Ministry of Food Processing Industries
Government of India

सत्यमेव जयते

NIFTEM
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Reading Manual for Soya Milk

Under PMFME Scheme

National Institute of Food Technology Entrepreneurship and Management

Ministry of Food Processing Industries

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Contents

Abbreviations & Acronyms

Sr:No.	Abbreviations &Acronyms	Full Forms
1.	PM FME	Prime Minister's Formalisation of Micro Food Processing Enterprises Scheme
2.	PET	Polyethylene terephthalate
3.	CAP	Controlled Atmospheric Packaging
4.	MAP	Modified Atmospheric Packaging
5.	HACCP	Hazard Analysis and Critical Control Point
6.	WVTR	Water Vapor Transmission Rate
7.	VEG	Vegetarian
8.	FSSAI	Food Safety and Standards Authority of India
9.	FoSCos	Food Safety Compliance System
10.	FBO	Food Business Operator
11.	FLRS	Food Licensing and Registration System
12.	FSS	Food Set and Sound Nutrition
13.	PFA	Prevention of Food Adulteration
14.	GST	Goods and Services Tax
15.	MoFPI	Ministry of Food Processing Industries
16.	FPOs	Farmer Producer Organizations
17.	SHGs	Self Help Groups

CHAPTER -1

INTRODUCTION

Soya milk is considered to be most inexpensive source of high-quality nutritive protein. Soya protein predominates the commercially available vegetables protein market in the world. Soy milk is obtained by the extraction of ground soybeans and forms a colloidal solution like mammal milk. It also resembles the dairy milk in appearance and composition with almost all the similar components including protein, lipid and carbohydrates. Production of soya milk originates from China during the second century B.C. It has gained immense popularity in Asian countries with time. By the virtue of its health claims and nutrition, it has achieved significant place in western markets and diets. The United States Food and Drug Administration (USFDA) authorized the Soyaprotein health claim reporting that consumption of 25 g of soya protein per day may reduce the cardiovascular disease risk. Soya milk was the second most important and widely consumed plant-based beverage next to almond milk during 2019.

1.1 Composition of Soya milk

Soya milk contains 8-10 % total solids based on the ratio of water and beans used during processing. Total solids contain around 3.5% protein, 2% fat, 3% carbohydrates and 0.5% ash.

Table 1: Composition of Soya milk

Components	Content / 100 g
Calorie	44-46 kcal
Water	90-91
Protein	3-3.5
Ash	0.5
Carbohydrates	2.75-3.0
Fat	2-2.25
Minerals (mg)	
Calcium	15-17
Phosphorous	46-49
Sodium	1.5-2.5

Iron	1-2.5
Vitamins (mg)	
Thiamine (B 1)	0.01-0.03
Riboflavin (B 2)	0.02-0.06
Niacin	0.4-0.7
Saturated fatty acids (%)	40-48
Unsaturated fatty acids (%)	52-60
Cholesterol (mg)	0

1.2 Health benefits

As compared to dairy milk and human milk, soya milk is considered to possess higheramount of proteins, unsaturated fatty acids, iron and vitamin B_1, while it contains lower fat, carbohydrates and calcium content. Being lactose free, it is apt for the people and infants who are lactose intolerant or have certain other conditions which render them to avoid the dairy milk and milk products. Soya milk becomes an appropriate alternative to cow milk in the locations where the milk is adequately available. Therefore, it acts as a refreshment beverage in addition to its highly nutritive value. Being cholesterol free and rich source of phytochemicals, it is also considered as healthy food. Soya milk is also used for the preparation of various other foods including tofu, the most popular soya food.

CHAPTER - 2

PREPARATION OF SOYA MILK

2.1 Different methods for preparation of Soya Milk

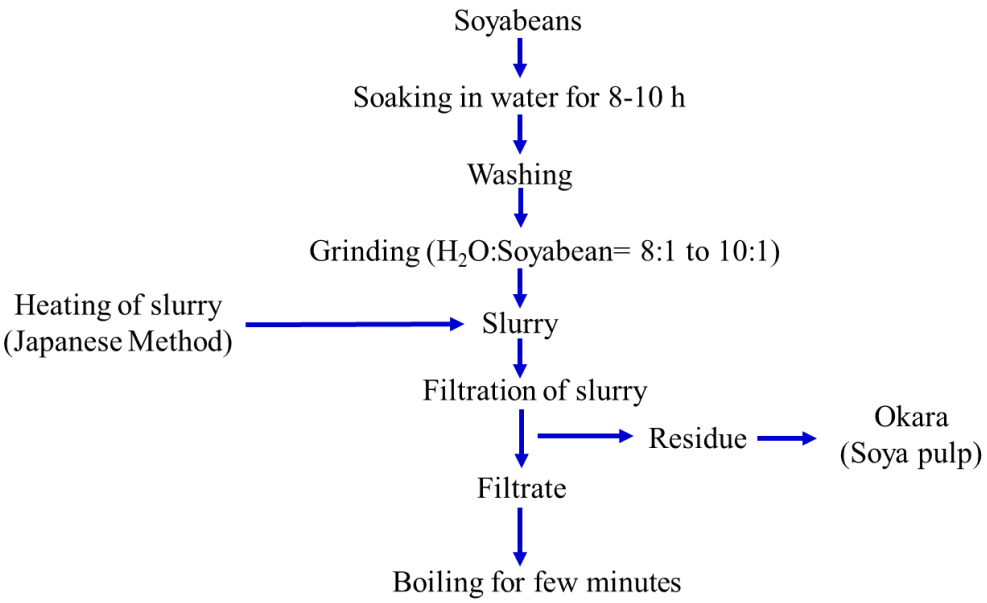
The preparation of soya milk has been tried since several decades. The basic steps and principle of preparation of soya milk are very similar. Basic steps include selection of good quality raw material, mixing of raw material with water, grinding of the mix followed by extraction of soya milk. Heat treatment is essential to pasteurize or sterilize the product and lastly, formulation and fortification of soya milk can be achieved incorporating various ingredients such as sugar, flavour etc. Following are the methods used for the preparation of soya milk since ancient time including certain modifications done to achieve deodorization and minimize the soya flavour in the end product.

