

*Note: Segregate the FRK from Fortified rice in well illuminated area.*

**Representational image for conducting a blending efficiency test**

*\*Note: i) This test should be done by trained personnel in properly illuminated area for proper segregation of FRK. ii) Keep a composite sample of the day's production in small Pet jar for future reference.*

## In-house testing of fortified rice (Iron Spot Test)

The rice mills equipped with an in-house laboratory facility should perform the Iron spot test once every 3 hours to standardise the process and validate the blending efficiency. For performing iron spot test, follow the steps as below:

- Place a 50g sample of fortified rice on petri dish.
- Pour 1ml of 2N HCl on the rice until all the rice kernels are wet.
- Pour 1ml of 10% Potassium thiocyanate (KSCN) on the wet rice sample.
- Immediately, the fortified rice kernels will turn red to dark red (black upon drying) indicating the presence of iron fortified rice kernels. (Refer the images and link to the demonstration video below)

- Figure 1: Fortified kernels in fortified rice will turn dark red/black, indication the presence of iron.



**Video Link: Suggested link:** ([https://www.youtube.com/watch?v=vwoSzYn\\_5aM](https://www.youtube.com/watch?v=vwoSzYn_5aM))

### **Random testing of fortified rice samples (from storage and current batch under production) prior to dispatch by an independent FSSAI's notified NABL accredited laboratory:**

To ensure the effective implementation of quality control protocols it is important to have time-bound testing system in place and hence it is advisable that one sample of fortified rice is collected from the rice mill and sent to an independent **FSSAI notified NABL accredited** Laboratory through courier every quarter for testing of micronutrients.

The lab is expected to share the results within 7 days of sample receipt at the lab. The results must be shared with state/district level technical committee for review and approval. The fortified rice should be dispatched once the report is approved.

FCI / concerned states procurement agencies may also collect sample of fortified rice as per their standard sampling procedures already in place and provide their consent for lifting after the successful report is made available from the department (provision for lifting of samples and testing by **FSSAI notified NABL** laboratory is available within the funds provided to the rice miller). In case there is deviation in the report, the concerned rice miller should be made aware of the same by the department.

#### **Note:**

- Payment to the empanelled laboratory will be made directly by the rice miller.
- This laboratory testing must be done in addition to the blending efficiency tests carried out on an hourly basis in the rice mill and the inhouse spot iron tests. The records of the same has also to be maintained.

#### **Sampling technique for collection of fortified rice samples by rice millers**

- Samples of fortified rice to be dispatched for FSSAI notified NABL Laboratory for testing can be collected from the current batch under production or already produced and stored bags.
- Samples of fortified rice shall be collected over every hour (at least 8 – 10 samples) of 500 gm each. A composite sample of fortified rice derived from all the samples collected, about 500 gm should be sufficient for dispatch and testing by the FSSAI notified NABL laboratory. The same process to be followed for sample collection from fortified rice stored in bags.



- The samples should be labelled appropriately and carry details like the date and location of sample collection, method of preparation and/or storage, Batch number, Lot Number, any other observations.
- The samples should be despatched within three days of collection to the laboratory. Samples should be collected in triplicates, one for the lab, one reference sample for the mill (from where it is collected) and one for the Government.

## Physical characteristics of normal rice and FRK

Fortified rice kernels shall resemble the custom milled rice as closely as possible in final attributes, including shape, size (length, breadth, and thickness), thousand kernel weight, bulk density, true density, colour, flavour, and cooking qualities. It should be free from added colouring matter, off odour metal pieces and other impurities. The variation in the physical characteristics of fortified rice kernels such as length, breadth, thickness, thousand kernel weight, and true density shall be within 10 percent when compared to the milled rice variety in which it is to be blended.

**Cooking Quality:** The percent solid loss after cooking should be less than 10% and the cooking time should be within 10% deviation to milled rice to which it is to be blended. The texture of cooked fortified rice kernel should be like cooked unfortified rice in which it is to be blended.

## Specification of Fortified Rice

S. No.	Parameter	Milled Rice	Milled Parboiled Rice
1	Moisture content, percent by mass, Max	15.5	15.5
2	Foreign matter	0.2	0.2
3	Inorganic, percent by mass, Max	0.8	0.8
4	Organic, percent by mass, Max	(With organic impurities should not be more than 0.1%)	(With organic impurities should not be more than 0.1%)
5	Weevilled kernels, percent by mass, Max	5.0	5.0
6	Heat - Damaged Kernels, percent by mass, Max	5.0	8.0
7	Damaged Kernels, percent by mass, Max	5.0	8.0
8	Kernels with pinpoint, percent by mass, Max	4.0	4.0
9	Immature Kernels, percent by mass, Max	0.5	0.5
10	Chalky Kernels, percent by mass, Max	5.0	0.1

*Ref: IS 17780: 2021, Fortified Rice Specification / Food Safety and Standards(Food Product Standards and Food Additives) amendment regulations under Section 16 (5) of Food safety and Standards act, 2006*

