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INSTITUTE OF
PUBLIC HEALTH
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fssai



ESSENTIALS OF FOOD HYGIENE - III

RSPH
ROYAL SOCIETY FOR PUBLIC HEALTH
VISION, VOICE AND PRACTICE

LEVEL III-SUPERVISORS - MANUFACTURING

ESSENTIALS OF FOOD HYGIENE – III

For Supervisors - Manufacturing

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INTRODUCTION

The food processing sector is one of the largest industries in India in terms of production, consumption, export and expected growth. This sector actually comprises many different sub-sectors like meat and meat processing industries, fruit and vegetable processing, grain processing, poultry and dairy industry, packaged foods, beverages, packaged drinking water etc. It also includes small scale industries like pickles & chutneys, bread, confectionery, rapeseed, mustard, sesame & groundnut oils, ground and processed spices, sweetened cashew nut products, tapioca sago and so on.

This book is the course book for a food safety training programme for supervisors working in these food manufacturing industries, and has been developed for the Food Safety and Standards Authority of India (FSSAI). It is written with the intention of providing supervisors with the essential, practical information to enable them to manage staff to provide safe food. Emphasis has been placed on the measures necessary to control the most common reasons for food borne illness. It is a useful guide and can be read on its own or as part of the FSSAI's level III training programme.

The fundamental causes underlying food safety are the same in all food operations: food is contaminated with microorganisms which multiply to dangerous levels if given the right conditions for growth. In the retail and catering sectors, the main strategy for preventing food poisoning is temperature control. In addition to this strategy, the food processing and manufacturing sector uses other strategies. These include heat treatment, use of suitable packaging after processing and the concept of water availability. It is also important to follow good food processing and preservation practices for the production of safe foods in this sector.

In recent times, many important advances have been made with the development of new food manufacturing processes and new types of food products. Consumers now have the option of choosing from a range of factory processed foods and ingredients. Despite these advances, as always, knowledge is the key to producing safe and wholesome foods; and it is through the application of knowledge that the food industry must try to satisfy customers as well as comply with the food safety and standards law.

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Section 1: FOOD POISONING AND ITS CAUSES

This section describes food hygiene, food poisoning and food contamination.

Food safety is the assurance that food will not cause harm to the consumer when it is prepared and /or eaten according to its intended use. Food safety is learned through several good practices which are a consequence of culture, history and lifestyle. These are concerned with reducing the acute and chronic hazards that make food injurious to the health of consumers.

A hazard is any agent in food, which can cause harm to the health of the consumer.

FOOD HYGIENE

Food Hygiene is the action taken to ensure the safety and suitability of food at all stages of the food chain. Good food hygiene is essential to ensure that the food prepared/sold by businesses is safe. Food safety and hygiene are important both to safeguard consumer health and the reputation of food businesses.

FOOD POISONING

Food Poisoning is a common, often mild but sometimes very serious illness resulting from eating contaminated food or drink. The main symptoms are diarrhoea and/or vomiting, often accompanied by nausea (feeling sick) and stomach pain. The onset of symptoms is usually sudden and may start within 2 hours of food intake but sometimes there may be an interval of several days. The illness typically lasts 1 or 2 days but sometimes can continue for a week or more.

Current definition of food poisoning includes some food and water borne illnesses which may have different symptoms. Some examples of food borne illness include viral gastroenteritis, hepatitis A, and typhoid.

Food poisoning is weakening and extremely unpleasant for anyone. However, certain groups of people like **infants, pregnant women, elderly people and those with weak immune systems** are at higher risk of serious consequences from food poisoning. Such groups are often referred to as 'at-risk' groups.

There are more numbers of food poisoning cases being reported in the media every day. Some contributory factors which may have led to this increase are:

- more intensive methods for growing or rearing of primary products;
- partial or full cooking of food before it reaches the consumer and as it proceeds along the distribution chain breakdowns in temperature and general hygiene controls;
- more people buying processed foods. They may not necessarily be aware of the correct handling and storage processes;
- More people eating poultry which is more prone to contamination; and
- The culture of eating out – poor standards in food processing and catering businesses can cause illnesses to large numbers of people.

There is general agreement that one of the main strategies for preventing food poisoning lies in the **better education** of all those involved with the various aspects of food handling from the farm to the table.

CONTAMINATION OF FOOD

Food contamination occurs by substances (contaminants) not intentionally added to food. Contaminants are the factors responsible for unhygienic food. They may compromise food safety and cause harm to the health of a consumer. Such hazardous substances may be chemical, physical, biological or allergenic.

CHEMICAL (for example, chemical poisons like insecticide)

Chemical poisons such as insecticides get into food, and toxic metal may enter food during growth, processing, transport and sale. Poisonous plants (and fungi) like some types of mushrooms and seafood produce chemicals or toxins which can cause illnesses if consumed incorrectly.

Unwanted chemicals can enter food through the following ways:

- growth – fertilizers, pesticides, veterinary drugs added during the growth of food products;
- processing – addition of oil, cleaning chemicals, insecticides during food preparation ;
- transport – spillage or leakage during transportation;
- sale – chemicals from the packaging processes.

PHYSICAL (for example, undesirable substances in food)

Reports of ‘foreign bodies’ such as dead rats, insects and pieces of glass in food get wide publicity although they are rare events. Physical contaminants such as these are usually detected by the consumer and the food is not consumed. However, substances like glass or staple pins used for packing can be dangerous. These incidents rarely cause food poisoning but, of course, are highly undesirable. Manufacturing businesses should have mechanisms by which to prevent or remove such contamination.

Most of the illnesses or incidents related to physical contaminants involve complaints of dental/oral injury or cuts, trauma to the oesophagus, abdomen or other organs of the digestive system. These incidents are rarely life-threatening, but are a matter of public health. Good Manufacturing Practices (GMP, dealt with in a later section) are the foundation of a physical hazard approach.

ALLERGENIC (for example, groundnuts, sesame seeds, milk, eggs and cereals)

Food allergies are an increasing problem for the food industry. Food allergens cause the body's immune system to react, often within minutes but sometimes this can take hours. In severe cases, a person can have an anaphylactic reaction, which can be life threatening. Groundnuts and other nut allergies are often very severe.

Manufacturers must be careful during food production to see that allergens do not contaminate other products, for example small amounts of sesame seed dust contaminating a product that normally does not contain sesame.

BIOLOGICAL (microorganisms like bacteria and their toxins, viruses, yeasts, moulds and protozoa)

Microorganisms/ microbes are small organisms that can be seen only through a microscope. The most common types of microorganisms are bacteria, viruses, yeasts, moulds and protozoa.

Bacteria

Bacteria are the most common cause of food poisoning. They are small living organisms often known as 'germs'. They are so small that it is impossible to see them without a microscope. Bacteria are everywhere: in soil, dust, water, the air around us and on our bodies. It may take only a small number of bacteria to cause illness such as typhoid fever or food

poisoning. Bacterial contamination is the cause of most food poisoning cases and thus will be dealt with in more detail in the next section.

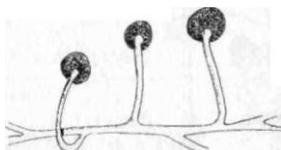
Viruses

Viruses can be seen only under a very powerful microscope as the viruses are even smaller than bacteria. They multiply in living cells, not in food. Some viruses can cause food borne illness; examples include gastroenteritis and hepatitis A.

Although viruses are not considered in detail in this book, it should be noted that many of measures that prevent contamination by bacteria also reduce the risk of viral infection.

Moulds

Moulds are of different colours, often hairy in appearance, and grow on food such as bread, jam and fruit. Under the microscope, moulds appear like a network of thread-like cell material (see picture below).



Moulds are found throughout the year and are spread through dry spores that float in the air. They grow best in warm, humid conditions, but can also grow at refrigerator temperatures.

Some moulds which are often found on nuts can produce very dangerous toxins (poisons), especially in damp climates. Other moulds are used in the manufacture of food such as certain kinds of cheeses.

Yeasts

Yeasts have been being used for baking and fermenting alcoholic beverages for thousands of years. However, they can also spoil food and drinks which contain lots of sugar. Yeasts do not cause food poisoning. Under the microscope they are seen as single living cells. It is important to remember that moulds and yeasts, like bacteria, need food, moisture,

warmth and time to grow. The optimum growth temperature for yeast is around 25⁰C to 30⁰C with a maximum of around 47⁰ C. Although a few moulds and yeasts can still grow slowly at or even below 0⁰C.

Protozoa

Protozoa are single-celled organisms which form a basis of the food chain. Some of them like *Entamoeba histolytica* and *Giardia Lamblia* are pathogenic and can result in diarrhoeal illness and intestinal discomfort of varying sensitivity. They are often found in untreated water and can become food borne if water containing these protozoa is used to irrigate plants or wash foods before service. They do not multiply in food but their cysts may remain infectious in food for a long time. Their infective dose is low, which means that only a few cysts are required to cause illness.

Investigations into incidents of food-related illnesses tend to find the cause is due to breaches of simple, well-known rules of food handling. These may include ineffective monitoring of temperatures, poor staff hygiene awareness, contamination resulting from poor practices and inadequate hand-washing facilities. We will discuss the guidelines for safe handling of food and the procedures for ensuring these in the following sections.

Section 2: BACTERIA

This section describes bacteria, other microorganisms and the importance of preventing food poisoning for businesses and health of consumers.

BACTERIA

Most bacteria are harmless and some are even beneficial to man like those in our intestines that aid digestion. Certain bacteria are needed to manufacture products such as cheese, curd and for fermentation of batter used in the preparation of *dosas* and *idlis*.

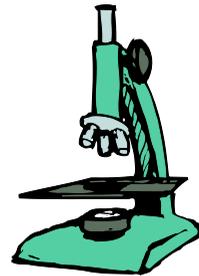
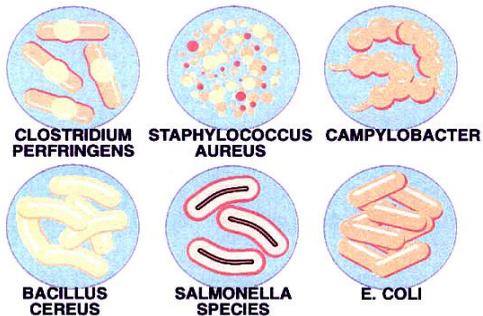
Another group of bacteria can cause food to smell, to lose texture, flavour and generally to decay. The food becomes so unpleasant that people will not eat it. These are referred to as **food spoilage bacteria**. Organisms that cause diseases are called pathogens. Such germs in food, often in relatively small numbers can cause serious illnesses such as typhoid fever.

Often, large numbers of food poisoning bacteria are required to cause illness. A low dose causes infection which can result in serious illnesses especially in vulnerable groups such as young children and elderly people. However the organism is easily destroyed by heat.

SPORES

Some kinds of bacteria are capable of forming protective coverings called spores. This protection enables bacteria to remain alive, but inactive, in situations that normally would kill them. Later, if conditions become suitable, the spores change into the usual form of bacteria that then multiply rapidly. Spores can withstand high cooking temperatures and are able to survive situations where nutrients or moisture are not immediately available.

BACTERIA AND FOOD POISONING



Food Poisoning Bacteria as seen under the microscope

Microscope

There are a number of different kinds of food poisoning bacteria, each having its own name. *Salmonella*, *E. coli* and *Staphylococcus aureus* are bacteria that are responsible for a large proportion of the reported food poisoning outbreaks in India.

Different bacteria cause food poisoning in different ways. They can act to cause food poisoning in these ways:

- **Bacteria that grow throughout the food in large numbers, so that when we eat the food we eat the bacteria too.**

For example, Salmonella bacteria could be transferred from raw materials to finished products, such as from raw poultry meat to cooked products, and from raw milk to cheese, as the result of bad practices such as using the same equipment to handle both raw and finished products. If the contaminated products are given sufficient time in the temperature danger zone many millions of bacteria will grow.

- **Bacteria that is difficult to kill with heat.**

*An example of this is a bacterium with the long name **Clostridium perfringens**, which is often found in raw meat and poultry. It has the capacity to change into a resistant form called spores. Some of these spores can survive the normal cooking process. A joint of meat in which even a few spores have survived cooking, if left to cool slowly under warm conditions, can result in the spores changing back into the usual form of bacteria which then grow very rapidly.*

- **Bacteria that release their toxins (poison) into the food before the food is eaten.**

*One such bacterium is called **Staphylococcus aureus** (found in the nose, throat and wounds) which can produce poisons in milk products and cooked rice as well as in cooked meat and poultry, if allowed time to grow in warm conditions.*

- **Bacteria which do not grow on food but multiply in the gastrointestinal tract.**

***Campylobacter** is an example. It is usually transmitted by contaminated food or water, can infect the gastrointestinal tract and cause diarrhoea, fever and cramps.*

Toxins are poisons produced by some bacteria as they grow in food or in the intestine.

Bacteria are invisible to the naked eye and do not usually cause any change to the appearance, smell or taste of food. People cannot, therefore, rely on any of their senses to tell them whether or not food is contaminated. This means that food handlers must practice very high standards of food hygiene to ensure that food does not become contaminated.

HOW BACTERIA GROW

Bacteria must have the following FOUR conditions to live and grow:

FOOD

MOISTURE

WARMTH

TIME

1. Food

Certain foods - most of which have high protein content – are particularly rich in nutrients and contain moisture and therefore provide excellent conditions for bacterial growth if kept in warm conditions. When these foods are ready to eat without further treatment such as cooking which would kill bacteria, they are known as s “High Risk” foods (More about this in section 9). High risk foods are implicated in most cases of food poisoning. Examples of such foods are milk, eggs, meat, sea food and their products and cooked rice, gravy, soup, cut fruits, salads and fresh juices. These foods are implicated in most cases of food poisoning.

Foods containing sugar, salt or acid - such as jam or pickles - discourage the growth of bacteria. Some foods have preservatives (chemical substances) added to them to restrict the growth of bacteria.

Acidity and alkalinity (pH) - The pH of food is measured on a scale from 1 to 14. Alkaline foods have a pH value above 7, acidic below 7 and a pH value of 7 is neutral. Most of the bacteria will not multiply in an acidic pH of below 4.0, an example being fruit juice. On the other hand, if a large number of food poisoning bacteria are introduced into an acid food, it may take some time for the bacteria to die. For this reason acid food must be protected from contamination at all times. Chicken is an example of a near neutral food: citrus fruit represents the high acid foods that provide little scope for bacteria to grow.

Bacterial growth may also be affected by the presence or absence of oxygen.

2. Moisture

To grow, bacteria need moisture and this can be found in many foods.

Bacteria are less likely to survive in dried food such as powdered milk or dried eggs but any bacteria that do survive under such dry conditions begin to grow again if fluids are added to the food.

One of the reasons why sugar and salt discourage the growth of bacteria is that they take up the moisture that is then not available to the bacteria. Similarly, when food is frozen its moisture turns into ice and is not available to the bacteria.

3. Warmth

Bacteria that cause food poisoning will grow at temperatures between 5°C and 63° C; they grow most quickly at a temperature of around 37°C, which is the normal temperature of the human body.

For this reason, the range of temperatures between 5°C and 63°C is known as the Temperature Danger Zone.

Bacteria that cause food poisoning will grow rapidly in food that is allowed to remain in the Temperature Danger Zone, for example, at room temperature.

Temperatures outside the Danger Zone are less suitable for these bacteria. Although bacteria grow in warmth they are usually killed by heat. Most bacteria are killed by temperatures of at least 70°C provided this is reached at the centre of the food and is held for a sufficient time.

However, some bacteria and their toxins (poisons) require higher temperatures for a longer period of time before they are destroyed.

Pasteurization is a method of destroying bacteria by rapidly heating the food to a sufficiently high temperature for a specified period of time. Milk and milk products are examples of food treated in this way.

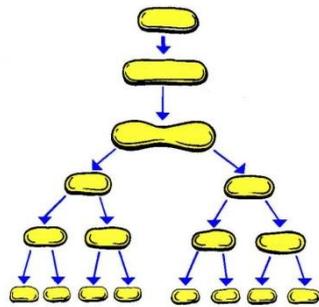
In cold conditions, that is below 5°C, bacteria do not grow or grow only very slowly. At very low temperatures some bacteria will die, but many will survive and grow again if warm conditions return.

STORE HIGH RISK FOODS BELOW 5°C OR ABOVE 63°C

4. Time

Given moist, warm food, bacteria simply need time to grow. It is often carelessness that allows them the time they need, such as when food is allowed to remain in the Temperature Danger Zone.

Each bacterial cell multiplies by splitting itself into two so that 1 bacterial cell becomes 2 bacterial cells. Each of these 2 bacteria then split to make 4 bacteria. Each of the 4 bacteria split into two again, making 8 bacteria, and so on.

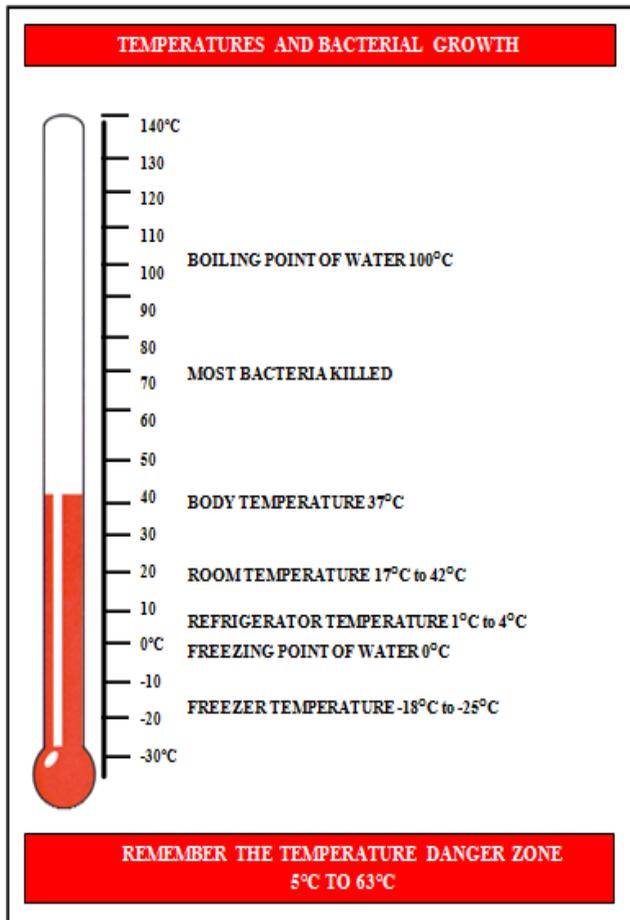


Multiplication of bacteria

If the temperature is suitable, bacteria will reproduce in this way every 10–20 minutes. Some take even less time.

