Ministry of Food Processing Industries
Government of India

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Reading Manual for Soya Chunks

Under PMFME Scheme

National Institute of Food Technology Entrepreneurship and Management
Ministry of Food Processing Industries
Plot No.97, Sector-56, HSIIDC, Industrial Estate, Kundli, Sonipat, Haryana-131028

Website: http://www.niftem.ac.in
Email: pmfmecell@niftem.ac.in
Call: 0130-2281089

CONTENTS

No	Chapter	Section	Page No
1	**Introduction**		**4-7**
1.1		Industrial Overview	4
1.2		Product Description	4-5
1.3		Market Potential	5-6
1.4		Raw Material	6
1.5		Types of Raw Material	6-7
2	**Process & Machinery Requirement**		**8-16**
2.1		Raw Material Aspect	8
2.2		Source of Raw Material	8-9
2.3		Technologies	9-10
2.4		Manufacturing Process	10-11
2.5		Flow Chart with Machines	11-12
2.6		Additional Machine & Equipment	12-13
2.7		General Failures & Remedies	13
2.8		Nutritional Information of Product	14-15
2.9		Export Potential & Sales Aspect	15-16
3	**Packaging**		**17-20**
3.1		Shelf Life of Coriander Powder	17-18
3.2		Coriander Powder Packaging	18-19
3.3		Types of Packaging	19-20
3.4		Material of Packaging	20-21
4	**FoodSafety& FSSAIStandards**		**22-28**
4.1		Introduction to FSSAI	22
4.2		FSSAI Registration & Licensing Process	23-24
4.3		Food Safety & FSSAI Standards & Regulations	24-26
4.4		Labelling	26-28
5	**Opportunities for Micro/Unorganized Enterprises**	**PM FME Scheme**	**29**

ABBREVIATIONS & ACRONYMS

Sr: No.	Abbreviations &Acronyms	Full Forms
1.	APEDA	Agricultural and Processed Food Products Export Development Authority
2.	FAO	Food and Agriculture Organization
3.	FBO	Food Business Operator
4.	FLRS	Food Licensing and Registration System
5.	FPO	Farmer Producer Organizations
6.	FIBC	Flexible Intermediate Bulk Containers
7.	FSSAI	Food Safety and Standards Authority of India
8.	GMO	Genetically Modified Organisms
9.	kcal	kilocalorie
10.	MoFPI	Ministry of Food Processing Industries
11.	PA	Polyamide
12.	PET	Polyesters
13.	PFA	Prevention of Food Adulteration
14.	SHGs	Self Help Groups
15.	UAE	United Arab Emirates
16.	UK	United Kingdom
17.	US	United States
18.	WVTR	water vapor transmission rate

CHAPTER 1
INTRODUCTION

1.1. Industrial Overview:

Soybean or *Glycine max L*. is a legume plant that Originated in Eastern Asia that has many uses and is widely cultivated for edible beans. Soybeans contains large quantities of phytic acid, nutritional minerals, and vitamins B. Another commodity in the processing of soybean crops is soy vegetable oil used in the food and industrial applications.

Soybean is the world's leading seed legume, contributing to 25% of the global edible oil and about 2/3 of the World's animal feed protein concentrate. Soybean is an important ingredient of feeds for poultry and fish food. Soybeans are a world-wide grown crop that provides oil and protein. Nuggets of soya beans are generally referred to as vegetarian meat for its similar characteristics to original meat. Soya bean is a rich protein source and is the highest protein (approx. 50 %) of all vegetarian foods. Soya beans are mostly grown in Madhya Pradesh though also cultivated in states such as Chhattisgarh, Gujarat, and West Bengal is a large area.

Many soybean's value added products are the dairy substitutes (e.g. soy milk, margarine, soy ice cream, soy yogurt, soy and soy cream cheese) and meat alternatives, (e.g. soy chunks). These substitutes are readily available in most supermarkets and markets.

1.2. Product Description:

Soya chunks or chunks are made of soy flour, which is a by-product of soy oil extraction. It has the same protein content as meat. It can be cooked quickly and easily, it can be used to cook a lot of dishes, such as soya pulao, soups, stir-fries, and more.

