foodsafety

Overview of presentation

- **Food safety**
- **Implications of unsafe food**
- **How to eliminate P/C/B hazards**
- **Food hygiene/Temp Control/Pest Control/Personal hygiene/Food storage/Cleaning/Allergens** *21*
- **AI in Food Processing**
- **Food Safety Standards** *21-30*
- Certifications – Food Safety
- FSMS/ ISO22000/HACCP/TACCP/HARPC
- BRC/FSSC/Kosher/HALAL
- Certification Agencies in India (HACCP/FSMS) *30-40*
- Principles of HACCP
- Elements of ISO 22000:2018 *60*
- Q/A

Who is at risk?

- Infants
- Toddlers
- Elderly
- Pregnant women
- Immunocompromised
- Taking specific medications

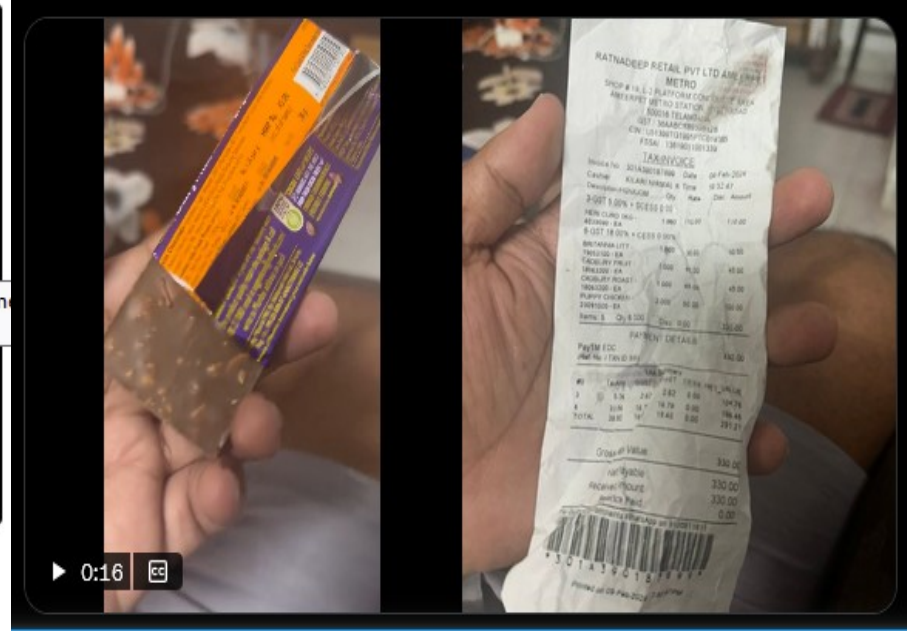
FOOD SAFETY

- Safety – prevention / protection from illness / sickness / injury,
- Food safety- illness/sickness arising from consumption of food
- Foodborne illness - Caused by eating contaminated foods or beverages

Lack of safety precautions / procedures can lead to *Hazards*
(Hazard: source of illness, injury, sickness..)

Understanding the hazards and methods for their control is important for food safety

A Ghaziabad sweet shop faces backlash after a customer found a frog leg in a samosa. (X/@SachinGuptaUP)



The IndiGo passenger allegedly discovered the metal item in his food after de-boarding. The airline has also shared a statement regarding the same. हिंदी में पढ़ें

Toshita Sahni | Updated: February 14, 2024 10:40 IST

Read Time: 2 min

A Reddit user recently claimed that they found a small metallic object in their flight food

Photo Credit: Reddit/ Macaroon1l3601

New Delhi/Tirupati: The country's foo safety regulator has issued a show cause notice to a Tamil Nadu-based firm for allegedly supplying substandard ghee to temple authorit Tirumala Tirupati Devasthanam eve as the chorus for a thorough probe and strict action over the alleged use of animal fat in Tirupati laddus grew louder. On Monday, a four-hour ritualistic sanitisation was carried out at the revered shrine to propitiate Lord Venkateswara Swamy after alleged "sacrilegious practices such as mixing animal fats" in making Tirupati laddus (consecrated sweet) and others, temple sources said.

A Man Died After Eating a Bag of Black Licorice Every Day

Doctors at Massachusetts General Hospital said the unusual case highlighted the risk of consuming too much glycyrrhizic acid, which is found in black licorice.