2.2 Traditional Methods

The traditional method for the preparation of soya milk has been devised by Chinese. Under this method, soya beans are kept soaked in water for overnight followed by their washing and grinding. Fresh water is added in the ratio of 8:1 to 10: 1 (water to soyabeans ratio) while grinding, followed by filtration of slurry with muslin cloth. The residue obtained is known as soya pulp or okara. The filtrate collected is kept for boiling for a few minutes before it can be served. The appearance of filtrate is observed to be similar to any other dairy milk with the substantial difference in taste.

In Japan, soya milk had been prepared with almost similar method with slight modifications. Their method employs heating of the slurry before filtration. This method provides more yield of soya milk as it enhances the milk extraction. Despite of these advantages, there are certain disadvantages associated with the Japanese method including burning of slurry easily at the bottom surface of utensil, utilization of machine pressing for extraction of hot slurry and it is not energy efficient method.

Traditional Method



Advantages:

1. Simple and reproducible methods
2. These methods can be operated at house or small-scale level.
3. Doesn't require any sophisticated or expensive equipment

Disadvantages:

1. Cannot be operated at large scale industries
2. Machine pressing is necessary in case of Japanese method.
3. Less energy efficient.

However, these methods are still being used in many parts of the Eastern world and with time, certain modifications in methods have been done using modern scientific equipment, which renders these methods to give low production yields.

2.3 Modern methods

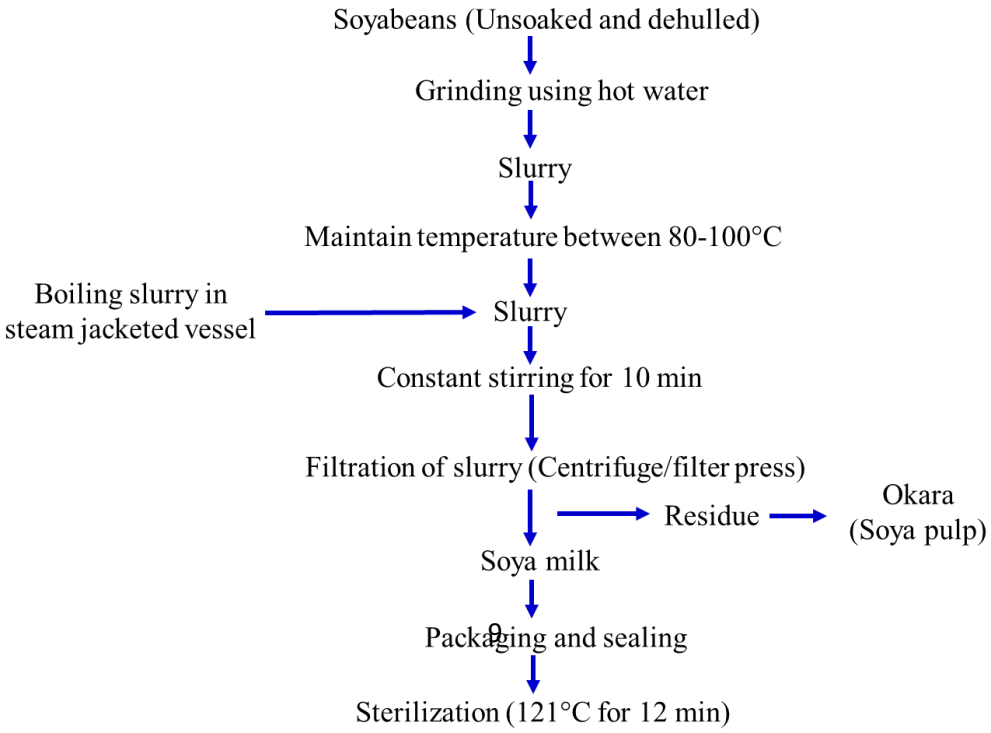
Research on flavor chemistry of soya beans brought the technical breakthroughs and revolutionized the traditional methods of soya milk preparation. Several modern methods/ technologies have been devised and developed and successfully adopted in past few decades. These methods are mainly focused at improving soya milk flavor that can be appealing to

consumers globally. Many of these methods are also adopted and commercialized by large scale industries.

2.3.1 Cornell Method

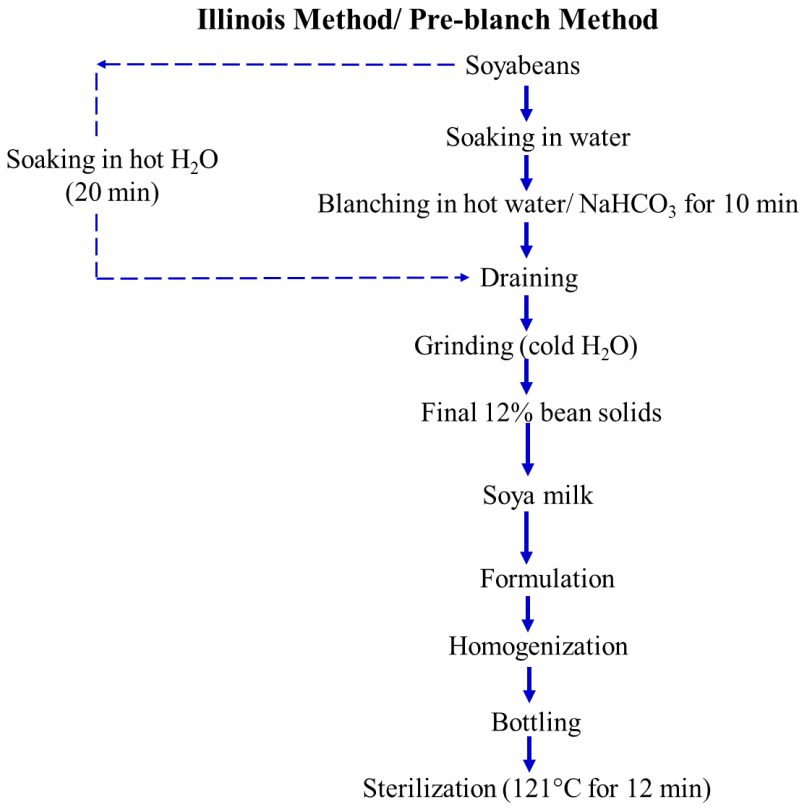
This method was developed by scientists of Cornell university as suggested by its name. The other name of this method is 'hot-grind' method. Under this method, grinding of soyabeans (unsoaked and dehulled) is done using hot water. Slurry, thus obtained is kept at the temperature between 80-100°C which inactivates the lipoxygenase enzyme completely. Further, the slurry is kept for boiling in a steam jacketed vessel with constant stirring for about 10 minutes. This is followed by the filtration of slurry using either a centrifuge or a filter press. The resultant product, soya milk, is then formulated according to the preferences, and packaged in a suitable material. Properly sealed packs of soya milk are subjected to sterilization temperature at 121°C for 12 minutes. However, it was reported that off-flavors still developed after few days of storage which might be because the temperature maintained was not sufficient enough to destroy the lipoxygenase enzyme.Thus, the critical determinant of this method is the temperature of water at the initial seconds of grinding. This method would be successful in case the temperature of water in initial seconds of grinding is no less than 80°C because as soon as the enzyme is activated within substrate, it becomes difficult to eliminate the beany flavor completely. Therefore, the heating of soya beans using hot water or soaking the soya beans in hot water can be the alternate for the elimination of beany flavor.

