Ministry of Food Processing Industries
Government of India

सत्यमेव जयते

NIFTEM
Knowledge. Innovation. Outreach

Reading Manual for Pasta

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

ABBREVIATIONS & ACRONYMS

Sr: No.	Abbreviations &Acronyms	Full Forms
1.	FAO	Food and Agriculture Organization
2.	FBO	Food Business Operator
3.	FLRS	Food Licensing and Registration System
4.	FPOs	Farmer Producer Organizations
5.	FSSAI	Food Safety and Standards Authority of India
6.	GMP	Good manufacturing practice
7.	kcal	kilocalorie
8.	MoFPI	Ministry of Food Processing Industries
9.	PA	Polyamide
10.	PET	Polyesters
11.	PFA	Prevention of Food Adulteration
12.	RF	Refined Wheat Meal
13.	SHGs	Self Help Groups
14.	UAE	United Arab Emirates
15.	UK	United Kingdom
16.	US	United States
17.	WGWF	whole-grain wheat flour
18.	WVTR	water vapor transmission rate

CHAPTER 1
INTRODUCTION

1.1. Industrial Overview:

Pasta is a food that is widely loved, and is a form of noodle, served in almost every country. It's mein in China; udon in Japan; pierogi in Poland; spaetzle in Germany. There are many factors that can be attributed to the popularity of pasta: it is readily available, takes up little storage space, is easy to prepare, and is rich in complex carbohydrates.

History states that pasta was brought by Marco Polo to Italy from China. At the time of the Yuan Dynasty (1271-1368), Polo went to China and the Chinese ate noodles as early as 3000 B.C. In the Province of Qinghai, an ancient Etruscan gruel and porridge meals were gradually replaced by more appetizing cakes of unleavened bread. Food historians say the predecessor to these cakes may have been now called pasta. The views on where the noodle originated differ. From his journeys in the Orient during the 1300s, the Italian explorer Marco Polo was widely credited with taking the noodle back to Italy. Some claim, however, that a close analysis of Polo's papers shows that in China, he mentioned enjoying a certain type of noodle, contrasting it favourably with the pasta he was used to eating in Italy. A dish called pastillum, essentially a ravioli-like pouch filled with meat, was also described by early French authors.

The Italians, however, have so vehemently staked the point that today we usually think of pasta dishes as of Italian origin. The term "pasta" originally comes from the Italian expression "paste (dough) alimentary (relating to nourishment)."

1.2.

1.2. Product Description:

Pasta refers to the traditional Italian cuisine's staple food that is made using dough, water, eggs, vegetables, and oil. The dough is kneaded into different kinds, some of which are known as penne, spaghetti, farfalle, barbine, fettuccine, etc. The pasta type is determined by the size and shape of the holes in the die.

- The pasta dough is forced through holes between 0.8-0.5 mm in diameter to produce vermicelli and capellini. Then the cutting machine slices the pasta into 10 inch (250 mm) lengths and coils it into curls. Spaghetti varies in diameter from 1.5-2.5 mm and is left straight.
- On a separate unit, tortellini (filled pasta rings) are made. From a roll of dough, the computer cuts tiny circles. On the circle of dough, a bucket of ricotta cheese mixture drops a pre-measured volume of cheese. The dough is then folded over and a circle is formed by connecting the two ends.
- Pre-measured amounts of cheese filling are dropped on a sheet of pasta at pre-measured intervals to produce ravioli (filled pasta squares). As it passes along a conveyer belt, another sheet of pasta is put over this sheet. The two layers then move into pre-measured squares under a cutting machine that perforates the pasta.

In Penne Pasta, the high carbohydrate content provides the body with glucose that is the key fuel for the brain and muscles. It is low in cholesterol and sodium. The whole grain pasta offers a high nutritional value, which makes it more popular. In addition to this, the form of sauce added will undoubtedly impact the nutritional value of the meal. While pasta items were first introduced in Italy in the 13th century, it has only been possible to manufacture efficient production equipment and high-quality ingredients since the 20th century. Today, most pasta is processed by continuous high-capacity extruders operating on the principle of auger extrusion, where kneading and extrusion are carried out in a single operation. Pasta processing types includes dry macaroni, noodles, and spaghetti.