Soya chunks are the cheapest and safest food for well-being. Due to its good nutritive values, and medicinal qualities, soy chunks, and related food products became popular all over the world.

They are also similar chewy characteristics on soaking in water. Also, they are free from cholesterol.

1.3. Market Potential:

The market for soya nuggets is rising as healthcare-conscious In heap more on their plate. Although new players of the market have begun to deliver soya chunks, older players have increased demand power. In India, the soy nugget market is rising annually at a rate of between 25% and 30%, leading businesses to become more aggressive. In the household as well as in commercial food joints, hostels, hospitals, protective cuisines, and others, the demand for Soya Nuggets has increased due to its high content of proteins, cheap price, and taste as well as easy-to-cook nature. Since soy nuggets are an adequate food substitute, particularly in the vegan diet, for consumers similar to meat but are cheaper than meat. Different related soya Products face the problem of adequate storage, however, this problem is remedied for soy chunks, as dehydrated soy granules can be stored easily for approximately 12 months.

The soy granules have various domestic uses in food and beverage preparation in different regions. Soy granules have different minerals; vitamins, lecithin, and is flavones enriched and are very healthy for reducing cholesterol and preventing bone loss and cancer.

For expectant moms, cardiac, diabetics, the aged personalities, soy is proposed by medical practitioners to improve their condition. The growing awareness among people about their health benefits is a major source of demand in the world soya market.

They often help to stimulate demand by growing applications in various end-use segments, such as livestock feed. Dedicated protein ingredients have the benefit of first-hand movers and improved customer acceptance to deter demand in the global soybean industry, on the other hand. The global soybean market will increase from US$146.23 Billion in 2017 to US$215,746 Billion by 2025, at a CAGR of 5.0 percent over the period between 2017 and 2025.

1.4. Raw Material Description:

The Soy Flour or Soybean can both be used as raw materials but if soybeans are being used then the process starts with soybean processing into soy flour. The conversion of soy flour into defatted soy flour, then the actual soy chunks manufacturing process can start. The process discussed in this material is soya chunks manufacturing from defatted soy flour, thus the raw material required is Defatted Soy Flour & Packaging Material.

Defatted Soya Flour (Toasted) is obtained from selected, pre-cleaned, cracked, dehulled, and solvent 'NON-GMO' soybeans harvested by milling. It is a natural product in which no chemicals or preservatives are present. For packing, HDPE Bag with inner liners (food grade) is required, and to pack those bags for transportation in bulk, cardboard boxes are required.

1.5. Types of Raw Material:

The choice of variety can be made on the basis of the rainfall period. Instead of a single variety, several varieties can be adopted. Some of the releases of newly developed varieties over the last 4 years are as follows:

Year of Notified	**Name of Variety**	**State**
	Chhattisgarh Soybean-1 (CG Soya-1)	Chhattisgarh
2018	JS-2098	MP, UP, Raj, Gujarat, Maharashtra
	Kota Soya-1 (RKS-113)	Assam, WB, Jharkhand, CG, NE State
	DSB-23	
	KS-103	KK, TN, Telangana, AP, Maharashtra
	MAUS-612	Maharashtra and South India
	Raj Soya-24 (RVS 2002-4)	MP, Maharashtra, Rajasthan, UP
	Pant Soybean-24 (PS-1477)	UP and Uttarakhand
	Pant Soybean-21 (PS-1480)	Uttarakhand
2017	Pant Soybean-23 (PS-1523)	Uttarakhand
	Raj Soya-28 (Pragya)	MP
	JS-2069	MP
2016	VL Soya-77 (VLS-77)	
	VL-Bhat-201 (VLB-201)	Uttarakhand
	NRC-86 (Ahilya-6)	MP, Rajasthan, Gujarat, UP and Maharashtra
	KDS-344 (Phule Agrani)	Maharashtra, Karnataka, TN, & Telangana
	DSB-21	Karnataka, TN, AP, Kerala, Maharashtra
	Pusa-12 (DS-12-13)	Punjab, Haryana, Delhi, UK, Bihar, UP
2015	SL-958	Punjabi