Cornell Method/ Hot-grind Method



2.3.2 Illinois method

Another modern method developed by scientist of Illinois University was focused on eliminating the soya bean flavor completely in 1976. This method is also known as pre-blanch method. Soyabeans are soaked in hot water for some time and then blanched in hot water for 10 min. Alternatively, dry soya beans can be placed directly in hot water for 20 minutes. Both these procedures will keep the soya beans hydrated and inactivate the enzymes. Beans are then drained and grounded using cold water so that final concentration of 12% bean solids is achieved. Then, soya milk so obtained is ready to serve or be packaged. In few cases, 0.2-0.5% of sodium bicarbonate can be used during soaking and blanching of soya beans in place of water. However, use of sodium carbonate will also demand the neutralization of soya milk with hydrochloric acid during homogenization in order to achieve the pH of 6.8 – 7.2. However, in other cases (without using sodium bicarbonate), the soya milk can be formulated according to own preferences, pasteurized followed by homogenization and bottling. This method is considered as 'greatest milestone in soya milk research'.



Advantages:

1. Production of soya milk with bland taste and flavor
2. 100% recovery of solids and protein

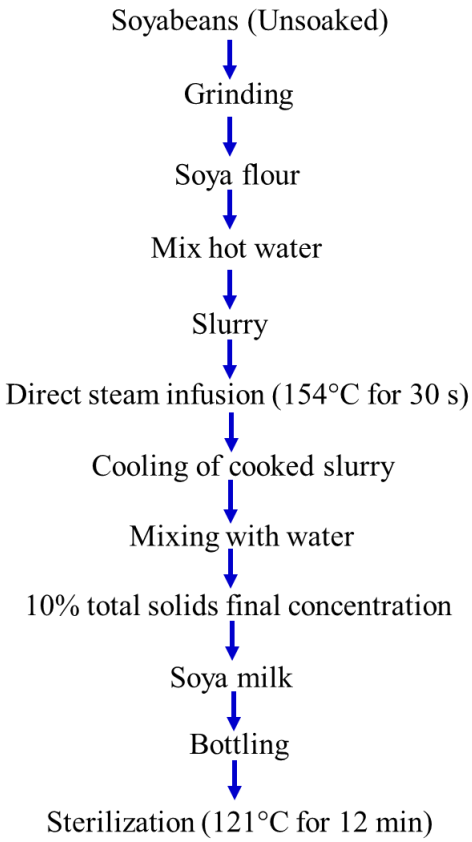
Disadvantages:

1. Chalkiness mouthfeel while consuming soya milk.

2.3.3 Rapid Hydration Hydrothermal Cooking

Under this method, soyabean are grounded to form flour which is then converted to slurry using hot water. Direct steam is infused at 154°C for 30 seconds in the slurry so that lipoxygenase enzyme is inactivated.Cooked slurry is made to cool and mixed with water so that final concentration of10% total solids is achieved.

Rapid hydration hydrothermal cooking method



Advantages of this method:

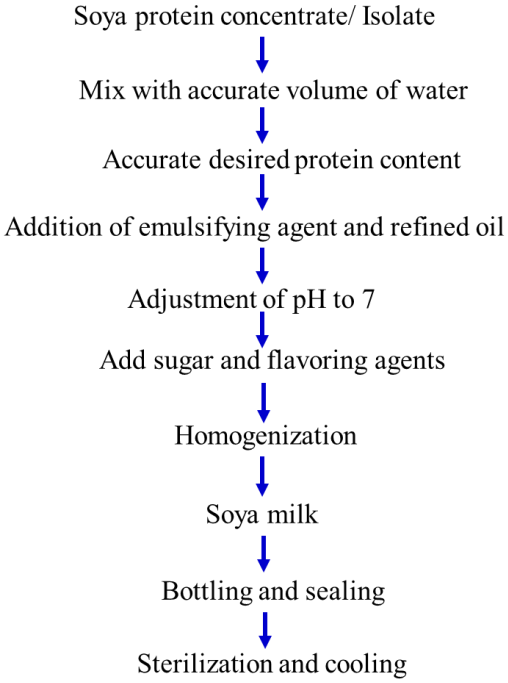
1. Bland flavorand aroma of soya milk
2. Higher recovery of proteins and solids

2.3.4 Utilization of defatted soya material

This method utilizes the defatted soya material as beany flavor arises due to action of lipoxygenase on the fat component (lipid fraction) of soya beans. Thus, defatted soya flour, soya protein concentrates and soya protein isolates can be used as suitable raw material for the preparation of soya milk with minimized beany flavor. Defatted soya flavor contains protein in the range of 50-55%, soya protein concentrates 70-75% and soya protein isolates 90-95%, on a moisture free basis. It has been reported that soya milk prepared from soya protein isolate contains bland taste and lower content of oligosaccharides with no beany flavor. For this, soya protein isolate is mixed with accurate volume of water in order to achieve desired protein content followed by the addition of an emulsifying agent and refined oil. The pH of the mixture is adjusted to 7, while sugars and other flavoring agents are added before the homogenization step. The soya milk is then filled in the bottles, sealed and sterilized followed by cooling prior to storage.