## Flowchart of Quality Assurance and Quality Control (QA/QC) measures during production of fortified rice

Level	Actions	Responsibility
Production of Premix	Submit Certificate of Analysis (CoA) for premix prior to production of fortified rice kernels to be verified by the appointed state / district level technical committee members (includes concerned development partners)	Premix manufacturer
Production of fortified rice kernels	Submit Certificate of Analysis (CoA) and minimum 500 gm sample for concerned batch of FRKs prior to dispatch for production to be verified by the appointed state / district level technical committee members (includes concerned development partners)	FRK Manufacturer
Production of fortified rice	<ol style="list-style-type: none"> <li>1. Iron Spot Test (IST) (conducted once every 4 hours) during production of fortified rice</li> <li>2. Blending Efficiency Test (BET) (once every hour)</li> <li>3. Random Samples of fortified rice (from storage and current batch under production) collected to test for micronutrient parameters prior to dispatch</li> </ol>	Rice Miller (IST & BET), District and Block FCI officials (for adherence to production SOPs)
Distribution and Consumption	<ol style="list-style-type: none"> <li>1. Field visits by District and Block FCI officials to Fair Price Shops to monitor storage, distribution of fortified rice</li> <li>2. Random Samples of fortified rice (from storage at FPS shops) collected to test for marker micronutrient parameters</li> </ol>	FCI officials

## What are good hygiene and good manufacturing practices during production of fortified rice?

A qualified person in the mill should be assigned the task of implementing basic pre-requisite steps including sanitation measures, cleaning and hygiene programme, pest control and personal hygiene to ensure safe food production and delivery.

Pest control at rice mill should be done monthly by a qualified third party. Operators, Supervisor, Mill owner and Visitors should adhere to the defined personal hygiene practices.

Handwashing, personal hygiene measures such as short hair and regular trimming of nails must be observed. They should wear Personal Protective Equipment i.e., Head gear, facemask, shoe cover, hand gloves. Other specific measures, especially concerning prevention of Covid-19 are shown below. Separate registers should be maintained to monitor and record the evidence that the required procedures are followed.



**DO NOT TOUCH  
YOUR FACE**



**Handmade face covers to be washed daily**

## What is the guidance on Pest Control for rice millers producing fortified rice?

The rice mill must have preventive measures in place to control insects, rodents, birds, cats, and other animals, flies, bees, rats, and mice from invading the mill premises in search of food. Cats and other animals enter the plant in search of rats and mice. All structures and equipment should be secured against them. Doors, windows, and other openings must be secured. Openings that are typically left open for ventilation should have screens. Installation of air curtains, fans, and anti-insect / anti-rodent measures at strategic locations will be extremely helpful. Snap traps, glue boards, and bait stations must be placed around the immediate building exterior and interior walls to trap these pests.

Use of chemical pest control measures must be carried out as per the general instructions and prescription provided by the concerned contractor. Below are some measures to be ensured during use of chemicals for pest control:

- i. Every chemical used in the plant should have an itemized list of its technical name, trade name, classification, concentration for application, and area where it is applied.
- ii. Material Safety Data Sheets (MSDS) must be provided for chemicals used for pest control.
- iii. The plant must have service schedule and the service contractor assigned for the services must have valid license for the work.
- iv. While Mechanical traps can be placed within the plant; each trap should be numbered and fixed, poisonous bait stations must be kept outside of processing/ production building.
- v. Restricted chemicals cannot be used in plant and the pest-control contractor shall not be allowed to store any chemicals on plant premises.

- vi. Management should take steps to reduce pest entry and its harbourage.
- vii. Trash bins should be placed in every corner, easily accessible, and should be regularly emptied.

## What is essential record keeping measures for fortified rice?

All the records on the incoming raw and packaging material, finished products including internal lab reports and external Certificate of Analysis (CoAs) of premix and FRK should be maintained. Records on pest control, stock/inventory, in process checks and dispatch should also be maintained and readily available as and when required. Few samples of record registers are given below for reference. List of records to be maintained at the rice mill are as below,

- i. Maintain books of records in respect of FCI Rice, FRK, Fortified Rice production & delivery.
- ii. Maintain and update the stack card for FCI Rice, FRK and Fortified rice. Display the daily stock and production figure at an appropriate place in the warehouse.
- iii. Maintain a feedback register for government or other stakeholders to provide feedback upon a visit.
- iv. Daily reports detailing the daily utilization of FCI Rice, FRK during production & fortified rice and distribution reports.
- v. Blending efficiency/kernel count test records to be maintained on regular basis.
- vi. CoA of FRK to be filed.
- vii. No. of samples sent for laboratory testing and its lab results to be filed.
- viii. Net weight and label check record register should be maintained.
- ix. Record the pest control activities conducted in the rice mills regularly

### Stock records for fortified rice kernels

Fortified rice kernels (FRK) - Stock records

Date of FRK manufacture	Batch No. of FRKs	COA available	Standard FRK count	Total available qty. of FRKs	Qty. of FRK issued for use	Balance quantity of FRK

Supervisor's Signature

## Daily production register

### Daily Product Sheet

Date of Production:

Average weight of each gunny bag: \_\_\_\_\_ gms

S. No.	Batch No and Qty. of FRK used for blending	Qty of fortified rice produced	No of bags of fortified rice	No of bags of fortified rice	Batch No.

