



# PM Formalisation of Micro Food Processing Enterprises Scheme

## Processing of Sorghum Flakes



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## CHAPTER 1

### INTRODUCTION

#### 1.1 ABOUT

**Sorghum**, (*Sorghum bicolor*), also called great millet, Indian millet, milo, durra, or shallu, cereal grain plant of the grass family (Poaceae) and its edible starchy seeds. The plant likely originated in Africa, where it is a major food crop. It is the fifth major staple cereal after wheat, rice, maize and barley. It is cultivated worldwide in warmer climates and is an important food crop in semi-arid tropical areas of Africa, Asia and Central America. In India sorghum is known as **jowar**, *cholam*, or *Jonna*. Different varieties of sorghum range in colour from white and pale yellow to deep red, purple and brown. Sorghum is especially valued in hot and arid regions for its resistance to drought and heat. It is tolerant to drought because of its root system. It performs better than maize during drought and occupies areas unsuitable for maize in stress-prone semi-arid areas. It is tolerant of salinity and to some extent to waterlogging for a short period. It is sensitive to frost and to sustained flooding. In recent years, there has been a shift in sorghum production from the drier western production areas to the wetter eastern areas. This change in production area has resulted in the identification and development of cultivars, which are more tolerant to lower temperatures.



Over half a billion people rely on sorghum as a dietary mainstay and, given its diversity of uses, as an important source of income. The grain is used mainly for food, prepared in the form of flat breads and porridges of different kinds. Other uses of Sorghum are:

**Cereal and Flour:** Sorghum has been used for human food for thousands of years in Africa and parts of Asia. Sorghum flour is a popular substitute for wheat flour for those who are unable to tolerate gluten. It can be used for baked goods, snack foods and noodles

**Livestock Feed:** Its feed value is similar to corn. More countries such as Colombia/Peru and China are changing the compound feed ration to include more sorghum in the formula.

**Syrup:** A variety of sorghum known as sweet sorghum is grown in the south-eastern and gulf states for the manufacture of syrup. Sorghum syrup is similar to molasses and can be substituted for sugar, honey or corn syrup in cooking or poured over pancakes, biscuits or waffles.

**Alcoholic Beverages:** In Africa, sorghum is used to make a traditional beer known as opaque beer. In the U.S., Anheuser-Busch produces a type of sorghum beer, called Redbridge, which is marketed to those who suffer from wheat allergy.

**Industry/Ethanol:** Sorghum is increasingly used for the production of ethanol, second only to corn. Percentage of Sorghum usage for ethanol depends on prices. Can be used for many different types of ethanol production including starch based, sugar-based and cellulosic ethanol production. Sorghum and corn are interchangeable in the grain-based ethanol market. A bushel of grain sorghum produces as much ethanol as a bushel of corn.

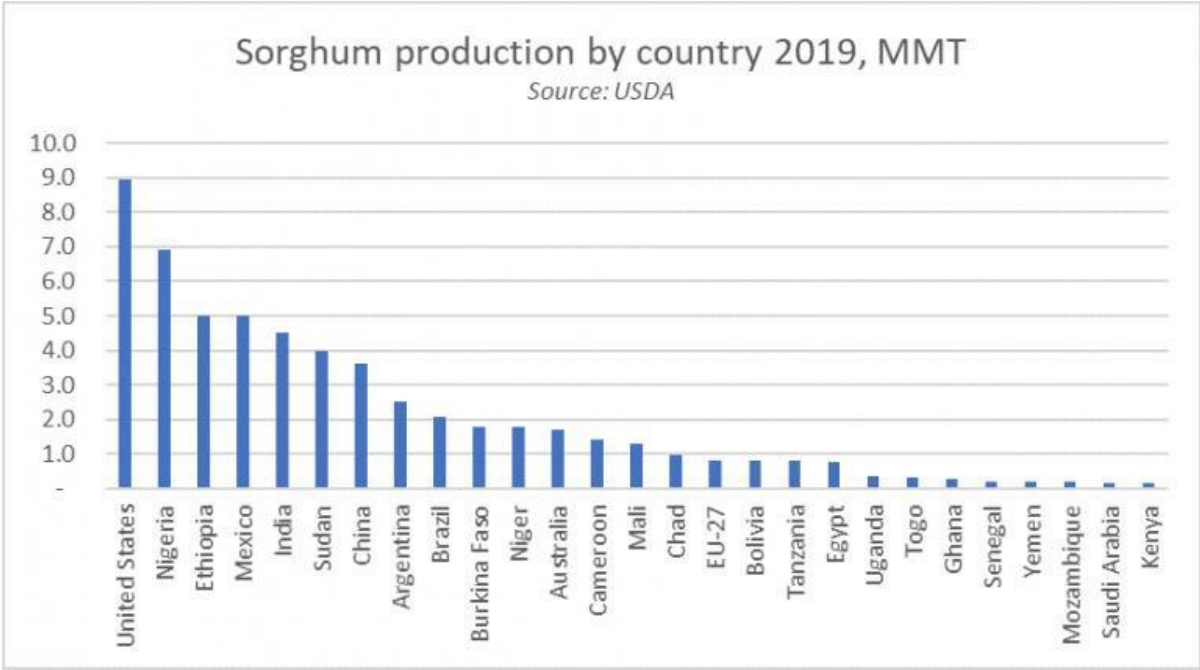
**Important varieties/hybrids of Sorghum available in India:** CO 21, CO, 26, BSR 1, K 5, COH 4, K Tall, K 8, Paiyur 1, Paiyur 2 etc.

## **1.2 WHERE SORGHUM IS GROWN?**

**World Scenario:** by area, more than 90% of the world's sorghum can be found in developing countries, mainly in Africa and Asia.