This means that after reproducing at around this rate for only 4 or 5 hours, one bacterium will have multiplied into many thousands. In reality, the severity of food poisoning will be even greater because

contaminated food usually carries considerably more than one bacterium at the outset.



SOURCES OF FOOD POISONING BACTERIA

If food is to be protected from bacteria it is important to know where they come from and how they come to be present in the food we eat.

Most come from animal and human sources.

1. Raw foods

Many bacteria live in the intestines of animals. The animals concerned usually have no symptoms and just carry the bacteria. Thus bacteria can be transferred to meat that will be used for eating, particularly during faulty slaughter, - if the intestines/stomach is ruptured.



For this reason, it is wise to think of all raw meat, poultry and fish/seafood, as well as the fluids that come from them, as already carrying many food poisoning bacteria before they arrive in the food area. Raw meat, poultry and fish/seafood are frequent sources of food poisoning outbreaks.

Other raw foods that may carry food poisoning bacteria are eggs – both inside and on the shell - and seafood. Unpasteurized milk may contain dangerous bacteria. Rice can also be contaminated.

In fact, many raw foods, including those which are delivered to the factories for processing, are naturally contaminated by bacteria from the soil, for example, fresh vegetables, unprocessed milk, fruits and meat. When raw foods are handled or prepared, it is important to follow good hygiene practices.

2. Water/Ice

When used in the preparation of food (including ice) may also be contaminated with biological,



chemical or physical hazards. Contaminated water is the usual source of many food-related diseases such as cholera and other diarrhoeal diseases. Contaminated water will create a public health risk, if it is used for drinking, cleaning, processing food and washing equipment and work.

3. People

Bacteria that can cause food poisoning are carried in several areas of the human body – for example, skin, nose, throat, mouth, ears, hair and finger nails. Bacteria that cause food poisoning can also be present in intestines and thus in faeces (stools).

People infected with food poisoning bacteria often have no symptoms and are referred to as ‘carriers’ because, although not feeling ill themselves, they can transfer the infection to foods with their hands unless they are careful in their personal hygiene.

Careless food handling is one of the causes of bacterial contamination – with bacteria being transferred from hands, mouth and nose through coughing, sneezing, smoking, eating, drinking, touching or scratching sections of the body like hair, nose, ear etc. Bacteria are also present around cuts, grazes, scratches or boils and nose or from cuts, grazes, scratches or boils.

4. Places

Bacteria can also harbour in places such as equipment, display shelves, billing counters and other work surfaces which may directly come into contact with food.



Rubbish as a source of bacteria

5. Other sources within the environment

Pests and animals such as flies and other insects, birds such as house crows, pigeons, rats and mice carry bacteria on their bodies and in their urine and droppings. They can infect food or places where food may be placed. Prevention and control of these pests is essential.

Pets, too, carry bacteria on and in their bodies and should not be allowed into food areas.

Waste food and rubbish provide ideal conditions in which bacteria can live and reproduce because they are warm and are left undisturbed for several hours. Hence waste must be disposed of in a proper manner.

Raw material delivered to factory- Some raw foods which are destined for processing, and are therefore classified as raw materials, can carry bacteria. For example, fresh vegetables, fruits and meat may contain organisms such as Salmonella, Listeria and Campylobacter.

Soiled facilities and equipment- When equipment is left dirty for long periods or are improperly cleaned, then bacteria, which may be naturally present in food or which have resulted from cross contamination, can grow.

THE COST OF POOR FOOD HYGIENE AND FOOD POISONING

Supervisors in a manufacturing business have a legal and commercial responsibility to provide safe food. The cost of food poisoning can be very high. The costs can be both financial and social, and fall on employers, employees as well as ill consumers. Employer costs include the following:

- The loss of working days caused when employees eat contaminated food and fall sick;
- Closing down of food premises by food regulatory authorities;
- Reputation damage: a loss of business and status, either from bad publicity or from public reaction to poor standards, food poisoning outbreaks and even deaths;
- Greater risk of pest infestation;
- Fines and costs of legal action taken because of breach of legislation;

- Food losses due to damage because of poor stock rotation, incorrect storage temperature or pest infestations;
- Low staff spirit, higher turnover with attendant costs;
- Food complaints and costs of internal investigation and decontamination; and
- Reduction in sales.

Employees may suffer by:

- Losing their jobs , loss of business or they could become long-term carriers of food poisoning organisms, especially *Salmonella*; and
- Losing overtime or bonuses.

THE BENEFITS OF MAINTAINING HIGH FOOD SAFETY STANDARDS

The benefits from a high standard of food safety at a manufacturing premise are the following:

- Content customers, a better status and improved business;
- Increased brand value;
- Better standards of food safety and compliance with food safety law;
- Less food wastage and longer shelf life;
- Greater staff morale and lower staff turnover, which promotes productivity; and
- Lower food poisoning cases and food complaints.

Section 3: FOOD PRESERVATION

This section sets out the main methods that food manufacturers use to preserve food and provide it to the public in a safe form.

Natural foods generally have a limited life. Some like milk and fish have a short life span. Others have a considerably longer life span but eventually decompose and spoil. The causes of food spoilage are many. Natural enzymes present in the food bring about their destruction, while chemical reactions decompose others – but the main cause of food spoilage is due to contamination by microorganisms such as moulds, yeasts and bacteria.

Food preservation is the treatment of food to prevent or delay spoilage and inhibit growth of microorganisms which would make the food unfit. Preservation may involve:

- use of low or high temperatures;
- controlling water in foods;
- use of chemicals;
- acid fermentation;
- controlled atmospheres and restriction of oxygen (vacuum packing); and
- smoking.

Food preservation by use of low or high temperatures

Bacteria will grow rapidly in foods, particularly in high risk foods, that are left *within* the Temperature Danger Zone of 5°C-63°C.

Bacteria do not grow, or grow only very slowly, at temperatures *below* 5°C.

They do not grow at temperatures *above* 63°C.

The idea behind correct temperature control is to keep food - most especially the high risk foods - out of the Temperature Danger Zone. The rules for achieving this are quite simple:

- keep hot food hot;
- keep cold food cold; and
- keep prepared food out of the Temperature Danger Zone.

Correct temperature control is the most powerful weapon against the infection of food by food poisoning bacteria.

Chilling and refrigeration

The chilling of foods to between 1°C and 4°C will slow down the growth rate of many germs, so chilling is used as a means to preserve numerous foods for short periods of time. While spoilage may be slowed by chilling, some germs which cause disease can continue to grow down to 2°C.

The suitability of a food for preservation by chilling and the length of time a food can be kept under chilled storage is dependent on the type and composition of the food. Soft fruit and salad vegetables can be kept in the refrigerator for only a few days before they become soft and soggy. Meat can be kept for a little longer but the quality will decline.

A product such as butter can be kept for a relatively long time at refrigeration temperatures. The high fat content makes butter an unsuitable medium for most germs to grow on and when stored at low temperatures the growth of bacteria is unlikely to occur. Gradual changes in the composition, rather than the action of bacteria, are more likely to cause the deterioration of butter, for example turning rancid with oxygen in the air. Thus it is important to ensure that butter is stored in airtight packaging.

Points to remember about refrigeration:

- raw materials and finished products should be kept in separate refrigerators;
- raw meat and poultry should be kept away from other foods - especially from cooked meat and cooked poultry;
- nothing - particularly raw meat and poultry – should drip onto food below or into the environment of the refrigerator where it may form a source of contamination
- hot food should never be placed in the refrigerator immediately after cooking: it should cool first to prevent condensation on walls and ceilings which may encourage mould growth;
- all food should be kept covered as far as possible;
- food should not be crowded into the refrigerator – there should be enough room for cold air to circulate;
- temperature of the refrigerator should be checked daily to see that it is between 1 °C and 4°C. (*See Record Chart below*);

TEMPERATURE RECORD SHEET				
Refrigerator No. _____				
Temperature range 1°C - 4°C				
Date	Time	°C	Comments	Signature

- refrigerator doors should be opened as infrequently as possible and closed quickly; and

- refrigerators should be defrosted regularly to prevent the build-up of ice. They should be kept clean.

Freezing of food

The chilling of food does not affect the water activity of products but the freezing of food does, as the water is changed into ice and made unavailable to germs. Freezing occurs when the temperature of food is lowered to below its freezing point and a proportion of the water in the food changes state to form ice. Freezing of pure water takes place at temperatures below 0°C, but there are small differences if the water has other substances in it. The precise temperature at which freezing occurs is therefore dependent on the type of food and the matter present in the water in the food.

Many foods are preserved by freezing for long periods of time, for example, peas, beans, sprouts, fish fillets and processed fish products such as fish fingers, red meats and poultry, bread, cakes, pizzas, desserts and of course, ice cream.

Germs will not grow and some will die at frozen food storage temperatures. However, spores and toxins (poisons) are little affected. The substances in the food can react together slowly to reduce the quality of frozen foods. So, depending on the type of food, it should not be stored frozen for longer than the recommended time.

The temperatures down to which foods are frozen will be dependent upon the nature of the industrial process in which freezing takes place and the intended storage time. Domestic chest freezers operate at -18°C, but many commercial freezers are maintained at -25°C to -35°C and sometimes lower.

Old stock should be used before new - maximum storage periods should be known. Ingredients, processed/cooked or packaged food

products should be subject to FIFO (First in, First Out), FEFO (First Expiry First Out) stock rotation systems. FIFO means that foods should be used in the order that they are delivered. For example, new milk should not be used if there are still two litres of good milk available from an earlier delivery. All goods should be dated and new ones should be placed behind old ones in storage shelves. FEFO is a system that is based on monitoring of temperatures. Temperatures vary greatly inside a storage room and even a few degrees difference can affect the shelf life of a product. By identifying temperature exposure of different lots, inventory management can be prioritized based on the remaining shelf life rather than on storage time.

A problem with freezing is that damage can be done to the tiny cells that make up foods, especially if the freezing has been done badly and ice crystals have formed inside cells of the food which then break the cell walls. When the foods then defrost fluid from the cells can leak out. These fluids can be perfect food for microorganisms because they are rich in nutrients, so there is a risk that spoilage and disease-causing germs could multiply and grow.

It is important to ensure that foods are defrosted under conditions which will slow down or prevent the growth of microorganisms. This will usually mean defrosting under refrigerated conditions.

Cook-chill and cook-freeze

Cook-chill is a system of food preparation that involves just what the name suggests. Immediately following thorough cooking, the food is rapidly *chilled* and then stored at a low temperature. Refrigerators and freezers are NOT suitable for chilling. Only purpose-built chilling equipment, for example a blast-chiller, should be used. Once chilled, the food is transferred to a refrigerated store reserved for cook-chill food and capable of maintaining the food at between 1°C and 3°C.

Cook-chill food can be stored under refrigeration for a maximum of 5 days *including* the day of production and the day of consumption. A cook-chill product carries a “Use by” date-mark based on this maximum safe life and this must be strictly observed.

Chilled food that rises above 10°C during storage must be discarded. If the temperature has risen above 5°C but not above 10°C the food must be eaten within 12 hours.

Food must be taken from the chill no more than 30 minutes prior to reheating commencing or to the food being eaten cold.

Where cook-chill food is to be eaten hot, the reheating should take place IMMEDIATELY BEFORE the food is due to be eaten. Food must be heated to a temperature of at least 70°C throughout and all preparation instructions followed - the larger the portion to be reheated, the longer the re-heating time.

Throughout the serving period the temperature of the food should not drop below 63°C.

Cook- Freeze has many similarities to cook-chill but in this system, following cooking, the food is rapidly *frozen* and then stored in freezers where it can remain for between 2 and 12 months depending on the particular food. The rules for re-heating and serving applicable to cook-chill foods apply equally to cook-freeze items.

Producing food by cook-chill and cook-freeze methods requires special equipment and rigorous working practices to ensure strict control of temperature and very high standards of hygiene.

Heat treatment

Processed foods are cooked to produce the appearance, aroma and flavour as desired by the consumer. During cooking a heat treatment takes place which not only confers the required characteristics to the food but also kills germs that cause disease and germs that make food unsafe: thus rendering the food safe to eat and to continue to be safe to eat for a set period of time (**'shelf-life'**) if correctly stored. However, apart from the use of heat treatment as a preservation technique in its own right, it may be used in combination with processes that reduce the water available for bacterial growth. The manufacture of jams and other preserves is an example.

Heat processing includes blanching, canning and pasteurizing as well as cooking. The process of blanching inactivates plant enzymes that destroy desirable colour, texture, flavour and nutrients. Canning is a sterilization process in which food in sealed containers like cans, bottles, tetra packs retort pouches are heated at temperatures sufficiently high to kill practically all microorganisms and their spores. Some foods require heat treatment at a fairly low temperature for a short time to achieve preservation and food safety. Thus there is little effect on taste, flavour or nutritional value. Pasteurised milk is one such product. Nowadays milk is heat treated at a temperature of not less than 71.7 degrees Celsius for not less than 15 seconds. This is sufficient to kill any germs that cause disease present in the raw milk and to reduce spoilage germs to levels so low that the milk has a shelf-life of many days, provided it is stored at low temperatures in a refrigerator.

In contrast UHT or Ultra Heat Treated milk is heat treated at about 142°C for 2-4 seconds which kills all disease-causing and food spoilage germs. Provided that the UHT milk is packaged under very clean conditions, the product then has a shelf-life of more than six months at room temperature. But any consumer will vouch for the fact that UHT milk has lost much of its original taste and flavour. With heat treatment

it is often a matter of the greater the heat treatment the greater the preservation effect but the more the natural characteristics of the product will be changed.

Various types of heat treatment processes are used by the food processing industry for the purpose of making safe foods. You may recognize some of these processes which might be employed at your place of work for processing liquids such as milk, fruit juices, soups, sauces and beer:

- plate heat exchangers
- tubular heat exchangers
- scraped surface heat exchangers

Some foods, such as canned foods, foods in glass jars and sterilized milk in bottles, are heat treated in their containers.

Controlling water in foods

Bacteria, yeasts and moulds need water to grow. The control of water in foods is of great importance for food manufacturers. So much so that many food preservation techniques have been developed to make water in food unavailable to microorganisms, thereby reducing or preventing the likelihood of food spoilage germs, and those that cause disease, increasing in number.

Although a food may contain a certain level of water, not all of it is necessarily available to microorganisms present in the food. Some water binds with the food. The water which is left unbound is known as **free water**. This is the water which bacteria, moulds and yeasts are able to use. If water activity is reduced during the processing of foods, then the activity of microorganisms may be restrained.

Drying

The drying or dehydration of foods to reduce water available for bacterial growth is probably one of the earliest food preservation techniques. Even today foods are sun-dried in many parts of the world, for example raisins, tomatoes, peaches, fish and meat. Drying is also the normal means of preservation for cereal grains such as wheat, maize, oats, barley, rice, millet and rye.

Drying is achieved by supplying heat to a food and using air to carry away moisture or water vapour. Many types of driers are used in the food industry.

- Spray driers - used to dry liquids such as milk. The liquid milk is sprayed in small droplets into a stream of hot air
- Fluidised bed driers - used for small sized foods such as peas and beans which move along a perforated tray on a bed of hot air blown through the perforations.
- Belt driers - used for fruit and vegetables, where the products are carried on a belt through a drying tunnel flushed with hot air.
- Rotary driers - used for foods such as cocoa beans which might stick if not kept moving in a rotating drum through which hot air is blown.
- Vacuum band driers - used for chocolate which must be dried at a low temperature so that it does not melt, so the chocolate is sprayed onto a belt which passes through a vacuum chamber in which the water evaporates.

Although the drying of food reduces water available for bacterial growth, it does not necessarily result in the death of all the microorganisms which may be present. This depends upon the degree to which foods are dried, the composition of the food, and the length of time the dried foods are stored.

Some microorganisms will gradually die during storage, although spores will live. Disease-causing germs may become active and start to grow when water is added to prepare the product for use. It is critical to dry only high quality foods with few, if any, microorganisms, and to ensure hygienic handling during the drying and packaging processes.

Dried foods may be either **hygroscopic** or **non-hygroscopic**.

Hygroscopic foods attract water and are able to pick up moisture from the atmosphere. They must therefore be suitably packaged and stored to prevent the absorption of moisture which might raise the moisture content to a level at which any microorganisms surviving in the food could grow. You will be familiar with the way in which milk powder and instant coffee granules become damp if left exposed to the air. However, the quality of a dried food which becomes damp will probably deteriorate before the growth of microorganism becomes a significant problem. Non-hygroscopic foods are resistant to moisture absorption and do not suffer the same effects.

Chemically preserved foods

Chemically preserved foods have been common for many generations. Traditional techniques include the curing of meats with salt and the production of fruit preserves with sugar. Water binds with salt and with sugar. So, once again, food is preserved because the amount of free water available for the growth of microorganisms is reduced.

The Food Safety Standards Act prohibits the use of any food additives or processing aid unless it is in accordance with the provisions of the Act, Rules and Regulations made thereunder.

Chemical preservation does not increase the nutritional value of foods but is used purely for reasons of quality and food safety because of the

effect of the chemicals on spoilage and disease-causing microorganisms. The amount of preservative that can be added to food is limited. Excess quantities could be hazardous and would be regarded as chemical contaminants rather than permitted additives. Commonly used preservatives include sodium nitrate and nitrite used for meat, sodium and calcium propionate used for bread, cakes, grain and jellies.

Fermentation

Fermentation is usually seen as the action of yeasts on sugars to produce beers and wines. In fact, whilst this was originally the meaning of fermentation, it now includes the action of other microorganisms such as bacteria.

Like drying, **fermentation** has been used for thousands of years as a means of preserving foods. Like drying, fermentation acts by reducing the amount of free water. Many foods are fermented. Cheese is a common example and is made in a process where lactose, the milk sugar, is fermented to lactic acid by the action of lactic acid bacteria. A substance called rennin is used to set the milk protein, casein, to give curds and whey. Water activity is reduced in cheese-making because moisture is removed as the cheese whey, thus assisting preservation of the product.