Supervisor's Signature

## Blending efficiency test records

### Record of hourly blending efficiency test

S. No.	Date and Time	Kernal count in fortified rice	Standard FRK count	Remarks

Supervisor's Signature

## Record of NABL Laboratory – Sample dispatch

Nabal Laboratory - Sample Dispatch register

S. No.	Date of sample dispatch	Qty. of sample sent for testing	Reference sample retained	Batch no. of fortified rice sample dispatched	Name of NABL Lab. where sample is sent	Date of report receipt and filed for records

Supervisor’s Signature



## Summary

- Quality control (QC) in essence is a set of activities for ensuring quality in food products by identifying defects in the actual products produced. It is a reactive process and aims to identify (and correct) defects in finished products. Quality Assurance (QA), on the other hand, is a set of activities for ensuring quality in the processes by which products are developed. It's a proactive process and aims to prevent defects by concentrating on the process used to make the product
- Quality control (QC) is one the most crucial elements in the entire value chain for fortified rice and rice millers have a very critical role in ensuring the same. In order to ensure appropriate quality control, rice millers have the following responsibilities:
  - a. During production of fortified rice
    - i. To ensure receipt and use of appropriately quality assured fortified rice kernels (FRKs),
    - ii. To ensure appropriate blending with milled rice in the defined ratio,
    - iii. To ensure appropriate packaging and labelling,
  - b. After production of fortified rice
    - i. Random testing of fortified rice samples (from storage and current batch under production) prior to dispatch by an independent FSSAI notified NABL accredited laboratory.
- A qualified person in the mill should be assigned the task of implementing basic pre-requisite steps including sanitation measures, cleaning and hygiene programme, pest control and personal hygiene to ensure safe food production and delivery.
- The rice mill must have preventive measures in place to control insects, rodents, birds, cats, and other animals, flies, bees, rats, and mice from invading the mill premises in search of food. Cats and other animals enter the plant in search of rats and mice. All structures and equipment should be secured against them.
- Doors, windows, and other openings must be secured. Openings that are typically left open for ventilation should have screens. Installation of air curtains, fans, and anti-insect / anti-rodent measures at strategic locations will be extremely helpful. Snap traps, glue boards, and bait stations must be placed around the immediate building exterior and interior walls to trap these pests.
- All the records on the incoming raw and packaging material, finished products including internal lab reports and external Certificate of Analysis (CoAs) of premix and FRK should be maintained. Records on pest control, stock/inventory, in process checks and dispatch should also be maintained and readily available as and when required.



## Questions

1. As part of the quality control measures for fortified rice, blending efficiency test (BET) must be performed by the rice miller with steps as follows:
  - i. Standardization of the FRK count
  - ii. Manual count of kernels in the fortified rice sample
  - iii. Matching the kernel count in fortified rice sample with the standard FRK count.
  - iv. Variation between the Standard FRK count and kernels in the fortified rice sample must not be more than + / - 10%