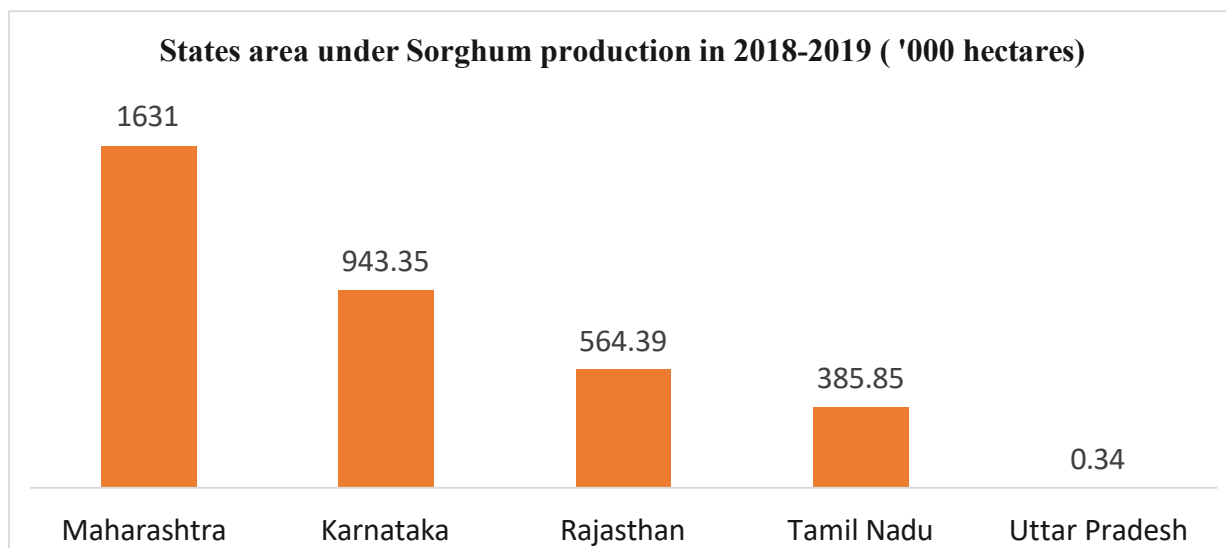
By production, the USA currently leads with an annual output of around 9 million metric tonnes, followed by Nigeria (6.9MMT), Ethiopia (5.0MMT) and Mexico (5.0MMT), India (4.5MMT), and China (3.6MMT).

Production by country is likely to change as farmers hit hardest by climate change and a reduction in rainfall look to replace maize with drought-resistant sorghum.



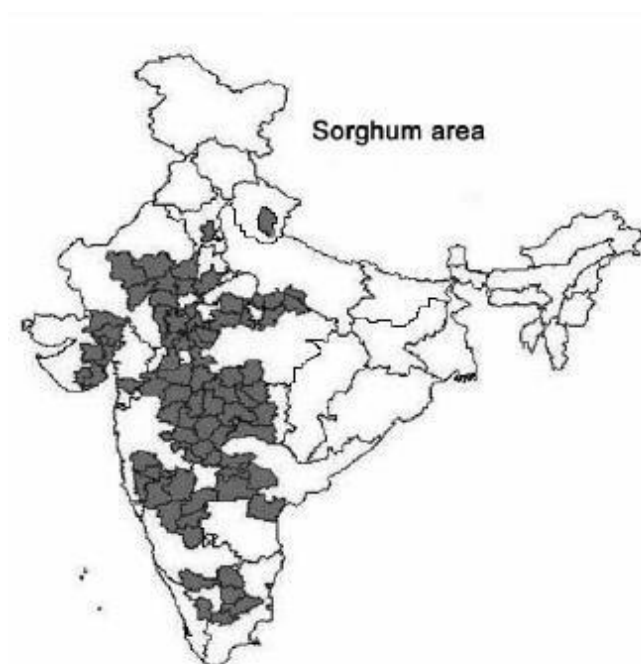
**Indian Scenario**

Total sorghum production in India was 3.475 MMT in 2019 (Source: Directorate of Economics and Statistics, Department of Agriculture, Cooperation and Farmers Welfare.)



(Source: Directorate of Economics and Statistics, Department of Agriculture, Cooperation and Farmers Welfare)

States above contributed 95% of country's total area and production under sorghum.



## Export from India

Market Year	Exports	Unit of Measure	Growth Rate
2018	51	1000 MT	-59.20 %
2019	31	1000 MT	-39.22%
2020	50	1000 MT	61.29 %

Source: Index Mundi

Top 5 countries which imports Sorghum from India are Saudi Arabia, UAE, Philippines, Kuwait and Japan which is worth USD 3.5 million in 2020.

### 1.3 MARKET POTENTIAL OF SORGHUM

Sorghum is beneficial for farmers because it is able to provide molasses, as sorghum seeds have higher sugar content. They also help farmers because the lower leaves of sorghum do not dry when the plant matures. Sorghum seeds can grow in very poor soils where maize, rice and other cereals cannot grow. Sorghum plantations are increasing at a rapid rate because it is a versatile plant which can withstand drought, soil toxicities, a wide range of temperatures, and high altitudes. Substantial demand from pet food industries and other customers is producing exceptional marketing opportunities for the sorghum seed market. Sorghum seed is also used for ethanol production.

The driving factor for the global sorghum seed market is a result of increase in sorghum seed in daily diet. Sorghum seed is used as biofuel and it has several advantages when used in alcoholic beverages. Globally, countries are investing a lot of money for the development of sorghum seed market to utilize barren lands where water availability is scarce. Similarly, high return on seed sales motivates the private sector to invest in sorghum seeds. Furthermore, rising demand for sorghum seeds in the Chinese market has transformed the demand scenario for the sorghum market, due to a huge difference between the import prices versus the local price. This factor creates an opportunity for farmers to invest in this field. Moreover, this factor motivates a country

to increase its import business. Thus, demand for sorghum seed is increasing continuously and it is expected that this trend will continue in future. However, increased competition from substitutes coupled with changes in customer preferences is hampering the market growth.

## **1.4 POTENTIAL HEALTH BENEFITS OF SORGHUM**

### **Anti-Inflammatory Effects**

Sorghum is known to be rich in phenolic compounds, many of which act as antioxidants. It has also been shown to be good at reducing some forms of inflammation due to its antioxidant properties

### **Anti- Cancer Effects**

Several of the phenolic compounds in sorghum have been linked to anti-cancer effects. The tannins in sorghum, which contribute to the grain's pigmentation, may inhibit an enzyme linked to the development of breast cancer. Another set of phenolic compounds found in sorghum, known as 3-deoxyanthocyanidins, have been shown to have a destructive effect on some human cancer cells.