During cheese-making the product becomes more acidic so that many spoilage and pathogenic bacteria find it difficult to grow. This does not mean say that food poisoning is never associated with cheese as some significant incidents have occurred as the result of poor hygiene and bad management practices.

Curd or Dahi is another popular fermented milk product, but unlike cheese, the milk protein which forms the characteristic thick sticky product is purely the result of lactic acid production.

A common example of a fermented product is one already referred to - alcohol. Whereas in cheese-making, bacteria ferment lactose to lactic acid, in alcohol production sugars are fermented by yeasts. Natural sugars found in fruits such as grapes are fermented by yeasts to make wine. Sometimes these sugars have been produced by the 'malting' of barley to make beer or whisky. Malting is the process of germinating grains to cause the conversion of starch to sugars, followed by heat treatment to halt germination. The main objective in alcohol production is not to preserve food and maintain nutritional value as it is in cheese-making, but to produce the alcoholic product itself.

Bread-making, the production of soy sauce, and the processing of coffee and cocoa also all rely on fermentation.

Smoking of foods

Smoking is a food preservation technique which has been known for many years and is still used widely today. Smoking is used for the curing of meats, mostly hams, sausages and fish, for example, turning herrings into kippers, but it can also be used for poultry.

The process is relatively simple. The meat is cleaned and prepared for smoking then hung in a smoke room. Smoke is generated by slowly burning wood sawdust such as oak. This is blown through the room and across the surface of the food.

There are two methods of smoking. One is **cold smoking**, where the air temperature is 32°- 38°C and the process takes 15-18 hours. The other, **hot smoking** has an air temperature of 60°C and takes only 2- 4 hours.

During smoking, the surface of the food dries, thus there is less moisture available for microorganisms to grow. Certain chemical

compounds such as phenols are deposited from the smoke onto the surface of the food and these acts to prevent microorganisms growing. The lowering of water activity and the presence of these compounds provide the preservation effect. The phenols also help to reduce the action of oxygen in the air on fat in the food, which you will remember can turn rancid. Apart from the preservation of food, there is a bonus from the consumers' point of view. Smoking is a process which gives products unique and enjoyable flavours.

Section 4: HYGIENE CONTROL IN FACTORIES

This section discusses how to identify risks from different hazards and the action that should be taken to prevent food becoming contaminated.

Hygiene control in factories which manufacture or process food is the adaptation of practices which will reduce the risk of clean food becoming contaminated.

Direct contamination may occur when high risk food has close contact with a contaminated source, but more frequently indirect contamination takes place when something transfers the bacteria, for example, hands, cloths and other examples given in this section.

The transfer of bacteria from a contaminated source to an uncontaminated (clean) food is called cross-contamination. The aim of hygiene control is to prevent the spread of bacteria and other microorganisms.

THE FACTORY ENVIRONMENT

It is essential that the factory is kept clean and tidy, both inside and out. The environment around the factory must be kept free from rubbish and waste material which could attract pests and allow moulds to grow. Pests breeding around the factory may find their way into the buildings. Spores from moulds may be carried inside on the air to contaminate food products. Roadways and pathways must be kept free for access and they must also be maintained and kept clean to prevent dirt being spread around the factory site and carried into buildings. Materials and equipment which are stored outside, such as pallets and cleaning chemical bulk containers, must not provide shelter for pests or accumulate leaves or other windblown refuse.

BUILDINGS: STRUCTURE AND MAINTENANCE

Ideally, a factory building should be designed and built to allow effective movement of people and vehicles and to exclude access or hiding places for pests.

Damage to buildings and wear and tear can result in contamination of food products.

The maintenance of buildings to prevent the invasion of pests is crucial.

Good maintenance avoids risks of contamination by bacteria and foreign bodies.

Any signs of damage and disrepair, whether inside or outside should be reported to the management.

PROCESSING AND STORAGE AREAS: FLOORS, WALLS, CEILINGS AND DRAINS

All processing and storage areas must be kept clean and tidy. Floors must be kept clear to allow access by people and vehicles. Waste materials and food deposits must be cleared from floors as soon as possible. Floors must be washed when necessary and at specified intervals in accordance with management rules. Where dry conditions are required, as in the manufacture of milk powders, floors may be kept free from food residues by vacuum cleaning.

Walls and ceilings must be kept clean and free from food particles which allow bacteria to grow especially in moist conditions, for example, as a result of condensation.

Ideally, there should be no flat, horizontal surfaces such as window-sills and girders in the factory, where dust, food particles etc. would accumulate. Any such surfaces should be cleaned regularly so as to

prevent the possibility of bacterial growth and the contamination of food products.

Drains should be kept free from accumulation of waste materials and food deposits. They should be kept clean, and ideally, in food processing areas, they should be capped when not in use.

PLANT AND EQUIPMENT: FIXED AND PORTABLE

The term plant refers to the machinery used in the manufacturing processes within a factory. Plant and equipment which becomes dirty through use can be a danger (hazard) to both food products and to the area where food is being manufactured. Fixed plant and fixed and portable equipment must be maintained in a clean and hygienic condition.

Plant and equipment which has been used should not be left standing for long periods of time but cleaned and, if necessary, disinfected. Spoilage bacteria and other bacteria which cause disease can grow readily on plant and equipment which is left dirty and such equipment may also be an attraction to pests.

Colour coding

One effective way of preventing cross contamination in the manufacturing industry is by the implementation of a colour code system. Equipment can be colour coded to prevent cross-contamination from processed and unprocessed products. For example, different coloured stickers can be used on cleaning equipment in different areas of the plant. A red zone sticker indicates the equipment from the area where food processing operations take place, green zone sticker indicates the delivery and pick-up area, blue zone sticker indicates the canteen, yellow zone sticker indicates the equipment from the wash rooms etc.

COLOUR	Colour coding for cleaning equipment
RED	Food processing area
GREEN	Delivery and pick up area
YELLOW	Washrooms
BLUE	Canteen

THE MOVEMENT OF PEOPLE AND BARRIER HYGIENE PRACTICES

People can be one of the major sources of hazard to foods, carrying contamination from place to place around the food factory. Employees should not contribute to the hygiene and safety problems of the factory by entering areas other than those in which they are supposed to be.

The transfer of contaminants from unprocessed product areas to processed product areas can be particularly troublesome in food manufacturing. For this reason many food companies operate what is known as ‘Barrier Hygiene’ practices, where only approved staff may enter certain areas, and then only wearing essential protective clothing. Always follow the restrictions placed on your movements by company rules which aim to ensure that the food produced is safe.

MANUFACTURING OPERATIONS: THE HANDLING AND STORAGE OF PRODUCTS

Usually food produced in a factory is manufactured in accordance with a Product Specification. This sets out a description of what is required to manufacture a product to the customers' satisfaction.

Tight controls of manufacturing operations, handling, storing and packaging requirements are needed in order to ensure that conditions laid down in the product specification are met. Food handlers involved

with the production, handling and storage of food products must ensure they play their part by following the rules.

Even though strict controls are in operation, problems can occur by allowing high personal standards to slip. Employees must be on guard to prevent anything which could lead to the contamination of plant, equipment, materials or ingredients, or to the deterioration of ingredients and materials.

The unfortunate outcome could be a defective or even dangerous product.

WASTE CONTROL

If they are not properly controlled, waste materials and waste products can be a major source of contamination in the manufacture of food products.

As well as the risk of direct contamination, spoilage bacteria and others which cause disease can grow on waste. Pests are attracted to waste. Thus, the danger to food products as a consequence is obvious.

Waste materials and waste food products should be placed in suitable waste bins which are clearly labelled for that purpose. These containers must be kept separate from the clean food products. They must be emptied frequently and the waste disposed of in accordance with the company's arrangements.

CHANGES TO FOOD PRODUCTION PROCESSES

Unauthorised and inadvertent changes to food production processes are a common cause of product contamination in food manufacture. Food production processes are intentionally designed and built, to ensure the

manufacture of products, which always meet the requirements of specifications and customers.

Specifications and the demands of customers regarding product quality usually concern various aspects of food products such as composition, chemical analysis, microbiological quality and physical characteristics. Unauthorised and inadvertent changes to food production processes may result in foods being improperly formulated, but of more importance such changes can result in foods being inadequately processed. For example, foods may receive a heat treatment less than required to kill food spoilage and food poisoning bacteria. Alternatively, changes may cause failures in the cleaning of food production processes, particularly when Cleaning-in-place (C.I.P.) systems are used. Process changes which result in dead-ends or blind-spots which are not cleaned and disinfected effectively can allow the growth of bacteria, yeasts and moulds which then contaminate food next time the process is used.

The food handler should always follow the processing instructions as laid down by the management.

FOOD PACKAGING

In matters of food hygiene, food packaging may often be overlooked. Food packaging suppliers should be reputable. They should have proven ability to provide packaging materials which are suitable for use with food, consistently comply with specifications and are free from contamination and damage which represent a risk to food products. Food packaging suppliers should be audited routinely to ensure their factory practices offer no hygiene risks. This is especially important where the food packaging is in direct contact with food.

Deliveries of food packaging should be inspected on receipt to ensure freedom from contamination, pest infestation and damage which might

place food products and factory hygiene at risk. Materials which are not acceptable should be rejected and securely kept in a separate and safe place until they can be returned to the supplier.

Food packaging materials should be stored under clean, dry conditions and safeguarded from contamination and damage while they await use. Clearly, packaging which is left in the open while being transferred from a delivery lorry to a store is at risk of contamination, for example by bird droppings. Bad practices in the handling and storing of packaging must always be eliminated.

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Section 5: PERSONAL HYGIENE

This section explains why strict standards of personal hygiene are necessary and the role of the supervisor in achieving them.

PERSONAL RESPONSIBILITIES

Bacteria live in and on the human body and can enter into food in the work-place if people do not maintain high standards of personal hygiene. Food handlers should be supervised and instructed in food hygiene matters appropriate to their work activity. Persons who are known or suspected to be suffering from or are carriers of disease which can be transmitted through food must be excluded from food business areas.

Any employee handler can be a direct source of contamination through the following: hands, face, head, jewellery, clothing, and practices such as smoking, chewing, and spitting.

HANDS

One of the easiest ways for bacteria to spread through the food area is through the **FOOD HANDLER'S** hands.

Hands come into direct contact with food more than any other part of the body. The Food handler's hands also touch and can contaminate work surfaces, and equipment which in turn may transfer the bacteria to food.

Thus it is important for the food handler to **always wash hands thoroughly** using hot water and soap (preferably liquid soap). All parts of the hands and wrists must be washed under running water. It is just as important to dry hands thoroughly.

The six steps in the correct hand washing procedure consist of:

- using warm water and soap;
- making a lather;
- rubbing back of hands and fingers;
- rubbing in between fingers, around thumbs and fingertips;
- rinsing with clean water; and
- drying hands thoroughly on a clean towel, and turning off the tap with a towel.



It is best to wash hands with warm water, but if not available cold or lukewarm water is acceptable when used with soap. Though it is ideal to wash hands with soap and water, several people do not have access to soap or even detergent. In their absence, it is acceptable to use coal ash as a substitute for soap to wash hands. A bucket and a pitcher can be used where running water is not available.

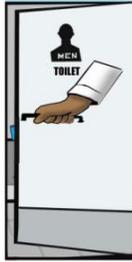
Hands must be washed:

- before entering the food area and before touching any food;
- after handling raw meat, poultry, seafood, eggs or vegetables;
- after using the toilet or touching any surface in a public area;
- after coughing into hands or using a handkerchief;
- after touching the face or hair;
- after handling waste or cleaning (handling chemicals);
- before and after eating;
- after changing a baby's nappy;
- after playing with pets;
- after handling waste or cleaning; and
- after smoking.



HANDS MUST BE WASHED

After touching
any surface in a
public area



After
Smoking



After
Cleaning



After
eating

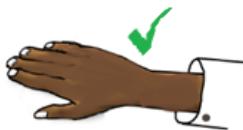


After playing with pets



After handling garbage

Bacteria can collect under finger-nails. Nail polish may flake off and contaminate food and false nails may become 'physical contamination' in food.



It is important that the food handler keeps nails short and clean and does not apply nail polish.

FACE AND HEAD



Bacteria live in the nose, mouth, throat and ears of humans and can be transferred to food, work-surfaces and equipment by the food handler.

Bacteria also live in hair and on the scalp. Unwashed hair carries more bacteria. Bacteria from the food handler's hair can easily fall into food.

The Food handler should:

- avoid coughing or sneezing into the food;
- avoid touching face and head particularly mouth, nose and ears;
- keep hair covered with a net or a cap;
- wash hair frequently; and
- never comb hair in a food area or while wearing protective clothing.

JEWELLERY

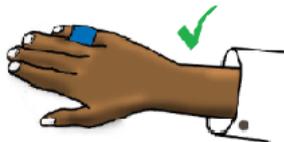
It is not a good idea to wear jewellery in a food area. Bacteria and food can gather on items such as rings and bangles. The area of skin underneath the jewellery warms up thus further encouraging the growth of bacteria. Similar rules apply to watches: if a watch must be worn, it should be removed before washing hands so that the wrists and forearms also can be washed.



Earrings, finger-rings and gemstones may fall into food.

WOUNDS

Wounds - cuts, grazes, scratches and boils
- can quickly become infected with germs.



The best way to prevent them from spreading to the food that is being handled is to make sure that all such wounds are properly covered.

The Food handler must:

- keep all wounds covered by waterproof Band-Aids;

FIRST AID

Food businesses should have a suitable and sufficient supply of first aid materials. And one person should be given responsibility of ensuring that adequate provisions are always available. It is advisable to have at least one person trained in first aid.

PROTECTIVE CLOTHING

Food handlers must wear suitable clean clothing. Protective clothing should be worn where appropriate, but it must be kept clean.



Everyday clothes can bring bacteria into the food area. The purpose of protective over-clothing is to prevent contamination from this source. But bacteria can also be spread if the over-clothing or uniform is soiled.

Food can be protected from the risk of contamination if the food handler:

- wears clean protective clothing where appropriate; and

- does not wear protective clothing (apron) away from work.

Staff must be aware that protective clothing is worn to protect food from risk of contamination and not to keep their own clothes clean.

NO SMOKING OR CHEWING OF TOBACCO

One must not smoke cigarette/beedi in an area where food is prepared. This may lead to contamination of food and thus one has a duty to adopt good personal hygiene practices.



Not only is it harmful to smoke in any enclosed public space, there is also risk of contaminating food from:

- fingers which touch the lips and may transfer bacteria;
- cigarette ends contaminated with saliva being placed on working surfaces;
- cigarette ends and ash (physical contamination); and
- coughing.

There should be legible notices displayed instructing food handlers never to smoke in food rooms. After smoking, food handlers should wash their hands.

Hands can pick up bacteria either from the mouth or cigarette/beedi end. Bacteria can be transferred to a work surface when the cigarette is laid down. Cigarette ash can fall into food.

REPORTING ILLNESS

If the food handler suffers from illnesses such as a stomach disorder, cold, cough, eye or ear discharge, it is important that she/he be not allowed to handle food. It is also important to report, even if someone else where the food handler lives seems to be suffering from diarrhoea.

The employer may require other illnesses also to be reported.

EXCLUSION OF FOOD HANDLERS

Supervisors must be aware that in fact healthy, symptom-free staff may be carriers of, and excrete, harmful bacteria. Even though healthy carriers are not likely to cause illness, they may contaminate food with, for example, Salmonella or Shigella. Organisms may be excreted from time to time. Healthy carriers may have become contaminated with harmful bacteria from contact with raw food with which they work; particularly meat or poultry.

Convalescent carriers are people who have recovered from an illness but still harbour the organism. The convalescent state might be somewhat extended and Salmonella are sometimes excreted for several months.

Laboratory testing cannot be relied on to detect small number of intermittently excreted pathogens. High standards of hygiene, and strict adherence to reporting procedures, are the only way to prevent contamination of food from an infected food handler.

Food handlers with food poisoning symptoms, such as diarrhoea or vomiting, or suspected of carrying foodborne organism, e.g. because of close contact with a confirmed typhoid or consuming a meal known to have caused illness, must be disqualified from any work which could expose food to risk of contamination.

If the supervisor has no confidence in the hygiene standards of a food handler who is a carrier of a food poisoning organism, even when symptom-free for 48 hours, they should not be permitted to handle high risk food.

Food handlers with skin infections such as psoriasis, boils or septic cuts, respiratory tract infections, infection of the eyes or ears, or dental sepsis should also be disqualified until medical clearance has been obtained.

VISITORS

Supervisors should make certain visitors adhere to the hygiene rules and do not expose food to risk of contamination. They should wear clean protective clothing and observe all personal hygiene rules applying to staff.

Visitors with food poisoning symptoms or any other conditions which would result in the exclusion of a food handler should not be allowed in the food area.

THE ROLE OF A SUPERVISOR IN PERSONAL HYGIENE

- Essential supervision is required to make sure that high standards of personal hygiene are maintained. The supervisors should set examples, by following all standards of personal hygiene, for example hand washing and wearing protective clothing;
- The staff should be persistently encouraged by the supervisors to maintain highest standards;
- Supervisors should ensure that proper facilities are provided to maintain personal hygiene;
- They should provide clear instruction and training of staff, including induction training and refresher courses;
- Posters and notice should be provided to remind food handlers of their personal hygiene responsibilities;

- When supervisors interview credible food handlers, they should make sure that the candidates are clean, free of skin infections and have no health problems. And they should also demonstrate a good attitude towards hygiene; and
- Supervisors should routinely ask food handlers to demonstrate personal hygiene rules like correct hand washing techniques.
- Ensure that food workers suffering from foodborne illnesses do not work in contact with open food and are aware of the action to take when suffering from ailments and illnesses.

Section 6: PEST CONTROL

This section describes pests and discusses preventive actions that can be taken.

PESTS AND FOOD

A food pest is a creature living on or in our food, which is capable of directly or indirectly contaminating food. They are destructive noxious or troublesome. Pests are commonly found in places where food for human consumption is prepared or stored.

COMMON PESTS

1. Rats and mice

Mice can enter premises through a hole no larger than the diameter of a pencil and young rats through one not much bigger.