1.3. Market Potential:

'Indian Pasta Market: Industry Dynamics, Share, Scale, Growth, Potential and Forecast 2018-2023,' India's pasta market reached a sales value of US$ 286.6 million in 2017, showing a CAGR of 17.1% in 2010-2017. In 2020, revenue in the pasta segment is forecast to hit 11,881 million US dollars. The market is expected to rise by 3.8 percent annually (CAGR 2020-2025).

In 2020, the average per capita intake will stand at 6.5 kg. Rising urbanization, changing lifestyles and increasing demand for ready-to-eat items are the primary factors increasing the growth of the pasta market in India. In addition, a growing rate of jobs for women, combined with rising disposable incomes, is also affecting the sector. In addition, health-conscious customers are calling for food items with healthy ingredients, which has contributed to an increase in the market for whole wheat pasta. The market has been segmented into dry pasta, instant pasta and fresh pasta on the basis of its form. Currently, the Indian pasta industry dominates dry pasta, retaining much of the revenue from the market share.

Italy is the country where pasta production, along with the growth of technology and machinery, had and still has its top expression. The artificial drying process allowed pasta to be manufactured at the industrial level from the beginning of 1900 and thus to be distributed first and then internationally to all regions of Italy (including big exportation volumes to USA).[i]

1.4. Raw Material Description:

The main raw materials are wheat flour or Maida and starch. Additionally, one would need sugar, common salt, spices, garlic, ginger, Sodium Bicarbonate, etc. to make a complete dish with veggies. A combination of water and semolina flour makes pasta. Semolina is a coarse-ground flour of durum wheat from the middle, or endosperm, amber-colored high protein hard wheat that is primarily grown for pasta production. Semolina flour is quickly digested with a lower starch content and a higher protein content than all-purpose flour. To produce some pasta, rougher granulations of other high-quality hard wheat, is also used. Before being delivered to pasta plants, the semolina and farina flour are fortified with B-vitamins and iron.

Eggs, for color or richness, are often applied to the mixture. It is stipulated by federal requirements that egg Pasta contain at least 5.5% egg solids. For color and taste, vegetable juices can also be added, such as spinach, beet, tomato, and carrot. The addition of herbs and spices, including garlic, basil, and thyme, has become popular in recent years.

Wheat Flour/Maida

Semolina and all types of flour are used to make Noodles or pasta, but soft white wheat flour is also preferred. The Pasta are elastic and chewy when cooked if solid, high-protein flour is used. Maida is a white flour made of wheat from the Indian subcontinent. Finely milled, polished and bleached without any bran, it closely resembles cake flour. Maida is commonly used to make fast foods- noodles, pasta, baked goods such as pastries, bread, sweets of different varieties, and traditional flatbreads.

Starch

Pastas are made from different legume starches such as large bean, pea, cowpea, bean, and various tuber or root starches such as potato, sweet potato, cassava, and a number of grain starches such as maize, wheat, sorghum, are made from coarse grain starches.

Salt

In pasta, sodium chloride is a significant component. In Asian pasta, the addition of sodium chloride at 2-3% level could improve noodle texture by strengthening and tightening the gluten network to increase viscoelasticity

Oil

Olive oil adds fat and taste, making it more supple and easier to roll out the dough. The texture of the pasta dough can be corrected with a little added water, rendering the dry dough smoother.

1.5. Types of Raw Material:

For pasta-making, the three most widely used kinds of flour are:

- All-purpose flour
- Semolina flour
- "00" flour[ii]

Flour contains the gluten needed to give its elasticity and plasticity to pasta dough. It must have the proper degree of elasticity for the dough for easy kneading. For it to be shaped into all of those wonderful forms, pasta dough also requires some plasticity.

- All-purpose flour- The all-purpose flour is made from wheat, but the whole grains are not used. It is white in colour and has been significantly refined to make a very fine powder appropriate for a wide range of types of pastas. There is a fairly neutral taste to all-purpose flour; it's easy to deal with because it's so good, and you probably already have a few packets sitting in your pantry. To prepare a dough that's going to be solid and elastic, and that works well for a number of different noodles/pastas which can also be combined with egg, water, or oil.