Soya milk preparation using defatted soya material

I. Direct use



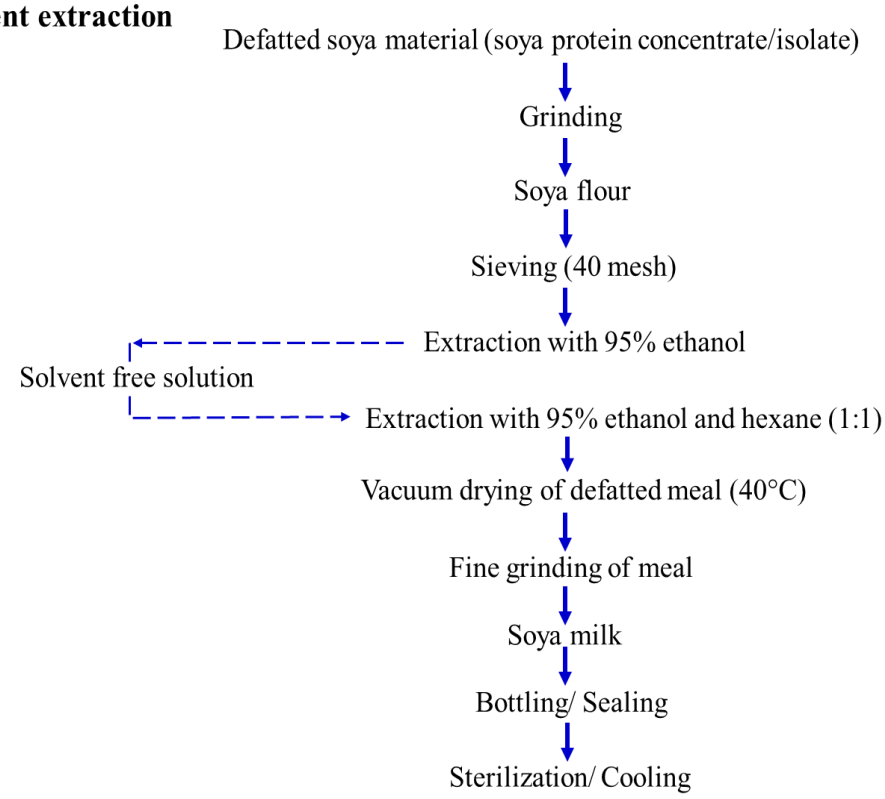
Advantages of using soya protein isolates as raw materials:

1. Lesser requirement of processing equipment
2. Lesser requirement of space
3. Shorter production time
4. Okara is not obtained, thus no disposal problem

Good quality soya milk can be prepared using defatted soya materials which had been subjected to minimum intensity of heat during solvent extraction as it prevents protein denaturation. Such one method had been devised by the researchers wherein, soya flour was subjected to 40 mesh treatment and then further extracted with 95% ethanol followed by second extraction step using equal volumes of 95% ethanol and hexane. The solution was made solvent free after each extraction. Further, drying of defatted meal was done under vacuum at the temperature of 40°C so that complete removal of solvent was achieved. This is followed by fine grinding of meal before converting it into soya milk having pleasantly bland flavor and aroma.

Soya milk preparation using defatted soya material

II. Solvent extraction



2.3.5 Deodorization Techniques

These techniques can be utilized to completely remove the off-flavor which had been developed during production and processing. This can be achieved by eliminating the volatile metabolites responsible for off-flavor and aroma. For this, cooked soya milk is passed through a vacuum pan under high temperature because of which majority of the volatile metabolites are completely removed including sulfhydryl compounds, short chain fatty acids and sterol compounds.

Advantages:

1. No beany flavors
2. No intensive heat treatment.

Disadvantages:

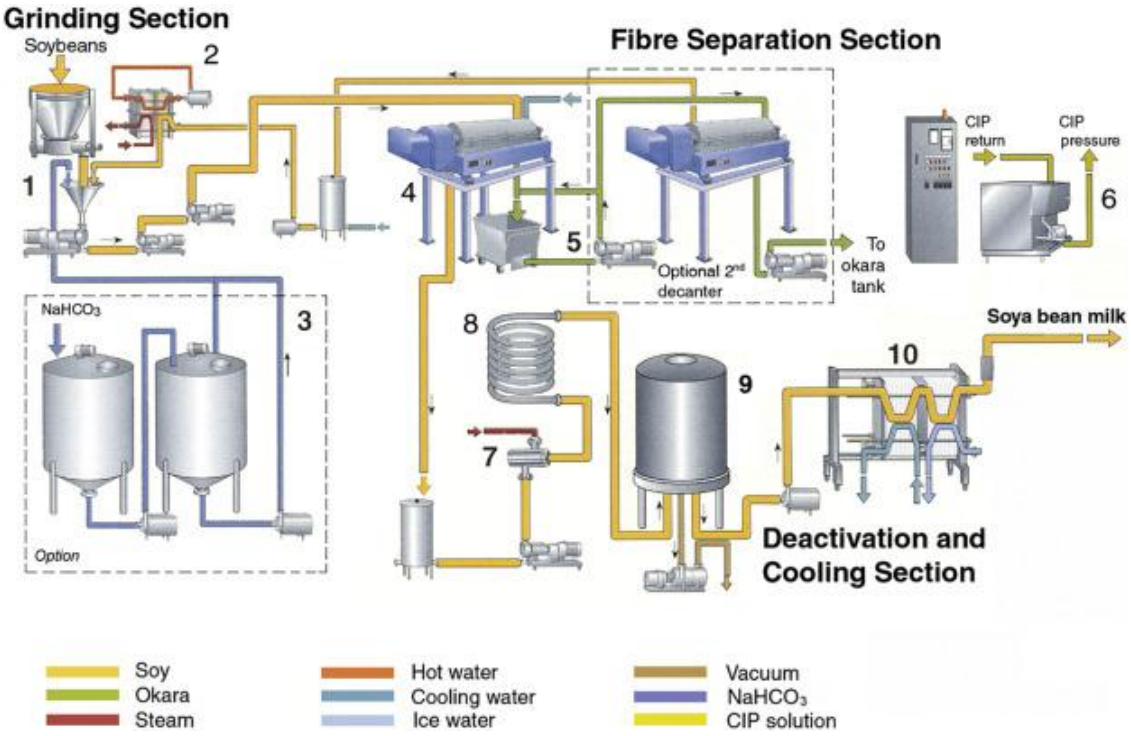
1. Complex method involving high expenditure and machinery.
2. Only followed by large scale industries