CHAPTER 2
PROCESS & MACHINERY REQUIREMENT

2.1. Raw Material Aspects:

Defatted soy flour is used for making chunks. For this the defatted soy flour is crucial to facilitate dry milling required for dry fractionation. As defatting methods are both organic solvent extraction and oil pressing are suitable. To defat the soybeans by organic solvent extraction, soybean seeds are first coarsely milled into soy grits with a mill. Then a batch of soya grits is immediately defatted by using industrial Soxhlet extractor using petroleum ether (40-60°C boiling range) with a sample-to-solvent ratio of 1:4 for 6 hours. The defatted soy grits were left overnight in a fume hood to allow complete evaporation of the residual petroleum ether. Alternatively, a single-screw oil press defats whole soybeans. Cooling was applied during pressing to keep the temperature at 60 0 C and thereby prevent potential heat damage during pressing. Defatted soy cakes are collected for further use.

2.2. Source of Raw Material:

Maharashtra and Madhya Pradesh dominate soybean production in India, contributing 89 percent of the total production. The remaining 11 percent of production contribute by Rajasthan, Andhra Pradesh, Karnataka, Chhattisgarh, and Gujarat. According to the expected production of soybeans India is given in the following table:

2020 SOYBEAN PRODUCTION BY STATE				
S. No.	**States**	**Kharif 2020**		
		Sowing Area	Expected Yield	Estimated Production
1	Rajasthan	11.002	780	8.585
2	Madhya Pradesh	58.541	714	41.774
3	Maharashtra	40.398	1125	45.446
4	Andhra Pradesh	1.599	1028	1.644
5	Chhattisgarh	0.776	884	0.686

6	Gujarat	1.492	972	1.45
7	Karnataka	3.32	1124	3.732
8	Others	1.257	988	1.242
	Grand Total	**118.385**	**883**	**104.559**[ii]

The whole soybeans can be procured and processed to obtain defeated or various soybean oil processing plant and online platform provide defeated soy flour for the food processing industry.

2.3. Technologies:

Cooking Extrusion techniques

Extrusion techniques are the production of textured soy proteins is central to the overall processing. A screw mechanism in a tube or barrel that conveys the dough to small openings called a die. The dough is compressed and heated to high temperatures at high pressures in the confined space of the barrel until it is extruded into the atmosphere through dying. A cooking extrusion process has key features: feeding devices providing raw materials (Feedstock), the screw system and its barrel design, the dimensions and numbers of the Dies, and the extruder handling devices. Active research and development have led to many technological developments that have made the process more accurate in turn, ensuring that the finished product is of high quality. The cooking method performs many other essential functions in addition to the texturization and restructuring of soy proteins given below:

- Protein denaturation
- Reducing raw and beany flavor
- Homogeneous mixing
- Shaping the products

Drying technology

The drying process which is necessary to reduce product moisture to the required level is one of the key steps for manufacturing the TSP (Textured Soy Protein). The aim of dehydration in food is to reduce its degradation and inhibit the growth of bacteria, yeasts, and molds. In addition, unwanted chemical and biochemical reactions, often causing deterioration and reduction in the life-cycle of the product, are caused by decreasing humidity.

The method of drying is very complex as it requires the simultaneous transfer of heat, mass, and momentum, by moisture from the foodstuff and by hot air. This activity can include chemical and biochemical reactions, phase changes, and food product shrinking.

Mainly several parameters (such as a dryer, system pressure, dry air temperature, speed, and relative humidity) and product design affect this operation (superficial area, the orientation of constituents, and type and concentration of solutes). The optimization of drying processes can be accomplished with modern and advanced continuous dryers, by adjusting the listed parameters, thereby reducing the product residence time within the dryer and thus increasing plant productivity.

2.4. Manufacturing Process:

Defatted Soy Flour Storage before processing

Because of poor flowability and bridging characteristics, defatted flour is hard to handle. Soybean meal takes more time to stabilize or consolidate. With increased moisture, a longer time frame, and small particles, this phenomenon gets more serious. Several processors are micro-millers and follow the policy of keeping shorter/smaller stocks to make available enough raw materials only for few batches. The speculative character of the markets also contributes to high procurement costs.