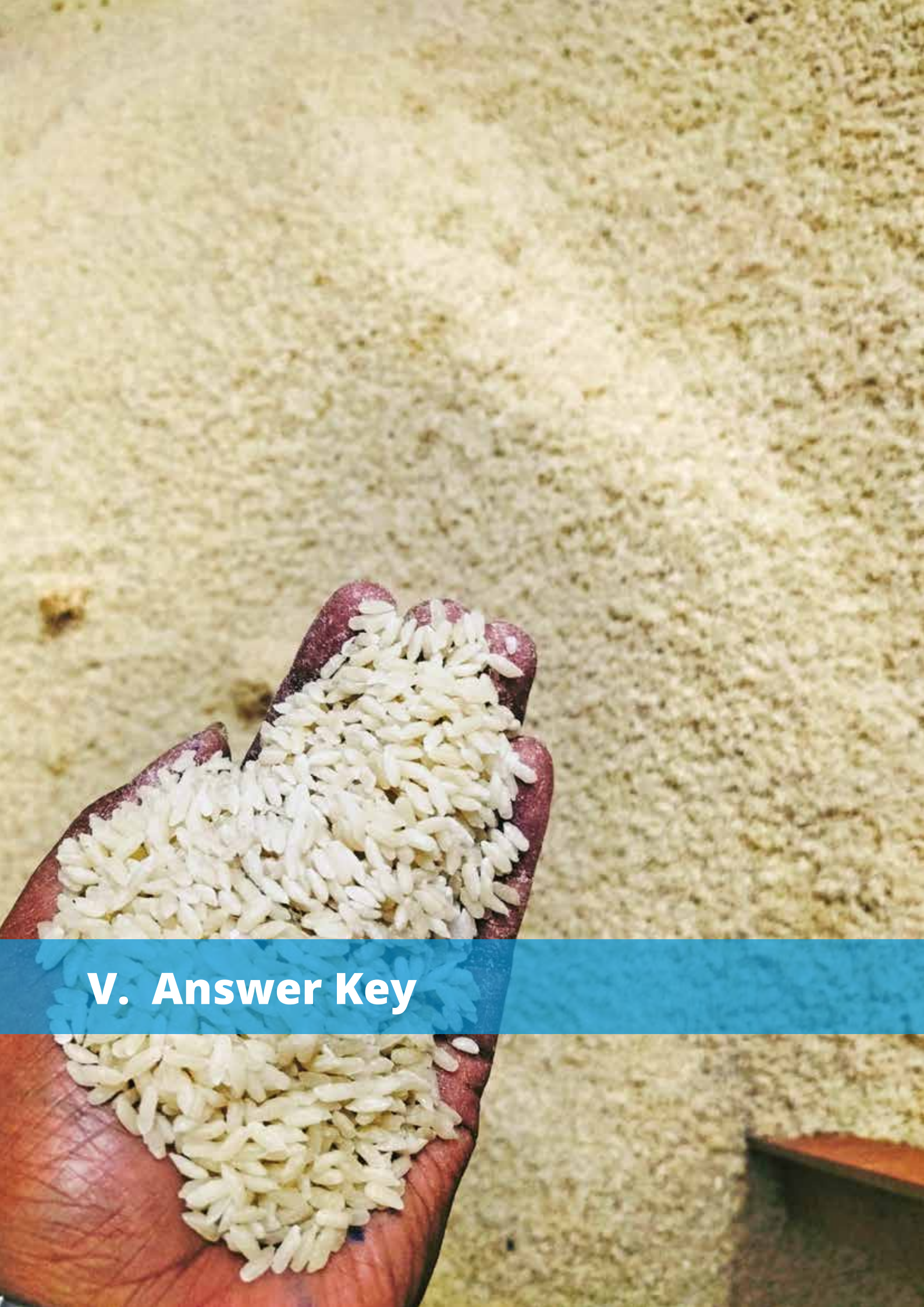
The above statements are \_\_\_\_\_

- a. Correct
  - b. Incorrect
- 
2. Rice millers can perform an "Iron Spot Test" using 1 ml of 2N HCl on the rice until all the rice kernels are wet and adding 1 ml of 10% Potassium thiocyanate (KSCN) on the wet sample. Upon conducting the test, the FRK in the fortified rice sample can be identified by \_\_\_\_\_
    - a. Its change in colour
    - b. Its change in size / shape
    - c. Both are correct
    - d. None are correct
  
  3. Pest control in rice mill premises can be adopted by use of
    - i. Snap traps, glue boards, and bait stations
    - ii. Use of air curtains, fans, and anti-insect / anti-rodent measures at strategic locations
    - iii. Chemical pesticides

From the above, select the correct answer as below

- a. Option I, ii and iii are correct
  - b. Only option I and ii are correct
  - c. Only option ii and iii are correct
  - d. None of the options are correct
- 
4. Rice millers shall maintain the records of \_\_\_\_\_
    - a. Batch no. of FRKs received, their date of manufacture, best before, valid COA etc
    - b. Daily production records indicating the quantity of fortified rice produced, quantity of FRK used, no. of bags produced etc
    - c. Sample of fortified rice drawn and dispatched to the laboratory, their batch no., production date etc
    - d. All the above options

5. A qualified person in the mill should be assigned the task of implementing basic pre-requisite steps including sanitation measures, cleaning and hygiene programme, pest control and personal hygiene to ensure safe food production and delivery.
  - i. The above statement is \_\_\_\_\_
    - a. Correct
    - b. Incorrect
6. While collection of samples for laboratory dispatch, a 500-gm composite sample must be collected for the following:
  - a. for the testing at NABL Laboratory
  - b. as a reference sample for the rice mill
  - c. as a reference sample for Government
  - d. All the above are correct
7. Which of the following statements are correct regarding the blending efficiency test to check the proportion of FRKs and Custom milled rice?
  - a. Be Performed at least every 1 – 2 hours
  - b. A separate register must be maintained to record hourly details of the blending efficiency count
  - c. Will help the miller against any potential litigations or claims for high / low FRK counts
  - d. All the above
8. Standard FRK count should be:
  - a. Performed upon receipt of every new batch of FRKs
  - b. Shall be performed every 1 – 2 hours
  - c. Shall be equal to 100 grains
  - d. Is the same as blending efficiency count
9. Personal hygiene measures to be employed by labor engaged in production of fortified rice include.
  - a. Trimmed nails, daily bath, and short hair
  - b. Use of face mask, shoe cover, hair net
  - c. Both a and b
  - d. None of the above
10. Comment True or False: Ensuring quality assurance and quality control of fortified rice is only the responsibility of FRK manufacture
  - a. False
  - b. True