2.3.6 Commercial Methods

These commercial methods have been devised to enhance both quality and yield of soya milk. These methods have been developed by large companies in Europe, Asia and United States and is considered to be the modification of Illinois method. The disadvantage of chalkiness in Illinois method is believed to be overcome by these commercial methods either by using decanter or continuous filtration. Few other commercial firms have been adopted by Cornell method by slight modification. Tetra Alwin® Soy process line is a commercially available system for soya milk processing.

This method employs extraction of soya base from soyabeans on a continuous line system. Soya beans are first cleaned and then fed from the feeder into the grinder funnel. Grinder funnel is the inlet for hot water. This hot water inactivates lipoxygenase and helps in the blocking of air entry in the slurry which helps in the effective inhibition of lipid oxidation. In some cases, sodium bicarbonate can also be added at this step to improve the flavor of the end product. Residue (okara) is either removed by a pump or mixed with water and again processed for extraction so that efficiency is increased. The resultant soya extract is subjected to direct steam infusion by

which the increased temperature deactivates trypsin inhibitors. The combination of time and temperature solely depends on 85% deactivation of inhibitors. Volatile metabolites responsible for off-flavors are also removed at this very step and cooled soya base can then be formulated with other ingredients to form soya milk.



This image is adapted from a review article of Preece et al. (2017). *(Preece, K. E., Hooshyar, N., &Zuidam, N. J. (2017). Whole soybean protein extraction processes: A review. Innovative Food Science & Emerging Technologies, 43, 163-172)*

Another commercial method adopted by Danish include cleaning and dehulling of soyabeans before blanching so that the enzymes can be inactivated. These beans are then mixed with hot water followed by grinding. Okara is separated by decanting and the resultant product, soya milk, can be formulated with other ingredients followed by homogenization.

2.4 Novel Approaches

One of the novel methods for preparation of soya milk includes soaking the soya beans in hot water at 70°C for 5 minutes before grinding. It is believed that using hot water before grinding decreases the content of n-hexanal (major contributor to off- flavor component in soya milk) to just 1% as compared to the untreated soya milk. However, in this method, hydroperoxide lyase is inactivated instead of lipoxygenase. MicroSoy Flakes® is a commercially available soya milk

flakes produced by MyCal Group, Niichi Corp., Jefferson Iowa, since 1991and can be utilized to produce soya milk.

Advantages:

1. Reduced soaking time
2. Decreased production time
3. Energy efficient (less water and electricity is used).

Disadvantages:

1. No significant effect on beany flavor.

2.5 Soya Milk Flavor

Now, the people have accustomed to their flavor and taste while earlier, the only unappealing part of these traditional methods lied with the production of soya bean flavor and aroma during the preparation soya milk. The flavor of soya milk is described as "beany," "painty," "rancid," or "bitter." Therefore, unless these flavors are completely eliminated from the soya milk, it becomes very difficult to market soya milk and enhance the consumption and marketability. The unique beany flavor of soya milk results from the presence of lipoxygenase which catalyzes the oxidation of polyunsaturated fatty acids or esters. This leads to the generation of volatile metabolites that can be detected and quantified using gas chromatography. These volatile metabolites include ketones, aldehydes, and alcohols which impact undesirable flavors.

Conditions required for activation:

1. Interaction of released enzyme and substrate
2. Presence of water

It is believed that soaking of whole, clean and raw soya beans in water for 8-12 hours or till their weight is doubled, no development of beany flavor takes place. But as soon as the cotyledons of soya beans is damaged or broken, lipoxygenase (enzyme) and lipids (substrate) are released which interacts in the presence of water (if the moisture is > 14%) and initiate the oxidation of lipid instantaneously. If the higher content of water is present, the oxidation reaction will take place at a rapid rate thus resulting in a highly pronounced and objectionable flavor.

Along with ratio of water to beans, the temperature of the mixture of water and beans (slurry) is also important as far as the generation of volatile metabolites is concerned. With increase in the temperature of the slurry, there is significant increase in the number and quantity of volatiles. However, subjecting the soya flour to water at 80°C for the formation of slurry, no volatile metabolites and objectionable flavor is produced.

CHAPTER - 3

PACKAGING OF SOYA MILK

Soya milk serves as an ideal medium for the growth of microorganisms. Shelf life of soya milk mainly depends on following factors:

a) Raw materials used for soya milk preparation
b) Processing conditions
c) Type of packaging material used.

Packaging is termed as scientific process to contain the food products in an enclosure that protects the food products against any damage being physical, chemical or microbiological. It ensures that the product is displayed in most pleasing manner as per the preference and convenience of consumers. It works as the coordinated system of the preparations of food products for transportation, warehousing, sale and end use. Therefore, packaging provides the containment, protection, preservation, transportation, information and selling of the products at an ease. In most of the countries, this system is fully integrated with government regulations, business enterprises, institutional activities and personal usage.