Flour Blending and pre-conditioning

A screw conveyor is generally used for intake and transfer to conditioner or mixer. The raw material passes through the pre-conditioner or mixing cylinders where moisture can be applied evenly in water or steam, with a moisture content of 10 to 25%. If steam applied, it is carefully injected into the raw material to maintain it at moderate temperatures between 65°C and 100°C. The blending cylinders are vented to avoid excess vapor and unwanted volatile flavoring elements in the raw soy protein. In order to ensure the comprehensive and continued mixing by all foodstuffs entering the extruder barrel, flavors, colouring agents and other additives may also be added at that time. The preconditioning process is an effective way to initiate growth inhibitors found in many raw soy proteins.

Cooking Extrusion

The pre-conditioner discharges pre-conditioned material directly into the barrel of cooking extruder. Here, the raw or preconditioned soy protein is significantly transformed. In the last 2-5 seconds of the extruder barrel, the temperature of this moist proteinaceous dough is quickly increased. Retaining times of 5-15 seconds, temperatures of 100 to 200°C, and moisture levels of 15 to 30% all influence the protein dough quality just behind the die and the final product expansion.

Drying

The moisture content in the extrusion processing of textured proteins is high and the cooked product must therefore be dried for safe storage.

Different Dryers are used for reducing the moisture content of the final product.

Dryers with different lengths, widths, and passes allow proper sizing and versatility of installation on existing or new installations for the extruder production.

Cooling

Once the product comes out of dryer, it is still is not cool enough for packaging. A cooling conveyor with several cooling fans used generally.

Packaging of products

After the proper drying process, the chunks are ready for the packaging by using appropriate packaging material, the soya chunks are packed according to market demand in various size bags.

2.5. Flow Chart:

Steps	Machine Name	Description	Machine Image.
Storage before processing	**Flat storage or vertical silos**	Store the raw material (Defatted Soya Flour)	
Mixing/ Blending and pre-conditioning	**Blender**	The raw material passes through the pre-conditioner or mixing cylinders where moisture can be applied evenly in water or steam, with a moisture content of 10 to 25%.	
Cooking Extrusion	**Soya Cooking Extruder Machine**	Used for cooking extrusion of soy flour so as to obtain nuggets.	
Drying	**Dryers**	Dryer used for reducing the moisture content of the final product.	
Cooling	**Cooling conveyor**	A cooling conveyor with several cooling fans used generally.	
Packaging	**Automatic weighing and packaging machine**	This is automatic machine used for weighing and packaging of soya nuggets according to market demand.	

2.6. Additional Machine & Equipment:

Screw Conveyor	Used horizontally or at a slight incline as an efficient way to move semi-solid materials.	
Belt Conveyor	**used** in transportation of bulk materials	
Heat Exchanger	Heat exchangers are used in both cooling and heating processes	

2.7. General Failures & Remedies:

S. No.	General Failures	Remedies
1.	**Ball bearing failure of various machine**	1. Proper periodic lubrication of all bearings in various machines. 2. Regular replacement of all bearing to prevent critical failures.
2.	**Power Drive Overload**	1. Ensure proper weighing & metering specially in case of semi-automatic plant. 2. Install warning sensor in buffer region of loading capacity to ensure efficient operation.

3.	**Mechanical Key Failure**	1. Ensure that mechanical keys are replaced as per there pre-defined operational life. 2. Prevent Overloading.
4.	**Loss of Interface**	1. This problem is dominant in newly established automatic plant, one must learn to maintain rules in plant & ensure no employee goes near transmission lines, unless authorised. 2. Provide proper physical shielding for the connections.
5.	**Extruder Barrel Jamming**	This failure rises due to improper cleaning or maintenance of extruder. The most common remedy is simply cleaning.