### **Weight Loss**

The starches in sorghum are difficult for the human body to digest, compared to other grains. As a result, sorghum is an excellent addition to any meal, helping you feel full without contributing too many calories to your diet.

### **Safe for Celiac Disease**

Sorghum and its by-products, including sorghum flour, have been determined to be a safe alternative grain for those with Celiac's disease.

### **Controls Blood Sugar Levels**

Sorghum, a complex carbohydrate, is digested slowly, prompting a more gradual rise in blood sugar. Therefore, it is a great choice for people with diabetes.

## **Good for Bone Health**

Because it contains high levels of magnesium, Sorghum helps maintain calcium levels in the body (magnesium increases calcium absorption)

## **Digestive System**

The high dietary fibre content in Sorghum also helps improve digestion. The fibre is a bulking agent that helps stool pass smoothly through the digestive tract. The whole grain helps improve digestive health and is useful in treating conditions like diarrhoea, bloating, stomach ache and constipation.

## **Improves Heart Health**

Sorghum is rich in dietary fiber. The abundance of fiber in it helps lower LDL (or bad cholesterol) levels in the body, thus reducing the risk of heart attack. The cholesterol lowering properties of Sorghum also reduce the chances of hindered blood flow, arteriosclerosis and plaque formation.

## **Nutrition credentials of wholegrain sorghum:**

- Rich in carbohydrates (mainly starch).
- Moderate protein content, but low in lysine.
- Low in fat, most of which is unsaturated.
- A good source of dietary fibre.
- High in potassium and low in sodium.
- Gluten free.
- Contains B-group vitamins such as thiamine, riboflavin, niacin, vitamin B6 (pyridoxine), folate and pantothenic acid.
- Contains vitamin E.
- Contains iron, zinc, magnesium, phosphorus and selenium (depending on the soil content of selenium).
- Contains small amounts of copper, manganese and calcium.
- Contains phytochemicals including lignans, phenolic acids, phytic acid, plant sterols and saponins.

## 1.5 VALUE ADDED PRODUCTS

Sorghum is versatile and easy to add to a number of recipes.

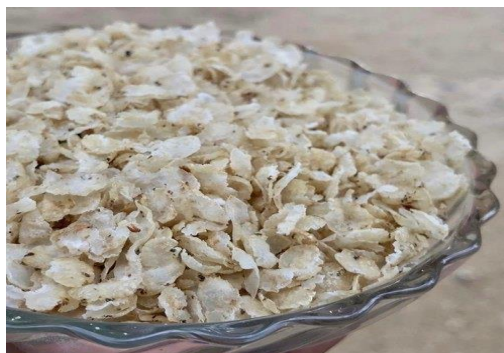
- Replace rice or quinoa. It can be cooked as whole grain and with pearled sorghum similarly to how rice and quinoa is cooked.
- Milled flour. It has a neutral flavour and light colour. Sorghum is naturally gluten-free, making it a good option for someone avoiding gluten. Gluten is a group of proteins found in certain grains that gives food products a stretchy quality and structure.
- Popped. The grains are heated in a pan to pop like popcorn. Seasonings are added for extra flavour.
- Flaked. Similarly, to other cereal grains like oats, flaked sorghum is delicious as a cereal and in baked products, such as granola bars and cookies.
- Syrup. Sorghum syrup is commonly added to processed foods as a natural sweetener or an alternative to molasses.

## 1.6 SORGHUM FLAKES

Flakes are a convenient food product often used as snacks. Flaking of cereals such as corn and rice to a larger extent whereas wheat, barley, oats and millets also to some extent is practiced worldwide for preparation of snacks and breakfast cereals. Flakes are generally precooked and require minimum preparation to consume as snacks and thus are classified as convenience foods and are suitable for consumption by all age groups. Conventionally, rice flakes are prepared by toasting paddy or rough rice. Cereal flakes are popular breakfast products and at present they are mostly made from corn. By suitable processing it might be feasible to produce flakes from millets. Ready to eat products like flakes are very popular, being crisp and friable in texture. The relatively smaller size and quick hydration of millets make them most suitable for the production of flakes.

At present there are three kinds of cereal flakes: (i) conventional flakes, (ii) flakes prepared using a roller flaker and (iii) RTE breakfast cereals (Lu and Walker, 1988). The first category of flakes is largely confined to rice, the second category includes flakes from almost all cereals, including oats and barley, whereas the third category of flakes is produced mainly

from maize. Currently, sorghum flake products are limited, but it is possible to prepare all three types of flakes from sorghum. Sorghum flakes, similar to those of rice, have been successfully produced on a semi-industrial scale from a roller flaker (Fast *et al.*, 1990).



### Nutritional Content of Sorghum Flakes

Sl. No.	Nutrient	Amount(/100g)
1	Moisture	10.55 g
2	Protein	7.23 g
3	Fat	1.79 g
4	Total dietary fibre	5.97 g
5	Carbohydrate	73.8 g
6	Calcium	10.94 mg
7	Phosphorous	110 mg
8	Iron	8.77 mg
9	Magnesium	68.9 mg
10	Zinc	0.88 mg
11	Thiamine	0.45 mg
12	Niacin	1.93 mg

Source: Dayakar *et al.*, 2014.

### Sorghum Flakes Savouries

Sorghum flakes are powerhouse of nutrition and a gluten free grain. It is easy on tummy and is good for babies and toddlers too. Sorghum flakes can be made into simple and easy dishes. It can be enjoyed in the form of Upma as it is quite easy and nutritious delicacy for early morning breakfast or along with tea. Sorghum Poha is indeed another healthy breakfast snack preferred in India. Other ways in which Sorghum flakes can be utilised is along with milk or curd.

## CHAPTER 2

### PROCESSING OF SORGHUM FOR FLAKES

Cereals undergo a number of processing stages between harvest and consumption. This chain of processes is often referred to as the total post-harvest system. The post-harvest system can be split into three distinct areas. The first is the preparation of harvested grain for storage. The second, which is referred to as primary processing, involves further treatment of the grain to clean it, remove the husk or reduce the size. The products from primary processing are still not consumable. The third stage (secondary processing) transforms the grains into edible products.