3.1 Importance of packaging:

a) Protection against physical damage–Packaging ensures the protection of the food product against shock, stress, vibrations, heat, cold, humidity, compression etc.

b) Protection as a barrier: -Packaging of the food products provides the protection against the infusion of oxygen, water and contaminants from the environment etc. The most critical factor in designing the specific packaging material is permeation. Some of the innovations in packaging material also provides the insertion of desiccants and oxygen absorbers so that shelf life can be extended. In continuation to his, Modified Atmosphere Packaging (MAP) and Controlled Atmosphere Packaging (CAP) is also in practice now a days. Therefore, the primary function of such packaging technologies rests with the intended extended shelf life of food products.

c) Packaging as a container for food products: Small sized food products/items can be kept together as a group and transported easily which also enhances the efficiency of packaging system.

d) Packaging as a tool for transmission of information: Packaging and labelling system helps in disseminating the information about the usage, recycling transportation and disposing off the package or any food item. Such information is made mandatory by government regulations at some time.

e) Packaging as a marketing tool: The packaging and labelling on the material entices the potential buyers and consumers to purchase the food product. This also includes the pleasing and attractive design of packaging material. Design has been evolved over a period of time which may also provide the convenience to the consumers. Marketing design and other graphics, information is usually put on the upper side of the packaging material and sometimes, at the point-of-sale display.

f) Packaging material as a security tool: Security –Packaging material plays significant role in providing the security to the food products sent in the shipment. They reduce the risk of security when food products are transported at a longer distance. For this, packaging material should be temper free and should have certain features which may indicate in case the package is tempered. These should be engineered in such a manner that pilferage losses are reduced to zero. They many include seals related to authentication of packaging material so that it indicates that food products or items are not counterfeited. These can also include certain features including anti-theft devices (dyes, radio frequency infra-red tags, electronic tags) which are generally activated at certain exit points and cannot be deactivated easily. These features would not only protect the food item abut also the retailer who otherwise suffer loss due to adverse circumstances.

g) Packaging as a measure of convenience: Convenience during distribution, loading, offloading, handling, piling up, stacking, display is very important as far as the packaging personnel's, potential buyers and consumers are concerned**.** It should be reusable or at least recyclable.

h) Packaging as a portion control measure: It is easier to package the food product in a single container, however bulk packaging containers need to be sub divided in the different compartments so that suitable size can be provided to each food item.

3.2 Properties of packaging material

3.2.1 Thickness of packaging material

Thickness of the packaging material is defined as the perpendicular distance between the inner and outer surface of material. The unit for measuring the thickness of the given sample is micron.

Calculations:

Conversions of units of thickness:

1 division of micrometer= 25 microns

= 0.001 inches

= 1 mil

=100 gauge

BIS recommendation for packaging of liquid milk:

0.5 liter of milk should be packaged in the material with thickness of 60 microns.

1 liter of milk should be packaged in the material with thickness of 75 microns.

Paper has the thickness of < 300microns and density of <224g/m^2

Paperboard has the thickness of >300 microns and density of >224g/m^2

3.2.2 Grammage of packaging material

It is also known as basis weight/substance/ Gram Square Meter (GSM).

3.2.3 Water absorptivity of packaging material

Water absorptivity is defined as the mass of water absorbed in a specified timeby specified circular area (100 cm^2) of packaging material under 1 cm head of water.

Principle:

It measures the amount of water absorbed by the paper or paper board when free water is applied to its surface. Sample is exposed to known and measured head pressure of water. After 30 seconds, excess water is removed by roller drum. Exposure time for corrugated fiberboard is 1 minute.

$$\text{Water absorptivity} = \frac{\text{Weight gain}}{\text{Area exposed}}$$

3.2.4 Tearing resistance:

This test indicates the strength of packaging materials. Tearing resistance is measured by Elmendorf testing strength tester. It is the force required to propagate the paper tear where tear has already occurred. Tearing resistance differs with the direction of paper manufacture i.e transverse direction or Machine direction. Tear factor is used to compare two papers with regard to their tearing strength.It is measured in millinewton (mN).

$$\text{Tear factor} = \frac{\text{Tearing resistance}}{\text{Substance (Grammage)}}$$

3.2.5 Grease resistance

Packaging materials used for full fat soya milk should have sufficient grease resistance in order to avoid fat oxidation of the products. It is measured by exposing one side of the sample to grease or oil containing red dye. Time elapse between dropping of dye and appearance of stain is known as transudation time. It is usually measured in seconds and should be more than 1200 seconds for grease proof paper.

3.2.6 Water Vapor Transmission rate (WVTR)

The permeability of packaging materials to water vapor is an important property to decide its suitability for food packaging. The ingress or egress of moisture, effects the shelf life of dried products and fresh produce, directly affecting the consumer acceptability. For example, if dried soya milk is packed in such packaging material which is having high WVTR, the problem of dry particles of soya milk due to egress (or loss) of moisture is bound to arise. Thus, in case of dried soya milk products, the packaging material having high WVTR may result in many defects such as caking, oxidation, rancidity, discoloration etc. due to ingress(or uptake) of moisture. WVTR is also commonly referred to as moisture vapor transmission rate (MVTR).

Principle

WVTR is defined as the mass of water vapor transmitted per unit time per unit area from one side of the sheet to the other under specified conditions. The standard unit of WVTR is g/m^2 /day. The test is usually conducted at standard atmosphere conditions i.e. 38° C and 90% of relative humidity. The water vapor permeability coefficient of the material determines how fast or slow the water vapor can permeate through the film.

$$\text{Water vapor permeability} = \frac{\text{WVTR}}{\text{L}} \times \Delta \text{ P g/m}^2\text{/day}$$

Where L is the thickness of the packaging material

Δ P related water vapor pressure difference

3.3 Requirements of Packaging material for milk

(a) Heat treated milk and milk products should be filled in bottles or performed mechanically however, the sealing of these bottles or any other containers should be done on an automatic basis.

(b) Re-suing or the packaging materials should be avoided for wrapping or packaging of milk and milk products except where there is a provision of re-using the containers after proper cleaning and disinfection.

(c) Sealing should be carried out at the location where the milk and milk products were heated in the last batch using sealing machine. This will ensure the milk gets protection from any adverse effects of environmental contaminants or other microbes. Sealing should be performed immediately after filling the bottles. Design of the sealing devices should ensure the evidence of opening the packaging material (if done) for easy checking of pilferage.

(d) After sealing, the milk and milk products shall be placed in a room which \has been provided exclusively for storage.

