



PM Formalisation of Micro Food Processing Enterprises Scheme

Processing of Bajra Flour



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CHAPTER 1

INTRODUCTION

1.1. Cereal Grains

Cereal grains (or simply grains) are small, hard and edible dry seeds that grow on grass-like plants called cereals. They are a staple food in most countries, and provide more food energy worldwide than any other food group, by far. Grains have played a major role in human history, and grain agriculture is one of the main advancements that fueled the



development of civilization. They are eaten by humans, and also used to feed and fatten up livestock. Then grains can be processed into various different food products.

Cereals form a major portion of human diet and are an important source of starch and other dietary carbohydrates (dietary fibre), which play an important role in the energy requirement and nutrient intake of human. The millets are with higher fibre content, and their protein quality and mineral composition contribute significantly to nutritional security of a large section of population residing in the millet growing areas, considered to be the most disadvantaged groups. Millets are most recognised nutritionally for being a good source of minerals magnesium, manganese and phosphorus. Research has linked magnesium to a reduced risk for heart attack and phosphorus is important for the development of body tissue and energy metabolism. Millets are also rich in phytochemicals, including phytic acid, which is believed to lower cholesterol, and phytate, which is associated with reduced cancer risk. Thus, millets are strategic in terms of their food, nutritional and livelihood security and their role in local agro-ecosystems.

A whole grain consists of 3 main parts:

- Bran: The hard, outer layer of the grain. It contains fibre, minerals and antioxidants.

- Germ: The nutrient-rich core that contains carbs, fats, proteins, vitamins, minerals, antioxidants and various phytonutrients. The germ is the embryo of the plant, the part that gives rise to a new plant.
- Endosperm: The biggest part of the grain contains mostly carbs (in the form of starch) and protein.
- A refined grain has had the bran and germ removed, leaving just the endosperm

Food uses of millets have, however, been confined only to traditional consumers; limited especially to areas of their cultivation, and still have remained underutilized. Processing them using traditional as well as contemporary methods for preparation of value added and convenience products would certainly diversify their food uses. Their exploitation for preparation of ready-to-use or ready-to-cook products would help in increasing the consumption of millets among non-millet consumers and thereby nutritional security.

1.1.1. Types of Cereal Grains

The cereals most commonly cultivated are wheat, rice, rye, Oats, millet, barley, corn (maize), and sorghum.

Image	Name	Description
	Rice (<i>Oryza sativa</i>).	Rice is an excellent source of calories because of its starch content. It contains 75-80% of starch, 7% of protein, 0.4-0.8% of lipids and 12% of water. Rice oats protein is of highly digestible quality and contains lysine 4.1mg/100g of protein higher than wheat.
	Barley.	It is highly nutritious and important for malting. Mostly used as a breakfast cereal with oat, it is also used as a feed for animals. It is mostly grown on land which is not capable of growing wheat

	Sorghum	Highly nutritious and used as a feed for livestock.
	Millet	Mostly grown Asia and Africa, millet porridge is popular in China, Russia and Germany. It can also be used to make alcoholic beverages, as an animal feed and bird feed.
	Oats	A staple cereal in Scotland, they are highly nutritious and used as breakfast cereals in more than half of the world. Due to high content of fibre it is popular to reduce weight and for lowering blood sugar level.
	Rye	The cereal grain of cold climates, used for making beer, breads, whiskeys, vodka and also use as animal fodder.
	Maize	Corn is a staple cereal in continents like South America and Africa, and used as an animal feed worldwide. Cornflakes are also a popular cereal globally.
	Wheat	Wheat is a major cereal crop and one of the oldest domesticated grains. In modern times, wheat is used to produce meal, breakfast cereals, and oats for bakery products. It can be cultivated in a wide range of soils but thrives in temperate climates.

1.1.2. Millet:

Millets are a group of highly variable small-seeded grasses, widely grown around the world as cereal crops or grains for fodder and human food. Millets are important crops in the semiarid tropics of Asia and Africa (especially in India, Mali, Nigeria, and Niger), with 97% of millet production in developing countries. The crop is favored due to its productivity and short growing season under dry, high-temperature conditions.