Share full article

The black and chewy candy contains glycyrrhizic acid, a plant extract that can lead to high blood pressure if consumed in large doses. Anoek De Groot/Agence France-Presse — Getty Images

HAZARDOUS SUBSTANCES

Physical

- Hair
- Pin
- Stone
- Glass
- Metal piece
- Jewellery
- Buttons
- Safety pins
- Nut/bolt/washer
- Eqpt. part

Chemical

- **Detergent**
- **Pesticides**
- **Water pollution**
- **Air pollution**
- **Lubricant oil**
- **Heavy metals**
- **Toxins**
- **Veterinary drugs**

Biological

- Insects
- Rodents
- Flies
- Excreta of …
- Microorganisms
- Bacteria
- Fungus
- Virus

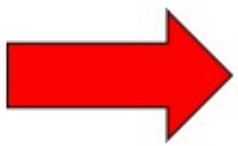
eliminate the hazards – reduce the risks

Food Poisoning

Bacteria are the major cause of food poisoning. Illness is caused by the presence of specific bacteria or their toxins, either in or on food.

Symptoms of Food Poisoning

- Vomiting
- Diarrhea
- Nausea
- Fever



Type of Foods that are considered "High Risk" in terms of food poisoning

- High protein foods such as meat and poultry
- Dairy products
- Eggs and egg products
- Soups, stews, stocks
- Rice
- Any product that requires refrigeration to prevent it from spoiling

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Methods to Prevent / eliminate hazards

Physical

- Cleaning
- Magnetic separator
- Maintenance of eqpt./ building /utilities/instruments
- Hair nets, masks, gloves, uniform
- No jewellery

Chemical

- Cleaning/washing, sanitizing
- Check quality of water
- GAP
- Labelled and designated storage of chemicals
- Ventilation
- Air curtains

Biological

- Building
- Pest control
- Fly killers
- Rat baits
- Time
- Temperature
- Acidity
- Oxygen
- Moisture

PRP/oPRP/CCPs

BASIC RULES OF HYGIENE, SANITATION AND SAFETY IN FOOD PROCESSING

Facilities required in the processing room

A changing room where clothing and shoes that are not worn for work can be stored. Separate hand-washing facilities for staff, with soap, clean water, nail brushes and clean towels or hot-air hand dryers. Hand-washing facilities should not be used for washing equipment.

- Toilets, which should be separated from the processing room by two doors or located in a nearby building.
- First aid materials.
- Protective aprons or coats washed regularly, hats/hairnets, and if necessary, gloves and shoes/boots.
- Cleaning chemicals, stored away from the processing room.

Hygiene and sanitation

Personal hygiene

- Wear a hat/hairnet that completely covers the hair. Do not comb your hair in a processing room or storeroom.
- Cover all cuts, burns, sores and abrasions with a clean, waterproof dressing.
- Do not smoke or eat in any room where there is open food because bacteria can be transferred from the mouth to the food.
- Do not spit in a processing room or storeroom.
- Wash hands and wrists thoroughly with soap after using the toilet, eating, smoking, coughing, blowing your nose, combing your hair, handling waste food, rubbish or cleaning chemicals. Dry them on a clean towel before handling food again.
- Keep finger nails cut short.
- Do not wear perfume or nail varnish as these can contaminate products.
- Do not handle any food if you have sores, boils, septic spots, a bad cold, chest infection, sore throat or a stomach upset. Report any of these to the manager and do alternative work.
- Do not cough or sneeze over food.

General principles of Food Hygiene

- Primary production
- Establishment: design and facilities
- **Control of operation**
- Establishment: maintenance and sanitation
- Establishment: personal hygiene
- Transportation
- Product information and consumer awareness
- Training

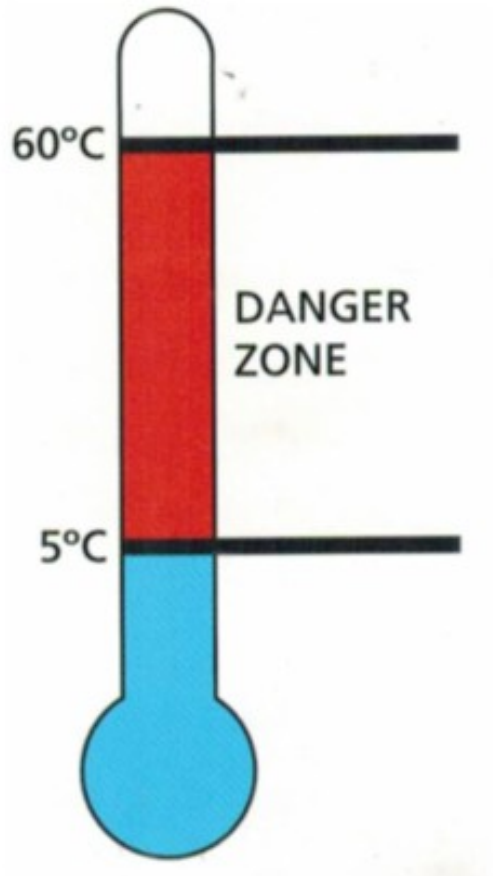
Temperature Control

Temperature

Temperature is the main method used to control the level of bacteria in foods.