2.8. Nutritional Content of Mature Soy Seed per 100g:

S. No	Nutrients	Quantity
1.	Carbohydrates	30.16 g
2.	Sugars	7.33 g
3.	Dietary fiber	9.3 g
4.	Fat	19.94 g
5.	Saturated	2.884 g
6.	Monounsaturated	4.404 g
7.	Polyunsaturated	11.255 g
8.	omega-3	1.330 g
9.	omega-6	9.925 g
10.	Protein	36.49 g
11.	Tryptophan	0.591 g
12.	Threonine	1.766 g
13.	Isoleucine	1.971 g
14.	Leucine	3.309 g
15.	Lysine	2.706 g

16.	Methionine	0.547 g
17.	Cystine	0.655 g
18.	Phenylalanine	2.122 g
19.	Tyrosine	1.539 g
20.	Valine	2.029 g
21.	Arginine	3.153 g
22.	Histidine	1.097 g
23.	Alanine	1.915 g
24.	Aspartic acid	5.112 g
25.	Glutamic acid	7.874 g
26.	Glycine	1.880 g
27.	Proline	2.379 g
28.	Serine	2.357 g
29.	Vitamin A equiv.	1 µg
30.	Thiamine (B1)	0.874 mg
31.	Riboflavin (B2)	0.87 mg
32.	Niacin (B3)	1.623 mg
33.	Pantothenic acid (B5)	0.793 mg
34.	Vitamin B6	0.377 mg
35.	Folate (B9)	375 µg
36.	Choline	115.9 mg
37.	Vitamin C	6.0 mg
38.	Vitamin E	0.85 mg
39.	Vitamin K	47 µg
40.	Calcium	277 mg
41.	Copper	1.658 mg
42.	Iron	15.7 mg
43.	Magnesium	280 mg
44.	Manganese	2.517 mg
45.	Phosphorus	704 mg
46.	Potassium	1797 mg
47.	Sodium	2 mg

48.	Zinc	4.89 mg
49.	Water	8.54 g

2.9. Export Potential & Sales Aspect:

In 2019 there was a US$ 40.5 trillion in the global soy food industry. Soybean is a type of legume originating in East Asia, with a low saturation but a high protein content, vitamin C, and folate content.

Iron, fiber, calcium, magnesium, potassium, phosphorus, and omega-3 fatty acids are strong sources. It has different health benefits because of its nutrient content, such as reducing blood cholesterol levels, raising bone density, and minimizing cancer danger. It is usually used in many recipes as an alternative to meat and is added to various vegan-friendly foods. The growing demand for plant-based foods confirms the soy market growth worldwide.

For the preparation of several things, soy milk, soybeans, tofu, tamari, tempeh, edamame, miso, natto, and teriyaki Soybeans have been used. Demand for tofu in particular for vegans and vegetarians is currently rising throughout the world. The lactose-intolerant user will eat an excellent replacement for cheese. Tofu's increasing sales are also certified in its shape, color, taste, and texture to its resemblance to meat. Furthermore, because of the increasing consumer health awareness, other soy products such as snacks and drinks also experience steady global growth in demand.

Furthermore, companies invest in R&D to launch new varieties of soy foodstuffs to extend their product range and draw new customers.

As a growth lever for the global food market for soy, the nutritive value and versatility of these ingestible forms are significant. With health-conscious foods in mind, soy foods are an excellent alternative to milk, meat, and poultry-intensive diets. Recent surveys have shown that about 40% of consumers under the age of 35 eat soya at least one week, twice the age of 55. According to recent data, almost 80% of consumers have tried some of the most popular soy food items or drinks. Given these factors, over the forecast period 2020-2030, the global soy food market is forecast to expand in an impressive CAGR.

CHAPTER-3
PACKAGING OF SOYA CHUNKS

3.1. Shelf Life Soya chunks:

Food storage is described as storage for a specific food item in the edible state for a certain period of time but typically refers to long-term storage.

Shelf life is defined in two ways:

- "Best if used by": Length of time food retains most of its original taste and nutrition.
- "Life-sustaining": Length of time foods can be stored and still be edible.

Between these two types of food items, there can be a significant difference. Depending on the product type, storage, and packaging conditions, foods purchased at the grocery store may have a shelf life of a few days or several years. The foods "life-sustainable" are those prepared for long-term storage. During the first packaging, food is processed for longer periods, the taste and nutritional quality decrease. Studies have however shown that frozen and dehydrated foods are preserved in their calories and can withstand a time of emergency and avoid starvation, properly packages, and stitching even if kept past the appointed period.

