PM Formalization of

Micro Food Processing Enterprises (PMFME) Scheme

HANDBOOK

OF

BESAN NAMKEEN

AATMANIRBHAR BHARAT

National Institute of Food Technology Entrepreneurship and Management
Deemed to be University (De-novo Category) under Section 3 of the UGC Act, 1956
An Autonomous Institution under Ministry of Food Processing Industries, Government of India,
Sonepat, Haryana, India
Website: www.niftem.ac.in
Email: pmfmecell@niiftem.ac.in
Call: 0130-2281089

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CHAPTER 1

INTRODUCTION

1.1. Pulses

Pulses are the edible seeds of plants in the legume family. The United Nations Food and Agriculture Organization (FAO) recognizes 11 types of pulses: dry beans, dry broad beans, dry peas, chickpeas, cow peas, pigeon peas, lentils, Bambara beans, vetches, lupins and pulses nes. Pulses are one of the most cost-effective proteins around, enjoyed by people around the world as a food staple. It is a fancy word to describe the ever-so-delicious and protein-packed chickpeas, lentils and dry peas. Pulses are part of the legume family, but the term "pulse" refers only to the dried seed. They are dried legumes that grow in a pod of one to twelve seeds. Includes beans, lentils, peas and other little seeds referred to as lentils or beans.

Dal is often translated as "lentils" but actually refers to a split version of a number of lentils, peas, chickpeas, kidney beans and so on. If a pulse is split into half, it is a daal. For example, split Mung beans are Mung daal. Indian pulses are usually available in three types: the whole pulse, the split pulse with the skin on, and the split pulse with the skin removed. Pulses are annual crops that yield between one and 12 grains or seeds. The term "pulses" is limited to crops harvested solely as dry grains, which differentiates them from other vegetable crops that are harvested while still green. Between 2010 and 2013, 173 different countries grew and exported pulses. Pulses are healthy, nutritious and easy to cook with. Growing pulses also promotes sustainable agriculture, as pulse crops help decrease greenhouse gases, increase soil health, and use less water than other crops.

1.1.1. Types of Pulses

Pulses are the dried seeds of the legume plants. Hundreds of different varieties of pulses are grown around the globe. It can be:

- Split & Skinned lentils
- Split Lentils
- Whole Lentils & Pulses

Below are the examples of Whole Lentils and spilt & Skinned Lentils:

Image	English Name	Hindi Name
	Yellow split Pigeon peas	Arhar dal, Toor dal, Tuvar dal
	Split & skinned green gram, yellow lentils	Moong dal, Mung dal
	Red lentils	Lal masoor dal
	Split & skinned black gram	Urad dal
	Split Bengal gram lentil	Chana dal

	Green Gram, Mung bean	Sabut moong, hari moong dal
	Black Gram	Sabut urad dal, maa ki dal
	Indian Brown Lentils	Kali Masoor
	Horse Gram	Kulthi
	Chickpeas, Garbanzo beans	Kabuli chana, Chole
	Black chickpeas	Kale cha
	Red Kidney Beans	Rajma
	Black Eyed Peas	Lobia, Chavle, Raungi
	Dried white peas	Sukhe safed matar, safed vatana

1.2. Besan

BESAN is a product obtained by grinding, dried and decuticled Bengal Gram. Besan is a bengal gram widely consumed in India. It is yellowish in colour and possesses characteristic bengal gram taste and smell. Khesaru dal and other colouring matter shall not be added to true besan . It is a staple ingredient in the cuisine of the Indian subcontinent, including in Indian, Bangladeshi, Burmese, Nepali, Pa kistani, and Sri Lankan cuisines. Indians by nature are fond of sweet as well as spicy food and Gram is an important ingredient in such preparations. It is a versatile product used in many preparations round the year. Apart from individual households, there are some institutional bulk consumers like restaurants, other eateries hostels and canteens, clubs, caterers, etc. It is a very commonly used item in the Indian kitchens and thus enjoys continuous market throughout the year.

1.3.Major component of Besan

Gram /Besan contains a high proportion of carbohydrates, higher fiber relative to other pulses, no gluten, and a higher proportion of protein.