Millets are indigenous to many parts of the world. The most widely grown millet is pearl millet, which is an important crop in India and parts of Africa. Finger millet, proso millet, and foxtail millet are also important crop species. Bajra pearl millet is just one of many types of millet. Some other popular varieties of millet are:

- Pearl Millet
- Fonio,
- Finger millet (ragi),
- Job's tears, foxtail
- kodo millet.

1.2. Pearl Millet/Bajra

Bajra also known as cumbu, pearl millet is the predominant crop in India. It has the same quantity of protein as wheat. The protein contains a high proportion of prolamine followed by the globulin and albumins. Pearling of bajra to about 8% polish leaves most of the germs intact and the nutritive value is not seriously affected. Pearling improves appearance and taste of



the products. The grain is sometimes eaten after it is parched, the product being similar to popcorn. The grain is also suitable for the preparation of malt. It is consumed after dehusking

and cooked in the same way as rice. More commonly it is ground into flour and made into chappathi. It is also made into thin porridge.

1.3. Major component of Bajra Flour

Bajra pearl millet is only one of numerous sorts of millet. Some other famous assortments of millet are fonio, finger millet (ragi), Job's tears, foxtail, and kodo millet. Most millets have noteworthy dietary profiles, including bajra. Here's the normal nourishing profile of 1 cup (170 grams) of cooked millet :

- Calories: 201
- Protein: 6 grams
- Fat: 1.7 grams
- Carbs: 40 grams
- Fiber: 2 grams
- Sodium: 286 mg
- Folate: 8% of the Daily Value (DV)
- Iron: 6% of the DV
- Magnesium: 18% of the DV
- Thiamine: 15% of the DV
- Niacin: 14% of the DV
- Phosphorus: 14% of the DV
- Zinc: 14% of the DV
- Riboflavin: 11% of the DV
- Nutrient B6: 11% of the DV

1.4.Importance

- Cooked millet is a decent wellspring of protein and carbs and a good wellspring of fiber. It's likewise a decent wellspring of nutrients and minerals. Generally, millet is a nutritious sugar source.

- It's additionally without gluten and an appropriate decision for individuals with celiac illness or those after a without gluten diet — as long as you guarantee that you're buying an item that is affirmed without gluten.
- Bajra is high in advantageous plant synthetic compounds like cell reinforcements, polyphenols, and phytochemicals, which are all known for adding to ideal human wellbeing from various perspectives.
- Be that as it may, the presence of helpful polyphenols may likewise hinder a portion of the minerals in bajra, for example, iron and zinc, from being completely consumed by your body.
- Like most millets, bajra is a supplement thick wellspring of protein, carbs, nutrients, minerals, and useful plant synthetics.
- Millets are an ideal food for people suffering from chronic diseases such as diabetes and heart diseases. Millets are rich in fiber, which helps in digestion and can relieve bowel issues. Regular consumption of millets helps in preventing gastrointestinal problems and other diseases related to kidney and liver.

1.5. Market Potential

The global millets market was valued at US\$ 9,407. 8 million in 2018 and is expected to grow at a CAGR of 4. 6% from 2019 to 2027 to reach US\$ 14,026. 3 million by 2027. Millets are small-seeded grasses widely grown across the world as cereal crops or grains for fodder and human food.

The global millet production was estimated at 27.8 million tons. India is the largest global producer with a 41.0% global market share. In the last two decades, the importance of millet as food staples, particularly in India, has been declining due to various factors, including rising incomes, growing urbanization, and government policies. More than 50% of the millet production is currently finding its way into alternative uses as opposed to its consumption only as a staple. The growing population is further propelling the demands for food and beverage products, which in turn leads to the millets market growth in India. The bakery industry is among the fastest-growing consumer goods sectors with strong market potential for international

companies. The Indian food sector has emerged as high growth and high-profit sector due to its immense potential for value addition, particularly within the food processing industry.