Homemade soya milk prepared using traditional methods should be consumed daily, however soya milk produced on commercial scale needs a suitable packaging material so that its shelf life can be extended. Packaging should be either in bulk or individual containers for commercial purposes. Thermal treatment in combination with the appropriate packaging material significantly extends the shelf life of the soya milk which helps in wide distribution of the product. Three basic heating methods are used for soya milk:

1. Pasteurization
2. Sterilization
3. Ultra-high temperature processing

All three methods utilize specific type of packaging material to avoid the physical, chemical and microbial spoilages outlined below.

Thermal treatment	Temp. (°C)	Time	Packaging material	Shelf life	Post treatment storage conditions
Pasteurization	75	15 sec	Plastic bag, Glass bottle	1 week	refrigeration temperature
Sterilization	121	20 minutes	Can, Glass bottle, Retort Pouch	2 years	Non-refrigerated conditions
Ultra-high temperature	140	2 seconds	Aseptic (cans, bottles, paper board planks, paper board roll stock)	6-8 months	refrigeration temperature

Aseptic packaging for soya milk was first used in 1970s using tetrahedral package made up of laminated paper roll stock. This milestone in the commercialization of soya milk was followed by packaging in 200 mL block shaped containers. Aseptic packaging involves the sterilization of soya milk and packaging material separately. Soya milk is subjected to a temperature range of 140-150°C for 2-8 seconds followed by spraying under vacuum for flash cooling to 60-75°C. The product is finally poured in a sterilized packaging material under sterile environment. Usually, super-heated steam or hydron peroxide us used for sterilization of containers.

Each of these methods has its own specific advantages and disadvantages:

Thermal treatment	Advantages	Disadvantages
Pasteurization	• Inactivates vegetative bacteria • Packaging is easy • Essential nutrients and flavor of soya milk is preserved	• It does not kill spores in soya milk • Shorter shelf life of soya milk
Sterilization	• All vegetative cells and spores are destroyed in soya milk • Shelf-stable soya milk is obtained.	• Destruction of vitamins and other heat sensitive nutrients • Browning may take place in soya milk leading to off-color • Undesirable flavor development may take place
Ultra-high temperature	• Retention of original flavor and	

	nutritive value to the maximum extent. • Inactivation of both vegetative cells and microbial spores • Least browning reactions • Lower cost • Lighter weight • Convenient handling and stocking • Wide consumer acceptance	

CHAPTER - 4

FOOD SAFETY STANDARDS AND FOOD SAFETY

Currently, there are no specific regulations provided by FSSAI, 2019 for soya milk in particular. However, regulations and certain hygiene requirements for manufacturing and processing of dairy milk is given hereunder:

4.1 Contaminants, Toxins and Residues. -

(a) The products shall comply with the Food Safety and Standards (Contaminants, toxins and Residues) Regulations, 2011.

(b) The total urea content in milk shall not be more than 700 ppm.

4.2 Hygiene. -

(a) The products shall be prepared and handled in accordance with the requirements specified in Food Safety and Standards (Licensing and Registration of Food Businesses) Regulations, 2011 and such other guidelines as specified from time to time under the provisions of the Food Safety and Standard Act, 2006;

(b) The products shall conform to the microbiological requirements (given in table below) of these regulations.

4.3 Microbiological specifications:

Description of the Product	**Aerobic plate count**				**Coliform count**			
	Sampling plan		**Limit (cfu)**		**Sampling plan**		**Limit (cfu)**	
	n	**c**	**m**	**M**	**n**	**c**	**m**	**M**
Pasteurized/ Flavored milk	5	3	3×10^4/mL	5×10^4 / mL	5	0	<10/mL	NA

NA for sterilized milk

Where, n = Number of units comprising a sample.

c = Maximum allowable number of units having microbiological counts above m for 2- class sampling plan and between m and M for 3- class sampling plan.

m = Microbiological limit that separates unsatisfactory from satisfactory in a 2- class sampling plan or acceptable from satisfactoryin a 3-class sampling plan.

M = Microbiological limit that separates unsatisfactory from satisfactory in a 3-class sampling plan.

4.4 Method of Sampling and Analysis

The methods of sampling and analysis mentioned in the manuals as specified by the Food Safety and Standards Authority of India from time to time shall be applicable.

4.5 Common ingredients used:

Raw Material: Soya bean

Soybean shall be obtained from the plants of *Glycine max* (L.) *Merr*, which shall be mature, clean and dried seeds free from molds and musty odor and shall also be free from non-edible and toxic seeds.

Parameters	**Limit**
Moisture (%), Maximum	12
Extraneous matter	< 1 % by weight of which not more than 0.25 % by weight shall be mineral matter and < 0.1 % by weight shall be impurities of animal origin
Organic (%), Maximum	
Inorganic (%), Maximum	
Immature, Shriveled and green seeds (per cent. by mass), Maximum	6
Weevilled Seeds by count (no. of grains/100g) (%), Maximum	2
Damaged or split or cracked seed (% by mass), Maximum	4
Oil content (% on dry basis), (%),Minimum	13
Acid Value of extracted oil (Maximum)	2.5
Uric acid (mg per kg), Maximum	100

4.6 Food additives: Certain food additives are permitted enlisted below

Food Category system	Food Category	Food Additive	INS No.	Recommended maximum level	Note
1.1.1.1	**Milk (Plain)**	Phosphates		1500 mg/kg	33,227
1.1.2	**Flavored milk**	Acesulfame potassium	950	350 mg/kg	188
		Alitame	956	100 mg/kg	
		Allura red AC	129	100 mg/kg	52
		Aspartame	951	600 mg/kg	191
		Asprtame-Acesulfmate salt	962	350 mg/kg	113
		Brilliant Blue FCF	133	100 mg/kg	52
		Carotenoids		150 mg/kg	52
		Curcumin	100	100 mg/kg	
		Canthaxanthin	161g	15 mg/kg	52, 170
		Caramel Color	150a	GMP	
		Caramel III - ammonia caramel	150c	2000 mg/kg	52
		Caramel IV - sulfite ammonia caramel	150d	2000 mg/kg	52
		Annatto	160b (i), (ii)	100 mg/kg	
		beta-Carotenes, vegetable	160a(ii)	1000 mg/kg	52
		Chlorophylls and Chlorophyllins, Copper complexes		50 mg/kg	190,52
		Diacetyltartaric and fatty acid esters of glycerol	472e	5000 mg/kg	
		Fast green FCF	143	100 mg/kg	52
		Grape skin extract	163(ii)	150 mg/kg	181, 52