Once established within premises these pests are difficult to get rid of because of their high rate of breeding and resistance to chemical poisons called rodenticides. They will make nests in or near food premises using old packaging and food refuse.

Rats and mice carry bacteria on their fur and feet, and in their droppings and urine. They contaminate and spoil food in addition to eating it. In particular, they will attack stored food and this is one reason why you must frequently check and clean storage areas.

Usually, removal of rodents requires specialist treatment but the food handler can play a major role in ensuring that they are not attracted to the premises in the first place. High standards of cleanliness and food protection make life less easy for them.

2. Houseflies

Houseflies usually enter food premises through open doors, open windows and ventilators. They breed anywhere there is decomposing food, faecal matter or general refuse. Just as they will breed anywhere, houseflies will feed anywhere and may have enjoyed a meal in a sewer minutes before setting on the food. A housefly will vomit and defecate on the food it is eating and its legs and body will further contaminate the food. Then it will depart - usually unseen.



Screens on windows and self-closing doors help to keep out flies and other insects. Sticky fly papers can be of use but require careful positioning, frequent renewal and careful disposal. Do not use insecticides in a food area unless under expert guidance.

The electronic insect killer – A ultra-violet tube lighting equipment - lures and then kills insects that make contact. The dead insects fall into a tray. The wall-mounted/ ceiling hung equipment must be positioned well away from a light source and from any part of the food area where open food is dealt with. Frequent, careful, clearing of the tray is necessary.

3. Cockroaches

These pests are difficult to spot. Cockroaches live behind woodwork and in drains and other inaccessible places. They may be brought into premises with incoming food supplies so always check these carefully. Cockroaches come out at night.



Removing an infestation of cockroaches is a specialist task requiring the use of dangerous chemicals, but the food handler can play a preventive role by keeping clean all surfaces, floors and walls, and by generally

avoiding a build-up of grease or food residues. Dust bins must be thoroughly cleaned otherwise the cockroaches will breed in them.

4. Birds

Birds gain access through doors or windows and through vents. Many commonly found birds scavenge for domestic food and contaminate food supplies through contact with their bodies, beaks or from their excreta.



Milk left outside premises is a common target. Throw away milk if the milk packets have been damaged. Once established, birds are difficult to get rid of and this increases the importance of preventive measures. Outside waste receptacles must be lidded, with no refuse lying around. Birds thrive in the vicinity of take-away food shops and open-air eating places unless you ensure that uneaten food is trashed promptly and the area is kept especially clean.

Cats, kittens, dogs, puppies and cage birds carry food poisoning bacteria and in the wrong place - the food area for instance – pets can become pests.

These pests eat and spoil food. They also transfer to the food the food poisoning bacteria they carry on their bodies and in their excreta.

PREVENTING ACCESS

Pests seek food, warmth and shelter. Steps should be taken to keep them out.

The Food handler should:

- keep doors and windows closed so far as is possible;
- use fly screens on windows;
- inspect the delivery bags, boxes, cartons for signs of pests; and

- find the routes by which pests gain access.

DENYING PESTS FAVOURABLE CONDITIONS

We can never be sure that pests will be kept out. But the pests' opportunities for contaminating food and infesting the workplace can be limited.

To do this, the following good working practices can be adopted:

- Food particles and spillages should promptly be removed from work-surfaces and floors;
- Unclean utensils and equipment should not be left lying around;
- A high standard of general cleanliness should be maintained;
- Any food that requires being left to 'stand out' should be covered;
- Dried foods should be stored in containers with tight lids(this will also prevent moisture entering the food);
- All food storage areas should be regularly checked; and
- Waste bins should be emptied regularly throughout the day and, certainly at the end of the each day.

SPOTTING PESTS

The following signs should be looked for:

- Droppings;
- greasy trails at the base of walls and around equipment;
- marks on food or small mounds of food debris;
- nibbled wrappings, holes in cardboard containers;
- pest carcasses;
- unusual smells and noises; and
- damage to woodwork (mice and rats nibble).

The food handler starting work early in the morning should be particularly vigilant in looking for the tell-tale signs - many pests do their work at night. If signs of pests are found or suspicion raised that the work-place is infested the supervisor must immediately be informed.

**GET RID OF ANY FOOD THAT YOU SUSPECT
MAY HAVE BEEN CONTAMINATED BY PESTS**

GETTING RID OF PESTS

Food businesses should carry out integrated pest management, i.e. a control programme involving a series of integrated measures to control pests. Pests require food, shelter, a nesting place, warmth and security. Premises where food businesses are located usually come with these factors. Denying these factors through environmental control is the first step towards pest control.



Buildings should be designed and maintained in such a way that they do not encourage pests. Boxing or ducting of pipes creates ideal conditions for harbourage and should normally be avoided. All parts of the structure should be capable of being easily cleaned. No gaps should exist around pipe work passing into cupboards. All structural damage such as holes in walls, broken windows, loose tiles and damaged insulation should be repaired immediately so that there is no potential for insect harbourage. All buildings should be adequately proofed: doors should be close fitting and external doors provided with metal kick plates. Defective drains both above and below ground must be made good.

Despite all precautions in the structure of buildings, pests will inevitably get into a building at some time. There is a difference, however, between an occasional pest and the establishment of a stable population. To reduce the risk of an infestation it is important to deny

the occasional pest the conditions it likes, and this can be done through good housekeeping practices. Supervisors should ensure that all employees in a food industry practice good housekeeping procedures to control pests.

On finding signs of pests or suspicion that the work-place is infested one must immediately tell the manager. Expert advice can be obtained from pest control specialists.

The main steps that can be taken are:

- trapping and catching pests such as rats and insects;

Many kinds of traps are available but knowledge of the habits of the pest is needed for complete success. NEVER use cats or dogs as 'trappers': they are likely to spread bacteria themselves.

- Laying poisons or other chemical substances.

Poisoned baits, powders, etc. may be used but only where authorized in the external areas/ periphery areas under expert supervision. Special cleaning of floors and surfaces may be necessary after such operations.

Poisons and chemicals must be handled with great care, kept away from food and be stored in a secure place.

THE ROLE OF THE SUPERVISOR IN PEST CONTROL

- The supervisors and their staff should be able to recognise signs of pest infestation;
- Supervisor should be aware of the actions needed in the event of infestation and be able to identify contamination of food products by pests;
- Signs of infestation should be reported to supervisor straight away and any contaminated food should be discarded;

- The supervisor should give instructions to staff concerning signs of pest infestation and importance of good housekeeping;
- The supervisor should contact their pest control contractor as soon as they are aware of this problem; and
- The supervisor needs to report to senior manager issues such as ineffective pest contractor, structural defects, conditions that allow pest incursion or inadequate control procedures.

Section 7: FACTORY DESIGN AND LAYOUT

This section describes guidelines for appropriate design, layout and equipment to minimize potential food safety hazards.

FACTORY LOCATION

Ideally, the factory should be located in an area suitable for food processing but this may not always be so. Food factories should be sited away from other industries which might affect the quality and safety of the food products. Examples of industries which do not make good neighbours for food manufacturers are mining operations and cement manufacturers, where dust may be carried by the air into the factory and onto ingredients, packaging and foodstuffs.

Apart from dust, other airborne contaminants can be a nuisance, for example odours carried on the wind from chemical processing plants. Some foods are very good at absorbing odours, especially foods which contain fats. The close proximity of farms can also cause difficulties. The approach road to the site should be concreted/cemented, surrounding areas should be clean with no garbage accumulation and stagnant water and not prone to pest infestation and flooding. There should be no uncontrolled vegetation at least 6 feet from building walls.

MATERIALS AND PRODUCT FLOW

The efficient flow of products through the factory can have a significant effect on the maintenance of hygiene and prevention of damage or deterioration to products. Ideally, the factory design and layout should ensure that raw materials, ingredients and packaging travel as short a distance as possible when passing from one stage of the food manufacturing process to the next. The flow should be designed that there is no criss-cross movement of men and material. The entry points for material and personnel should be separate as far as possible.

Products should be handled as little as possible, not only to reduce the costs of handling, but also to reduce the risks of contamination, damage and deterioration.

The factory design and layout should ensure that raw materials, ingredients and packaging are received into handling and storage areas which are suitable for preventing the possibility of dust, dirt and other contaminants, which might be carried with deliveries, from being distributed to other parts of the factory. The inspection of deliveries should ensure that obviously contaminated products are rejected.

At times, materials and packaging may be stored in buildings set apart from food manufacturing processes. In such cases, precautions should be taken to protect against the introduction of contaminants into food processing areas when materials are transferred. For example, bird droppings may fall on materials being transported across a factory site.

The flow of food storage and manufacturing activities should prevent the possibility of raw materials from accidentally entering processing areas, with the risk of contamination of finished products. Food flow should be in one direction, as far as possible. For example, the accidental transfer, on the footwear and clothes of process operators, of raw milk from storage areas, increases the possibility of spreading microorganisms that spoil food or cause disease to milk processing areas: with the consequent risk that pasteurised products may become contaminated.

The factory design and layout should also ensure that intermediate products and final products are stored in designated areas and that these are for preventing contamination, damage, deterioration and misidentification. Storage areas should be appropriate to maintain products in the required condition. For example, dry stores should be clean and dry and kept at the correct temperature for the products

stored. Refrigerated stores and freezer stores should be operated within the required temperature range and should be clean and free from condensation which might affect the quality and integrity of stored products.

DRAINAGE SYSTEMS - RAIN WATER, EFFLUENT, FOUL WATER, RIVERS AND STREAMS

The factory layout and buildings should be so designed and constructed to allow the flow of rainwater, effluent (outflow of liquid waste) and sewage away from buildings, storage and production areas.

Gutters, storm drains and process water drains should be kept free from accumulations and blockages which might cause the leakage or backflow of foul water into storage and production areas. Effluent plants within premises are sources of contamination.

Sewerage systems should not open into storage and production areas. The premises' design should also prevent any chance overflow from sewerage systems into storage and production areas. Storm water drains should be appropriately located and of a suitable gradient to prevent any backflow from rivers and streams onto the factory site during times of flood.

Food should not be prepared or stored in open spaces, such as yards, streets, side or rear lanes and roof tops.

EFFLUENT TREATMENT

The potential for other industries to cause problems for food manufacturers was discussed earlier. However, food factories can cause problems of their own for local residents, particularly if the effluent treatment plant is not controlled satisfactorily.

The content and quality of the liquid wastes (effluents) that flow out of a food factory are dependent on the process taking place. In some cases objectionable smells can arise, for example, from the effluents of milk factories and confectionery factories. The aim of effluent treatment is to remove, as far as possible, any nuisance or potential damage to the environment. Some factories ship out effluent or it enters the local sewerage system to be handled by the local water authority.

When a food factory site includes an effluent plant, care must be taken to control the plant adequately. This is necessary to ensure the effective treatment of effluent, to avoid the nuisance of odour to the factory and local residents, and also to avoid the possibility of contaminating the factory with fine sprays (known as aerosols) containing microorganisms and effluent solids.

Effluent plants can attract pests such as rats, mice and wasps. Precautions must be taken at all times to prevent pests from finding sanctuary in and around effluent plants.

Section 8: CLEANING AND DISINFECTION

This section describes the methods available for cleaning and disinfecting factory equipment and premises and the role of the supervisor in achieving this.

CLEANING THE WORK-PLACE

Cleaning should achieve two things:

- the removal of grease, food debris and dirt; and
- the destruction of microorganisms (disinfection).

Cleaning of the work-place can be divided into two broad categories:
'clean-as-you-go' and 'scheduled cleaning'

CLEAN-AS-YOU-GO applies to cleaning that must be done very quickly after the soiling occurs. The aim is to prevent cross-contamination, or injury to staff, or simply to keep working areas clean and tidy. These items should be cleaned and disinfected throughout the work period. Staff should implement a 'clean-as-you-go' policy by clearing away and cleaning up as they work, and immediately after completing a task.

Examples of this type of cleaning are:

- cleaning up a floor spillage just after it has happened



It is vital that the surfaces of plant and equipment which come into contact with food are kept clean and bacteria-free for each new job. In addition to clean-as-you-go there may be a daily requirement to clean the surfaces at the start of work. Work surfaces should be left clean and clear at close of work.

The stages of cleaning by hand are:

- removing food particles and spillages using a damp cloth, brush or hose- whichever is suitable;
- using a solution of detergent and very hot water to remove grease and general soiling;
- rinsing the surface thoroughly using very hot water;
- applying a suitable disinfectant in very hot water, and allowing sufficient time for the solution to do its work; and
- rinsing again using very hot water and leaving the surface to dry. Alternatively, the surface can be dried using disposable paper towels.

Whenever possible, with plant and equipment follow clean-as-you-go. Leaving plant and equipment dirty for longer than is absolutely necessary can result in the growth of bacteria which might get transferred to clean plant and equipment or products. It will also make cleaning more difficult when done later. Many food materials have the habit of sticking and drying solid if left for any length of time. This can make the food deposits much harder to remove and increase the possibility that not all of the deposit will be removed. If bacteria have grown in the food before cleaning, then the chances of the bacteria being protected by the dried deposit and subsequently contaminating food are very much greater.

Wet cleaning and dry cleaning

Wet cleaning and dry cleaning are the two common cleaning options in food manufacture.

Wet cleaning, as the name suggests, involves the use of water to carry cleaning chemicals and also for rinsing plant and equipment. Ensure that wet cleaning is confined to the process, plant and equipment intended to be wet cleaned. In some instances wet cleaning can cause greater problems than it solves. Wet cleaning can result in water deposits being left on plant and equipment and in food production areas. The opportunity is then provided for bacteria to grow with the consequent possibility of food products being subject to cross-contamination.

Dry cleaning is the preferred cleaning method where the use of water could cause subsequent problems. Dry cleaning often employs vacuum cleaners as well as brushes, spatulas and other implements. It is particularly effective in removing powder deposits which might spread and stick with the use of water. Since detergents and disinfectants are not used in dry cleaning, particular care must be taken to ensure the hygienic condition of the vacuum cleaner. Any condensation forming in the vacuum cleaner will allow bacteria to grow in the food materials and dust collected.

SCHEDULED CLEANING refers to cleaning tasks carried out at regular intervals. Manufacturing factories should have a timetable which specifies all the details for every piece of equipment to be cleaned and all parts of the structure to be cleaned. Two of the standard types of scheduled cleaning are Cleaning-out-of-place and Cleaning-in-place.

CLEANING-OUT OF-PLACE (C.O.P)

Cleaning-out-of-place or C.O.P. is the cleaning practice employed when plant and equipment are removed from their place or point of use to be cleaned in another location. C.O.P. is mostly a hand-cleaning operation and, therefore, concerns plant and equipment of manageable proportions. A drawback of C.O.P. is that cleaned plant and equipment can easily be recontaminated whilst it is being taken back to its place of use and re-installed.

Operator error is possible in the preparation of cleaning chemicals and in observing the correct contact time, such that effective cleaning and disinfection may not always occur.

Care must be taken to ensure that cleaning chemicals are made up to the right strength, used in the right order and are given the required time to work (contact time).

CLEANING-IN-PLACE (C.I.P)

Cleaning-in-place or C.I.P. is used when plant and equipment cannot be removed for cleaning elsewhere because it is either too big or because reassembly would present unacceptable hygiene risks, such as, operators handling cleaned and disinfected surfaces or such surfaces being exposed to the atmosphere and the possibility of aerial contamination. The C.I.P. process ensures that plant and equipment are washed and disinfected in their place of operation to stand ready for re-use without the risk of subsequent recontamination.

CLEANING AND DISINFECTION CHEMICALS

Chemicals are available to enable proper standards of cleaning and disinfection to be maintained. Usually the chemical is added to water to make the cleaning solution.

DETERGENTS are chemicals that will dissolve grease and assist the removal of food debris and dirt. Detergents do not kill bacteria.

DISINFECTANTS are chemicals designed to destroy bacteria. They reduce the number of bacteria to a safe level. Disinfectants are not effective in removing dirt and grease. Disinfectants which have a very strong smell that might taint food must not be used on any surfaces or equipment that comes into direct contact with food. However, it is very important that these surfaces are properly disinfected using a suitable chemical solution or steam or hot water (over 82°C).

SANITIZERS are chemicals which are designed to remove grease, dirt and to disinfect at the same time.

Disinfection by HEAT is an effective way of killing bacteria for example, using very hot water (80°C-85°C). Chemical disinfectants and sanitizers can be used in addition or in situations where hot water is not available. However they are less effective in water that is not hot and on surfaces that have not received a preliminary clean using hot water and a detergent.

It is a popular myth that the use of disinfectants achieves perfect hygiene. They are useful in reducing the numbers of bacteria on surfaces that come into contact with food, as well as for floors and toilet areas. Disinfectants used must be suitable for work areas and must not taint food.

When using cleaning solutions the food handler should:

- follow the 'Instructions For Use' including those for dilution and storage;
- make up fresh, hot solutions frequently: dirty or cool water makes the chemicals less effective;
- wear rubber gloves or other protective clothing when necessary;

- not store chemicals within the food area or where they may warm up; and
- NEVER mix different chemicals - they become less effective when mixed and poisonous gases may be produced.



CLEANING IMPLEMENTS AND PORTABLE EQUIPMENT

A variety of cleaning implements and portable equipment may be used for cleaning food processing plant and equipment, food processing areas and other areas of a food factory. The Food handler must ensure that the cleaning implements and portable equipment used are appropriate for each cleaning task and for use in the location to be cleaned.

Food handlers must be careful that cleaning implements and portable equipment are fit for use and are not so dirty that they prevent effective cleaning. Often implements and equipment are assigned for use in specific locations, so care must be taken not to cause problems by using the wrong tool for the job. One effective way of preventing cross contamination in the factory is by the implementation of a colour code system. For example, brushes may be colour coded to signify use on floors, use on the non-food contact surfaces of food processing plant or for use on food contact surfaces. Using a floor brush on food contact surfaces could spread more contamination than the cleaning itself prevents.

The area around the bins should be kept tidy: waste material should not be left stacked up outside the bin. The area should be cleaned after each collection. During the summer months it may be necessary to disinfect the receptacles or to spray them with insecticides.