Primary processing involves several different processes, designed to clean, sort and remove the inedible fractions from the grains. Primary processing of sorghum includes cleaning, grading, hulling, milling, pounding, grinding, tempering, parboiling, soaking, drying, sieving. Secondary processing of sorghum (or 'adding value' to cereals) is the utilisation of the primary products (whole grains, flakes or flour) to make more interesting products and add variety to the diet. Secondary processing of sorghum includes the following processes: fermentation, baking, puffing, flaking, frying and extrusion.

#### 2.1 PRIMARY PROCESSING OF SORGHUM

##### **Cleaning and Grading**

Before further processing, grains are cleaned and graded according to size. Winnowing machines can be used to separate out the chaff, soil and dirt. Some machines have integral sieves that combine cleaning with grading.

##### **Parboiling**

It involves steeping the soaked sorghum in hot water and steaming at steam pressure of 1.5 kg/cm<sup>2</sup> for 10 minutes. Degree of parboiling depends on the water content of the steeped grain. Then drying is done to reduce the moisture content. This process allows the vitamins and minerals present in the hulls and bran coat to be carried into the endosperm.

##### **Milling**

The cleaned grain is conditioned, by addition of water, to soften the endosperm, and milled by the conventional roller mills to separate the endosperm, germ and bran from each other. Another milling process for sorghum is '**pearling**' or **decortications**. In this case cleaned

grains are wetted by spraying water for 12-15 min. and immediately milled in rice huller, to remove a major part of the coarse fibre, with minimum degree of cracking of the grain. A maximum of 12 per cent polishing can be carried out. This type of milling can give products rich in protein (up to 27 per cent), and which are also high in fat and give a high yield of ash, but are low in fibre. These products are used in the preparation of food products of high protein content.

### **Drying**

Prior to storage or further processing, cereal grains need to be dried. The most cost-effective method is to spread out in the sun to dry. In humid climates it may be necessary to use an artificial dryer. Simple grain dryers can be made from a large rectangular box or tray with a perforated base. The grain is spread over the base of the box and hot air is blown up through a lower chamber by a fan. The fan can be powered by diesel or electricity and the heat supplied by kerosene, electricity, gas or burning biomass. Cereal grains should be dried to 10-15% moisture before storage.

## **2.2 SECONDARY PROCESSING (FLAKING) OF SORGHUM**

### **Soaking**

At the cottage level, soaking of grain is done in metal drums or cement tanks for about 5 hours, after which the water is drained. Too much soaking can make sorghum grains soggy.

### **Softening**

Flaked cereals are partially cooked and can be used as quick-cooking or ready to eat foods. The grains are softened by partially cooking in steam or pressure cooking for 15 min. Subjecting hydrated sorghum to high temperature short time treatment in grain roaster (till starch content of the sorghum get gelatinised without rupturing the overall integrity of the sorghum but causing slight swelling) or cooked due to hydrothermal effect and the sorghum grain are rendered malleable.

### **Pre-Drying**

The cooked grains are allowed to cool for 1 hour at 70 degree Celsius in cabinet dryer, stabilizing the moisture content of each grain.

**Flaking**

Flattening the cooked sorghum in edge runner machine by repeated pressing between side wall of rotating machine till the sorghum flatten to the desired degree of thinness. After completion of flaking, the flaked sorghum is scooped out and collected in wide-mouthed, shallow trays. Flakes prepared from the edge-runner are short, broad, almost circular and white in colour comparable to rice flakes.