Nutritional value per 100 g (3.5 oz)		
Energy	1,619 kJ (387 kcal)	
Carbohydrates	57 g	
Sugars	10 g	
Dietary Fiber	10 g	
Fat	6 g	
Protein	22 g	
Vitamins	***Quantity***	***%DV+***
Niacin (B3)	1 mg	7%
Folate (B9)	437 ug	109%
Minerals	***Quantity***	***%DV+***

Calcium	45 mg	5%
Iron	4 mg	31%
Magnesium	166 mg	47%
Phosphorus	318 mg	45%
Potassium	846 mg	18%
Selenium	8 ug	11%
Sodium	64 mg	4%
Zinc	2 mg	21%
Other Constituents	***Quantity***	
Water	10 g	

1.4.Importance

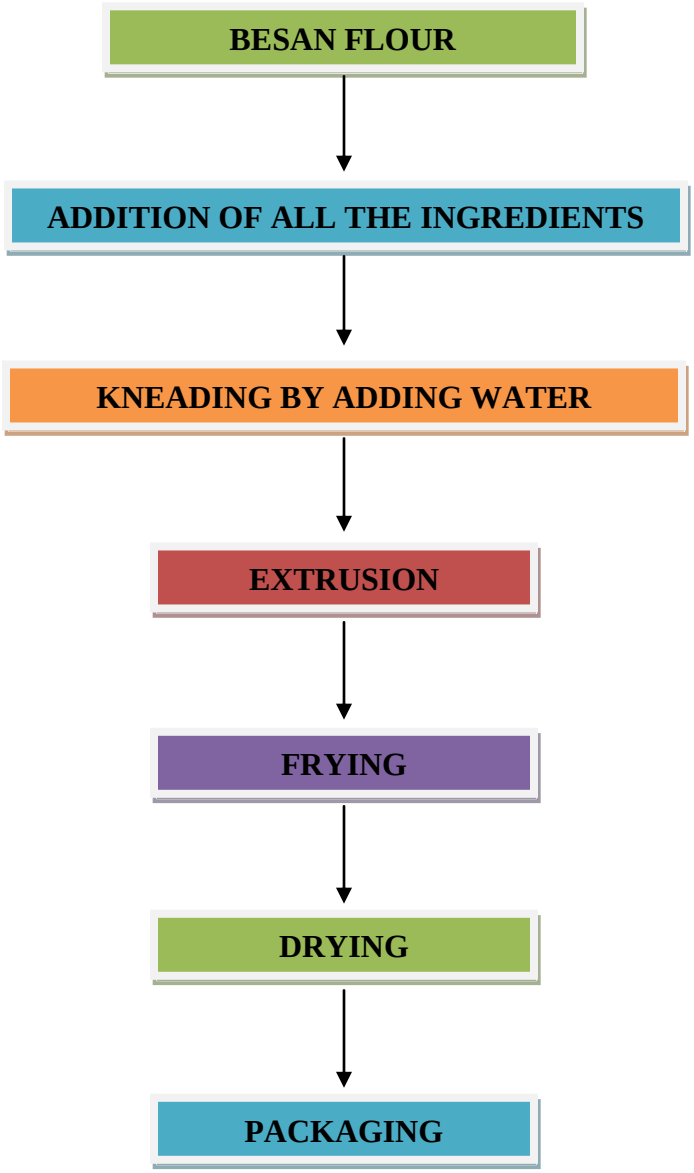
- In India it is popular as Besan and is used in various Indian recipes like 'besankeladdu', Bhajia, pakode, paraths, Curry etc. Gram is also used in making sweat dishes as well as in preparing instant mixes available in market. Chickpea , chana or gram , besan is used commonly throughout India and in parts of the Mediterranean also.
- It is also perfect as a thickener in curries and coatings in different kinds of fries. It is a substitute of egg for vegetarian people and it has a high in proteins and can be used instead of egg coatings in various recipes.
- Besan is also a terrific anti-inflammatory foodas consumption of the same has been shown to have antiinflammatory abilities and protective benefits against cancer, in particular cancer of the digestive tract including colon, stomach and kidney cancer. As besan has zero wheat, barley, rye or cross-contaminated oats, it's totally free from gluten and all grains. Whether or not someone has true gluten sensitivity or allergy, most people can benefit from avoiding gluten due to its negative effects on the gut, digestion and immune responses
- Apart from its capacity to make enhanced fried items and delicious recipes, it is also used as a facial mask mixing with milk or yogurt and turmeric and is popular among young women in Asia.
- This face mask has proven to be successful as a cleanser and whitening skin. Gram is a versatile product and used in many preparations throughout the year. Apart from individual households, there are some wholesale consumers like restaurants, canteens, caterers, clubs etc. who use these products frequently.
- As Indians love spicy and sweet recipes and besan is a very important ingredient in these items, thus it enjoys continuous use in Indian kitchens all through the year.