The shelf life of food stored depends on these 4 main criteria:

Temperature:

Nutritious and edible foods kept at or below room temperature (75°F/24°C or below). Foodstuffs stored at 50°F to 60°F can last longer than foodstuffs stored at higher temperatures (the optimum one). Food and its nutritional value are killed completely by heat. Proteins break down and some vitamins will be destroyed. Some foods can also have a different flavor, color, and smell.

Moisture:

Due to the long-term dehydration or freezing of feeding stuff, moisture is removed. Too much humidity encourages an environment in which micro-organisms flourish and chemical reactions can eventually sicken us in foods.

Oxygen:

Too much oxygen can damage foods and encourage the growth of microbes, fats, vitamins, and food colors. This is why oxygen absorbers should be used when your foodstuffs are dry.

Light:

Too much light exposure can lead to food degradation. It affects in particular the colors, loss of vitamins, fats, oils, and proteins of food. Maintain long-term storage of food for the longest shelf life in low light areas.

The factors that lead to spoilage/defects the soya chunks are highlighted as below:

Blemish - Scars, colouring, sunburn, dark spots, dark nose, or similar surface appearance defects affecting an additional region wider than the 7 mm circle.

Dirt-packaging can lead to this problem on an outdoor field. Dirt can reduce the quality of soya chunks.

Insects and mites

The presence of dead insects or mites, bits of insects or mites, or their excreta can be harmed or polluted by the contamination of chunks.

Scouring: Breakdown of the sugars into alcohol and acetic acid by yeasts and bacteria.

3.2. Soya chunks Packaging:

The packaging material to be used must be carefully chosen, taking into account both practical and marketing specifications, in order to ensure the consistency of the Protein during handling, transport, storage, and delivery. In general, the packaging specifications for Soya chunks are listed below:

- To protect the product from spillage and spoilage.
- To provide protection against atmospheric factors such as light, heat, humidity, and oxygen.
- The selected packaging materials should have high water vapor and oxygen barriers.
- The packaging material should have a high barrier property to prevent aroma/flavor losses and ingress of external odor.

- Therefore, the wrapping material should be resistant to grease and oil and be compliant with the commodity.
- The packaging content should, in addition to the above practical specifications, have good machinability, printability and be readily available and disposable.

3.3. Type of Packaging:

Bulk Packaging: The conventional approach is to use gunny/jute bags with a size varying from 10kg to 20 kg for the packing of Soya nuggets. Jute bags can be supplied with a polyethylene loose liner container, or maybe without a liner. Often double gunny bags, particularly for whole seeds are also used. An inner polyethylene lining is provided with the double gunny sack. The consistency of the jute fabric used varies from one trader to the other with respect to the gram mage and the weave (ends/picks).

There is no standardization about the type of fabric used and its consistency. A number of jute fabrics are used, including hessian, lightweight DW, A-twill, hard Cee, etc. Some traders/packers have recently used alternative bulk packing media, such as woven plastic bags that can be laminated or supplied with a loose liner bag, and plastic liner bag multiwall paper sacks. To overcome the toxicity issues associated with jute, plastic-based alternative wrapping materials are used. In comparison, the plastic bags/liners often help to maintain for a longer time the consistency of the soya chunks packed inside.

Jumbo bags (Flexible Intermediate Bulk Containers) (FIBCs) for the export of Soya chunks are the new theme. These bags have a size of up to 1 tonne and have different benefits, such as:

- Bags are flexible, collapsible and durable
- It can be used to store granules, powder, flakes, and other free-flowing substance
- It is possible to prevent commodity waste/spillage and tampering.
- Since handling is mechanized, less labour is required.
- Time saved for loading and unloading
- Bags are low in weight and freight rates are also minimized.
- Creates an eco-friendly working environment free of emissions

Institutional packaging: Traders also make use of institutional power packs ranging from 2 kg to 10 kg. The range of packets used includes lightweight laminated pouches and woven plastic sacks that replace conventional materials such as tinplate containers and jute bags.