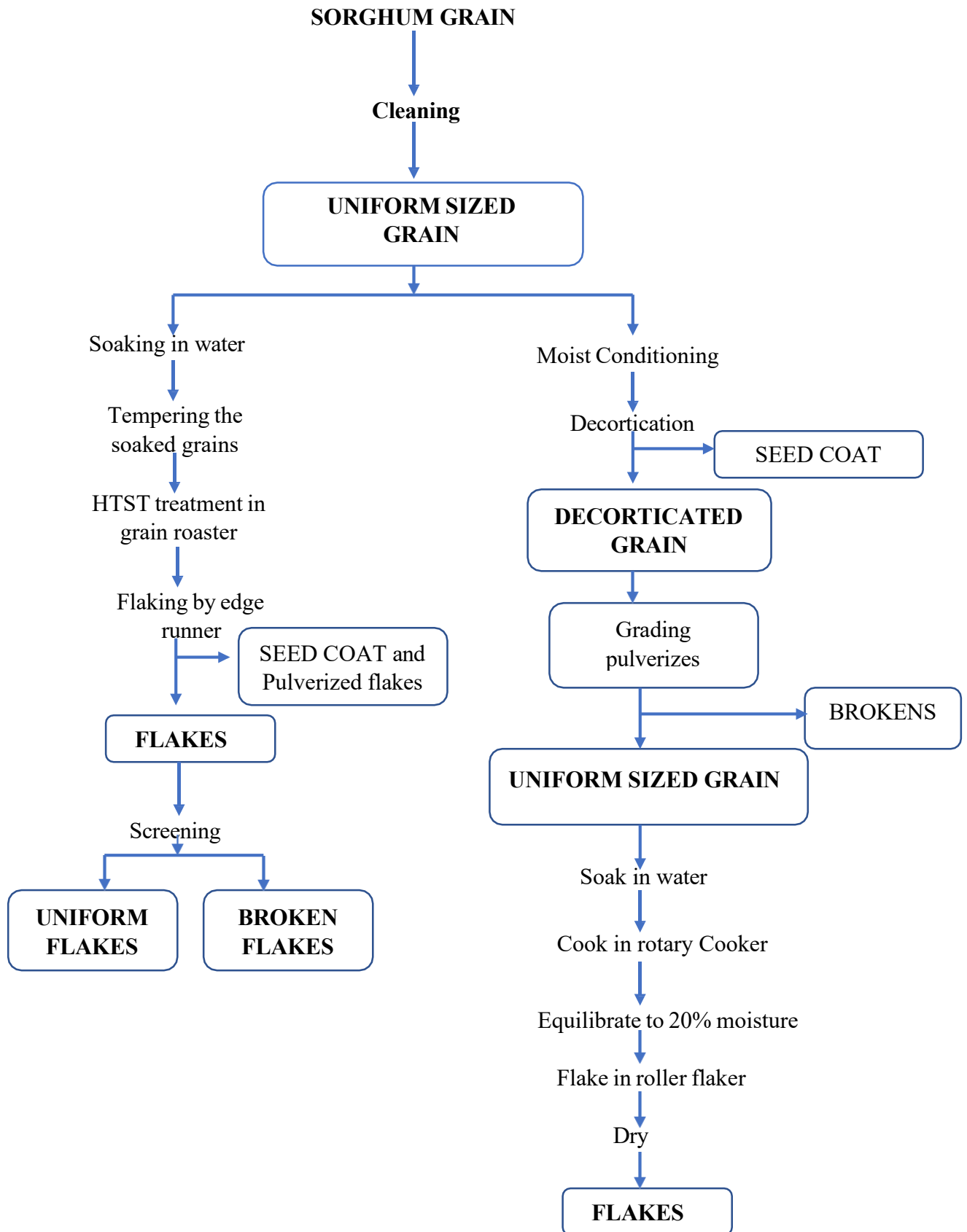
**Roasting**

The still soft and flexible Sorghum flakes are dried in the roaster machine with heat. This is where the flakes get their typical “crunch” through the formation of blisters.

**Sieving and Grading**

The flaked sorghum is sieved in a sieve shaker in order to separate small, broken, powdered material and lumps. The graded flaked sorghum is collected in heaps and turned from time to time until cool. It requires drying in order to avoid any moisture before packing which may reduce its shelf life.

### 2.3 FLOW CHART



## 2.4 MACHINES USED

### 1) Cabinet Dryer



Cabinet/tray dryers are used for batch drying of solid foods at small to moderate scale. They are inexpensive and simple to construct. Cabinet dryers consist of a closed compartment in which trays containing the food to be dried are placed. In order to secure more uniform drying, the direction of air flow may be reversed or the trays may be rotated periodically.

### 2) Edge Runner Machine



Edge runner mill, also known as Chilean mill or Roller stone mill consists of one or two heavy steel or granite rollers mounted on a horizontal shaft and turned round a central vertical shaft on a bed of steel or granite. The material to be ground is kept in the path of the runner by scrapers. The reduction is partly due to crushing: by the weight of the stones, but more to friction between the surfaces of contact between the runners and the bed stone.

### 3) Grain Roaster Machine



The Grain Roasting Machine multipurpose machine used for roasting, reduction of moisture contents, homogenous mixing, increasing shelf life of various types of Grains like wheat, barley, Maize, Jawar, flakes, granules type products, and most ideal machine for preparation of various types of Premix, Snacks foods, etc.

### 4) Vertical Packaging machine



The packaging installation with a vertical packaging machine (VFFS) is used for the dosing and packing of cereal flakes in flexible bags. Thermo-sealable film in the form of a roll is used as the packaging material. Depending on the desired level of automation, the packaging machine can be configured in different ways, as it may consists of the modules like Vertical packaging machine, Dosing device, Printing device etc:

## 2.5 ECONOMIC SIGNIFICANCE OF THE FLAKING PROCESS

1. Sorghum and millets are primarily consumed in form as unleavened pancakes and also in the form of thick porridge but seldom processed, especially for production of convenient high

value food products. Hence, with advent of this process where in sorghum and millets are converted to flakes may offer cheaper alternative to rice flakes of good quality which are nutritious.

2. Sorghum flakes are circular or oval in shape and offer better nutrition benefits than traditional rice flakes owing to higher proportion of minerals, vitamins and antioxidants and also dietary fibre. The slow releasing carbohydrates in sorghum will help in minimising the incidence of lifestyle diseases such as diabetes, obesity, etc.

3. The technology offers snacking and breakfast cereals preparation option thereby the demand for sorghum will be enhanced due to convenience attached to the technology in question, in long run it would help to strengthen the demand for sorghum crop cultivation and aids the poor dry land farmers in the country.

4. The process is simple and does not require sophisticated equipments and machinery. The flakes following this process could be prepared manufactured at cottage scale industry making use of conventional grain cleaning units, soaking tanks, grain roaster and the edge runner machine.

5. The process can be applied to any kind of clean sorghum and millet grains irrespective of agro-climatic condition of harvest, variety, shape and size of the grains. Even grain with poor economic strata could also be processed to prepare flakes.

6. The flakes could be used in conventional manner similar to rice flakes or could be processed further to prepare value added sweet and savoury products.

## CHAPTER 3

### PACKAGING

#### 3.1 DETERIORATING FACTORS

The factors influencing the quality of cereals and pulses are:

##### a. Physical

**Physical** losses are caused by spillages, which occur due to use of faulty packaging materials.

- **Loss of Crispness** The crispness is lost due to moisture absorbed by the product. Hence, the packing material should have good barrier properties to keep away the moisture from penetrating inside. Packages for Breakfast Cereals Plastic Pouches for Breakfast Cereals
- **Mechanical Damage** The rigidity of the packing material could save the packed product from handling damages including transport.

##### b. Physiological

Examples of physiological losses include respiration and heating in grains, temperature, humidity and oxygen.

- **Lipid Oxidation** In dry breakfast cereals, lipid oxidation is one of the primary means of chemical deterioration. The grains used in breakfast cereals have high ratio of unsaturated and saturated fat, which gives rise to lipid oxidation. To minimize oxidative rancidity, it is necessary that the package excludes light. Excluding oxygen may be of limited assistance in extending the shelf-life. When a case study for storage stability of flaked oat cereal was conducted, it was found that PVC/PVDC copolymer coated with PP-LDPE performed to offer good oxygen barrier. Use of antioxidants in packing materials can increase the shelf-life of a product, but is not permitted in most countries.
- **Loss of Vitamins** This can be a problem when certain cereals are flavoured with fruit. In such cases, loss of flavours would indicate the end of shelf-life of the cereal. Micronutrients present in cereals are not the major factor in determining the shelf-life of cereal.

##### c. Biological Losses

Due to micro-organisms, insects, rodents, etc. The grains and pulses are low moisture commodities due to which they are less susceptible to spoilage and have greater shelf-life. The spoilage mainly occurs due to moisture absorption during storage leading to fungal

growth at high temperature and humidity. Before bulk packaging and storage, the whole grains are fumigated to reduce microbial load and increase storage period.