The global millet consumption has declined at a rate of 0.9% and expected to witness positive movement during the forecast period. India, Niger, and China are the largest producers of millet in the world, accounting for more than 55% of global production. For many years, India was the world's major producer of millet. However, in recent years, millet production has increased dramatically in Africa.

CHAPTER 2

PROCESSING OF BAJRA FLOUR

2.1. Bajra Flour Processing



Bajra is a customary Hindi name for the *Pennisetum glaucum* crop — otherwise called pearl millet. It's moreover known as dukn, cumbu, gero, sanio, kambu, babala, or bulrush millet. The grain is essentially developed in Africa and India, where it's a significant wellspring of nourishment. Notwithstanding, it's likewise developed and expended in numerous different spots far and wide. Bajra alludes to the palatable seeds of pearl millet plants. They

develop in different shades of white, yellow, dark, earthy colored, and pale blue purple. The seeds are regularly cooked as an oat grain or now and then finely ground and utilized as a flour.

India is one of the major countries dominating the millets market in Asia Pacific, followed by China. Bajra has the same quantity of protein as wheat. The protein contains a high proportion of prolamine followed by globulin and albumins. Pearling improves appearance and taste of the products. It is consumed after dehusking and cooked in the same way as rice. More commonly, it is ground into flour and made into *chapaties*. It is also made into thin porridge. The grain is sometimes eaten after it is parched. The product is similar to popcorn. The grain is suitable for the preparation of malt. An intoxicating drink is obtained from its malted seeds.

2.1.1. Raw materials (100 Kg)

- Whole Pearl Millet themselves are the raw material;
- Packaging material

2.2. Manufacturing Process

- Grain delivery: Grain is delivered to mills by covered trucks and hopper railcars. The distance the grain has travelled varies greatly. In some cases it has travelled hundreds of miles in a 110-car unit train. In other instances it is being delivered from a local farm in the same county. Grain deliveries will frequently have gone through a number of aggregation steps prior to arriving at the mill (farmer, country elevator, terminal elevator etc.). The number of conveyances making deliveries of grain can vary depending on the time of year with more deliveries at harvest time.

- Grain standard: Before Pearl Millet is unloaded at a facility; samples are taken to ensure it passes inspection. Grain is tested for moisture content, test weight, unsound kernels, and foreign material. Grain is graded according to the Indian Grain Standards and is also subject to commercial specifications set by the ISO. At unloading, product control chemists begin their tests to classify Pearl Millet and determine end-use qualities. The results from these tests determine how the Pearl Millet will be handled and stored.

Standards define quality and condition factors and set grade limits based on those factor determinations. However, one must use commercial specifications that are even more rigorous than the Grain Standards when testing for natural toxins, evidence of pest exposure, stress cracks, etc. Sampling, grading and testing of grade and quality factors continues throughout the storage, handling and milling processes.

- Grain storage: Once the grain has passed inspection it is unloaded directly from the delivery vehicle into unloading bins and moved via conveyors and bucket elevators into large bins or silos. Storing grain is a science. The right moisture, heat and air must be maintained or the Pearl Millet may mildew, sprout, or ferment. During storage the grain may also be made to go through a fumigation process to eliminate insect pests. Pearl Millet is stored according to

nutrient level and other quality considerations. Storage times vary. Many mills will clean the Pearl Millet at this time to obtain better storage results.