- Semolina flour- Semolina is also known, quite correctly, as wheat pasta or wheat macaroni. Hard durum wheat used to make semolina is commonly grown in northern Italy, which has the ideal warm climate for sturdier grains. Semolina flour can be used in contrast to soft wheat flour for those dense and rough pasta shapes that soak up rich sauces so wonderfully. Semolina has less elasticity and much more plasticity than all-purpose-flour. This consistency also ensures that, when cooked, pasta tubes such as penne or macaroni do not lose their extruded appearance.

- "00" flour - Both Semolina and 00 flour are wheat flour, but their texture and flavour vary greatly. Based on how well they have been grounded, Italians identify various types of flour. "1" flour is a larger particulate wheat flour with a coarse texture, while 00 flour is a much finer powder. 00 flour is a soft wheat flour which, particularly cakes and crumbly pastries, is perfect for baking. Because of its texture and powdery consistency, one may also use soft wheat flour for pasta. For softer pasta shapes such as tagliatelle, it is not only perfect, it is also the best flour for ravioli pasta.

CHAPTER 2
PROCESS & MACHINERY REQUIREMENT

2.1. Raw Material Aspects:

Pasta is an important food ready to be consumed mostly in homes, restaurants, and institutional environments. Italian explorer, Marco Polo from the 13th century is known as an introducer of pasta from China to Europe. Italian pasta is usually made from durum wheat, including Macaroni and spaghetti. Various techniques are available for serving spaghetti, fried and eaten with a sauce, souped and fried, beef, cheese or vegetables, served cold and lettuce. The basic required raw materials are wheat flour, semolina, starch, vegetable oils, different spices, Sodium Bicarbonate, etc. Both anatomic components of the grain, including endosperm, bran, and germ, are found in whole-grain wheat flour (WGWF) in the same proportions as intact shape. WGWF thus provides considerably more fiber, vitamins, minerals, and phytochemicals than a processed wheat meal (RF). Starch and protein are the two principal ingredients of the flour. The amount of flour sugar (less than 0.5%) is scarcely appropriate for proper yeast fermentation, which is why at least some sugar or amylase is used in most formulations of yeast dough. Protein chunks (6–18%) serve as concrete containing the endosperm of starch granules. The gluten-forming proteins together make up approximately 80 percent of the endosperm proteins. The white flour contains other proteins such as amylase, protease, and lipase. Mixed from hard wheat is high-gluten food. Usually, 13.5-14.5 percent of protein is high in nature and also comes with potassium bromate or a bromate replacer with even more heavy gluten. A polymeric carbohydrate-containing many glucose units together with glycoside bonds called polymers is Starch or amylum. The most green plants generate this polysaccharide for the storing of energy. In human diets, it is the most common carbohydrate in significant quantities in essential foods such as potatoes, maize (corn), rice, wheat, and cascade. Semolina is a coarse flour made from durum wheat, a hard form of wheat. When ground into flour, durum wheat is known as semolina and is used in bread, pasta, and porridge all over the world. This flour is richer and more golden than all-purpose flour.

2.2. Source of Raw Material

Uttar Pradesh is the largest producer of wheat in an area with 9.75 million hectares (32%), followed by Madhya Pradesh (18.75%), Punjab (11.48%), Rajasthan (9.74%), Haryana (8.36%), and Bihar (6.82%). As wheat is a major grown crop the availability of wheat grain is easy in the northern states of India. Various mandis are available in every district for wheat. Raw material can be procured from these mandis, local vendors, or direct from the farm.

2.3. Technologies:

- **Sheeting**

  Pre-measured amounts of cheese are filled by the machine on a sheet of pasta for the production of ravioli. This plate includes a further layer of pasta while going down the conveyor belt. The two layers then move into pre-measured quadrates under a cutting machine.

- **Extrusion technology**

  This technology is used to extrude the given raw material through a fixed die in order to force it into required shape. Some products made via this technology are as follows:

1. **Vermicellii and Capellini**

   The pasta is squeezed into holes in diameter from 0.8-0.5 mm to produce vermicelli and capellini. The cutting machine cut pasta into 10-inch (250 mm) lengths and turns it into curls.

2. **Tortellini**

   A different machine is used to make Tortellini. A small circle of a roll of dough is cut by the machine. Bucket of ricotta cheese mixture drops a pre-measured amount of cheese onto the circle of dough. The dough will then be folded and the two ends will form a circle.