THE ROLE OF THE SUPERVISOR IN CLEANING

- An effective supervision and organization is needed to ensure coordinated and satisfactory cleaning. It is the duty of the supervisors to guarantee that sufficient cleaning materials and suitable facilities are available and staff is given clear instructions;
- The supervisor should ensure that the appropriate cleaning/disinfecting chemical, concentration and procedure is used;
- The supervisor should check that the cleaning equipment is stored properly;
- If any equipment is found spoiled, it needs to be replaced. For example, worn brushes;
- The staff should be continuously encouraged by the supervisors on the high standards they maintained; and
- Regular auditing of the cleanliness of premises and equipment is necessary to verify that cleaning is effective.

Section 9: PACKAGING, TRANSPORTATION AND LABELLING

This section develops an appreciation of the importance of supply chain in food safety and procedures for safe packaging, transportation, and labelling

FOOD PACKAGING

Food packaging is the enclosing of food to protect it from damage, contamination, spoilage, pest attacks, and tampering during transport, storage, and retail sale. It is an integral part of food processing. It has two main functions: to advertise foods at the point of sale, and to protect foods to a pre-determined degree for the expected shelf life.

The package is often labelled with information such as amount of the contents, ingredients, nutritional content, cooking instructions (if relevant), and shelf life. The package needs to be designed and selected in such a manner that there are no adverse interactions between it and the food. Packaging types include bags, bottles, cans, cartons, and trays.

FUNCTIONS OF FOOD PACKAGING

Food packaging serves many important functions. These are as follows:

1. **Containment:** For items that are granulated, paper-based packages are the best, with a sealing system to prevent infiltration of moisture into the product. Other products are packaged using metal cans, plastic bags and bottles, and glass containers.

Containment improves packaging durability—in other words; the packaged food has to survive transport from the food processing facility to the supermarket to the home for the consumer.

2. **Protection:** The packaging must protect the food from (a) biological agents such as rats, insects, and microbes; (b) mechanical

damage such as product abrasion, compressive forces; and (c) from chemical degradation such as oxidation, moisture transfer, and ultraviolet light.

3. **Communication:** Packaged food must be identified for consumer use, mainly with label text and graphics. It can also be done by using special shapes for the food package, such as a soft drink bottle and potato chip bags.

These packages also detail nutritional information, manufacturer name and address, weight, bar code information, directions/instructions for use. The label may also indicate whether it is safe to put the packaged food through a microwave process. Packages also carry such information as merchandising messages, health messages, recipes and coupons.

4. **Environmental issues:** To protect the environment, we must be willing to reuse or recycle the packaging or reduce the size of the packaging.
5. **Package safety:** Before using a particular type of package for food, it must be ensured that it is safe to use that packaging for the food being considered, and that there are no adverse interactions between the package and the food. This includes any metal contamination issues from a can to the food product or any plastic contamination from a bottle to the food product.

It is necessary that Food grade packaging material be used wherever the food is in direct contact with the package (primary package), especially in the case of ready-to-eat foods.

6. **Product access:** The packaging must be such that the product is readily accessible when the consumer is ready to use it. For

example, pour spouts on milk cartons can make it easy to dispense the milk.

CLASSIFICATION OF PACKAGING MATERIAL

Packaging materials can be classified into rigid and flexible packaging material.

- **Flexible packaging** material is a package capable of being readily deformed by hand, including being bent, flexed or twisted. They range from bags, bubble wraps to tubes and foam cushioning materials.
- **Rigid packaging** materials are used when packages need to be transported to long distances and when extra care is required. Some examples include metal containers, wooden containers, drums and crates.

Types of Packaging Material

Packaging material is classified into primary, secondary and tertiary packaging.

- **Primary packaging** is the main packaging that holds the food that is being processed. For example a bottle or can. In it the food comes in direct contact with the packaging material.
- **Secondary packaging** combines the primary packages into a single box, and do not have direct food contact.
- **Tertiary packaging** combines all of the secondary packages into one pallet. They provide additional food protection during storage and distribution.

Packaging type	Type of container	Examples of foods packaged
Plastic trays	Primary	Portion of fish
Bags	Primary	Potato chips
Boxes	Secondary	Box of soft drink bottles
Cartons	Secondary	Carton of eggs
Pallets	Tertiary	A series of boxes on a single pallet, to transport packaged food from the manufacturing plant to a distribution centre.

WRAPPING AND PACKAGING

Packaging and wrapping materials must be stored in clean, dry areas where they are not exposed to risk of contamination

Cling film

Cling film is useful for stopping food drying out and protecting it against contamination. Under certain conditions, however, it can speed up spoilage and mould growth by trapping moisture. It is therefore important that:

- Raw meat or wet food is unwrapped when removed from the refrigerator; and
- Food wrapped in cling film is not left in bright light or sunlight.

Because of the risk of chemical migration, cling films should not be used where they could melt into food during heating, or for wrapping foods with high fat content, unless manufacturers advice indicates their suitability for this purpose.

Vacuum packing

Vacuum-packed food, and modified atmosphere packs, should be refrigerated to prevent the multiplication of anaerobic bacteria. Immediately after opening a vacuum pack, the contents should be removed completely. Slightly darker colors of meat and the acid odour disappear shortly after being removed.

Care must be taken to avoid puncturing packs, for example, with sharp bones or rough handling. Defective seams commonly result in loss of pack integrity. However, air-tight vacuum packaging may blow if the contents ferment. It is advisable to purchase branded vacuum packs from reputable suppliers to avoid receiving low grade meat of dubious origin. Unmarked packs without 'use-by' dates should always be regarded with suspicion.

Points to remember on Packaging:

- Materials used for wrapping are not to be a source of contamination; they must be stored in such a manner that they are not exposed to a risk of contamination.
- Reusable wrapping and packaging material is easy to clean and where necessary to disinfect.
- As far as possible all unpacking and packing should be carried out in areas separate from food production or preparation to prevent contamination of open food.
- String removed from sacks and ties removed from bags should be immediately placed in suitable containers provided specifically for the purpose.
- Paper sacks should be cut open, although care should be taken to ensure paper does not finish up in the food.
- Special care is needed to ensure that staples, which tend to fly considerable distances when boxes are opened, do not contaminate food.

- Suppliers should be requested to use adhesive tape to fasten boxes, instead of staples.
- Packaging materials and gases shall be non-toxic and not pose a threat to the safety of food. Certificates of conformity or other evidence may be used for verification.

Packaging and Rotation of Food:

- Refrigerators should not be overloaded and they need packing in a manner which allows good air circulation.
- Good stock rotation is essential, and daily checks should be made for out-of-date- stock.

LABELLING

Food labelling is a means of communication between the producer and seller of food on one hand, and the purchaser and consumer on the other. It can be written, electronic, or graphic communications on the packaging or on a separate but related label. The symbols used on package labels are generally internationally standardized.

Pre-packaged food must conform to compulsory standards on labelling and advertising. The details that must appear on packaging include the name under which the product is sold, a list of ingredients and quantities, potential allergens (products which may cause allergies), the minimum durability date and conditions for storage, processing and handling. A batch, code or lot number which is a mark of identification by which the food can be traced in manufacture and identified in distribution, should also be given on the label.

FOOD DISPATCH AND DISTRIBUTION

- All packaged food products shall carry a label to ensure that adequate and accessible information is available to the next

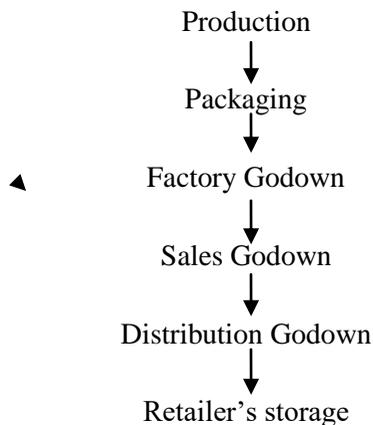
person in the food chain to enable them to handle, store, and process, prepare and display the food products safely and correctly and that the batch can be easily traced and recalled if necessary.

- First in First Out and First Expire First Out stock rotation system should be applied to release the food products from the factory. This means that foods should be used in the order they are delivered and expire. For instance, the newest milk should not be used first if there are still several litres that are good from the last delivery. Expired material should be discarded and not entered into the dispatching process.
- Expired material should be discarded and not enter into the dispatching process.

TRANSPORTATION OF FOOD:

Damage during transport is one of the commonest problems in packaging. The type of the packaging methods used in this distribution system depends on the mode of transportation and method of handling and storage.

The supply chain of a consumer good is shown below.





Points to Remember in Transportation:

- Vehicles used to transport foods must be maintained in good repair and kept clean.
- The temperature of food when transported in containers should be maintained at the required temperature.
- For bulk transport, containers and conveyances should be designated and marked for food use only and be used only for that purpose.
- Conveyances and containers for transporting food should be kept in an appropriate state of cleanliness, repair and condition.
- The vehicle used for transport should not carry animals, toxic substances or contaminating materials along with the prepared food. Food and non-food should be suitably segregated during transportation. Where the same conveyance or container is used for transporting different foods or non-foods, effective cleaning and where necessary, disinfection should take place between loads.
- Food should be adequately protected during transport.

TRACEABILITY

Traceability is the ability to trace the history, application, or location of an item or activity with the help of documentation. Food businesses must be able to trace foods or any substance that is intended to be part

of a food throughout all the stages of production, processing and distribution.

Food businesses are required to:

- identify their suppliers of food, food-producing animals and any other substance intended or expected to be incorporated into food;
- identify the businesses to which they have supplied products; and
- produce this information to the competent authorities on demand.

The purpose of the traceability provisions is to assist in targeted and accurate withdrawals and to give information to food regulatory officials in the event of food safety problems, thereby avoiding the potential for wider disruption.

Several examples of food safety incidents show how a single source food contamination can affect an entire business/industry because of a lack of traceability. For example, in a case of food poisoning, if the origin of the contaminated food can be identified quickly, a much smaller quantity of the food could have been contaminated, less people affected, and consumers given the information much sooner. Food businesses must have written systems and procedures in place to identify all business to which they have supplied products or received products from, and be able to operate internal traceability systems to identify, isolate and correct food safety problems as quickly as possible. Records of recalled products should be maintained.

All food products placed in the market must be adequately labelled or identified to enable full traceability. Food businesses have a legal duty to withdraw products from the market that they identify as unsafe and carry out a full recall of these products

Section 10: FOOD SAFETY MANAGEMENT PROCESS

This section describes the management of food safety hazards by using a food safety management process.

A fundamental requirement of any food process is that the food produced should be safe for consumption. Food safety is such a basic consumer expectation, that it is 'taken for granted' when we decide our meal from the menu options or purchase products from the retailer. However, there is a real danger to consumers, if essential control measures are overlooked or mismanaged in a busy food operation. Thus, it is important for all food businesses to have a food safety management process in place.

Definition: Food safety management is the application of food policies, systems and processes in a food operation in order to prevent food borne illnesses and protect consumer health.

The focus in food safety standards has shifted from end product requirements and testing to a preventive approach in food safety management, that addresses chemical, physical and biological risks through the use of Good Manufacturing Practices (GMP), Good Hygiene Practices (GHP) and Hazard Analysis Critical Control Point System HACCP.

GOOD MANUFACTURING PRACTICES/GOOD HYGIENE PRACTICES

Good manufacturing practices (GMP) are a combination of manufacturing and quality control procedures aimed at ensuring that products are consistently manufactured to their specification. The requirements for maintaining the quality and safety of products are written down in a GMP manual which becomes the key reference for the operation of a food manufacturing business.

GMP requires a quality approach to manufacturing, enabling food businesses to minimize or eliminate instances of contamination, mix ups, and errors. This in turn, protects the consumer from purchasing unsafe and poor quality products. Failure of firms to comply with GMP can result in very serious consequences including recall, seizure, fines,

and imprisonment. It addresses issues including recordkeeping, personnel qualifications, sanitation, cleanliness, equipment verification, process validation, and complaint handling. Most GMP requirements are very general and open-ended, allowing each manufacturer to decide individually how to best implement the necessary controls. This provides much flexibility, but also requires that the manufacturer interprets the requirements in a manner which makes sense for each individual business.

The overall combined approach to issues of food quality and safety is consolidated when GMP is put into action. Existing quality assurance procedures are integrated so that food companies are able to demonstrate their commitment to customer requirements as well as their compliance with food safety legislation.

Good Hygiene Practices are those regarding the conditions and measures necessary to ensure the safety and suitability of food.

HAZARD ANALYSIS CRITICAL CONTROL POINT (HACCP) SYSTEM

HACCP is a food safety management system designed to control hazards at points critical to food safety.

The HACCP system for food safety control was initially developed for the U.S. space programme. HACCP provided a means of ensuring that food eaten by astronauts was safe and did not contain any food poisoning organisms which may have added to the difficulty of space missions. Since their introduction in the 1960s, HACCP systems have increasingly been used throughout the food industry.

HACCP is a preventative system of food control. Instead of waiting until a problem arises and then taking action, HACCP seeks to determine what problems might arise and then to prevent them from happening at all. This is clearly a most sensible way of running a food

manufacturing process. A system of prevention reduces the likelihood of contaminated products being sent to customers and it reduces the cost of quality assurance because it can often limit time-consuming inspections of the finished product and eliminate the need to reject defective products. Under the new act certification is not essential but its application is encouraged to ensure food safety.

Prerequisite for HACCP

Prior to implementation of HACCP, a business must operate in accordance with GHP and a factory with GMP as well as comply with all relevant food safety legislation. The main purpose of prerequisite programs is to control bacterial growth, protect products, and maintain equipment. Other benefits include customer satisfaction and ultimately increased sales; employee satisfaction because there is a safe and easy working environment, resulting in increased productivity; energy savings because the food business is designed for efficiency and profit making. These prerequisite programs will need to be reviewed before implementing an effective HACCP plan.

All food businesses should document their basic requirements for food hygiene standards. It is important that all staff can refer to these authorised standards and procedures for guidance on what is expected. It is also important to be able to prove by written documentation that the entire business operates according to established principles for hygiene management.

Development of HACCP Plan

The application of a HACCP system involves 12 steps. These steps can be divided into two sections – the first five steps are the preliminary steps and next seven are based on the seven principles of HACCP.

Preliminary Steps

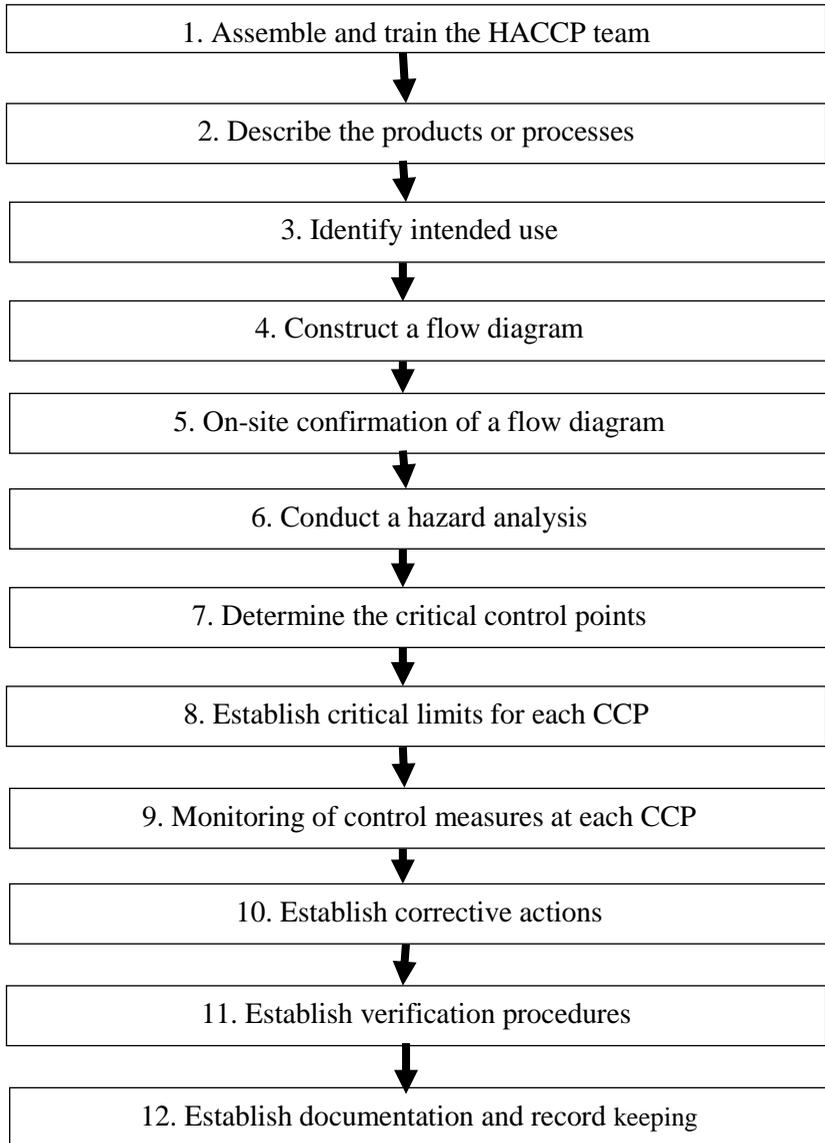
1. Assemble and train the HACCP team

The food business should assure that the appropriate product specific knowledge and expertise is available for the development of an effective HACCP plan. This often requires assembling a multi-disciplinary team with members who have expertise in different areas such as production, public health, microbiology, food technology, engineering, sanitation etc. Such a team can analyse all physical, chemical and biological hazards and controls associated with the production of food. If such expertise is not available, expert advice should be obtained from other sources. In small scale businesses, one person may be the only team member, but efforts should be taken to obtain expert advice from other sources.

2. Describe the products or processes

In the manufacturing sector, a detailed description of each product is required. This may include relevant safety information such as the major raw material, food ingredients, preservation and packing materials used, durability and storage conditions and method of distribution. The description should also include their impact on food safety. Separate HACCP plan should be made for each product. But if two or more products have the identical raw material, ingredients, process operations, packaging, storage and distribution, they can be clubbed together in one HACCP plan.

Development of HACCP Plan



3. Identify intended use

It is important to identify the intended use of the product, including the intended target group. Is the food intended for the general public; is the food intended for consumption by a population with increased susceptibility to illness (e.g., infants, the elderly, immunocompromised individuals, pregnant women). The intended user may be another processor, who will further process the product. For example, the intended use may be specified as being for “fast food” restaurants.