## V. Answer Key

### Chapter One

1	2	3	4	5	6	7	8	9	10
C	D	D	A	B	D	B	A	A	B

### Chapter Two

1	2	3	4	5	6	7	8	9	10
C	A	A	A	A	A	A	D	A	B

### Chapter Three

1	2	3	4	5	6	7	8	9	10
D	A	B	D	C	D	C	C	A	A

### Chapter Four

1	2	3	4	5	6	7	8	9	10
A	A	A	D	A	D	D	A	C	A





## Annexures

## FSSAI Standards for fortified rice



Food Safety and Standards (Fortification of Food) Regulation 2016

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

S. No.	Nutrient	Level of fortification per Kg
1	<b>Iron-</b> (a) Ferrous pyrophosphate	28 mg- 42.5 mg*
	Or (b) Sodium Iron (III) Ethylene diamine tetra Acetate Trihydrate (Sodium ferredetate - Na Fe EDTA),	14 mg- 21.25 mg
2	<b>Folic acid</b> -Folic acid;	75 µg - 125 µg
3	Vitamin B12- Cyanocobalamine or Hydroxycobalamine	0.75 µg - 1.25 µg

Note: \*added at a higher level to account for less bioavailability

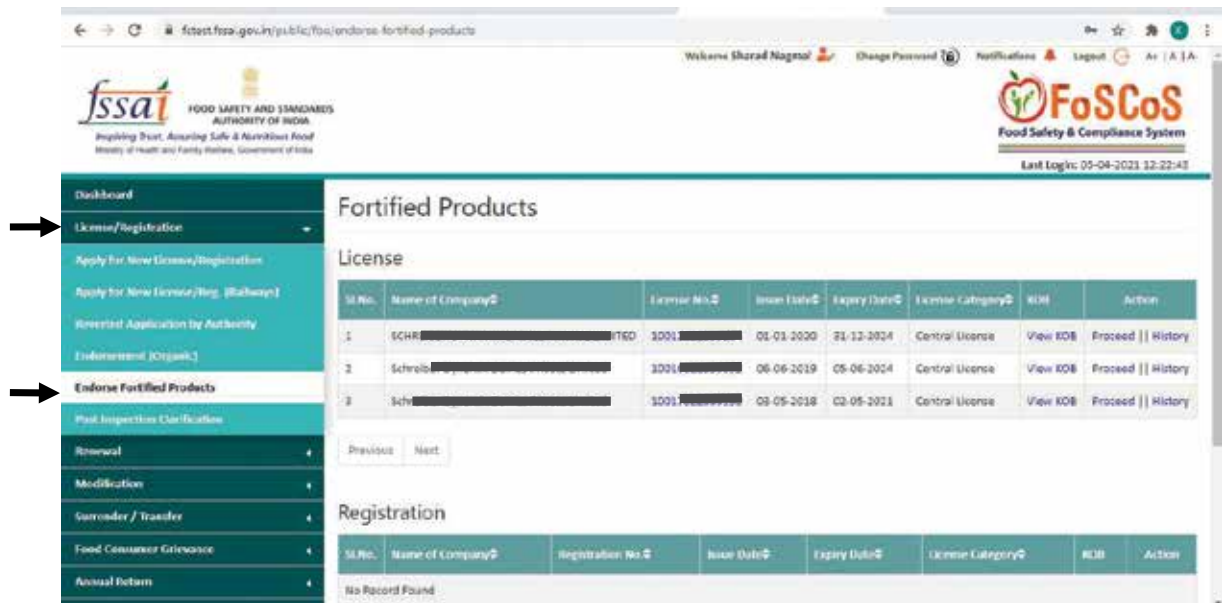
In addition, rice may also be fortified with following micronutrients, singly or in combination, at the level given in the table below:

S. No.	Nutrient	Level of fortification per Kg
1	<b>Zinc-</b> Zinc Oxide;	10 mg- 15 mg
2	<b>Vitamin A-</b> Retinyl Palmitate;	500 µg RE- 750 µg RE
3	<b>Thiamine (Vitamin B1)-</b> Thiamine hydrochloride or Thiamine mononitrate;	1 mg- 1.5 mg
4	<b>Riboflavin (Vitamin B2)-</b> Riboflavin or Riboflavin 5'-phosphate sodium;	1.25 mg- 1.75 mg
5	<b>Niacin (Vitamin B3)-</b> Nicotinamide or Nicotinic acid;	12.5 mg- 20 mg
6	<b>Pyridoxine (Vitamin B6)-</b> Pyridoxine hydrochloride;	1.5 mg- 2.5 mg

