FOOD SAFETY & HYIGENE GUIDE

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Foreword

"Let your food be your medicine, and your medicine be your food" –Hippocrates

Food is any substance consumed to provide nutritional support for the body and can be of plant or animal origin. It is a fundamental need and a prerequisite to good health. Importantly, food should be free from contaminants such as microorganisms and chemicals which are a risk to the health of the consumer. Unsafe food containing harmful micro-organisms or chemical contaminants causes diseases - ranging from diarrhoea to cancers. Therefore, it is imperative to prevent the possible food hazards arising than to simply monitor food at the point of sale or consumption.

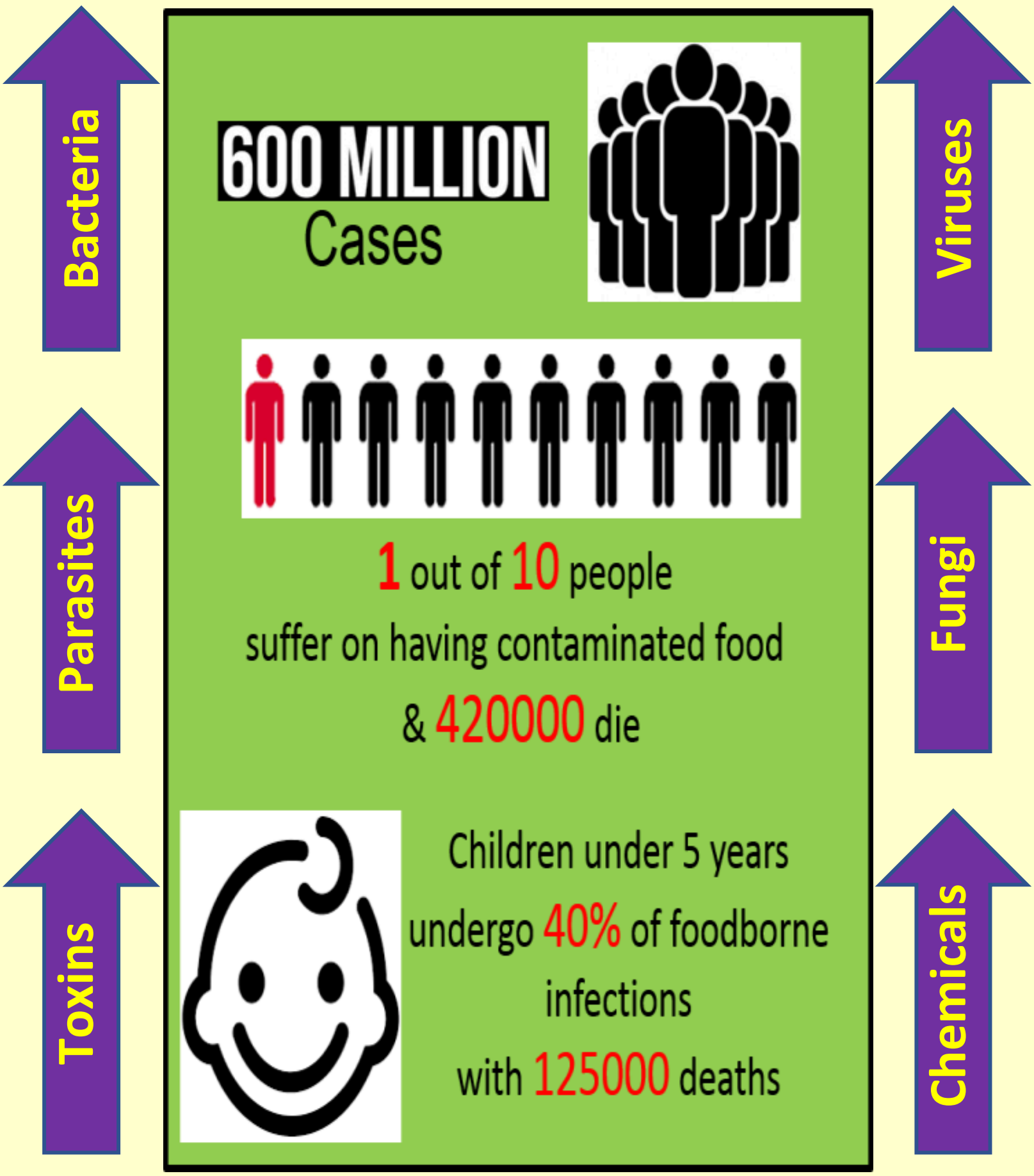
"Food safety involves everybody in the food chain"- Mike Johanns, which means that protection of food from all hazards is a shared responsibility betweengovernments, producersand consumers.