4. Construct a flow diagram

The next step is to develop a systematic flow diagram of the process for which the HACCP plan will be applied. The diagram should show individual activities in a stepwise manner as well as the interaction of the different activities for the steps involved with a particular food.

On-site confirmation of flow diagram

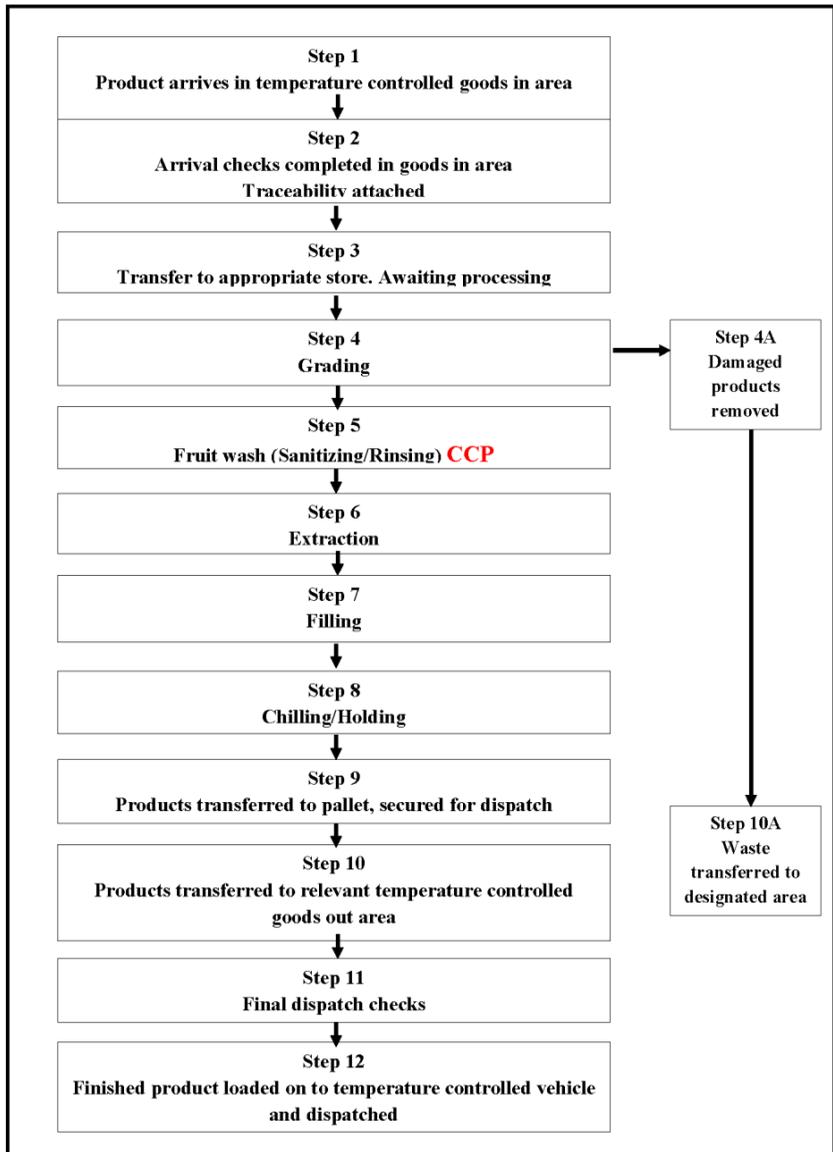
This can be done by going into the process area and comparing the documented diagram with the actual process activities, noting any changes necessary. This is important to add credibility and accuracy to the process.

Steps based on HACCP Principles

5. Conduct a hazard analysis (Principle 1)

Essentially HACCP is concerned with identifying all the potential hazards associated with a food product and its manufacturing process. The hazards to a food may be biological, chemical or physical agents that may cause a food to be unsafe for human consumption.

Example of HACCP at a Manufacturing Unit (Production of Orange juice)



Hazards may be introduced with purchased raw materials, ingredients and packaging, or they may arise throughout the manufacturing, storage and delivery processes, or as the result of loss of control of part of the process.

If we take the first step in the example of the orange juice - raw material arriving in temperature controlled area of plant –

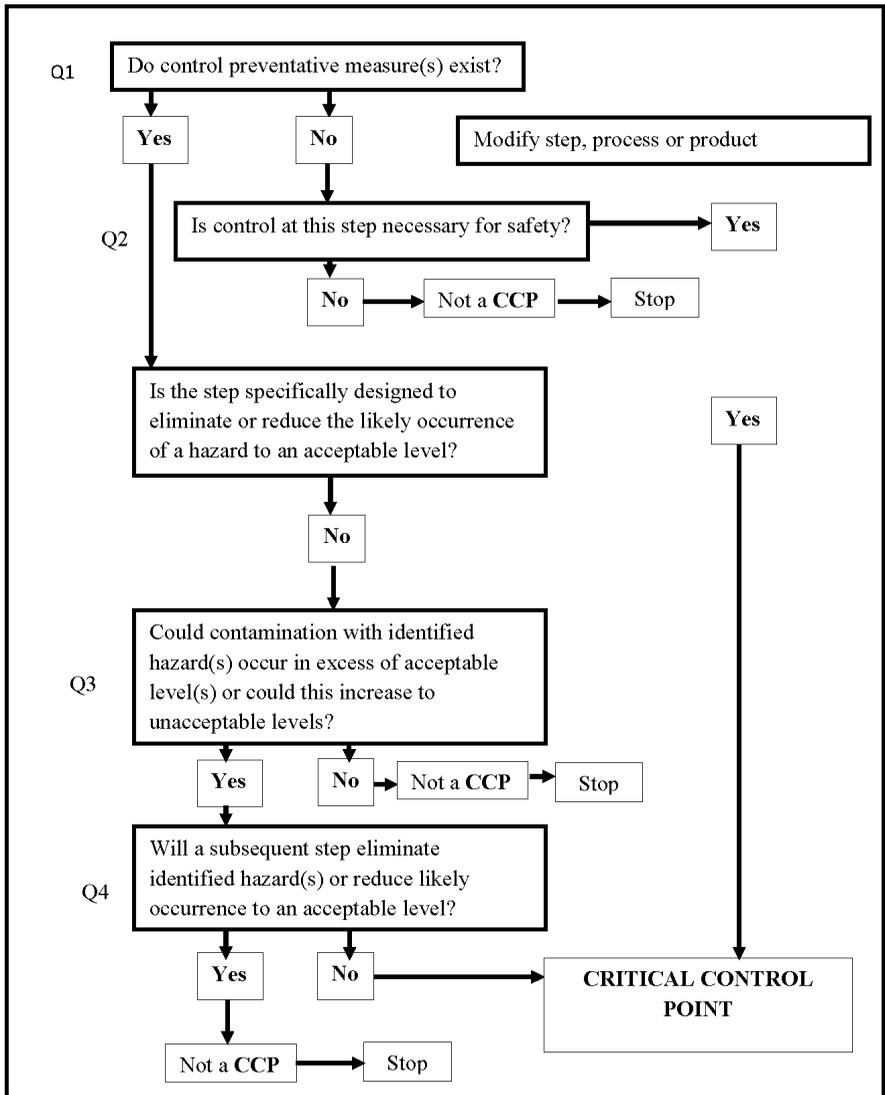
- (1) Physical hazards are external contamination from rain water, bird droppings and flying insects during the loading process, pests from poor hygiene conditions, and foreign bodies found in crates while loading.
- (2) Chemical hazards may be pesticides used at source of origin and
- (3) Microbiological hazards are any microbial contamination at source of origin or transportation.

6. Determine the critical control points (Principle 2)

When the hazards have been identified a decision is made as to where in the process each hazard can be controlled. The points or sections of the process at which hazards are controlled are known as **Critical Control Points** (CCPs), hence the Hazard Analysis Critical Control Point system. It may be that hazards can be eliminated at CCPs, but in some instances they can only be reduced to an acceptable level.

Whether the hazards are eliminated or reduced, a process of monitoring is established for each CCP to confirm that the required target is being achieved. If it is found that control has been lost at a CCP, then corrective action is immediately taken to restore control at the CCP and to screen for any product that has been made defective. From this you will understand that continuous supervision is needed and any faults must be reported. In addition, the entire HACCP system must be kept

EXAMPLE OF DECISION TREE TO IDENTIFY CCPs
(Answer questions in sequence)



under constant and close review to ensure that it is suitable for the task and is operating as planned.

7. Establish critical limits for each CCP

Critical limits are values which are set for control measures (at each CCP) to ensure that the food is safe. The critical limits include time, temperature, size, weight and appearance.

8. Monitoring of control measures at each CCP

The monitoring systems should state **WHAT** the critical limits are; **HOW** monitoring should be undertaken; **WHERE** the monitoring should be undertaken; **WHEN** the monitoring should be undertaken and **WHO** is responsible for it.

9. Establish corrective actions

Corrective actions should be taken when a critical limit is breached. Manufacturers, wholesalers and retailers should ensure that all products are clearly labelled and traceable in the event of a recall being necessary.

10. Establish verification procedures

The commonly used procedures for verification include

- HACCP audits
- review of CCP monitoring records;
- product testing, both chemical and microbiological testing; and
- assessment of deviations, including product disposition and customer complaints

11. Establish documentation and record keeping

.Documents and records are to be maintained and procedures for this must be established.

BENEFITS OF HACCP:

Many varied benefits of HACCP have been described, including:

- Better understanding of the processes and rationale for food safety controls;
- Personnel understand their roles better and are better trained;
- Provides a systematic approach;
- Control is tightened up, which may also lead to quality benefits;
- Proactive strategy means that controls are built in to prevent problems and these continuously managed;
- Real-time monitoring so problems are quickly identified and actioned straight away; and
- Cost effective by targeting resource to the essential areas.

Section 11: HIGH RISK FOODS & STORAGE OF FOOD

This section helps to identify high risk foods and describes techniques of handling and storage of these foods.

Food categories include those with high level of public health risk and those that represent a low level of risk. Food handlers should recognize them so that necessary action can be taken to prevent illness.

LOW-RISK FOODS

Low risk foods are those that are rarely implicated in food poisoning and may be stored and suitably packaged, at ambient temperatures. They do not support multiplication of food poisoning bacteria.

Some examples include:

- Preserved food such as jam;
- Dried foods or food with little moisture, such as flour, rice bread or biscuits. However, once liquid has been added to powdered food, such as milk, the food becomes high risk;
- Acid foods such as vinegar or products stored in vinegar;
- Fermented products;
- Foods with high fat/sugar content, such as chocolate; and
- Canned foods, whilst unopened.

HIGH-RISK FOODS

High-risk foods are ready to eat foods that under unfavourable conditions support the multiplication of harmful bacteria and are intended for consumption without further treatment that would destroy such organisms. High risk foods are most likely to be involved in cases of food poisoning. They are usually high in protein and moisture, requiring strict temperature control and protection from contamination.

According to the Food Safety and Standards Authority of India, the high risk foods in India include the following:

- Cut fruits/ salads, fresh juices and beverages;
- Confectionery products;
- Meat, poultry and fish products;
- Milk and dairy products;
- Water based chutneys, sauces etc;
- Food transported to point of sale from point of cooking;
- Food with gravy;
- Fried foods;
- Post-cooked mixing; and
- Thawing of frozen products.

1. Cut fruits/salads, fresh juices and beverages

The practices that can be used to keep fresh cut fruits and vegetables and their juices safe are:

- Food should be used immediately; however, if stored for short time it should be under refrigeration and should be kept in clean and properly covered vessels.
- Uncooked vegetables and fruits should be washed thoroughly with potable water before being cut and mixed with other ingredients. Uncooked, ready to eat fruits and vegetables should be washed with 50 ppm chlorinated water before cutting, peeling or serving.
- Water used for juices and beverages, including that used for making ice, should be potable.
- Food or beverages should not be stored in the same container used to store the ice intended for consumption.
- Juice concentrates must be checked regularly for any fungal growth / change of colour, odour or gas formation in the bottle.
- Juice dispensing machines should be cleaned and rinsed with water regularly.

- Containers made of food grade material should be used for collecting juice.
- Clean and intact utensils/crockery & cutlery/disposables should be used for serving.

2. Confectionery products

The following good hygienic practices should be followed for confectionery products:

- Prepared confectionery products should be kept in airtight containers and displayed hygienically;
- The cream to be used in these products should be stored covered under refrigeration;
- Finished products should be refrigerated with proper labels indicating date of expiry;
- Products should be properly wrapped/ packaged after proper cooling.; and
- Only permitted food additives (colour, preservatives, flavouring agents etc.) should be used.

3. Meat, poultry and fish products

The following are important dos and don'ts for meat, poultry and fish products:

- Non-vegetarian products/raw materials should be purchased (chilled products temperature should be at 5⁰ C or below and frozen products at - 18 ⁰C or below) from authorized/licensed slaughter houses/vendors.
- Processing area should be cleaned and disinfected promptly.
- Preparation and processing of meat, poultry and marine products should be separate.
- Non-vegetarian products should be washed with potable water before use.



- Non-vegetarian. products are cooked thoroughly (core temperature 75⁰ C) for at least 15 seconds or an effective time/temperature control e.g. 65⁰ C for 10 minutes, 70⁰ C for 2 minutes.
- Non-vegetarian products should be stored covered in refrigerator below the veg. products.
- Raw and cooked products should be stored physically separated with cooked products at the top.
- All refuse/waste should be promptly removed from preparation area.

4. Milk and dairy products

Milk and dairy products can be kept safe through the use of the following practices:

- All equipments and utensils should be thoroughly washed and rinsed with potable water before starting of work and at the end.
- All mechanical equipments should be routinely cleaned, checked and maintained.
- All products should be routinely checked for spoilage/contamination and shelf life.
- Any spoiled/contaminated product should be promptly removed and discarded..
- Milk should be received in clean and hygienic conditions at temperature below 5⁰C.
- Milk and milk products should be used immediately or pasteurized and refrigerated.

5. Water based chutneys, sauces

The following good hygiene practices should be used to keep chutneys, sauces and other items that are water based.

- All fruits/vegetables should be washed properly before processing.

- Clean and disinfected chopping boards/grinding stone/machine should be used.
- Personal hygiene of food handlers need to be ensured.
- Water used in the chutneys should be safe and potable.
- Only permitted food additives should be used, if required, and added in recommended quantities only.
- Spoiled products should be discarded immediately after confirmation of spoilage (change in colour/ texture/ odour).
- Sauces and chutneys should be stored in glass/food grade plastic containers with proper lids.
- Clean and intact containers should be used for storing sauces and chutneys.
- Sauces and chutneys should be stored in refrigerator when not in use.
- Perishable/uncooked chutneys should be consumed immediately.

6. Food transported to point of sale from point of cooking

Food is cooked in one place and is transported to another. This may include many cooked items like biryani, fried rice, curries, gravy based items, sweets etc. To give the example of how spoilage occurs, let us consider the rice based items. Bacterial spores can be found in dry rice. Once water is added to the rice during cooking the bacteria became active. Some of the bacteria may survive the cooking temperature. If, after cooking, the rice is not eaten immediately or not refrigerated; these particular bacteria will grow profusely and produce a toxin (poison) which may persist even if the rice is re-heated before being consumed.

The following should be practiced with such food:

- Food should be reheated up to 70⁰ C before consumption; and
- Food should be consumed within 4 hours of reheating.

7. Food with gravy

In the case of foods with gravy it is important that:

- Food products should not be stored at room temperature for more than 2 hours during display or sale;
- For prolonged storage, foods should be stored in refrigerators or kept for hot holding at or above 60 °C; and
- No water should be added after cooking/reheating/boiling.

8. Fried Foods

The following good practices should be adopted in the case of fried foods:

- Proper quality / branded oils/fats should be used for food preparation, frying etc;
- Use packaged oil only;
- Use of oils with high trans fats (like vanaspati) should be avoided as far as possible; and
- Re-heating and reuse of oil should be avoided as far as possible. Therefore, avoid having leftover oil wherever possible.

9. Post-Cooked Mixing

When mixing ingredients after cooking, it is important to follow these practices:

- Ingredients added to the cooked food should be thoroughly washed/ cleaned.
- After cooking or post-cooked mixing, the food should be used immediately.
- Garnishes etc., if added should be prepared using fresh, thoroughly washed and freshly cut vegetables and used immediately.

10. Thawing of Frozen Products

- Frozen products should be thawed in refrigerator/microwave/convection oven or under running potable water well before cooking.
- Only required portion of the food should be thawed at a time.

Thawed products should be used immediately and not refrozen or kept in chillers.

DISTRIBUTION OF HIGH-RISK FOOD

Vehicles used for distribution of high-risk food must always be insulated and preferably refrigerated, even for short journeys. Insulation of the roof and floor is just as important as the insulation of the walls. Properly located thermometers should be fitted to all the vehicles.

DELIVERY AND UNLOADING OF RAW MATERIAL

- Effective documentation checking system should be in place for selecting suppliers and dealing with deliveries;
- Deliveries should be accepted from approved suppliers;
- All deliveries should be checked before storage;
- The delivery vehicle should be clean and if necessary refrigerated;
- All outer packaging should be in a good condition and not be discoloured or contaminated, example, from bird droppings;
- The food should be labelled and date coded;
- The food should have sufficient shelf life to enable it to be used;
- Chilled food is delivered below 50C and frozen food at or below -180C;
- A satisfactory delivery should be transferred within 15 minutes of unloading;

- High risk food delivered in a unrefrigerated vehicle should be rejected;
- If food comes from an unapproved source, out of date food, damaged packaging or food with evidence of pests should be rejected;
- The delivery area should be kept clean and staff should always be available to accept deliveries.

STORAGE OF FOOD

RAW MEAT AND POULTRY

Raw meat products should be stored between -10C and + 10C, with a relative humidity of 90%. They should not touch the wall surface and only approved suppliers should be used.

EGGS

Raw eggs are a source of Salmonella; it can be present both inside the egg and on the shell, especially if contaminated with chicken faeces. Manufacturers should store eggs at a constant temperature of 20C. Fluctuations in temperature will result in condensation on the egg, leading to Salmonella being sucked into the egg from the surface. Stock rotation is necessary.