- Cleaning the Pearl Millet: The first milling steps involve equipment that separates grain from seeds and other grains, removes foreign materials that might have originated during the farmer's harvest such as metal, sticks, stones and straw; and scours the kernels of Pearl Millet. It can take as many as six steps. The machines that clean the grain are collectively called the cleaning house.
 - ✓ Magnetic separator – The grain first passes by a magnet that removes ferrous metal particles. It will pass through other metal detectors after milling to ensure that no metal pieces are in the finished product. Magnets are also positioned throughout the milling process and at the last step prior to load-out.
 - ✓ Separator – Vibrating or rotating drum separators remove bits of wood, straw and almost anything else too big or too small to be the desired grain.
 - ✓ Aspirator – Air currents act as a vacuum to remove dust and lighter impurities.
 - ✓ De-stoner – Using gravity, the machine separates the heavy material from the light to remove stones that may be the same size as the desired grain.
 - ✓ Disc separator – The grain passes through a separator that identifies the size of the kernels even more closely. It rejects anything longer, shorter, more round, more angular or in any way a different shape. Scourer – The scourer removes outer husks, dirt in the kernel crease and any smaller impurities with an intense scouring action. Currents of air pull all the loosened material away.
 - ✓ Impact Entoleter – Centrifugal force breaks apart any unsound kernels or insect eggs and aspiration rejects them from the mill flow. From the entoleter, the sound Pearl Millet flows to grinding bins, large hoppers that control the feeding of the Pearl Millet to the actual milling process.
 - ✓ Color Separator – Newer mills may also utilize electronic color separators to simplify the cleaning process.
- Grinding Pearl Millet: The Pearl Millet kernels are now ready to be milled into flour. The modern milling process is a gradual reduction of the Pearl Millet kernels through a process of

grinding and sifting. This science of analysis, blending, grinding, sifting and blending again results in consistent end products.

Pearl r Millet kernels are measured or fed from the bins to the “roller mills”, corrugated cylinders made from chilled steel. The rolls are paired and rotate inward against each other, moving at different speeds. Passing through the corrugated “first break” rolls begins the separation of bran, endosperm (starch) and germ.

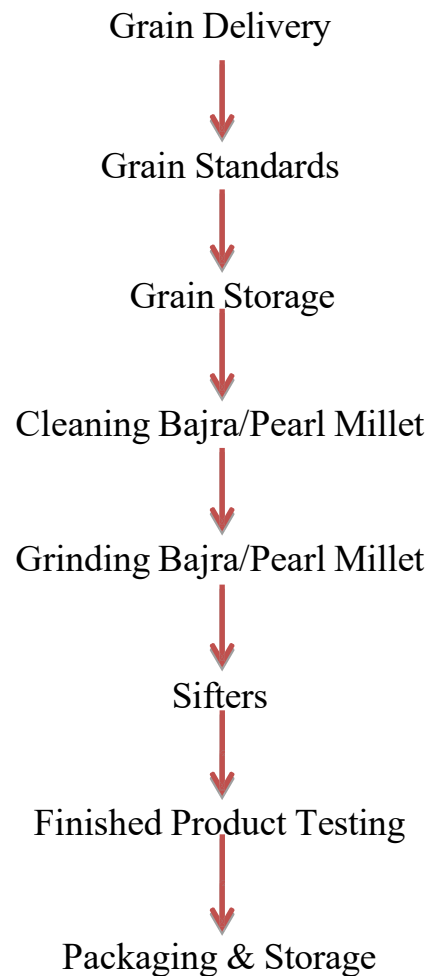
There are about five roller mills or breaks in the system. Again, the goal is to remove the endosperm from the bran and the germ. Each break roll must be set to get as much pure endosperm as possible. The “break” rolls, each have successively finer corrugations. After each trip through the break rolls, the grist is sent back upstairs to drop through sifters. The system reworks the coarse stocks from the sifters and reduces the Pearl Millet particles to granular “middlings” that are as free from bran as possible.

In some mills double high roller mills eliminate elevating and sifting the product between two successive passages in the milling process, thus increasing efficiency.