		Iron Oxides		20 mg/kg	52
		Indigotine (Indigo carmine)	132	100 mg/kg	52
		Neotame	961	20 mg/kg	
		Phosphates		1320 mg/kg	33
		Polysorbates		3000 mg/kg	
		Ponceau 4R	124	100 mg/kg	52
		Carmoisine	122	100 mg/kg	
		Erythrosine	127	50 mg/kg	
		Tartrazine	102	100 mg/kg	
		Propylene glycol esters of fatty acids	477	5000 mg/kg	
		Riboflavins		300 mg/kg	52
		Saccharins		80mg/kg	
		Sorbates		1000 mg/kg	220, 42
		Steviol glycosides	960	200 mg/kg	26, 201
		Sucralose (Trichlorogalactosucrose)	955	300 mg/kg	
		Sucroglycerides	474	5000 mg/kg	
		Sunset yellow FCF	110	100 mg/kg	52
		Sodium aluminosilicate	554	60 mg/kg	6, 253
		Hydroxy propyl methyl cellulose	464	7.5 g/kg	For flavored
6.8.1	**Soybean based beverages**	Caramel III - ammonia caramel	150 c	1500 mg/ kg	
		Phospahates		1300 mg/ kg	33
		Riboflavins		50 mg/kg	
		Steviol glycosides	960	200 mg/kg	26
		Sucralose (Trichlorogalactosucrose	955	400 mg/kg	

4.7 Regulations on Packaging requirements

1. "*Best before*" means the date which signifies the end of the period under any stated storage conditionsduring which the food shall remain fully marketable and shall retain any specific qualities for which tacit or expressclaims have been made and beyond that date, the food may still be perfectly safe to consume, though its quality mayhave diminished. However, the food shall not be sold if at any stage the product becomes unsafe.

2. "*Date of manufacture*" means the date on which the food becomes the product as described;

3. "*Date of packaging*" means the date on which the food is placed in the immediate container in which it willbe ultimately sold;

"*Lot number*"/"*code number*"/ "*batch number*" means the number either in numerical or alphabets orin combination thereof, representing the lot number or code number or batch number, being preceded by the words

"*Lot No*" / "*Lot*" / "*code number*"/ "*Code*"/"*Batch No*"/ "*Batch*" or any distinguishing prefix by which thefood can be traced in manufacture and identified in distribution.

"*Prepackaged*"/"*Pre-packed food*", means food, which is placed in a package of any nature, in such amanner that the contents cannot be changed without tampering it and which is ready for sale to the consumer.

"*Use – by date*"/"*Recommended last consumption date*"/"*Expiry date*" means the date which signifiesthe end of the estimated period under any stated storage conditions, after which the food probably will not have thequality and safety attributes normally expected by the consumers and the food shall not be sold;

4.8 Labelling Requirements

1.Every prepackaged food shall carry a label containing information as required here under unless otherwise provided, namely,

2. The particulars of declaration required under these Regulations to be specified on the label shall be in English or Hindi in Devanagari script

3.Provided that nothing herein contained shall prevent the use of any other language in addition to the language required under this regulation.

4.Pre-packaged food shall not be described or presented on any label or in any labelling manner that is false, misleading or deceptive or is likely to create an erroneous impression regarding its character in any respect;

5.Label in pre-packaged foods shall be applied in such a manner that they will not become separated from the container;

6.Contents on the label shall be clear, prominent, indelible and readily legible by the consumer under normal conditions of purchase and use;

7.Where the container is covered by a wrapper, the wrapper shall carry the necessary information or the label on the container shall be readily legible through the outer wrapper and not obscured by it;

4.8.1Labelling of Pre-packaged Food

In addition to the General Labelling requirements specified in 2.2.1 above every package of food shall carry the following information on the label, namely,

a. The Name of Food: The name of the food shall include trade name or description of food contained in the package.

b. List of Ingredients: Except for single ingredient foods, a list of ingredients shall be declared on the label in the following manner:

(a) The list of ingredients shall contain an appropriate title, such as the term “Ingredients”;

(b) The name of Ingredients used in the product shall be listed in descending order of their compositionby weight or volume, as the case may be, at the time of its manufacture;

(c) A specific name shall be used for ingredients in the list of Ingredients;

c. Nutritional information – Nutritional Information or nutritional facts per 100 gm or 100ml or per serving ofthe product shall be given on the label containing the following:

(i) energy value in kcal;

(ii) the amounts of protein, carbohydrate (specify quantity of sugar) and fat in gram (g) or ml;

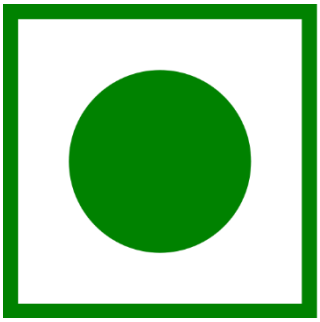
(iii) the amount of any other nutrient for which a nutrition or health claim is made:

(iv) Wherever, numerical information on vitamins and minerals is declared, it shall be expressed in metricunits;

(v) Where the nutrition declaration is made per serving, the amount in gram (g) or milliliter (ml) shall beincluded for reference beside the serving measure

4.9 Declaration regarding Veg or Non veg

a. Every package of "*Non-Vegetarian*" food shall bear a declaration to this effect made by a symbol and color code as stipulated below to indicate that the product is Non-Vegetarian Food.



b. Every package of "*Vegetarian*' Food shall bear a declaration to this effect by a symbol and colorcode as stipulated below for this purpose to indicate that the product is Vegetarian Food.

c. Size of logo

Area of display	Diameter (minimum in mm)
< 100 sq. cm	3
100 – 500 sq cm	4
500 – 2500 sq cm	5
> 2500 sq cm	6

4.10 Declaration regarding addition of natural additives: The package of the product must declare any natural additive added in the product.

4.11 Declaration regarding Net quantity: Net quantity of the product should be mentioned on the package clearly.

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.[i]