2.4. Manufacturing Process:

Kneading and Mixing:

The first step is the process of wheat flour Semolina and water being mixed into the mixing machine. Here, the dough is kneaded with water and is then filled with tissue producing elastic properties of the flour at a temperature of 20 to 30 Celsius.

Extrusion:

Once the wheat flour, semolina with water, has been uniformly mixed, a stiff dough has formed that pass through die under high pressure. A wide variety of pasta can be produced by adjusting the shape of the die. During extrusion, a constant movement of screws that causes pressure and friction against the wall of the chamber raises the temperature inside the extrusion chamber. They maintain the chamber temperature within 50ºC the water of 20–the temperature is being circulated in water jackets around the extrusion cylinder and head just to prevent damage to the gluten network, and to achieve good cooking in the finished product. Immediately after coming from die a blast of hot air is allowed to pass through to minimize strands sticking together before entering the pre-dryer.

Drying:

The drying time will be important because when the pasta is too dried, it will break down and the risk of spoilage will rise if it is dried too slowly. The amount of oxygen is often regulated in the tank and laboratory technicians also test salmonella and other bacteria.
During the drying process, it is also important to treat the pasta carefully. Spaghetti is one of the most delicate Pasta and hangs well above the ground.

Packaging:

Fresh pasta is folded into transparent plastic containers in pre-measured quantities. As the containers pass along a transport belt, each container is covered by a plastic sheet and hot-pressed. At the same time, a tube sucks the container's air and replaces it for the shelf-life of the product with a combination of carbon dioxide and nitrogen. At the top of the containers are labels that list the type of Pasta, nutritional details, cooking instructions, and date of expiration.

Quality Parameter

Appearance:

The most significant aspect of the appearance of any food is its colour, particularly when it is directly correlated with other features of food quality. Form, surface profile, and clear texture are other attributes. The appearance of food is almost as important to a food product's quality as its taste and flavor.

Taste:

The gustatory system or taste is the sensory system that partially perceives the taste (flavor). Snack is the perception produced or induced when the material in the mouth interacts with taste receptor cells in the oral cavity, especially on the tongue, on taste buds, chemically. The different food products have their own tastes and any deviation from them would result in a deviation from the final dish, so it is important in refined food products to retain a consistent taste.

Nutritional Content*:*

Increasing the nutrient content of a product is its consistency since suitable additives must be used to increase the nutritious value, along with the basic ingredient.

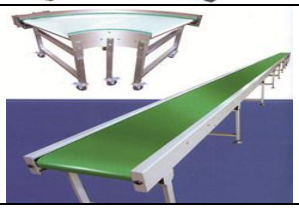
Shelf Life:

Shelf life is the length of time a commodity may be stored without becoming unfit for use, consumption or sale. It comes into play after presentation, flavor and nutrition, provided the option of products with the same nutritional content and taste, one prefers to go for a product with more shelf life.

2.5. Flow Chart:

Steps	Machine Name	Description	Machine Image.
Mixing of ingredient	Powder Blender	This machine is used for mixing the ingredients required to make Pasta.	
Kneading	Dough mixer blade type	With a rotating bowl in a Spiral mixer the spinning motion imitates hand kneading and rolling motions and gently mixes Pasta dough.	
Extrusion	Extruder	An extruder for pasta is a machine to make various types of pasta by squeezing pasta dough through dies. By modifying the pasta die, various pasta types are obtained.	
Drying	Dryer machine	The Dryer machine is used for remove the execs water from the steamed Pasta.	
Packaging	Pasta packaging machine	Used for packaging the Pasta for marketing in various packages. It is also a type of Flow Wrap Machine that packs the raw Pasta inside the pouch.	

2.6. Additional Machine & Equipment:

Machine and Equipment	Uses	Pictures
Material handling Equipments	These Equipments are used for material handling.	
Food Grade Conveyor	These are conveyors with food grade belt to maintain food safety standards set by monitoring authorities.	

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 Screw Jamming	Regular maintenance is necessary to avoid blockage of extruder.