- Sifters- The broken particles of Pearl Millet are elevated through pneumatic tubes and then dropped into huge, vibrating, box-like sifters where they are shaken through a series of bolting cloths or screens to separate the larger from the smaller particles.
Inside the sifter, there may be as many as 27 frames, each covered with either a nylon or stainless steel screen, with square openings that get smaller and smaller the farther down they go. Up to six different sizes of particles may come from a single sifter.
- Blending: The flour is separated from the fibre and the process is repeated again.
- Finished product testing: After milling, lab tests are run to ensure that the flour meets specifications. Millers also conduct routine monitoring of indicator natural organisms. Although dry flour does not provide an environment that is conducive to microbial growth, it is important to understand that flour is a minimally processed agricultural ingredient and is not a ready-to-eat product. Flour is not intended to be consumed raw. The heat processes of baking, frying, boiling and cooking are adequate to destroy any pathogens that may be present in flour and reduce the potential risk of food borne illness.

- **Packaging of Product:** The packaging is carried out in a much simple process then milling, the Pearl millet flour is fed to holding tank of the packaging machine, which simply seals one end of continuous packaging first, then it simply fills the packet as per required weight & seals the other end, generating the required packet.

Flow chart of Bajra Flour Processing



2.4. Machines Used

1. Vibrating Pre-Cleaner: It's composed of a vibrating sieve, powered by an exciter which is in turn is powered by an appropriate motor; which is used to remove most of the dirt & large impurities from given grain.



2. De-stoner: It's a machine which is used to remove stones from the given grain, widely used in various grain mills in cleaning section.



3. Disc Separator: It's a separator class machine, generally used to remove foreign grains from required grain efficiently.



4. Magnetic Separator: It's a type of separator which is used to magnetic impurities from given product using powerful electromagnets, used in wide range of industries for separation.



5. Aspirator: It's a more fine-tuned separator designed to remove finer impurities like remaining dirt, similar sized impurities, leaves etc.



6. Heavy duty Pulveriser Mill: It basically a grinder class machine, which may employ any possible grinding arrangement to achieve, required grinding as per product to be grinded.



7. Flour Sifter Machine: It's basically an industrial version of the sieve used to sieve out, large fibers, particles etc, to achieve required particle size in flour.



8. Packet Filling & Packaging Machine: It's a simple packaging machine, designed to fill the given food grade plastic material's continuous pouch with required product after sealing one end & after filling sealing the other end also to generate packet of product.



Equipments:

1. Unloading Bin: These are large bins designed for unloading of grains & similar product; they are equipped with large rod mess to prevent big impurities from entering system.



2. Dust Collection Bin: These are large bins usually used in dust collection system to efficiently store the removed dirt from system or product.



3. SS Storage Tanks: It's a simple tank designed to hold required product.



4. Silos: These equipments are class of storage equipments which are specifically designed for dry grain raw material of small granule composition. Usually used to store grains but can also be used to store cement & aggregate.



5. Food Grade Conveyor: These are conveyors with food grade belt to maintain food safety standards set by monitoring authorities.



6. Other Material Handling Equipments: They are simply used to hold and transfer given material efficiently.



7. Power Distribution Equipments: They are used to safely receive and distribute electrical power.



CHAPTER 3

PACKAGING OF BAJRA FLOUR

3.1 Characteristics of Bajra Flour

The coarse grain contains 8-10 % husk. The average chemical composition of bajra, 67.1; fibre, 1.2 and mineral matter, 2.7 percent. The mineral matter is rich in calcium, phosphorous and iron. More than 50 percent of the phosphorous is as phytin which is a major factor for the poor digestibility of the bajra grain. The protein content of bajra varies from 8.8 to 16.1 %. Among the amino acids tryptophan content is high and lysine content is average to low. The carbohydrates consist mostly of starch with smaller amounts of sugars (1.2 %), pentosans and hemicelluloses. The starch is composed of 32.1 %t amylose and 67.9 % amylopectin. The grains are rich in thiamine, riboflavin and niacin. Pearl millet was found significantly rich in resistant starch, soluble and insoluble dietary fibers, minerals, and antioxidants. It contains about 92.5% dry matter, 2.1% ash, 2.8% crude fiber, 7.8% crude fat, 13.6% crude protein, and 63.2%, also is a potential functional food ingredient and the essential amino acid pattern suggests possible use as a supplementary protein source to most cereals because it is rich in lysine .