Consumer Packages: The possibilities open to soya chunks are very large. The choice of the packaging material, however, depends on a number of factors, which are listed broadly below:

- ✓ Shelf-life duration, i.e. the degree of protection required by the commodity against pick-up of moisture, preservation of aroma retention, decolouration, etc.
- ✓ During packaging, transportation, and delivery, environmental conditions
- ✓ Business type/sector
- ✓ Preferences for users
- ✓ Printability and appeal of aesthetics

The package types generally used as consumer packs are:

- ✓ Glass bottles of various sizes and shapes with labels and provided with metal or plastic caps. The plastic caps have added inbuilt features of tamper evidence, dispensing, grinding, etc.
- ✓ Printed tinplate container with/without dispensing systems
- ✓ Printed tinplate container with/without dispensing systems
- ✓ Plastic containers with plugs and caps with dispensing and tamper evidence features
- ✓ Printed flexible pouches – pillow pouch, gusseted pouch, stand-up pouch.
- ✓ Lined cartons

3.4. Material of Packaging:

Due to their simple availability, excellent printability, lightweight, machinability, and cost-effectiveness printed flexible pouches have recently become quite popular. The laminate/film may also be customized to serve a particular purpose, depending on the practical and marketing criteria. The printed flexible pouches are generally laminates of various compositions. Some of the commonly used laminates are:

- ✓ Polyester/metallised polyester/LDPE
- ✓ BOPP/LDPE
- ✓ BOPP/metallised polyester/LDPE
- ✓ Polyester/Al foil/LDPE

Polyester and BOPP-based laminates are usually more common in the packaging of soya chunks due to its potential and characteristics of both of these two films. In general, the polyester used for lamination is 10 to 12μm thick. The film is good clarity with outstanding transparency, excellence, and printability thereby improving the sales appeal. The film has

very low moisture and gas permeability and thus guarantees a long shelf life of the contents of aroma, flavor, and flavor retention.

It may be Heat sealable or non-heat sealable. The film has high yields, is stable under climate change, and has an outstanding moisture barrier. The film is glossy, crystal clear, and smooth and has high mechanical strength and non-contamination properties for food contact applications. The sealant coating of LD – HD or LDPE may be replaced by LLDPE. Co-extruded films can also be used. Flexible materials based on PVDC, EVOH and EVAL still need to be tested, since they are now on the market and have high barrier properties.

CHAPTER 4
FOOD SAFETY & FSSAI STANDARDS

4.1. Introduction to FSSAI:

The Food Safety and Standards Authority of India (FSSAI) has been established under Food Safety and Standards, 2006 which consolidates various acts & orders that have hitherto handled food-related issues in various Departments. The FSSAI is responsible for setting standards for food so that there is one body to deal with and no confusion in the minds of consumers, traders, manufacturers, and investors. The Act aims to establish a single reference point for all matters relating to food safety and standards, by moving from multi-level, multi-departmental control to a single line of command.

Highlights of the Food Safety and Standard Act, 2006-

Various central Acts like Prevention of Food Adulteration Act, 1954 , Fruit Products Order , 1955, Meat Food Products Order , 1973, Vegetable Oil Products (Control) Order, 1947,Edible Oils Packaging (Regulation)Order 1988, Solvent Extracted Oil, De- Oiled Meal and Edible Flour (Control) Order, 1967, Milk and Milk Products Order, 1992 etc will be repealed after commencement of FSS Act, 2006.

The Act also aims to establish a single reference point for all matters relating to food safety and standards, by moving from multi- level, multi- departmental control to a single line of command. To this effect, the Act establishes an independent statutory Authority – the Food Safety and Standards Authority of India with head office at Delhi. Food Safety and Standards Authority of India (FSSAI) and the State Food Safety Authorities shall enforce various provisions of the Act.

Establishment of the Authority-

Ministry of Health & Family Welfare, Government of India is the Administrative Ministry for the implementation of FSSAI. The Chairperson and Chief Executive Officer of Food Safety and Standards Authority of India (FSSAI) have already been appointed by Government of India. The Chairperson is in the rank of Secretary to Government of India.