2.8. Nutritional Information:

Pasta is a popular food made from hard wheat, water, or eggs. It is shaped and cooked in boiling water in various noodle shapes. Most items sold as pasta currently consists of common wheat. However, other grains, such as rice, barley, or buckwheat may be made with similar noodles. Some types of pastes are processed, bran and germ are separated from the wheat kernel and many of the nutrients are removed. Refined pasta is often enriched, which means that it contains nutrients such as B and iron. Sometimes the minerals are added back to enrich the flour. The nutritional content of pasta (100 gram) are given below table:

Name	**Pasta (Gram)**
Calories	131
Total Fat	1.1 g
Saturated fat	0.2 g
Polyunsaturated fat	0.4 g
Monounsaturated fat	0.1 g
Cholesterol	33 mg
Sodium	6 mg
Potassium	24 mg
Total carbohydrates	25 g
Protein	5 g[iii]

2.9. Export Potential & Sales Aspect:

India is the major food and grain producer country in the world, but only less than 10% is processed. In the coming years, demand for processed food products will increase in India, offering opportunities for higher value addition, lower waste, and alternative jobs. Analysis of corporate data shows that the value-added factor has increased dramatically for food processors. The driving factors for pasta market growth in India include increased urbanization, changes in lifestyles, and growing demand for ready-to-eat products. In addition, there is a growing employment rate for women, along with increasing disposable incomes that influence the market. Health-conscious customers are now seeking healthy food products that have increased demand for pasta made from wheat. Some of the other forces that have been proactive in maintaining the market growth are longer shelf-life and ease of preparation Market growth in 2020-2025 is expected to be high.

CHAPTER 3
PACKAGING

3.1. Shelf Life of Product:

The drying process is the final main step in the development of industrial pasta and it is important that the shelf life of the product is greatly extended (many months to some years). The relative humidity for drying varies from 32-35% of the unleavened pasta dough to no more than 12.5% of the final dry pasta. Often this level is even smaller than the moisture of the initial semolina flour (e.g. 14-15 percent).

The quality of the product is also established, apart from the basics such as food grade packaging material, the type of process and technology further improves the quality of the product, such as the addition of anti-microbial packaging to the value of the product and thus the quality. With natural drying, such a deep degree of dryness cannot be reached at appropriate times, so rooms or cabinets are commonly used at controlled temperature and humidity. The shelf life of dry pasta is roughly 1-2 years. When opened to cook, to keep out moisture and other toxins, the remaining raw pasta should be stored in a tightly closed jar. Opened and unopened pasta are not separately listed because as long as the pasta is re-sealed and properly packaged, fresh, cooked or dried, it really makes no difference in terms of shelf life.

- **Proper Storage**

When food products are kept for a long period of time and not properly stored, they are spoiled by other food products that are bad for health. As germs begin to grow on it, food products stored for a long time get spoiled. It cannot be eaten until the food is rotten, and needs to be thrown away. Spoilage is a phase in which food goods deteriorate to the point that human food is not edible. "In most cases it has been seen that these Maida-based instant take a toll on the digestive process. Its remnants may reach the appendix area of the body and trigger infection."

- **The bad fats:**

Sadly, most processed foods, including saturated fatty acids or trans fats, are filled with not-so-good fats. The fats that are safe for you are both monounsaturated fatty acids and

polyunsaturated fatty acids. If dig deep into food labels and what those words actually mean, one will know that edible vegetable oil, sugar, sugar syrup, taste enhancer, and many other agents like these are not good at all for your wellbeing. Instant food have saturated fats that can increase the amount of cholesterol in the blood if eaten excessively or daily. Having high cholesterol raises the risk of both type 2 diabetes and heart disease.

Food and water can be germ-infected. Germs are borne by bees. They pass these germs on to our food while they are sitting on our food. There are various causes, such as bacteria, mould, yeast, moisture, light, temperature, and chemical reaction, that are responsible for food spoilage.

3.2. Pasta 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 food shape and size during handling, transport, storage, and delivery. In general, the packaging specifications for Pasta 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 vapour and oxygen barriers.
- The packaging material should have a high barrier property to prevent aroma/flavour losses and in gross of external odour.
- 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:

- ✓ **Hanging Bags-** Hanging bags in grocery stores and other shopping outlets are commonly used. They are a type of plastic bag that is also sealed with a back-middle seam on both ends as well. Hanging bags have a pre-cut hole that makes it easier for them to hang from hooks so that they can be seen in an attractive way.