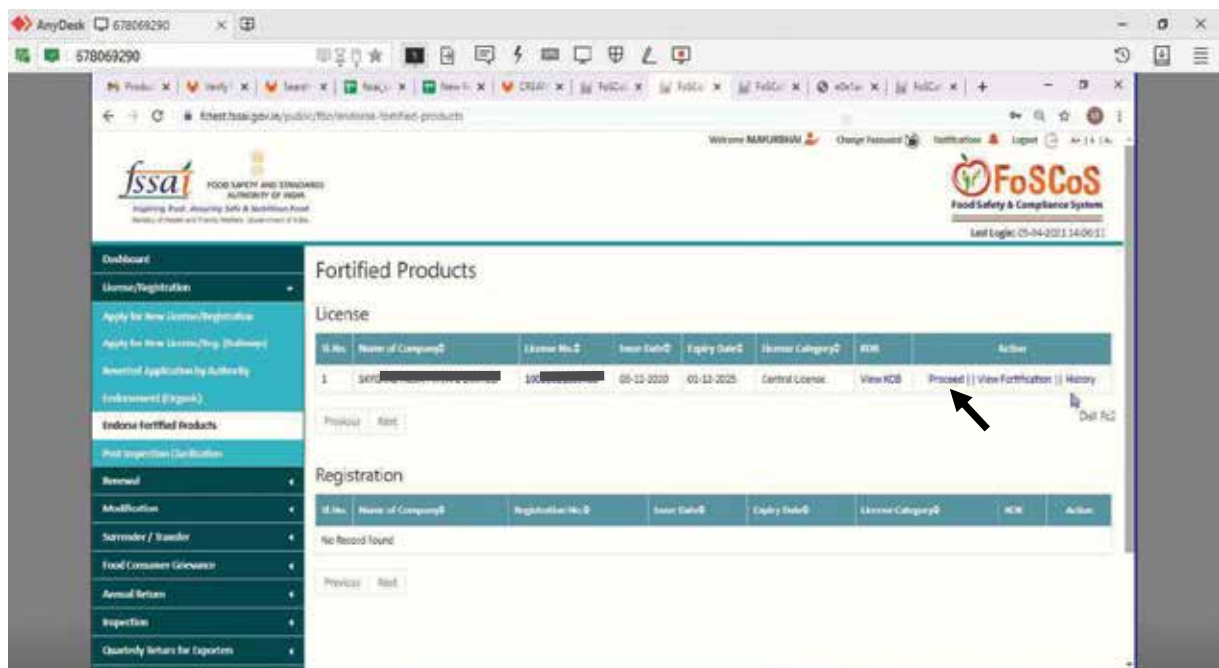
## Annexure – II

### Procedure for application of +F endorsement via FoSCoS website

Step 1: The FBO will have to log into the FoSCoS website (<https://foscoss.fssai.gov.in/>) using their credentials. After logging in, navigate to License/Registration and click on “Endorse Fortified Products”.