FRUITS AND VEGETABLES

Although different fruits and vegetables have their own optimal storage conditions, a general guide is to store cut or peeled fruits and vegetables under refrigeration. Usually dry stores are used to store fruits and vegetables. Fruit should be examined regularly and mouldy items are removed to prevent rapid mould spread.

A stock rotation system to ensure that older products are used first must be implemented. Vigorous washing, turbulence and brushing will all help to reduce the levels of bacteria as well as remove soil, dust, insects and chemicals.

MILK AND CREAM

They need to be stored under refrigeration (below 50C) and should be placed in it or in a cold store as soon as they are received. Milk crates should not be stored below raw meat.

ICE CREAM

Ice creams need to be stored in a clean, dedicated freezer. They should be kept away from raw products. Ice cream that has defrosted should be discarded. Defrosted ice cream is a hazard, because at high temperatures it provides ideal conditions for Salmonella growth.

FLOUR AND CEREALS

They need to be stored in stainless steel containers with tight fitting lids. Large stocks of flour kept in original sacks must be stored clear of the ground and free from damp. Condensation can result on mould growth on wet flour.

STAFF RESPONSIBILITIES

Food handlers should open doors for as little, and for as short a time, as possible. The temperature of the refrigerator should be checked regularly. Spillages should be cleared up immediately.

UNFIT FOOD OR DAMAGED STOCK

All damaged stock should be thoroughly examined and segregated before use. The suspect food should be clearly marked as 'unfit' or 'not to be sold'. A dustbin should be designated for this purpose.

Food with damaged packaging should not be used for food processing or offered for sale. Damaged packaging can expose food to physical or microbiological contamination.

Section 12: SUPERVISION OF STAFF

This section describes the role of the supervisor to monitor and supervise the staff to ensure they comply with food safety.

WHAT IS SUPERVISION?

Supervision refers to the activity carried out by supervisors to oversee the productivity and progress of employees who report directly to them. Supervision is a management activity and supervisors have a management role in the organization. Supervisors and managers are responsible and accountable for food safety in the establishment. They have a primary responsibility for food safety and hygiene training in a food establishment. The role often involves training employees in their tasks and providing continuous supervision.

Supervisors cannot train or monitor food safety and hygiene unless they are familiar in these matters. Thus, it is important for supervisors themselves to be trained and to understand how to prevent foodborne disease outbreaks.

RESPONSIBILITIES OF A SUPERVISOR:

The responsibility of a supervisor is:

1. training of the food handler;
2. ensuring certain tasks are completed;
3. monitoring activities related to food hygiene;
4. communicating and clarifying food safety priorities, and expectations;
5. establishing and communicating food hygiene performance standards; and
6. providing food safety training and constructive feedback in timely manner.

PERFORMANCE PROBLEMS

The reasons why employees don't perform well are the following:

- Lack of food hygiene skills;
- Lack of food safety and food hygiene information;
- Personal Issues; and
- Food safety environmental issues.

IMPROVING STAFF PERFORMANCE

These steps can be taken to improve staff performance:

- Identify the performance problems.
- Deal with these problems. Begin by talking with the relevant staff.
- Manage the conflict. The ultimate goal is to come up with “win-win” situation
- Address staff motivation.
- Provide effective feedback.

MONITORING

Monitoring is the process of routinely gathering information on all aspects of the job.

Monitoring provides managers with information needed to:

- Analyze current situation
- Identify problems and find solutions
- Discover trends and patterns
- Keep project activities on schedule
- Measure progress towards objectives and formulate/revise future goals and objectives
- Make decisions about human, financial, and material resources

Monitoring is continuous. Monitoring activities should be scheduled on the project work plan. The first level of monitoring is done by staff.

Supervisors are responsible for monitoring the staff and tasks under them, and the manager is responsible for monitoring all aspects of the work place.

Monitoring can be carried out through field visits, review of service delivery and commodities records.

USE A SUPERVISORY CHECKLIST:

- It's a means to ensure a systematic approach to supervision by reminding the supervisors to focus on the knowledge, skill, major activities, plans and performance of the worker
- No checklist format ideal for all situations. It has to be developed to suit his/her specific needs
- It should have two essential parts:
 - List of activities and skills to be supervised.
 - Space for the supervisor to make notes on his observations, assessment, recommendations, or actions taken.

Section 13: FOOD HYGIENE AND THE LAW

This section describes the Food safety and standards Act, 2006

Every country has its own food laws which supervisors in Food establishments need to understand as they relate to their work and themselves. In India, a new era in Food safety began with the Food Safety and Standards (FSS) Act, 2006 which became operational from August 5th, 2011 throughout the country. (More information on this act is available from the Food Safety & Standards Authority of India website <http://fssai.gov.in>).

THE FOOD SAFETY AND STANDARDS ACT, 2006

The FSS Act consolidates the earlier laws relating to food. As part of the process of consolidation, the eight earlier food laws in the country have been repealed since this Act came into being on August 5th, 2011. It moves from a multi-departmental and multi-level control to a single reference point for all food safety and standards related matters. It lays more emphasis on science based and participatory decisions in both standard setting and implementation. The Act enables unidirectional compliance and addresses the need for a single regulatory body.

The Food Safety and Standards Authority of India

To this effect, the Act establishes an independent statutory Authority – the Food Safety and Standards Authority of India (FSSAI) with head office at Delhi. FSSAI and the State Food Safety Authorities enforce various provisions of the FSS Act. The Ministry of Health & Family Welfare, Government of India is the Administrative Ministry for the implementation of FSSAI.

The Act aims to achieve an appropriate level of protection of human life and health and the protection of consumer's interests, including fair

practices in all kinds of food trade with reference to food safety standards and practices. Food business operators should thus ensure that the articles of food satisfy the requirements of this Act, at all stages of production, processing, import, distribution and sale within their business.

This section describes relevant points of the Act that are related to food hygiene.

Everyone working with and handling food needs to understand the law as it relates to their business and themselves. More information is available from the Food Safety and Standards Authority of India website <http://fssai.gov.in>. The following section picks out some points directly on the law concerning food hygiene.

RESPONSIBILITIES OF FOOD BUSINESS OPERATOR

1. Every food business operator shall ensure that the articles of food satisfy the requirements of this Act and the rules and regulations made thereunder at all stages of production, processing, import, distribution and sale within the businesses under his control.
2. No food business operator shall himself or by any person on his behalf manufacture, store, sell or distribute any article of food –
 - which is unsafe; or
 - which is misbranded or sub-standard or contains extraneous matter; or
 - for which a license is required, except in accordance with the conditions of the license; or
 - which is for the time being prohibited by the Food Authority or the Central Government or the State Government in the interest of public health; or
 - in contravention of any other provision of this Act or of any rule or regulation made thereunder.

3. No food business operator shall employ any person who is suffering from infectious, contagious or loathsome disease.
4. No food business operator shall sell or offer for sale any article of food to any vendor unless he also gives a guarantee in writing in the form specified by regulations about the nature and quality of such article to the vendor:
5. Provided that a bill, cash memo, or invoice in respect of the sale of any article of food given by a food business operator to the vendor shall be deemed to be a guarantee under this section, even if a guarantee in the specified form is not included in the bill, cash memo or invoice.
6. Where any food which is unsafe is part of a batch, lot or consignment of food of the same class or description, it shall be presumed that all the food in that batch, lot or consignment is also unsafe, unless following a detailed assessment within a specified time, it is found that there is no evidence that the rest of the batch, lot or consignment is unsafe:

Provided that any conformity of a food with specific provisions applicable to that food shall be without prejudice to the competent authorities taking appropriate measures to impose restrictions on that food being placed on the market or to require its withdrawal from the market for the reasons to be recorded in writing where such authorities suspect that, despite the conformity, the food is unsafe.

LIABILITY OF THE MANUFACTURERS, PACKERS, WHOLESALERS, DISTRIBUTORS AND SELLERS

1. The manufacturer or packer of an article of food shall be liable for such article of food if it does not meet the requirements of this Act and the rules and regulations made thereunder.

2. The wholesaler or distributor shall be liable under this Act for any article of food which is–
 - Supplied after the date of its expiry; or
 - Stored or supplied in violation of the safety instructions of the manufacturer; or
 - Unsafe or misbranded; or
 - Unidentifiable of manufacturer from whom the article of food have been received; or
 - Stored or handled or kept in violation of the provisions of this Act, the rules and regulations made thereunder; or
 - Received by him with knowledge of being unsafe.
3. The seller shall be liable under this Act for any article of food which is –
 - sold after the date of its expiry; or
 - handled or kept in unhygienic conditions; or
 - misbranded; or
 - unidentifiable of the manufacturer or the distributors from whom such articles of food were received; or
 - Received by him with knowledge of being unsafe.

FOOD RECALL PROCEDURES

1. If a food business operator considers or has reasons to believe that a food which he has processed, manufactured or distributed is not in compliance with this Act, or the rules or regulations, made thereunder, he shall immediately initiate procedures to withdraw the food in question from the market and consumers indicating reasons for its withdrawal and inform the competent authorities thereof.
2. A food business operator shall immediately inform the competent authorities and co-operate with them, if he considers or has reasons to believe that a food which he has placed on the market may be unsafe for the consumers.

3. The food business operator shall inform the competent authorities of the action taken to prevent risks to the consumer and shall not prevent or discourage any person from cooperating, in accordance with this Act, with the competent authorities, where this may
4. Prevent, reduce or eliminate a risk arising from a food.
5. Every food business operator shall follow such conditions and guidelines relating to food recall procedures as the Food Authority may specify by regulations.

ENFORCEMENT OF THE ACT

AUTHORITIES RESPONSIBLE FOR ENFORCEMENT OF ACT

1. The Food Authority and the State Food Safety Authorities shall be responsible for the enforcement of this Act.
2. The Food Authority and the State Food Safety Authorities shall monitor and verify that the relevant requirements of law are fulfilled by food business operators at all stages of food business.
3. The authorities shall maintain a system of control and other activities as appropriate to the circumstances, including public communication on food safety and risk, food safety surveillance and other monitoring activities covering all stages of food business.
4. The Food Safety Officers shall enforce and execute within their area the provisions of this Act with respect to which the duty is not imposed expressly or by necessary implication on some other authority.
5. The regulations under this Act shall specify which of the Food Safety Officers are to enforce and execute them, either generally or in relation to cases of a particular description or a particular area, and any such regulations or orders may provide for the giving of assistance and information by any authority concerned in the administration of the regulations or orders, or of any provisions of

this Act, to any other authority so concerned, for the purposes of their respective duties under them.

6. The Commissioner of Food Safety and Designated Officer shall exercise the same powers as are conferred on the Food Safety Officer and follow the same procedure specified in this Act.

LICENSING AND REGISTRATION OF FOOD BUSINESS

1. No person shall commence or carry on any food business except under a licence.
2. Nothing contained in sub-section 1. shall apply to a petty manufacturer who himself manufactures or sells any article of food or a petty retailer, hawker, itinerant vendor or a temporary stall holder or small scale or cottage or such other industries relating to food business or tiny food business operator; but they shall register themselves with such authority and in such manner as may be specified by regulations, without prejudice to the availability of safe and wholesome food for human consumption or affecting the interests of the consumers.
3. Any person desirous to commence or carry on any food business shall make an application for grant of a licence to the Designated Officer in such manner containing such particulars and fees as may be specified by regulations.
4. The Designated Officer on receipt of an application under sub-section (3), may either grant the licence or after giving the applicant an opportunity of being heard and for reasons to be recorded in writing, refuse to grant a licence to any applicant, if he is satisfied that it is necessary so to do in the interest of public health and shall make available to the applicant a copy of the order:

Provided that if a licence is not issued within two months from the date of making the application or his application is not rejected, the

applicant may start his food business after expiry of the said period and in such a case, the Designated Officer shall not refuse to issue a licence but may, if he considers necessary, issue an improvement notice, under section 32 and follow procedures in that regard.

5. Every licence shall be in such form and subject to such conditions as may be specified by regulations.
6. A single licence may be issued by the Designated Officer for one or more articles of food and also for different establishments or premises in the same area.
7. If the articles of food are manufactured, stored, sold or exhibited for sale at different premises situated in more than one area, separate applications shall be made and separate licence shall be issued in respect of such premises not falling within the same area.
8. An appeal against the order of rejection for the grant of licence shall lie to the Commissioner of Food Safety.
9. A licence unless suspended or cancelled earlier shall be in force for such period as may be specified by regulations: Provided that if an application for a renewal of licence is made before the expiry of the period of validity of the licence, the licence shall continue to be in force until orders are passed on the application.
10. The licence shall subsist for the benefit of the deceased's personal representative or any other member of his family, until the expiry of—
 - (a) the period of three months beginning with his death; or
 - (b) such longer period as the Designated Officer may allow.

OFFENCES AND PENALTIES

GENERAL PROVISIONS RELATING TO OFFENCES

1. A person may render any article of food injurious to health by means of one or more of the following operations, namely:-
 - a. adding any article or substance to the food;

- b. using any article or substance as an ingredient in the preparation of the food;
 - c. abstracting any constituents from the food; or
 - d. subjecting the food to any other process or treatment, with the knowledge that it may be sold or offered for sale or distributed for human consumption.
2. In determining whether any food is unsafe or injurious to health, regard shall be to –
- a. dasd
 - i. the normal conditions of use of the food by the consumer and its handling at each stage of production, processing and distribution;
 - ii. the information provided to the consumer, including information on the label, or other information generally available to the consumer concerning the avoidance of specific adverse health effects from a particular food or category of foods not only to the probable, immediate or short-term or long-term effects of that food on the health of a person consuming it, but also on subsequent generations;
 - iii. to the probable cumulative toxic effects;
 - iv. to the particular health sensitivities of a specific category of consumers where the food is intended for that category of consumers; and 44
 - v. also to the probable cumulative effect of food of substantially the same composition on the health of a person consuming it in ordinary quantities;
 - b. the fact where the quality or purity of the article, being primary food, has fallen below the specified standard or its constituents are present in quantities not within the specified limits of variability, in either case, solely due to natural causes and beyond the control of human agency, then such article shall not

be deemed to be unsafe or sub-standard or food containing extraneous matter.

Explanation – For the purposes of this section, “injury”, includes any impairment, whether permanent or temporary, and “Injurious to health” shall be construed accordingly.

GENERAL PROVISIONS RELATING TO PENALTY

While adjudging the quantum of penalty under this Chapter, the Adjudicating Officer or the Tribunal, as the case may be, shall have due regard to the following:-

- (i) The amount of gain or unfair advantage, wherever quantifiable, made as a result of the contravention,
- (ii) The Amount of loss caused or likely to cause to any person as a result of the contravention,
- (iii) The repetitive nature of the contravention,
- (iv) Whether the contravention is without his knowledge, and
- (v) Any other relevant factor,

PENALTY FOR SELLING FOOD NOT OF THE NATURE OR SUBSTANCE OR QUALITY DEMANDED

Any person who sells to the purchaser’s prejudice any food which is not in compliance with the provisions of this Act or the regulations made thereunder, or of the nature or substance or quality demanded by the purchaser, shall be liable to a penalty not exceeding five lakh rupees.

Provided that the persons covered under sub-section (2) of section 31, shall for such non-compliance be liable to a penalty not exceeding twenty five thousand rupees.

PENALTY FOR SUB-STANDARD FOOD

Any person who whether by himself or by any other person on his behalf manufactures for sale or stores or sells or distributes or imports any article of food for human consumption which is sub-standard, shall be liable to a penalty which may extend to five lakh rupees. 45

PENALTY FOR MISBRANDED FOOD

- (i) Any person who whether by himself or by any other person on his behalf manufactures for sale or stores or sells or distributes or imports any article of food for human consumption which is misbranded, shall be liable to a penalty which may extend to three lakh rupees.

- (ii) The Adjudicating Officer may issue a direction to the person found guilty of an offence under this section, for taking corrective action to rectify the mistake or such article of food shall be destroyed.

PENALTY FOR MISLEADING ADVERTISEMENT

1. Any person who publishes, or is a party to the publication of an advertisement, which—
 - a. Falsely describes any food; or
 - b. is likely to mislead as to the nature or substance or quality of any food or gives false guarantee, shall be liable to a penalty which may extend to ten lakh rupees.
2. In any proceeding the fact that a label or advertisement relating to any article of food in respect of which the contravention is alleged to have been committed contained an accurate statement of the composition of the food shall not preclude the court from finding that the contravention was committed.

PENALTY FOR FOOD CONTAINING EXTRANEOUS MATTER

Any person whether by himself or by any other person on his behalf manufactures for sale or stores or sells or distributes or imports any article of food for human consumption containing extraneous matter, shall be liable to a penalty which may extend to one lakh rupees.

PENALTY FOR FAILURE TO COMPLY WITH THE DIRECTIONS OF FOOD SAFETY OFFICER

If a food business operator or importer without reasonable ground, fails to comply with the requirements of this Act or the rules or regulations or orders issued thereunder, as directed by the Food Safety Officer, he shall be liable to a penalty which may extend to two lakh rupees.

PENALTY FOR UNHYGIENIC OR UNSANITARY PROCESSING OR MANUFACTURING OF FOOD

Any person who, whether by himself or by any other person on his behalf, manufactures or processes any article of food for human consumption under unhygienic or unsanitary conditions, shall be liable to a penalty which may extend to one lakh rupees.

PENALTY FOR POSSESSING ADULTERANT

(1) Subject to the provisions of this chapter, if any person who whether by himself or by any other person on his behalf, imports or manufactures for sale, or stores, sells or distribute any adulterant shall be liable –

- (i) where such adulterant is not injurious to health, to a penalty not exceeding two lakh rupees;
- (ii) where such adulterant is injurious to health, to a penalty not exceeding ten lakh rupees.

(2) In a proceeding under sub-section (1), it shall not be a defence that the accused was holding such adulterant on behalf of any other person.

PENALTY FOR CONTRAVENTIONS FOR WHICH NO SPECIFIC PENALTY IS PROVIDED

Whoever contravenes any provisions of this Act or the rules or regulations made thereunder, for the contravention of which no penalty has been separately provided in this Chapter, shall be liable to a penalty which may extend to two lakh rupees.