Keeping in view this year's theme 'Safe food today for a healthy tomorrow' on World Food Safety Day 2021, this booklet aims to provide comprehensive overview and handy information on food control systems to address food hygiene and safety along the food supply chain. This handbook is consumer oriented and covers contents describing practices that protect food from being unsafe to eat. It describes the concepts related to food safety and quality, the observance of preventive measures with a focus on production and consumption of safe food for immediate andlong-term benefitsforconsumers.

Food safety: A public health priority

Food containing harmful bacteria, viruses, parasites or chemical substances-a cause of more than 200 diseases from diarrhoea to cancers.

Foodborne diseases hamper socioeconomic development, medical and health care systems, and retard trade and tourism.



Source: World Health Organisation

What is Food Poisoning?

- Food poisoning is an acute illness, usually of sudden onset, caused by eating contaminated or poisonous food.
- The symptoms normally include abdominal pain, diarrhea, nausea, vomiting and fever.

High-Risk Foods

- Cooked poultry
- Cooked meats
- Dairy produce
- Dishes with Eggs
- Fish and sea food
- Cooked rice
- Soups, gravies and stocks

Low-Risk Foods

- Dried or pickled foods
- Chemically-preserved foods
- Foods with high sugar content
- Food with high salt content

Important factors influencing microbial food spoilage are temperature, pH levels, and moisture of the food.
Temperature range, 40°F–40°F (Danger Zone),

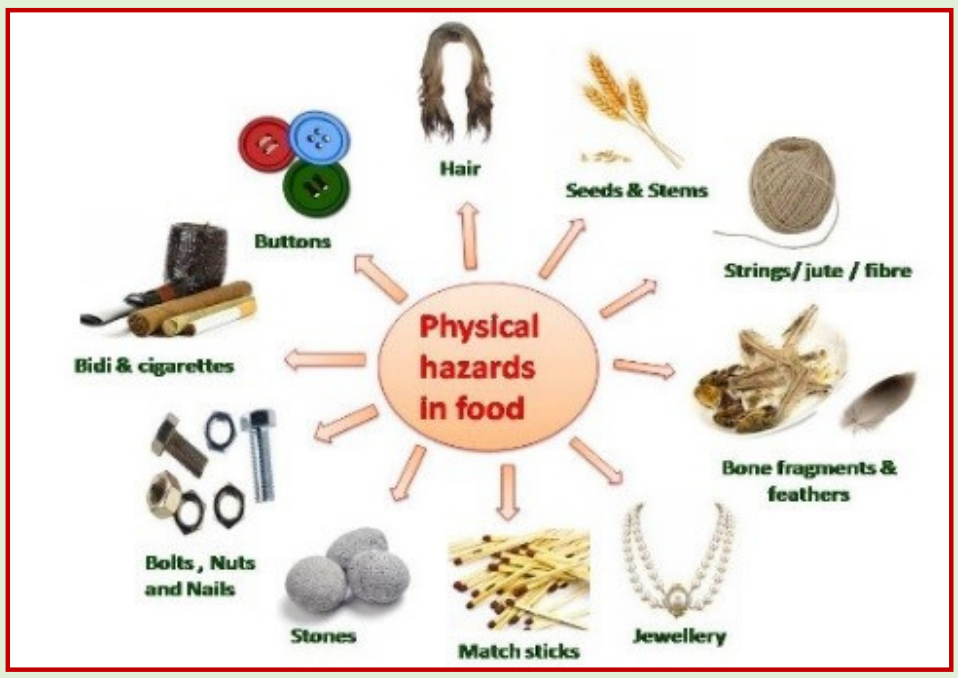
bacteria doubling its number in 20 min.

Foods that are less acidic like milk, enable bacterial growth at higher rates than acidic foods, like lemon juice.