- ✓ **Pillow bags -** A pillow bag is another typical type of package. The bags are named for their shape, which is like a cushion. They are found lying flat on grocery store shelves in the grocery store and were known to carry the items.
- ✓ **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 perfect way to carry most packaged items. They can be made with zipper-seal closures, which tend to keep the inside contents fresh for use. Flexible pouches offer amazing printing capabilities, many pouches stand up on their own, which helps you improve your shelf appearance.

Essentials

- ✓ Shelf-life duration, i.e. the degree of protection required by the commodity against pick-up of moisture, preservation of aroma retention, decolouration, etc (in case taste maker is added)
- ✓ 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:

- ✓ Plastic packages of various sizes and shapes with labels and provided with metal or plastic caps. The plastic lids 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:

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. Polythene, polypropylene, laminated pouches, PVC wrapped trays and plastic jars were the various packaging materials used. In terms of preserving consistency during the storage era, the suitability and adoptability of these packaging materials have been examined. Plastic-based packaging materials that can be used for Pasta 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 product 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.

- **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.

CHAPTER 4
FOOD SAFETY REGULATIONS AND STANDARDS OF PASTA

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 CEREALS AND CEREAL PRODUCTS: 2.4.10(1) MACARONI PRODUCTS"

- **PASTA PRODUCTS:** means the product obtained from one or a combination of ingredients including suji , Maida , rice flour, groundnut flour, tapioca flour, edible soy flour or flour of any other cereal referred to in sub-regulation 2.4 by kneading the dough and extending it or by any other process. It may contain one or more of the following ingredients either singly or in combination: milk powder, fruit and vegetables and products thereof or their extracts; edible common salt, nutritive sweeteners, meat and products thereof; fish and products thereof; eggs and products thereof; spices, condiments and herbs including their extracts; vitamins and minerals; edible fats and oils; yeast extract, yeast and product thereof; hydrolysed plant protein and soy sauce powder.
- It shall be free from dirt, insect's larvae and impurities or any other extraneous matter.
- It shall conform to the following standards:-
  - ✓ Moisture - Not more than 12.5 per cent.
  - ✓ Ash insoluble in dilute HCl - Not more than 0.1 per cent. (On dry basis)

Permitted additive for Pasta "6.4.2 Dried pastas and noodles and like products"

Food Additive	**Recommended maximum level**
Canthaxanthin	15 mg/kg
Caramel IV - Sulfite Ammonia Caramel	50,000 mg/kg
Diacetyl tartaric acid and fatty acid esters of glycerol	5,000 mg/kg
PHOSPHATES	900 mg/kg
Agar	GMP
Alginic acid	GMP
Ammonium	GMP

Alginate	
Ascorbic acid, L	GMP
Calcium 5'-Ribonucleotide	GMP
Calcium alginate	GMP
Calcium Ascorbate	200 mg/kg
Calcium Carbonate	GMP
Calcium sulphate	GMP
Carob bean gum	GMP
beta – Carotenes , vegetable	1,000 mg/kg
POLYSORBATES	5,000 mg/kg
Carrageenan, Citric acid Disodium 5'- guanylate, Disodium 5'- Inosinate Disodium 5'- ribonucleotide, Distarch phosphate, Fumaric acid, Gellan gum, Guar gum, Gum arabic, Karaya gum, Konjac flour, Lactic acid L-, D-and DL-, Lecithins, Malic acid, Mannitol, Microcrystalline cellulose, Mono- and diglycerides of fatty acids, Monosodium Lglutamate, Nitrous oxide, Pectins, Phosphated distarch, phosphate, Potassium alginate, Potassium carbonate, Potassium chloride, Processed eucheuma seaweed, Pullulan, Salts of myristic, palmitic and stearic acids with ammonia,calcium, potassium and sodium, Sodium acetate, Sodium alginate, Sodium ascorbate, Sodium carbonate, Carboxymethyl cellulose, Sodium luconate, Sodium hydrogen Carbonate, Sodium lactate, Tara gum, Tragacanth gum, Xanthan gum.	GMP

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 equipment's 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.[iv]

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 Udyog Aadhar;
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.[v]

Reference:

[i] https://www.imarcgroup.com/indian-pasta-market

[ii] https://pastaevangelists.com/blogs/blog/what-flour-should-i-use-for-making-pasta

[iii] https://fdc.nal.usda.gov/

[iv] https://www.fssai.gov.in/cms/food-safety-and-standards-regulations.php

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