Danger Zone

The temperature range within which the bacteria grows rapidly is between 5°C and 60°C. This is known as the danger zone. Below 5oC, bacteria grow more slowly and above 60oC, bacteria start to die.



Temperature Control

Temperature requirements

- Cold food must be kept at less than 5°C
- Frozen food shall remain hard frozen and at less than -18°C.
- Cooked food should be heated to a temperature of over 75°C.
- During cooling, food products must be cooled from 60°C to 21°C within 2 hours and from 21°C to less than 5°C within a further 4 hours.

➢ **Keep Hot Food Hot and Cold Food Cold**

Pest Control

Pest control to be undertaken by licensed agency.

Employees should not interfere with pest control activity.

Do not touch rat bait stations or any other pest control device.

Be aware of the pests and record any sighting of the pests like cockroaches, rodents and mice, flies, fruit flies, moths, ants etc.

Sometimes actual pests may not be visible, but evidence of their presence in the form of droppings, excreta, broken packaging etc. may be noticed.

Do not allow entry and breeding of pests in processing and storage areas.

PERSONAL HYGIENE (Food handlers, workers)

- **Food handlers must be clean and tidy and must wear a clean uniform, protective clothing and head wear**
- **Hair – clean, tied back and covered**
- **Disposable gloves to handle high risk foods**
- **Watches, earrings, nose rings/pins, rings, chains, necklaces not allowed.**
- **Fingernails short and clean**
- **Hand wash stations to be provided with soap, paper towel/dryer and hot water.**

When to wash hands

Wash hands after

- Handling garbage
- Handling raw food
- Using the toilet
- Sneezing, coughing and using a handkerchief or tissue
- Carrying out cleaning duties
- Eating or smoking

Wash hands before

- Before starting any food handling activities

Workers suffering from diarrhea, vomiting, flu, fever, etc. not permitted to work

Food Storage

Dry

- Cool dry and well-lit rooms.
- Product shall be stored off the floor and away from walls.
- Rotate stock – First In First out
- Ensure shelving is cleaned regularly

Cold rooms and Fridges

- Ensure temperature is less than 5°C
- Store raw products beneath cooked or 'ready to eat' foods
- Cover, label and date all foods.
- Keep cold rooms, fridges clean

Freezers

- Ensure temperature is less than -18°C
- Cover, label and date all foods
- Defrost and clean freezer regularly

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Food Storage

2 – HOUR – 4 HOUR RULE

Products in the temperature danger zone

- **For less than 2 hours – may be returned to cold storage, cooked or consumed.**
- **From 2 hours to 4 hours – must be cooked, consumed or discarded.**
- **For more than 4 hours – must be discarded.**

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CLEANING

All premises need to be kept clean and tidy

- Clean to remove soil and dirt and sanitise to kill bacteria.
- Cleaning procedures should be available describing how to clean the equipment and the structure of the facility.
- Cleaning chemicals should be stored away from work areas and from food and packaging storage areas.
- Record all cleaning activities in the cleaning report.

Keep surfaces in good condition so they are easy to clean

- Fix broken tiles
- Avoid wooden shelves
- Repair damaged junction seals
- Repair and eliminate rust on any surface

Cleaning will ensure

- Cross contamination is reduced and minimised
- Bacteria does not grow on the surfaces
- Quality of the product or process is of high standard

Waste disposal

- Waste is an easy breeding ground for bacteria and pests
  - Waste shall not be allowed to stay inside the food preparation premises.
  - It shall be routinely removed and disposed of properly, following the norms

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Allergens

Following foods are allergic and may not be suitable for many individuals. Allergic foods may cause mild to severe sickness.

- Peanuts and their products
- Tree nuts and their products
- Shell fish, crustacean and their products
- Finned fish and their products
- Milk and milk products
- Eggs and egg products
- Sesame and sesame products
- Cereals containing **gluten** and their products (Wheat, rye, barley, oats and their products)
- Soybeans and their products
- Added sulphites in concentrations of 10 ppm (10 mg/kg) or more

An allergen is **a substance that can cause an allergic reaction**. In some people, the immune system recognizes allergens as foreign or dangerous. As a result, the immune system reacts by making a type of antibody called immunoglobulin E (IgE) to defend against the allergen.