CHAPTER 2

PROCESSING OF BESAN NAMKEEN

2.1 MANUFACTURING OF NAMKEENF ROM BESAN

Besan have been widely used in manufacturing of namkeen/ Snacks due to its nutrition benefits as well as it also have good flavor. Manufacturing of namkeenfrom besan involves following steps:



2.1.1 Grinding of Bengal gram : Grinding of Bengal gram is mainly done with help of grinding machine to get besan and it should be smoothly grind so that texture of namkeen will be of good quality.

2.1.2 Addition of ingredients : Ingredients such as such as salt and spices are added in appropriate quantity. While adding these ingredients proper regulation of FSSAI must be followed.

2.1.3 Kneading : It is done for dough making, besan powder should be kneaded properly and during this process addition of water in to dough should be carefully monitored so that amount moisture should be present in appropriate quantity. Lesser use or more use of water affect the quality of dough.

4.1.4 Extrusion : After kneading, dough is passed through an equipment called as extruder. Extrusion is done to cut down the dough in a proper shape.

2.1.5 Frying : Product obtained from extruder are fried deeply in oil.

2.1.6 Drying : It is done to lower down temperature f fried product as well as drying process also remove some amount of oil at the same time.

2.1.7 Packaging : After drying, packaging is done for selling the products in market.

CHAPTER 3

EQUIPMENT FOR NAMKEEN PROCESSING

3.1 WEIGHING MACHINE :

For getting good quality of product, all the ingredients should be properly weighed with the help of digital weighing machine.

3.2 SIEVE :

It used for sieving besan so that only fine powder can be utilized for manufacturing purpose. Without sieving coarse powder will be mixed up.

3.3 DOUGH MAKER :

Dough maker is used for dough preparation at a larger quantity and in lesser time. All the ingredients are mixed together uniformly with help of dough maker.

3.4 EXTRUDER MACHINE:

It is used for cutting the dough in to thick and small shape which will be appropriate for frying process.

3.5 FRYER :

Fryer is used for deep frying of bhujia.

3.6 PACKAGING MACHINE:

It's a packing class machine, used to pack given efficiently. It's especially designed to handle with minimum wastage.

3.7 OTHER MATERIAL AND HYGIENE EQUIPMENT : The are simply used to hold and transfer the given material efficiently.

3.8 POWER DISTRIBUTION EQUIPMENTS : They are used to safely receive and distribute power.

CHAPTER 4

4.0 PACKAGING :

Packaging is an important part of food manufacturing process. It protect the food products from physical ,chemical, biological damages. Without packaging, food handling would be a messy, inefficient and costly exercise and modern consumer marketing would be virtually impossible. Thus food packaging lies at the very heart of the modern food industry.

Packaging Institute International defined packaging as the enclosure of products, items or packages in a wrapped pouch, bag, box, cup, tray, can, tube, bottle or other container form to perform one or more of the following functions: containment, protection, preservation, communication, utility and performance. If the device or container performed one or more of these functions, it was considered a package.

4.1 NEED OF PACKAGING :

Packaging performs a series functions:

4.1.1 CONTAINMENT : The containment function of packaging makes a huge contribution to protecting the environment from the myriad of products that are moved from one place to another on numerous occasions each day in any modern society. Faulty packaging (or under-packaging) could result in major pollution of the environment.

4.1.2 PROTECTION : the primary function of the package: to protect its contents from outside environmental influences such as water, water vapor, gases, odors, microorganisms, dust, shocks, vibrations and compressive forces.

4.1.3 CONVENIENCE : Products designed to increase convenience include ready to cook or ready to eat foods which can be reheated in a very short time, preferably without removing the primary package. Thus, packaging helps in convenience of consumer. Convenient packages promote sales.

4.1.4 COMMUNICATION : Packaging contains a lot of information such name of its manufacturer, product name, terms and uses, date of manufacturing, best before. nutritional information thus helping the consumer to be more informed.

4.2 TYPES OF PACKAGING :

4.2.1 PRIMARY PACKAGING :

- Primary package are those package which directly came into contact with food products. It provides first or initial layer of protection to the food products.
- Examples - Metal cans, tea bag, paperboard cartons, glass bottles and plastic pouches.

4.2.2 SECONDARY PACKAGE :

- Secondary package are those package which surrounds or contains the primary package.
- It further used to group primary packages together.
- Act as carriers and many a times also used for the display of primary package.
- Examples are Corrugated case, Boxes.

4.2.3 TERTIARY PACKAGE :

- It contains number of secondary package together.
- Mainly used for bulk handling of food products.
- Example : stretch-wrapped pallet.