PUNISHMENT FOR UNSAFE FOOD

Any person who, whether by himself or by any other person on his behalf, manufactures for sale or stores or sells or distributes or imports any article of food for human consumption which is unsafe, shall be punishable,—

- (i) where such failure or contravention does not result in injury, with imprisonment for a term which may extend to six months and also with fine which may extend to one lakh rupees;
- (ii) where such failure or contravention results in a non-grievous injury, with imprisonment for a term which may extend to one year and also with fine which may extend to three lakh rupees;
- (iii) where such failure or contravention results in a grievous injury, with imprisonment for a term which may extend to six years and also with fine which may extend to five lakh rupees;
- (iv) where such failure or contravention results in death, with imprisonment for a term which shall not be less than seven years but which may extend to imprisonment for life and also with fine which shall not be less than ten lakh Rupees.

PUNISHMENT FOR INTERFERING WITH SEIZED ITEMS

If a person without the permission of the Food Safety Officer, retains, removes or tampers with any food, vehicle, equipment, package or labelling or advertising material or other thing that has been seized

under this Act, he shall be punishable with imprisonment for a term which may extend to six months and also with fine which may extend to two lakh rupees.

PUNISHMENT FOR FALSE INFORMATION

If a person, in connection with a requirement or direction under this Act, provides any information or produces any document that the person knows is false or misleading, he shall be punishable with imprisonment for a term which may extend to three months and also with fine which may extend to two lakh rupees.

PUNISHMENT FOR OBSTRUCTING OR IMPERSONATING A FOOD SAFETY OFFICER

If a person without reasonable excuse, resists, obstructs, or attempts to obstruct, impersonate, threaten, intimidate or assault a Food Safety Officer in exercising his functions under this Act, he shall be punishable with imprisonment for a term which may extend to three months and also with fine which may extend to one lakh rupees.

PUNISHMENT FOR CARRYING OUT A BUSINESS WITHOUT LICENSE

If any person or food business operator (except the persons exempted from licensing under sub-section (2) of section 31 of this Act), himself or by any person on his behalf who is required to obtain license, manufacturers, sells, stores or distributes or imports any article of food without license, shall be punishable with imprisonment for a term which may extend to six months and also with a fine which may extend to five lakh rupees.

PUNISHMENT FOR SUBSEQUENT OFFENCES

(1) If any person, after having been previously convicted of an offence punishable under this Act subsequently commits and is convicted of the same offence, he shall be liable to—

- i. twice the punishment, which might have been imposed on a first conviction, subject to the punishment being maximum provided for the same offence;
- ii. a further fine on daily basis which may extend up to one lakh rupees, where the offence is a continuing one; and
- iii. his license shall be cancelled.

(2) The Court may also cause the offender's name and place of residence, the offence and the penalty imposed to be published at the offender's expense in such newspapers or in such other manner as the court may direct and the expenses of such publication shall be deemed to be part of the cost attending the conviction and shall be recoverable in the same manner as a fine.

COMPENSATION IN CASE INJURY OF DEATH OF CONSUMER

(1) Without prejudice to the other provisions of this Chapter, if any person whether by himself or by any other person on his behalf, manufactures or distributes or sells or imports any article of food causing injury to the consumer or his death, it shall be lawful for the Adjudicating Officer or as the case may be, the court to direct him to pay compensation to the victim or the legal representative of the victim, a sum—

- (a) not less than five lakh rupees in case of death;
- (b) not exceeding three lakh rupees in case of grievous injury; and
- (c) not exceeding one lakh rupees, in all other cases of injury:

Provided that the compensation shall be paid at the earliest and in no case later than six months from the date of occurrence of the incident:

Provided further that in case of death, an interim relief shall be paid to the next of the kin within thirty days of the incident:

(2) Where any person is held guilty of an offence leading to grievous injury or death, the Adjudicating Officer or the court may cause the name and place of residence of the person held guilty, the offence and the penalty imposed to be published at the offender's expense in such newspapers or in such other manner as the Adjudicating Officer or the court may direct and the expenses of such publication shall be deemed to be part of the cost attending the conviction and shall be recoverable in the same manner as a fine.

(3) The Adjudicating Officer or the court may also,—

(a) Order for cancellation of licence, re-call of food from market, forfeiture of establishment and property in case of grievous injury or death of consumer;

(b) Issue prohibition orders in other cases.

OFFENCES BY COMPANIES

(1) Where an offence under this Act which has been committed by a company, every person who at the time the offence was committed was in charge of, and was responsible to, the company for the conduct of the business of the company, as well as the company, shall be deemed to be guilty of the offence and shall be liable to be proceeded against and punished accordingly:

Provided that where a company has different establishments or branches or different units in any establishment or branch, the concerned Head or the person in-charge of such establishment, branch, unit nominated by the company as responsible for food safety shall be liable for contravention in respect of such establishment, branch or unit:

Provided further that nothing contained in this sub-section shall render any such person liable to any punishment provided in this Act, if he proves that the offence was committed without his knowledge or that he exercised all due diligence to prevent the commission of such offence.

(2) Notwithstanding anything contained in sub-section (1), where an offence under this Act has been committed by a company and it is proved that the offence has been committed with the consent or connivance of or is attributable to any neglect on the part of, any director, manager, secretary or other officer of the company, such director, manager, secretary or other officer shall also be deemed to be guilty of that offence and shall be liable to be proceeded against and punished accordingly. Explanation.—For the purpose of this section,—

(a) “Company” means anybody corporate and includes a firm or other association of individuals; and

(b) “Director” in relation to a firm, means a partner in the firm.

PENALTY FOR CONTRAVENTION OF PROVISIONS OF THIS ACT IN CASE OF IMPORT OF ARTICLES OF FOOD TO BE IN ADDITION TO PENALTIES PROVIDED UNDER ANY OTHER ACT

(1) Any person who imports any article of food which is in contravention of the provisions of this Act, rules and regulations made thereunder, shall, in addition to any penalty to which he may be liable under the provisions of the Foreign Trade (Development and Regulation) Act, 1992 (22 of 1992) and the Customs Act, 1962 (52 of 1962) be also liable under this Act and shall be proceeded against accordingly.

(2) Any such article of food shall be destroyed or returned to the importer, if permitted by the competent authority under the Foreign Trade (Development and Regulation) Act, 1992 (22 of 1992) or the Customs Act, 1962 (52 of 1962), or any other Act, as the case may be.

APPENDIX

BACTERIA AND OXYGEN

To grow, some bacteria require the presence of oxygen: these are classified as “aerobic”. Others that will not grow if oxygen is present are classified as “anaerobic”. There are also bacteria that can tolerate either condition.

Sometimes it is possible to deny bacteria the environment they favour. For example, the risk from aerobic- type bacteria can be reduced by vacuum packaging, i.e. the air is extracted from the wrapper containing the food.

BACTERIA AND ACIDS

Bacteria do not like acid and if enough is present in food they will not grow. The extent to which foods are acidic is measured on the “pH” scale.

A measurement of pH 7.0 denotes that a food is “neutral”. Bacteria grow best in neutral foods.

Measurements lower than pH 7.0 indicate that acid is present; the lower the figure, the more acid there is in the food. Foods measuring pH 3.7 or lower are known as “high acid” foods. Bacteria do not find such foods suitable for their growth.

Chicken (pH 6.3) is an example of a neat neutral food; grapefruit (pH 3.0) exemplifies the high acid foods that provide little scope for bacteria to grow.

Few foods are alkaline, i.e., have pHs above 7.0.

HYGIENE RULES

'WHAT SHOULD I DO?'		'WHY SHOULD I DO IT?'
<p>WASH YOUR HANDS</p> <ul style="list-style-type: none">• Before entering the food area• After using the toilet• Between handling raw meat/ poultry/ fish/seafood/ eggs• Before and after touching food• After coughing into your hands or using a handkerchief• After touching your face or hair• After carrying out any cleaning or handling rubbish		<p>To stop bacteria from spreading and contaminating food.</p>
<p>Avoid touching your nose or coughing or sneezing over food</p>		<p>Many of us carry <i>bacteria</i> in our nose and throats which can cause illness. Don't add your own bacteria to food</p>

Try not to touch food with your hands. Whenever possible use clean tongs to handle food and plates or trays to carry it



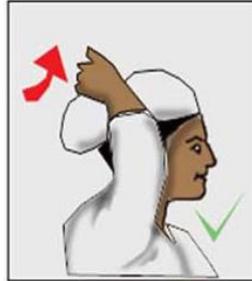
The less your hands are in direct contact with food, the less chance there is of contamination occurring

Avoid touching those parts of equipment that come into direct contact with food



Bacteria on your hands may be transferred to food via the equipment

Keep your hair covered with a net or hat and do not comb your hair in a food area



Your hair and scalp carry many bacteria that can fall into food

Keep finger-nails short and clean and do not wear nail polish



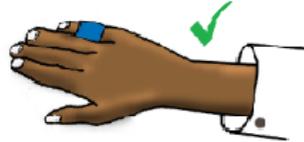
Bacteria can collect beneath long nails and get into the food you handle. Nail polish can come off in the food

Do not wear jewellery (watches, bangles, earrings and rings with stones).



Bacteria can collect on items of jewellery or stones or metal may fall into the food. Hand/wrist washing is more thorough if you do not wear a watch or bangles.

Keep cuts, grazes and boils covered with a waterproof bandage



Wounds such as these are often infected with bacteria. They must be properly covered to prevent the spread of bacteria.

Inform your supervisor if you have:

- A stomach upset
- Cough, cold or eye or ear discharges
- A sore or a wound (even if it is covered by a waterproof dressing)
- Family or close friends have diarrhoea



If you are suffering from any of these conditions you may contaminate food

Wear clean protective over-clothing



Your own clothing may carry bacteria

Do not smoke or eat in a food area



Bringing cigarettes or food to your mouth contaminates your hands. This spreads to food. Also, cigarette ash may fall into food

Keep raw and cooked ready-to-eat foods separate, especially raw meat/poultry and cooked meat/poultry



Raw foods can spread bacteria to other foods that will be eaten without further cooking. Keep raw and cooked ready-to-eat foods apart when handling and storing them

Keep food at the correct temperature during storage and preparation.



Ready-to-eat foods (e.g. meat, poultry, gravy etc.) provide bacteria with the nutrients and moisture needed to grow. Bacteria multiply at a very fast rate in the Temperature Danger Zone (5°C to 63°C)

Keep food covered whenever possible



To protect it against contamination

Always ensure that the workplace is clean before preparing food



Thorough cleaning is necessary to kill any bacteria already present

Only use clean equipment and clean thoroughly, before and after use.
Use clean wiping cloths

Equipment may have become contaminated by bacteria which can be transferred to food. Dirty cloths spread bacteria

Never mix different cleaning chemicals



This can make the mixture ineffective and may also produce poisonous gases

‘Clean as you go’. Any surfaces or equipment that have been in contact with raw food and any spillages must be cleaned up at once

Compile a cleaning schedule for the entire workplace

Find out about food safety controls in your workplace and carefully follow instructions relating to hazard analysis and safe food handling procedures

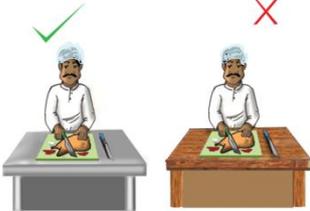


E. Coli

To avoid the risk of contamination

You should have a list of ALL tasks that must be done, how and by whom, and a timetable for doing them

All food handlers must play their part to reduce the risks of bacterial, chemical or physical hazards contaminating food because they could cause harm to the consumers

<p>Vehicles used for distribution of high-risk foods must always be insulated and refrigerated even for short journeys</p>		<p>High-risk foods are high in protein and moisture, requiring strict temperature control and protection from contamination.</p>
<p>Do not use wood tables in the work area. Instead use metal tables</p>		<p>Wood wears quickly, is absorbent and can develop cracks and crevices in which bacteria can lodge. It is therefore unsuitable for use as floors, work-surfaces or as items of equipment.</p>
<p>Decide in a Hazard Analysis, where the hazard can be controlled.</p>	<p style="text-align: center;">HACCP</p>	<p>The Critical Control Points are points during which the hazards can be controlled and eliminated</p>

GLOSSARY

1. **Allergens** are substances that cause the body's immune system to react, often within minutes but sometimes this can take hours. In severe cases, a person can have an anaphylactic reaction, which can be life threatening.
2. **Bacteria** are small living organisms often known as 'germs'. They are so small that it is impossible to see them without a microscope. Some bacteria cause illness such as typhoid fever or food poisoning.
3. **Chilling** is a process of reducing the temperature of foods to between 1°C and 4°C so that the growth rate of many germs is slowed down. It is used as a means to preserve foods for short periods of time.
4. **Clean-As-You-Go** applies to cleaning that must be done very quickly after soiling occurs. The aim is to prevent cross-contamination or injury to staff, or simply to keep working areas clean and tidy.
5. **Contamination** is the presence of substances not intentionally added to food. These can be physical, chemical or biological in nature.
6. **Cook- Freeze** is the process of the food rapidly being frozen immediately after cooking and then stored in freezers where it can remain for between 2 and 12 months depending on the particular food.
7. **Cook-chill** is a system of food preparation that involves food being rapidly chilled and then stored at a low temperature immediately after cooking.
8. **Critical Control Points:** When the hazards have been identified a decision is made as to where in the process each hazard can be controlled. The points or sections of the process at which hazards are controlled are known as Critical Control Points (CCPs).

9. **Cross-contamination:** The transfer of bacteria from a contaminated food to an uncontaminated (clean) food is called cross-contamination.
10. **Detergent:** are chemicals that will dissolve grease and assist the removal of food debris and dirt.
11. **Disinfectants** are chemicals designed to destroy bacteria. They reduce the number of bacteria to a safe level. Disinfectants are not effective in removing dirt and grease
12. **FEFO** (First Expiry First Out) is a system that is based on monitoring of temperatures. Temperatures vary greatly inside a storage room and even a few degrees difference can affect the shelf life of a product. By identifying temperature exposure of different lots, inventory management can be prioritized based on the remaining shelf life rather than on storage time.
13. **Fermentation** is the process of converting sugars to produce alcohols using yeast or bacteria. It is a method of food preservation.
14. **FIFO** (First in, First Out), means that foods should be used in the order that they are delivered.
15. **Food Handler:** Any person who directly handles packaged or unpacked food, food equipment and utensils, or food contact surfaces and is therefore expected to comply with food hygiene requirements.
16. **Food Hygiene** is the action taken to ensure the safety and suitability of food at all stages of the food chain.
17. **Food labelling:** Is a means of communication between the producer and seller of food on one hand, and the purchaser and consumer of the other. It can be written, electronic, or graphic communications on the packaging or on a separate but related label. The symbols used on package labels are generally internationally standardized.
18. **Food packaging:** Is the enclosing of food to protect it from damage, contamination, spoilage, pest attacks, and tampering during transport, storage, and sale.

19. **Food poisoning:** Food Poisoning is a common, often mild but sometimes very serious illness resulting from eating contaminated food or drink. The main symptoms are diarrhoea and/or vomiting, often accompanied by nausea (feeling sick) and stomach pain.
20. **Food Preservation** is the treatment of food to prevent or delay spoilage and inhibit growth of microorganisms which would make the food unfit.
21. **Food safety** is the assurance that food will not cause harm to the consumer when it is prepared and /or eaten according to its intended use.
22. **Food safety management** is the application of food policies, systems and processes in a food operation in order to prevent food borne illnesses and protect consumer health.
23. **Food spoilage bacteria** are a group of bacteria that can cause food to smell, lose texture, flavour and generally to decay.
24. **Freezing** is the process of lowering the temperature of food to below its freezing point so that a proportion of the water in the food changes state to form ice.
25. **HACCP (Hazard Analysis Critical Control Points):** A systematic approach to identification, evaluation and control of food safety hazards.
26. **Hazard** is a biological, chemical, or physical agent in a food, with the potential to cause an adverse health effect.
27. **High-risk foods** are ready to eat foods that under unfavourable conditions support the multiplication of pathogenic bacteria and are intended for consumption without further treatment that would destroy such organisms.
28. **Hygiene control** is the adaptation of practices which will reduce the risk of clean food becoming contaminated.
29. **Low-Risk Foods** are foods are rarely implicated in food poisoning and may be stored, suitably packaged, at ambient

temperatures. They do not support multiplication of food poisoning bacteria.

30. **Microorganisms** are small organisms that can be seen only through a microscope. The most common types of microorganisms are bacteria and viruses.
31. **Moulds** are microorganisms that are often hairy in appearance, and grow on food such as bread, jam and fruit. Under the microscope, moulds appear like a network of thread-like cell material
32. **Pasteurization** is a method of destroying bacteria by rapidly heating the food to a sufficiently high temperature for a specified period of time.
33. **Pathogens** are organisms that cause diseases.
34. **Pests** are creatures commonly found in places where food for human consumption is prepared or stored. They are capable of directly or indirectly contaminating food.
35. **Protozoa** are single-celled organisms which form a basis of the food chain. Some of them are pathogenic and can result in diarrhoeal illness and intestinal discomfort of varying sensitivity.
36. **Safe food** is food which is free of contaminants and will not cause illness, harm or injury.
37. **Sanitizers** are chemicals combining the role of both detergent and disinfectant. They are designed to remove grease, dirt and destroy microorganisms by disinfecting at the same time.
38. **Scheduled Cleaning:** Refers to cleaning tasks carried out at regular intervals. Food businesses should have a timetable which specifies all the details for every piece of equipment to be cleaned and all parts of the structure to be cleaned.
39. **Spores** are thick walled protective structures formed by certain bacteria to protect their cells. This protection allows the organisms to remain alive, but inactive in situations that normally would kill them.

40. **Temperature Danger Zone** is the range of temperatures between 5 to 63°C, at which most bacteria multiply rapidly. Food has to be kept out of the temperature danger zone.
41. **Toxins** are poisons produced by some bacteria as they grow in food or in the intestine.
42. **Traceability** is the ability to trace the history, application, or location of an item or activity with the help of documentation. Food businesses must be able to trace foods or any substance that is intended to be part of a food throughout all the stages of production, processing and distribution.
43. **Viruses** are small living organisms that are smaller than bacteria and can be seen only under a very powerful microscope. Some viruses can cause foodborne illness like gastroenteritis and hepatitis A.
44. **Yeasts** are single living cells that need food, moisture, warmth and time to growth. They are used in baking and fermenting alcoholic beverages. Though they do not cause food poisoning, they can spoil food and drinks which contain lots of sugar.

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