The allergic reaction to food is caused by **a protein** in the food that the immune system mistakenly believes is harmful.

The 14 allergens are: **celery**, **cereals containing gluten** (such as wheat, barley and oats), **crustaceans** (such as prawns, crabs and lobsters), **eggs**, **fish**, **lupin**, **milk**, **molluscs** (such as mussels and oysters), **mustard**, **peanuts**, **sesame**, **soybeans**, **sulphur dioxide and sulphites** (if they are at a concentration of more than ten parts per million) and **tree nuts** (such as almonds, hazelnuts, walnuts, brazil nuts, cashews, pecans, pistachios and macadamia nuts).

This also applies to additives, processing aids and any other substances which are present in the final product.

Food Hygiene can prevent illness

FOOD SAFETY STANDARDS

- Microbiological contamination (pathogens, coliforms, TPC, Yeasts and Molds)
- metal contaminants (heavy metals)
- mycotoxins
- residues (pesticide residues)

Food Safety Standards Authority of India

Microbiological analysis - pathogens

Microbiological analyses are extremely sensitive: just a single infectious particle may be detected in volumes of up to 1000 l of water.
The weight of a bacterium is in the order of 10^{-12} g;
the weight of a virus may be as low as 10^{-17} g.
Hence, **the limit of detection is between 10^{-15} and 10^{-20} g l^{-1}**.

Contaminants, Toxins and Residues

Metal elements (in foods not specified) upper limit; FSSAI

Lead	–	**2.5 ppm**
Copper	-	30 ppm
Arsenic	–	**1.1 ppm**
Tin	-	250 ppm
Zinc	-	50 ppm
Cadmium	–	**1.5 ppm**
Mercury	–	**1.0 ppm**
Methyl Mercury	–	**0.25 ppm** (calculated as the element)

Chromium	–	**Refined Sugar**	**– 20 ppb**
Nickel	–	**1.5 ppm**	

All hydrogenated, partially hydrogenated, inter-esterified vegetable oils and fats such as vanaspati, bakery and industrial margarine, bakery shortening

Mycotoxins are toxic compounds produced by certain types of fungi that can contaminate food and cause adverse health effects in humans and animals:

Regulatory limits of mycotoxins

Toxin	Article of food	Limit µg/kg (FSSAI)
Aflatoxin	Cereals, pulses and products	15.0
	Ready to eat products	10.0
	Oilseeds, nuts	15.0
	Spices	30.0
Aflatoxin M1	Milk	0.5; 0.05 (EU)
Patulin	Apple juice	50.0
Ochratoxin A	Wheat, barley and rye	20.0
Deoxynivalenol	Wheat	1000.0

US FDA and EU have more stricter regulatory requirements for mycotoxins.

Residues (Insecticides, Herbicides, Fungicides)

- 567 formulations of 272 insecticides - registered in India.
- More than 150 combinations are also registered
- Worldwide, more than 1200 active substances are registered for pesticides production. *Pesticides can be classified into more than 100 classes/groups, for example, Carbamates, Triazines, Pyrethroids, Organophosphates, Organochlorines, Phenoxy alkane Pesticides, Pesticides based on glyphosate….*
- Organochlorines, organophosphates, carbamates and pyrethroids
- Tolerance limits of the residues (insecticides, herbicides, fungicides) on crop, food commodities are prescribed under regulations. Also called MRLs

FSSAI Tolerance Limits - Residues

Name of the insecticide	Crop/commodity	Tolerance limit (mg/kg or ppm)
Aldrin, Dieldrin	Food grains	0.01
	Milled foodgrains	Nil
Fenitrothion	Food grains	0.02
	Milled foodgrains	0.005

FOOD SAFETY MANAGEMENT SYSTEMS

Make food safe
PREVENT HEALTH HAZARDS
Reduce wastage of food
Improve compliance to regulations
Promote export

ISO 22000 certification

ISO 22000 is a Food Safety management System that can be applied to any organization in the food chain, farm to fork, irrespective of manufacturing or service industry involved in food and beverage service, food and beverage trading, food and beverage warehousing, food and beverage transportation and food packaging, involved in Agriculture, Aquaculture, Horticulture, Fruits and Vegetables, Dairy Products, Meat and Meat Products, Fish and Fishery products, Spices and Condiments, Nuts and Nut products, Cereals, Bakery and Confectionery, restaurants, Hotels, Fast Food Operations.

ISO 22000 combines and supplements the core elements of ISO 9001 and HACCP to provide an effective framework for the development, implementation, monitoring and continual improvement of a documented FSMS.