### **3.2. PACKAGING REQUIREMENTS FOR SORGHUM FLAKES**

The following factors are to be taken into consideration while developing packaging materials for cereal and cereal products:

- Protection against environmental conditions like humidity, temperature, etc
- The packaging material should be able to withstand mechanical hazards during transportation and facilitate stacking several tiers high so as to optimize the use of available space
- To protect the contents from spillage
- To protect the contents from insect infestation
- To protect from external odour
- Easy to handle
- Economical and easily available

### **3.3 PACKAGING MATERIAL FOR SORGHUM FLAKES**

#### **PRIMARY PACKAGING**



- Envelops and holds the product.
- Direct contact with the flakes.

The available options in the market for packaging of cereal flakes are:

#### **Rigid Pack**

##### **1. PET Container**

PET is an FDA approved plastic for food contact. It also repels microorganisms and doesn't corrode, making it an overall ideal material for food contact and storage.



## 2. Tin

A lot of food is packaged in cans. And while steel cans are also handy, tin cans are also a resource that can be easily recycled, Tin cans are valued for their convenience and portability. Lightweight and durable, they are an ideal fit without the risk of accidental breakage. Metal offers a powerful barrier against light and oxygen. The larger surface area of cans, for example, offers more space to promote your brand with eye-catching graphics, attracting consumer attention in the store

## Flexible Pack

### 1. Trilaminare Pouch with zip opening

An adhered combination of two or more films or sheets made to improve overall characteristics. Also, multilayer film. Resistance against heat and shrinkage makes these pouches highly demanded in various packaging applications.



### 2. Kraft Paper Pouches

Kraft stand up pouches are an excellent option because they are made from natural paper and scientifically developed layers of film that keep products fresh and free from

harmful contaminants, UV light, and bacteria. Not only are kraft stand up pouches 100 percent recyclable, they're also made from FDA-approved food grade materials.



### **3. Polyester/foil/LDPE laminate printed packs**

Most commonly used packaging material for flakes: Polyester/foil/LDPE laminate packs, which are inserted in a duplex board printed carton. Other packaging material that is used include

- 15 $\mu$  BOPP/200-gauge LDPE laminate
- 12 $\mu$  metallised polyester/200-gauge LDPE laminate

The above laminates are less expensive as compared to the carton pack.

## **SECONDARY PACKAGING**

- Used to group the primary packages
- Present outside the primary unit

## **TERTIARY PACKAGING**

- Used for handling of bulk during storage and transport.
- Carton palletized unit of secondary package. Package for any product is selected based on their characteristics and stability



## CHAPTER 4

### FSSAI FOOD SAFETY AND STANDARDS

#### 4.1 FOOD SAFETY AND STANDARDS (FOOD PRODUCTS STANDARDS AND FOOD ADDITIVES) REGULATIONS, 2011

##### 2.3.20 Fruit/Vegetable, Cereal Flakes:

1. Fruit/Vegetable, Cereal Flakes means the product prepared by blending fruit(s) Pulp/Puree of sound ripe fruit(s) / vegetables of any suitable variety, fresh, frozen or previously preserved, starch, cereals & nutritive sweeteners, other ingredients appropriate to the product with or without salt & dehydrated in the form of flakes.

2. The product may contain food additives permitted in these regulations including Appendix A. The product shall conform to the microbiological requirements given in Appendix B. The product shall comply with the following requirements: —

(i)	Moisture (m/m)	Not more than 6.0 percent
(ii)	Acid insoluble Ash (m/m)	Not more than 0.5 percent
(iii)	Starch (m/m)	Not more than 25.0 Percent

#### 4.2 FOOD SAFETY AND STANDARDS (CONTAMINANTS, TOXINS AND RESIDUES) REGULATIONS, 2011

##### CONTAMINANTS, TOXINS AND RESIDUES

###### 2.1 : METAL CONTAMINANTS

Article of food	Name of metal contaminant	Parts per Million (mg/kg or mg/L)
Cereal grains	Lead	0.2
	Cadmium	0.1

## 2.2 CROP CONTAMINANTS AND NATURALLY OCCURRING TOXIC SUBSTANCES

Article of food	Name of the contaminant	Limit µg/kg
Cereal and cereal products	Total Aflatoxins	15
	Aflatoxin B1	10

## 2.3: RESIDUES

Name of the contaminant	Maximum Residue Limit (MRL) in mg/kg (In Food Grains)	Maximum Residue Limit (MRL) in mg/kg (In Milled Food Grains)
2,4-Dichlorophenoxy Acetic Acid	0.01	0.01
Sum of benomyl and carbendazim expressed as carbendazim	0.5	0.01
Carbaryl	1.5	0.01
Carbendazim	0.1	0.1
Carbofuran (sum of carbofuran and 3-hydroxy carbofuran expressed as carbofuran)	0.10	0.03
Chlorpyrifos	0.005	0.01
Deltamethrin (Decamethrin)	2.0	0.2
Dichlorvos (DDVP) (content of di-chloroacetaldehyde (D.C.A.) be reported where possible)	1	0.25

Dithiocarbamates(the residue tolerance limit are determined and expressed as mg/CS2/kg and refer separately to the residues arising from any or each group of dithiocarbamates)	0.2	0.05
Ethion(Residues to be determined as ethion and its oxygen analogue and expressed as ethion)	0.03	0.01
Malathion (Malathion to be determined and expressed as combined residues of malathion and malaoxon)	4	1
Monocrotophos	0.03	0.01
Paraquat dichloride (Determined as Paraquatcations)	0.03	0.03
Phorate (sum of Phorate, its oxygen analogue and their sulphoxides and sulphones, expressed as phorate)	0.05	0.01
Pirimiphos-methyl	7	1
Thiometon(Residues determined as thiometon its sulfoxide and sulphone expressed as thiometon)	0.03	0.01
Trichlorfon	0.05	0.01

### **4.3 FOOD SAFETY AND STANDARDS (PACKAGING AND LABELLING) REGULATIONS, 2011**

#### **FSSAI 2.1: Packaging 2.1.1: General Requirements**

1. A utensil or container made of the following materials or metals, when used in the preparation, packaging and storing of food shall be deemed to render it unfit for human consumption:— (a) containers which are rusty; (b) enamelled containers which have become chipped and rusty; (c) copper or brass containers which are not properly tinned (d) containers made of aluminium not conforming in chemical composition to IS:20 specification for Cast Aluminium & Aluminium Alloy for utensils or IS:21 specification for Wrought Aluminium and Aluminium Alloy for utensils.