4.2.4 QUATERNARY PACKAGE :

- Quaternary package is mainly used for handling the tertiary packages.
- It generally includes a metal container which can be transferred to or from ships, trains.

4.3 PACKAGING OF NAMKEEN:

Packaging of namkeen and its products are mainly done to protect the food products from outside environment especially after the completion of process so that products can retain flavor, aroma, freshness for a longer period of time. Packaging is also done to increase their shelf life. Namkeen products can be packed in wide range material which includes LDPE, PET, glass, aluminum etc.

4.3.1 LDPE :

Low-density polyethylene is heat sealable, inert, odour free and shrinks when heated. It act as a barrier to moisture and has high gas permeability, sensitivity to oils and poor odour resistance. It is less expensive, therefore widely used. One of the great attributes of LDPE is its ability to be fusion welded to itself to give good, tough, liquid-tight seals.

4.3.2 PET :

PET can be made into film by blowing or casting. It can be blow moulded, injection moulded, foamed, extrusion coated on paperboard and extruded as sheet for thermoforming. Melting point of PET is higher than PP which is around 260°C and due to the manufacturing conditions does not shrink below 180°C. Thus PET is ideal for high-temperature applications. PET is also flexible to low temperature (-100°C). It also act as good barrier of oxygen and water vapour.

4.3.3 POLY VINYL CHLORIDE (PVC) :

PVC is a stiff and clear film having a low gas transmission rate. PVC can be used as small wraps, bags, and pouches. PVC when co-polymerized with polyvinylidene chloride is known as Saran. Since it is a costly material, it is only used as a coating to obtain barrier properties and heat salability. PVC film is also used for twist wraps, as it has twist retention properties and is excellent on high-speed machines.

4.3.4 GLASS :

Now a day glass container has been also used for packaging. It has following advantages:

- act as strong barrier to moisture and gases.
- Prevent unwanted odors and microbial growth.

- do not react with food products.
- suitable for heat processing when hermetically sealed
- glass are re-useable and recyclable
- they are transparent to display the contents
- they are rigid, to allow stacking without container damage.

The disadvantages of glass include:

- glass have high weight which increases the transportation cost.
- very much fragile and low resistance to thermal shock as compare to other materials.
- potentially serious hazards from glass splinters or fragments .

4.3.5 ALUMINIUM:

Aluminium is used for packaging due its highly malleable properties: can be easily converted to thin sheets and folded, rolled or packed. Aluminium foil acts as a total barrier to light and oxygen odours and flavors, moistness, and germs, and so it is used broadly in food and pharmaceutical packaging, including long-life packs.

4.3.6 LAMINATE :

The laminates can be formed, filled, gas flushed and sealed on a single machine from reel stock. Gas flushing is achieved by saturating the powder with inert gas. The main advantages associated with laminates are lower material cost and lighter material weight. The disadvantages are that laminates do not have the mechanical strength and durability of rigid containers, and there can be difficulty in obtaining a satisfactory heat seal because of contamination of the heat seal area by powder during filling at high speed.

4.4 SOME RECENT DEVELOPMENT IN PACKAGING :

4.4.1 ASPECTIC PACKAGING

Aseptic packaging is the filling of sterile containers with a commercially sterile product under aseptic conditions, and then sealing the containers so that reinfection is prevented; that is, so that they are hermetically sealed. Application of aseptic packaging involves: packaging of pre-

sterilized and sterile product and packaging of a non-sterile product to avoid infection by microorganisms.

The major reasons for the use of aseptic packaging are : to take advantage of high temperature-short time (HTST) sterilization processes, to enable containers to be used that are unsuitable for in-package sterilization and to extend the shelf life of products at normal temperatures.

4.4.2. ACTIVE AND INTELLIGENT PACKAGING

Active packaging is defined as packaging in which subsidiary constituents have been deliberately included in or on either the packaging material or the package headspace to enhance the performance of the package system.

Intelligent packaging is defined as packaging that contains an external or internal indicator to provide information about the history of the package and/or the quality of the food. Sachets and pads are the most widely used forms of active packaging and the various functions which they perform are discussed in the following:

- Oxygen absorber
- Carbon dioxide absorber or emitter
- Ethylene absorber
- Ethanol emitter
- Moisture absorber

4.4.3 MODIFIED ATMOSPHERE PACKAGING

MAP can be defined as packaging of food items where atmosphere inside the packet has been modified to increase the shelf life of food products. It involves active modification or passive modification. In active modification air is displaced with a controlled, desired mixture of gases, and the process is called as gas flushing. Passive modification occurs due to respiration and the metabolism of microorganisms associated with the food. The package structure normally incorporates a polymeric film, and so the permeation of gases through the film also influences the composition of the atmosphere that develops.