3.1.1. Shelf Life

This flour is best used within 20 days. Store in an airtight container in a cool and dry place. One cup of Bajra Flour is 130 g (which is obtained from 96 g of whole bajra), which makes 6 rotis.

3.2. Selection of Packaging Material

Factors to consider include product damage, fines, stickiness, bag opening size, re-closure among other things. In selection of packaging materials for sweet packaging the following need to be considered:

3.2.1. Tensile Strength & Elongation

Tensile Strength and Elongation properties of materials need to be studied as their running on high-speed machines should be suitable.

3.2.2. Tear Strength

For a flour processed product, tear strength is of importance as low tear values are necessary and useful for opening packages by hands.

3.2.3. Heat Seal Strength

The performance of a finished package is determined by the effectiveness of the package seal i.e. the permeability to water vapor, gases and volatiles increase if the seal is not perfect. Thermoplastic films such as polyethylene give excellent heat seals.

3.2.4. Performance Properties

Apart from the above mentioned important properties, a material has to perform well on machines; therefore knowledge of physical properties like slip, stiffness, blocking resistance is also necessary.

Twist retention for twist wrap is also of importance. The initial function of packaging is to protect. However, the emotional role played by packaging is also of importance, especially when the confection is a gift. A sophisticated packaging using deluxe materials is often used as a way of expressing feelings.

Packaging must also be specialized for specific target groups. A different pack size is required for quick impulse buys at petrol stations and roadside shops than for the super markets selling predominantly family sized packs.

3.3. Frequently-used plastic-based packaging materials

A very high quantum of polymeric materials, besides cellulosic and aluminum foil, are used for packaging items. Paper board and metal containers are also used for certain applications. Although a variety of packaging materials are available, the ultimate choice of the wrapper depends upon the required shelf-life, performance of the wrapping machine, and the cost which is purely based on the segment of the market targeted by the manufacturer. The most common choice of packaging medium is plastic (generally flexible) as it provides the required protection and preservation, grease resistance, physical strength, machinability, and printability. Plastics being lighter in weight are, therefore, the most preferred material for packaging of flour. There are many changing trends in the packaging of Flour. Plastic films and their laminates are

increasingly used due to better properties and aluminum foil laminates due to price and better flex crack property. Plastic-based packaging materials that can be used are listed below.

- **Polyethylene (PE)-** It is considered to be the backbone of packaging films. Since one of the greatest threats to the quality of flour comes from moisture, polyethylene with its low water vapor transmission is of definite interest. Polyethylene films are fairly free of plasticizers and other additives and are quite extensively used as a part of lamination. Its ability to heat seal increases its value. Low-Density Polyethylene (LDPE) is an economical material with low WVTR, however, it has high permeability's to flavors/volatiles, poor grease resistance, and are limp. High-density polyethylene (HDPE) is stiffer, more translucent, and has better barrier properties but needs a higher temperature for sealing.

Later additions include high molecular weight high-density polyethylene (HM HDPE) and linear low-density polyethylene (LLDPE). HM HDPE is a paper-like film with high physical strength and barrier properties but is less transparent than ordinary polyethylene. HM HDPE is available in twist-wrap grades. Polyethylene films are also suitable for making bags. A copolymer of polyethylene and polyvinyl alcohol and EVOH has outstanding gas barrier properties especially when dry.

- **Polypropylene-** Polypropylene films have better clarity than polyethylene and enjoy superior machinability due to stiffness. Lack of good salability has been a problem; however, PVDC and vinyl coating have been used to overcome this problem. Some varieties of PP have been specially developed for twist-wrap applications as they have the ability to lock in position after twisting.
- **Poly Vinyl Chloride (PVC)-** PVC is a stiff and clear film having a low gas transmission rate. PVC can be used as small wraps, bags, and pouches. PVC when co-polymerized with polyvinylidene chloride is known as Saran. Since it is a costly material, it is only used as a coating to obtain barrier properties and heat salability. PVC film is also used for twist wraps, as it has twist retention properties and is excellent on high-speed machines.