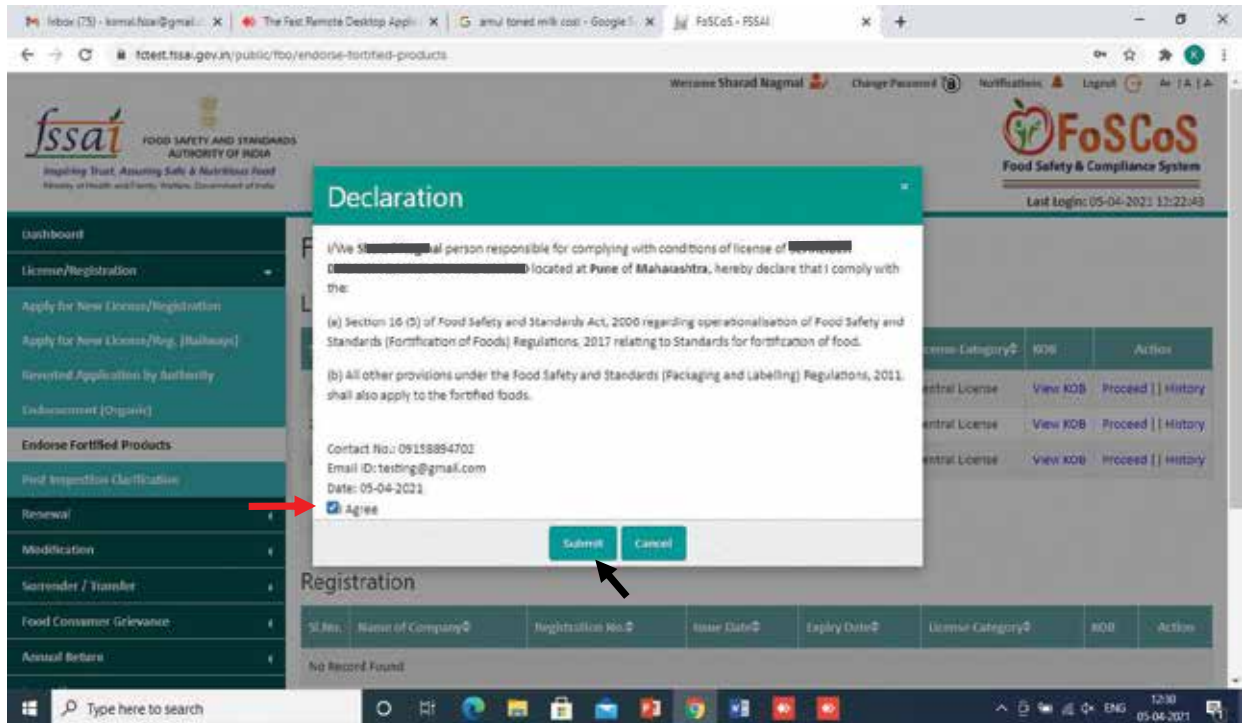


Step 2: Click on “Proceed” against the application for which endorsement is required.