4.2. FSSAI Registration & Licensing Process:

According to Section 31(1) of Food Safety and Standards (FSS) Act, 2006,Every Food Business Operator (FBO) in the country is required to be licensed under the Food Safety & Standards Authority of India (FSSAI).

As per FSS (Licensing & Registration) Regulations, 2011, Licenses and Registrations are granted to FBOs in a 3 tier system

- Registration - for petty FBOs with annual turnover less than Rs 12 lakhs
- State license - for medium-scale food manufacturers, processor and transporters
- Central License - for large-scale food manufacturers, processor and transporters

FSSAI registration is done online on the FSSAI website through Food Safety Compliance System (FoSCoS)

- FoSCoS has replaced the Food Licensing and Registration System (FLRS).
- Petty food business operators are required to obtain FSSAI Registration Certificate
- "Petty Food Manufacturer" means any food manufacturer, whomanufactures or sells any article of food himself or a petty retailer, hawker, itinerant vendor or temporary stall holder (or) distributes foods including in any religious or social gathering except a caterer;

or

- Other food businesses including small scale or cottage or such other industries relating to food business or tiny food businesses with an annual turnover not exceeding Rs. 12lakhs and/or whose production capacity of food (other than milk and milk products and meat and meat products) does not exceed 100 kg/ltr per day

Any person or entity that does not classify as a petty food business operator is required to obtain an FSSAI license for operating a food business in India.

FSSAI License - two types - State FSSAI License and central FSSAI License

Based on the size and nature of the business, the licensing authority would change.

- Large food manufacturer/processors/transporters and importers of food products require central FSSAI license
- Medium-sized food manufacturers, processor and transporters requires state FSSAI license.

- License period: 1 to 5 years as requested by the FBO.
- A higher fee for obtaining FSSAI license for more years.
- If a FBO has obtained the license for one or two years, renewal may be done, no later than 30 days prior to the expiry date of the license.

4.3. Food Safety & FSSAI Standards & Regulations:

Food Standards

"2.4.27. Textured Soy Protein (Soy Bari or Soy Chunks or Soy Granules)" Soy Bari or Soy Chunks or Soy Granules is obtained by extrusion of defatted soy flour or grits. Textured Soy Protein shall conform to the following standards, namely:-

S. No.	Parameter	Limits
i.	Moisture (per cent. by mass), Max.	7
ii.	Protein (N x 6.25) (per cent. on dry matter basis), Min.	50
iii.	Fat (per cent. not more than) on dry mass basis	1
iv.	Total Ash (per cent. on dry mass basis), Max.	8
v.	Crude Fiber (per cent. on dry mass basis) Max.	3.5
vi.	Acid Insoluble Ash (per cent. on dry mass basis), Max.	0.3
vii.	Hexa ne, Max.	10 ppm
viii.	Urea se Index Value	0.05-0.2 pH Units rise

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.

4.4. Labelling Standards (Regulation 2.5 of FSS)

Labelling 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 colouring 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 labelling 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.[iii]

CHAPTER 5

OPPORTUNITIES FOR MICRO/UNORGANIZED ENTERPRISES

5.1. PM-FME Scheme:

Ministry of Food Processing Industries (MoFPI), in partnership with the States, has launched an all India centrally sponsored "PM Formalisation of Micro Food Processing Enterprises Scheme (PM FME Scheme)" for providing financial, technical and business support for up-gradation of existing micro food processing enterprises. The objectives of the scheme are :

I. Support for capital investment for up-gradation and formalization with registration for GST, FSSAI hygiene standards and UdyogAadhar;

II. Capacity building through skill training, imparting technical knowledge on food safety, standards & hygiene and quality improvement;

III. Hand holding support for preparation of DPR, availing bank loan and up-gradation;

IV. Support to Farmer Producer Organizations (FPOs), Self Help Groups (SHGs), producers cooperatives for capital investment, common infrastructure and support branding and marketing.[iv]

Referance

[i] National Food Security Mission (https://www.nfsm.gov.in)

[ii] http://www.sopa.org/statistics/soybean-production-by-state/

[iii] Food Safety and Standards (Food Products Standards and Food Additives) Regulations, 2011 (FSSAI)

[iv] https://mofpi.nic.in/pmfme/