- **Polyesters (PET) and Polyamide (PA)-** Polyethylene terephthalate film has high tensile strength, gloss, and stiffness as well as puncture resistance. It has moderate WVTR but is a good barrier to volatiles and gases. To provide heat seal property, PET is normally laminated to other substrates. Nylons or polyamides are similar to PET but have high WVTR.
- **Metallised Films-** When polymeric films are metalized there is an improvement in their barrier properties. Metallization is also used for decorative purposes and aesthetics. The films, which are used for metallization, are PVC, PET, PP, and polyamides. To safeguard the interest of the consumer the Standards of Weights & Measures (Packaged Commodities) Rules, have imposed a limit on the weight of the wrapper.

3.3.1. Types of Packages

Flour is packed directly in gunny bags, poly-line gunny bags for bulk selling and in laminated pouches or poly-bags for retail selling.

- **Hanging Bags-** Hanging bags are frequently seen in grocery stores and other retail locations. They are a type of plastic bag that is sealed on both ends and sometimes with a back-middle seam as well. Hanging bags have a pre-cut hole that allows them to hang easily from hooks, so they can be displayed in an attractive way.
- **Pillow Bags -** Another common type of packaging is a pillow bag. The bags get their name from their shape, which resembles a pillow. They are found lying flat on grocery store shelves and have been known to hold the product.
- **Gusseted Poly Bags-** Gusseted bags are often called flat-bottom bags because they feature a tucked in pleat that's been pressed flat. It allows the bag to expand for greater carrying capacity and to keep the shape of a box if necessary. These types of poly bags can be heat sealed, tied, stapled, or taped shut. They're the perfect poly bag for anyone looking to get more flour in a single bag.
- **Flexible Pouches-** Flexible pouches are a great option for holding any processed products. They can be manufactured with zipper-seal closures, which help keep the interior contents fresh for use. Flexible pouches offer amazing printing capabilities, so

you can add your attractive product branding to the pouch itself. Many pouches stand up on their own, which helps you improve your shelf appearance.

3.3.2. Quality considerations during packing

Quality control of packed products is the last time the product is checked before reaching the customer.

Documented checking of the packages entails:

- Weight of the package
- Weight of the Flour
- Arrangement of the flour
- Defects; and Moisture content.

The surrounding area is also checked:

- Cleanliness of the handling equipment during processing
- Calibration of the scales (automatic or manual);
- Writing on the packages;
- Satisfactory working of the metal detector (installed on every retail packing line);
- Repackaging installations and marking; and
- Qualification for international standards such as ISO and HACCP

CHAPTER 4

Project component

4.1. Land- The approximate total area required for a complete small scale factory setup is 4000-5000 Sq. ft. approximately smooth production.

4.2. Civil work-

- **Workshop Area-** This area includes the machinery setup and foundation space for all tools and equipment etc. The total workshop area is approx. 2000 Sqft.
- **Inventory Area-** This area includes the storage space for all the raw materials, finished Product area. Total inventory area is approx. 1500 Sqft.
- **Office Area –** This space includes staff working region, their accommodation space, canteen area, medical facility, etc. The total workshop area is approx. 1000Sqft. This may be considered above the ground floor.
- **Parking Space, Electricity Utensils Mounting Space, and Others.** This could be approx. 500 Sqft.

Land and building requirements may vary depending on the size of project.

4.3. Miscellaneous Assets-

- Water Supply Arrangements
- Furniture

4.4. Power requirement- The manufacturing unit requires 15-20 KW producing 200 Kg/hr with semi automatic plant.

4.5. Man power requirement- For a small unit to begin with around 12-15 people is required including skilled, non- skilled worker and a supervisor.