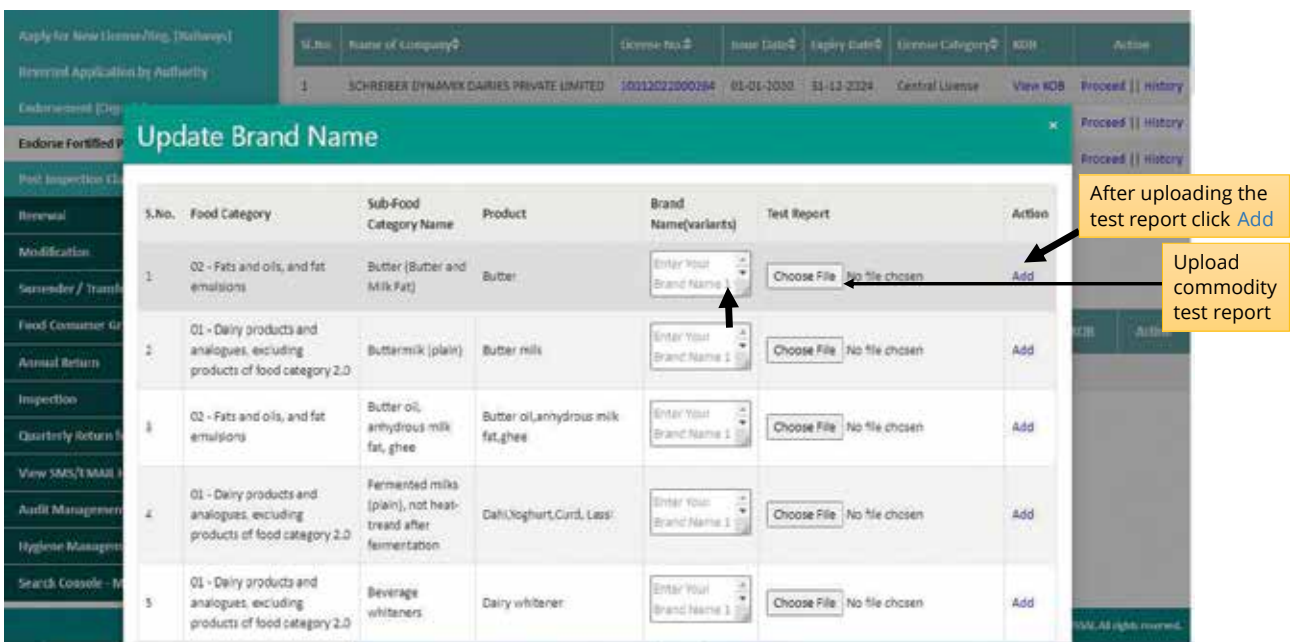




Step 3: Read the declaration and submit the same

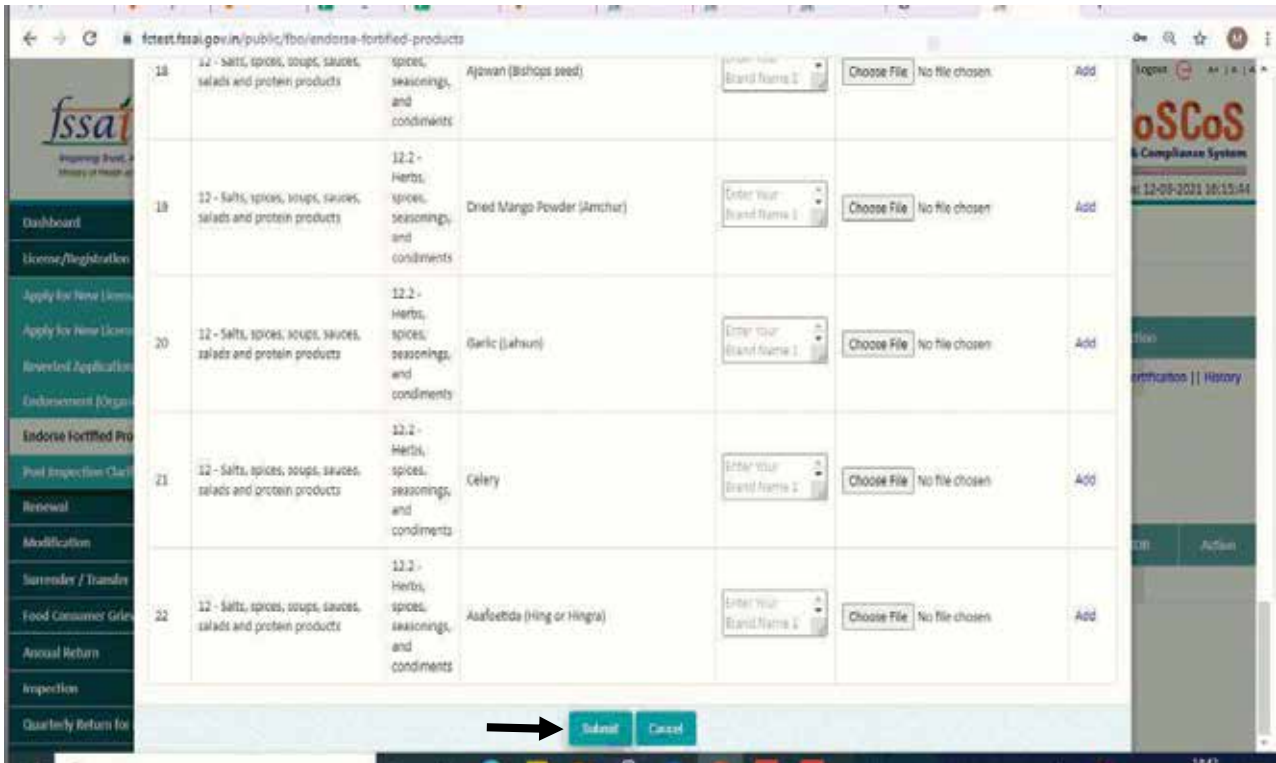


Step 4: Select the product for endorsement, enter the brand name and upload the commodity testreport for the product for which endorsement is required.

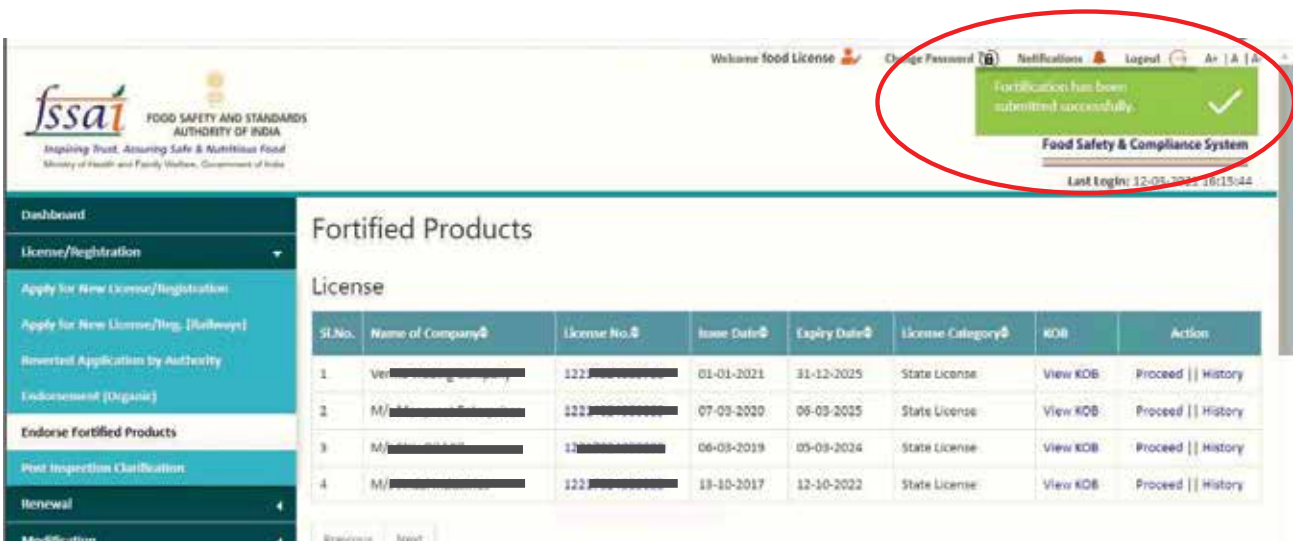


Note: One can apply for endorsement of multiple products at once

**Step 5:** Submit your application. Fortification Endorsement Certificate will be generated after approval of product test report by the DO/RA of the state.



Once the application has been successfully submitted the window will display the message "Fortification has been submitted successfully".













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**wfp.org**