4.5 LABELING

Labeling performs the communication function of packaging, informing the consumer about nutritional content, net weight, product use and so on. Labeling acts as a silent salesman through distinctive branding, as well as facilitating identification at check-outs through the Universal Product Code (UPC).

There various types of labeling which are as follows:

4.5.1 GLUED-ON LABELS : These are the simplest type and consist of sheet material (typically paper), which has been printed and cut to size. They are attached to the package with adhesive, which is applied either at the time of application, or at the time of manufacture, in which case the adhesive is activated with moisture immediately prior to application.

4.5.2 SELF-ADHESIVE (PRESSURE-SENSITIVE) LABELS : These can be made from paper, plastic or aluminum foil laminated to paper or plastic, and can be produced to adhere to a wide range of materials.

4.5.3 IN-MOLD LABELS : It offers better resistance to heat, moisture and chemical than those labels made from paper. There are also recycling advantages with film labels. IML materials must be able to withstand the container manufacturing process. The heat generated during blow molding presents a challenge to most inks because pigments can change.

4.5.4 SLEEVE LABELS : A wide range of containers can be sleeve labeled including glass bottles, plastic bottles and metal cans. Sleeve labels shrink into or stretch around contours, penetrate variable geometries and conform to irregular features.

4.5.5 HOLOGRAPHIC LABELS : Holographic labels that incorporate a hologram have large application in food packaging for both marketing and security reasons, specifically in the areas of anticounterfeiting (authentication) and brand protection. Surface relief and volume are the most common type of hologram. Surface relief holograms exhibit a characteristic rainbow-colored pattern or image. Volume, or reflection, holograms have a very different appearance to surface relief holograms and are generally used for authentication.

4.6 QUALITY CONSIDERATIONS DURING PACKING

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

Documented checking of the packages entails:

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

The surrounding area is also checked:

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

Qualification for international standards such as ISO and HACCP

CHAPTER 5

PROJECT COMPONENT

5.1. Land- The approximate total area required for a complete small scale factory setup is 1200-1500 Sq. ft. approximately smooth production.

5.2. Civil work-

- **Workshop Area-** This area includes the machinery setup and foundation space for all tools and equipment etc. The total workshop area is approx. 800 Sqft.
- **Inventory Area-** This area includes the storage space for all the raw materials, finished Product area. Total inventory area is approx. 400 Sqft.
- **Office Area –** This space includes staff working region, their accommodation space, canteen area, medical facility, etc. The total workshop area is approx. 200Sqft. This may be considered above the ground floor.
- Parking Space, Electricity Utensils Mounting Space, and Others. This could be approx. 100Sqft.

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

5.3. Miscellaneous Assets-

- Water Supply Arrangements
- Furniture

5.4. Power requirement- The manufacturing unit requires 10-12 KW.

5.5. Man power requirement- For a small unit to begin with around 8-10 people is required including skilled, non- skilled worker and a supervisor.

CHAPTER 6

6.1 STORAGE OF NAMKEEN

The proper storage of namkeen and its products with utmost care is very important otherwise it will become stale and rancid much faster which may further alter the aroma and flavor and can also harm the health of consumer. Food products are mainly vulnerable to light , air, heat, odour, and moisture. Thus the proper storage requires following :

6.1.1 Dark Place : Processed food products should be always stored in a dark room to avoid it from sunlight or UV light, so that quality such as aroma and flavor should be maintained till final consumption.

6.1.2 Airtight : To avoid food products from absorbing moisture and unpleasant odour from air.

6.1.3 Hypothermia: Exposure of food products to heat will ruin its quality thus avoid keeping food products in sunlight or near heat .

6.1.4 Away from strong odour . Some food products have tendency to absorb any odour quickly thus processed food products must be stored separately.

6.1.5 Away from moisture.

CHAPTER 7

7.1 FSSAI REGULATION FOR NAMKEEN

SL.NO	ADDITIVES	MAXIMUM LEVEL
A	**Antioxidants**	
1.	Tocopherol	GMP
2	Lecithin	GMP
3	Butylated hydroxy anisole (BHA)	200ppm
4	Tertiary butyl hydro quinone (TBHQ)	200ppm
B	**Emulsifier/ Stabiliser**	
1	Methyl cellulose	0.5%
2	Carboxymethyl cellulose	0.5%

7.2 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.