CHAPTER 5

FOOD SAFETY REGULATIONS AND STANDARDS OF BAJRA FLOUR

5.1. Food Standards

Standards of Sorghum (Jowar) and its flour, whole and decorticated peal millet grain (Bajra) and its flour, Finger Millet (Ragi), and Amaranth are prescribed in the sub-regulation 2.4 of Food Safety & Standards (Food Product Standards and Food Additives) Regulations, 2011.

For sub-regulation 2.4.17, following shall be substituted, namely:-

Sl. No.	Characteristics	Requirement
1.	Moisture, %by mass, not more than	13.0
2.	Crude protein, % on dry mass basis, Not more than	2.5
3.	Acid insoluble ash, % on dry mass basis, Not more than	13.0
4.	Particle Size, %	Shall pass through 1mm sieve (18 mesh).
5.	Uric acid (mg per kg), Maximum	100
6.	Protein (N×5.7)(per cent on dry matter basis), Not less than	8.0
7.	Fat (% on dry mass basis), Not more than	7.0

8.	Alcoholic acidity (with 90 percent alcohol) expressed as H ₂ SO ₄ , % on dry weight basis, Not more than	0.15
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5.2. Food Safety

Part I - General Hygienic and Sanitary practices to be followed by Petty Food Business Operators applying for Registration

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.

5.3. Labeling Standards (Regulation 2.5 of FSS)

Labeling requirements for packaged food products as laid down in the Part 2.4 of the Prevention of Food Adulteration (PFA) Rules, 1955, and the Standards of Weights and Measures (Packaged Commodities) Rules of 1977, require that the labels contain the following information:

1. Name, trade name or description
2. Name of ingredients used in the product in descending order of their composition by weight or volume
3. Name and complete address of manufacturer/packer, importer, country of origin of the imported food (if the food article is manufactured outside India, but packed in India)
4. Nutritional Information
5. Information Relating to Food Additives, Colors and Flavors
6. Instructions for Use
7. Veg or Non-Veg Symbol
8. Net weight, number or volume of contents
9. Distinctive batch, lot or code number
10. Month and year of manufacture and packaging
11. Month and year by which the product is best consumed
12. Maximum retail price

Provided that — (i) the nutritional information may not be necessary, in case of foods such as raw agricultural commodities, like, wheat, rice, cereals, flour, spice mixes, herbs, condiments, table salt, sugar, jaggery, or non –nutritive products, like, soluble tea, coffee, soluble coffee, coffee-chicory mixture, packaged drinking water, packaged mineral water, alcoholic beverages or flour and vegetables, processed and pre- packaged assorted vegetables, flours, vegetables and products that comprise of single ingredient, pickles, papad, or foods served for immediate consumption such as served in hospitals, hotels or by food services vendors or halwais, or food shipped in bulk which is not for sale in that form to consumers.

Wherever applicable, the product label also must contains the following

The purpose of irradiation and license number in case of irradiated food. Extraneous addition of coloring material. Non-vegetarian food – any food which contains whole or part of any animal including birds, fresh water or marine animals, eggs or product of any animal origin as an ingredient, not including milk or milk products – must have a symbol of a brown color-filled circle inside a brown square outline prominently displayed on the package, contrasting against the background on the display label in close proximity to the name or brand name of the food.

Vegetarian food must have a similar symbol of green color-filled circle inside a square with a green outline prominently displayed.

All declarations may be: Printed in English or Hindi on a label securely affixed to the package, or Made on an additional wrapper containing the imported package, or Printed on the package itself, or May be made on a card or tape affixed firmly to the package and bearing the required information prior to customs clearance.

Exporters should review the Chapter 2 of the “FSS (Packaging and Labeling) Regulation 2011” and the Compendium of Food Safety and Standards (Packaging and Labeling) Regulation before designing labels for products to be exported to India. FSSAI revised the labeling Regulation and a draft notification to that effect was published on April 11, 2018, inviting comments from WTO member countries and the comments received are under review and the publication date remains unknown.

According to the FSS Packaging and Labeling Regulation 2011, “prepackaged” or “pre packed food” including multi-piece packages, should carry mandatory information on the label.



Contact Us

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