2. Containers made of plastic materials should conform to the following Indian Standards Specification, used as appliances or receptacles for packing or storing whether partly or wholly, food articles namely: —

(i) IS: 10146 (Specification for Polyethylene in contact with foodstuffs);

(ii) IS: 10142 (Specification for Styrene Polymers in contact with foodstuffs);

(iii) IS: 10151 (Specification for Polyvinyl Chloride (PVC), in contact with foodstuffs);

(iv) IS: 10910 (Specification for Polypropylene in contact with foodstuffs);

(v) IS: 11434 (Specification for Ionomer Resins in contact with foodstuffs);

(vi) IS: 11704 Specification for Ethylene Acrylic Acid (EAA) copolymer.

(vii) IS: 12252 - Specification for Poly alkylene terephthalates (PET).

(viii) IS: 12247 - Specification for Nylon 6 Polymer;

(ix) IS: 13601 - Ethylene Vinyl Acetate (EVA);

(x) IS: 13576 - Ethylene Metha Acrylic Acid (EMAA);

(xi) Tin and plastic containers once used, shall not be re-used for packaging of edible oils and fats; Provided that utensils or containers made of copper though not properly tinned, may be used for the preparation of sugar confectionery or essential oils and mere use of such utensils or containers shall not be deemed to render sugar confectionery or essential oils unfit for human consumption.

### **Labelling Requirements**

All food products sold in India that are pre-packaged are required to comply with the Food Safety and Standards (Packaging and labelling) Regulations, 2011. The Food Safety and

Standards Regulation, 2011 is a notification issued by the Food Safety and Standards Authority of India under the Ministry of Health and Family Welfare.

### **Applicability of Food Labelling Regulations**

The food labelling regulations require all “Pre-packaged” or “Pre-packed food” to comply with the labelling regulations in India. As per the rules, pre-packaged food means food, which is placed in a package of any nature, in such a manner that the contents cannot be changed without tampering it and which is ready for sale to the consumer.

### **General Labelling Requirements**

The following labelling requirements must be complied with by all pre-packaged food sold in India:

- The label must be in English or Hindi or Devnagri language. In addition to the above, the label can contain information in any other language, as required.
- The label must not contain information about the food that could be deemed to be false, misleading, deceptive or otherwise create an erroneous impression regarding the product.
- The label must be affixed to the container in such a manner that it would not easily be separated from the container.
- The contents or information presented in the label should be clear, prominent, indelible and readily legible by the consumer.
- If the container is covered by a wrapper, then the wrapper must contain necessary information or make the label of the product inside readily legible by not obscuring.
- The name of the food must be mentioned along with the trade name and description of the food contained. In case the food contains more than one ingredient, then a list of ingredients must be presented in descending order of their composition by weight or volume, as the case may be, at the time of its manufacture;

### **Nutritional Information**

- Nutritional Information or nutritional facts per 100 gm or 100ml or per serving of the product must be given on the label along with the following information:
- energy value in kcal;

- the amounts of protein, carbohydrate (specify the quantity of sugar) and fat in gram (g) or ml;
- the amount of any other nutrient for which a nutrition or health claim is made:

It is important to note that any “health claim” or “nutrition claim” or “risk reduction” claim made in the label will be thoroughly scrutinized by the FSSAI authorities. Hence, any such claim must be validated by test data. As per the rules, the following is the definition for “health claim”, “nutrition claim” and “risk reduction” claim:

- **“Health claims”** means any representation that states, suggests or implies that a relationship exists between a food or a constituent of that food and health and include nutrition claims which describe the physiological role of the nutrient in growth, development and normal functions of the body, other functional claims concerning specific beneficial effect of the consumption of food or its constituents, in the context of the total diet, on normal functions or biological activities of the body and such claims relate to a positive contribution to health or to the improvement of function or to modifying or preserving health, or disease, risk reduction claim relating to the consumption of a food or food constituents, in the context of the total diet, to the reduced risk of developing a disease or health-related condition;
- **“Nutrition claim”** means any representation which states, suggests or implies that a food has particular nutritional properties which are not limited to the energy value but include protein, fat carbohydrates, vitamins and minerals;
- **“Risk reduction”** in the context of health claims means significantly altering a major risk factor for a disease or health-related condition

### **Veg or Non-Veg Symbol**

All packaged food that is “Non-Vegetarian” must have a symbol that is a brown colour filled circle inside a square with a brown outline. If a food contains only egg as a non-vegetarian ingredient, then the manufacturer may provide a declaration that the product contains only egg and add the non-vegetarian symbol



**Non-Veg Symbol**

Packaged vegetarian food should have a symbol that consist of green colour filled circle inside a green square.



### **Vegetarian Symbol**

#### **Information Relating to Food Additives, Colours and Flavours**

Food additives contained in the food product must be mentioned along with class titles along with the specific names or recognized international numerical identifications. Addition of colouring matter should be mentioned on the label along with certain statements like “CONTAINS PERMITTED NATURAL COLOUR(S)”, just beneath the list of the ingredients on the label. In case of addition of extraneous flavouring agent, then it should be mentioned in a statement like “CONTAINS ADDED FLAVOUR” just beneath the list of ingredients on the label.

#### **Name and Complete Address of the Manufacturer**

The name and complete address of the manufacturer must be mentioned on every package of food. In the case of imported food, the package must contain the name and complete address of the importer in India.

#### **Net Quantity**

All packaged food must carry the net quantity by weight or volume or number, as the case may be. The net quantity of the commodity contained in the package must exclude the weight of the wrappers and packaging materials.

#### **Lot Number of Batch Identification**

A lot number or batch number or code number must be mentioned on all packaged food so that it can be traced while manufacturing and distribution. Only bread and milk including sterilised milk are not required to comply with this regulation.

#### **Date of Manufacture or Packing**

The date, month and year in which the commodity is manufactured, packed or pre-packed must be mentioned on the label. In the case of food products having a shelf life of more than three

months, then the month and the year of manufacture can be given with the “Best Before Date”. In case of products having a shelf life of fewer than three months, the date, month and year in which the commodity is manufactured or prepared or pre-packed must be mentioned on the label with best before date.

### **Country of Origin for Imported Food**

For imported food, the country of origin of the food should be declared on the label of the food. In case a food product undergoes processing in a second country which changes its nature, the country in which the processing is performed should be considered to be the country of origin for the purposes of labelling.

### **Instructions for Use**

Instructions for use, including reconstitution, should be included on the label, if necessary, to ensure correct utilization of the food.

#### 4.4 SPECIFIC LABELLING REQUIREMENTS OF SORGHUM FLAKES

##### 8[2.4.4]: Specific Labelling Requirements of other Products

43. Every package of biscuits, bread and cakes 2[yoghurt, mousse, spreads, dairy based drinks (milk shakes, yoghurt drink), cheese, pudding, cream and ice-Cream, frozen dessert like non-dairy ice, sorbet and fruit ice, frozen yoghurt, flakes and ready-to-eat dry breakfast cereals, chocolates and sweets and carbohydrate based and milk product based sweets like halwa, mysore pak, boondi laddu, jalebi, khoya burfi, peda, gulab jamun, rasogolla and similar milk product based sweets sold by any name, cooked sausages, ham and meat spreads] containing Oligofructose shall bear the following declaration, namely,—

Contains Oligofructose (dietary fibre— gm/100 gm

49. Every package of biscuits, bread, cakes, breakfast cereals, carbonated water, thermally processed fruits, fruit juices, fruit nectars, fruit beverages, fruit squashes, jam, jelly, fruit cheese, marmalade, dairy based drinks, milk powder, carbohydrate- based and milk product based sweets like gulabjamun, rosogolla, peda, khoyaburfi, macroni products, noodles, pasta, sweets and confectionery, candies and icings, savouries and snacks wherever the trehalose is added shall bear the following label, namely:—

“Contains Trehalose”

3[50. The term "Gluten Free" shall be printed in the immediate proximity of the name of the product in the case of products described in regulation 2.14 of the Food Safety and Standards (Food Products Standards and Food Additives) Regulations, 2011, namely: -

“Gluten Free”

51. The term “Low Gluten” shall be printed in the immediate proximity of the name of the product in the case of products described in regulation 2.15 of the Food Safety and Standards (Food Products Standards and Food Additives) Regulations, 2011, namely: -

“Low Gluten”

52. The label shall carry a ‘warning’ that ‘the food labelled as Low Gluten may pose a risk for those with celiac disease.’]

54. Every package of flakes and ready to eat dry breakfast cereals, noodles, pasta, salad dressings or toppings and spreads; table top fibre as filler or carrier, cereals and other snack food or savouries and bakery products including biscuits, cookies, bread, cake mix and pastries and other products where dextrin is allowed under these regulations containing added Dietary Fibre (Dextrin-soluble fibre), shall bear the following declarations, namely:

Contains Dietary Fibre (Dextrin) -----(Source of soluble Dietary Fibre)

#### **4.5 SANITARY AND HYGIENIC REQUIREMENTS FOR FOOD, MANUFACTURER/PROCESSOR/HANDLER**

The place where food is manufactured, processed or handled shall comply with the following requirements:

1. The premises shall be located in a sanitary place and free from filthy surroundings and shall maintain overall hygienic environment. All new units shall set up away from environmentally polluted areas.
2. The premises to conduct food business for manufacturing should have adequate space for manufacturing and storage to maintain overall hygienic environment.
3. The premises shall be clean, adequately lighted and ventilated and sufficient free space for movement.
4. Floors, Ceilings and walls must be maintained in a sound condition. They should be smooth and easy to clean with no flaking paint or plaster.
5. The floor and skirted walls shall be washed as per requirement with an effective disinfectant the premises shall be kept free from all insects. No spraying shall be done during the conduct of business, but instead fly swats/ flaps should be used to kill spray flies getting into the premises. Windows, doors and other openings shall be fitted with net or screen, as appropriate to make the premise insect free. The water used in the manufacturing shall be potable and if required chemical and bacteriological examination of the water shall be done at regular intervals at any recognized laboratory.
6. Continuous supply of potable water shall be ensured in the premises. In case of intermittent water supply, adequate storage arrangement for water used in food or washing shall be made.
7. Equipment and machinery when employed shall be of such design which will permit easy cleaning. Arrangements for cleaning of containers, tables, working parts of machinery, etc. shall be provided.
8. No vessel, container or other equipment, the use of which is likely to cause metallic contamination injurious to health shall be employed in the preparation, packing or storage of food. (Copper or brass vessels shall have proper lining).
9. All equipments shall be kept clean, washed, dried and stacked at the close of business to ensure freedom from growth of mould/ fungi and infestation.
10. All equipments shall be placed well away from the walls to allow proper inspection.
11. There should be efficient drainage system and there shall be adequate provisions for disposal of refuse.

12. The workers working in processing and preparation shall use clean aprons, hand gloves, and head wears.
13. Persons suffering from infectious diseases shall not be permitted to work. Any cuts or wounds shall remain covered at all time and the person should not be allowed to come in direct contact with food.
14. All food handlers shall keep their finger nails trimmed, clean and wash their hands with soap, or detergent and water before commencing work and every time after using toilet. Scratching of body parts, hair shall be avoided during food handling processes.
15. All food handlers should avoid wearing, false nails or other items or loose jewellery that might fall into food and also avoid touching their face or hair.
16. Eating, chewing, smoking, spitting and nose blowing shall be prohibited within the premises especially while handling food.
17. All articles that are stored or are intended for sale shall be fit for consumption and have proper cover to avoid contamination.
18. The vehicles used to transport foods must be maintained in good repair and kept clean.
19. Foods while in transport in packaged form or in containers shall maintain the required temperature.
20. Insecticides / disinfectants shall be kept and stored separately and `away from food manufacturing / storing/ handling areas.



## Contact Us

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