Food-borne hazards

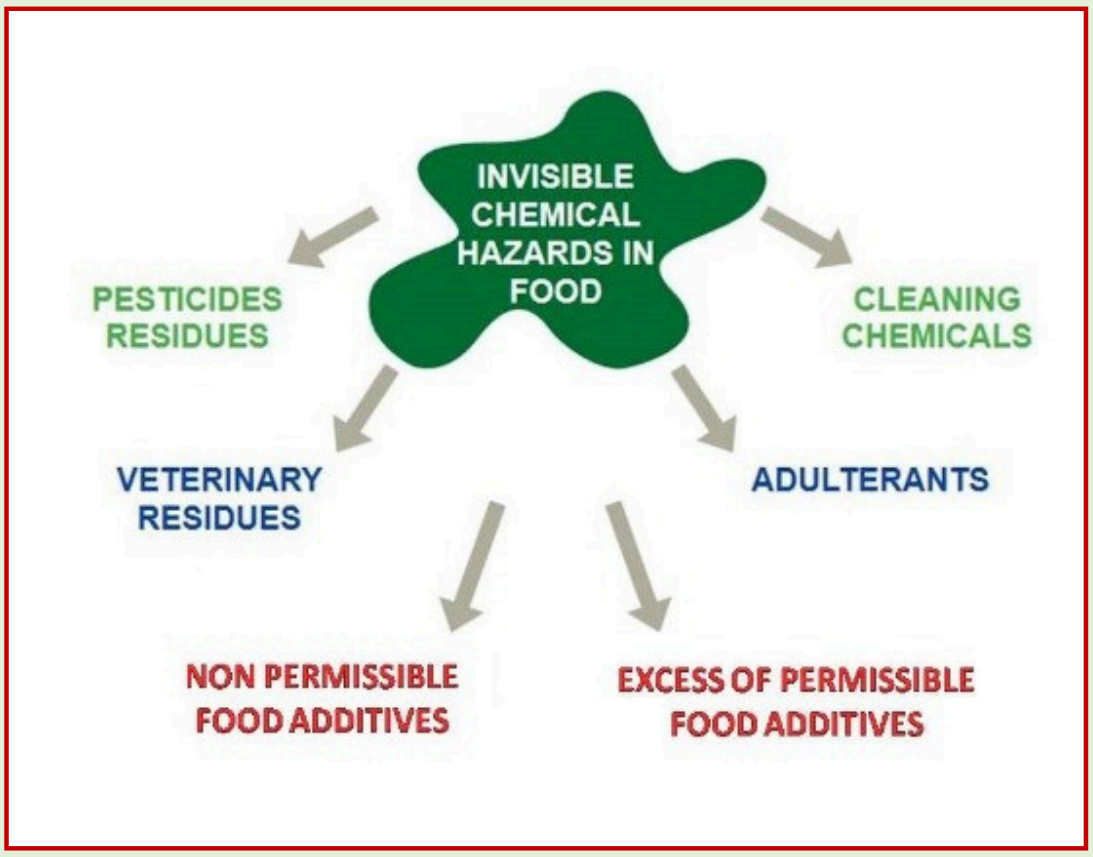
Physical Hazards

- Occurs when a foreign object gets into food accidentally, or natural objects are left in food.
- Occurs in food by contamination or introduced during food handling / food processing.



Chemical Hazards

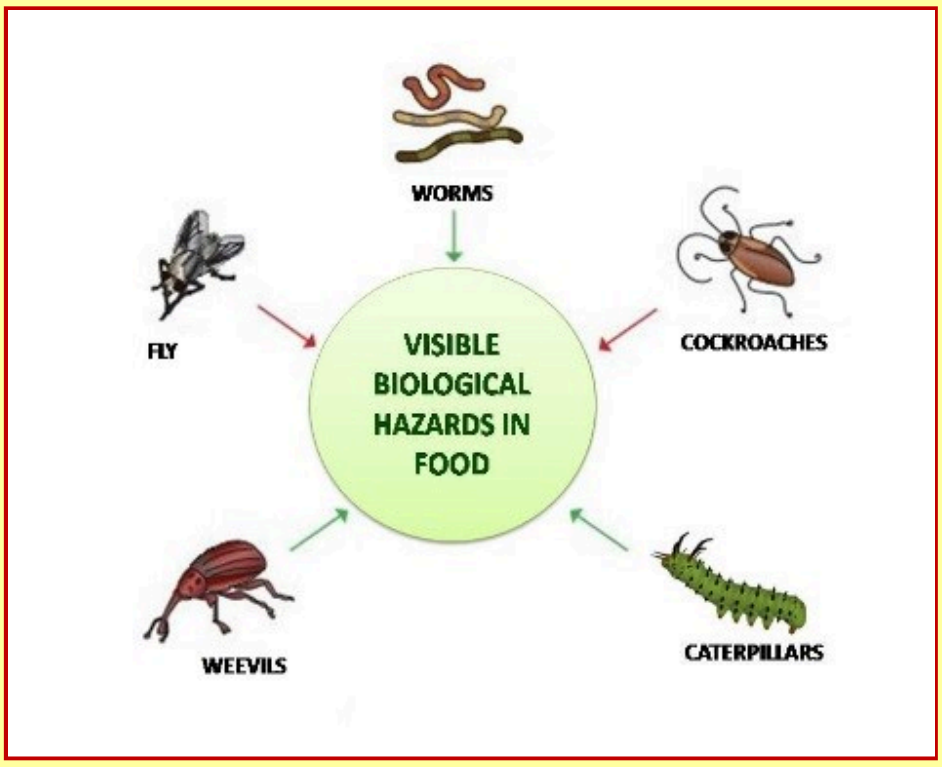
- Occur in food naturally, e.g. mycotoxins, marine biotoxins, cyanogenicglycosides, mushroom toxins
- Maybe intentionally added chemicals, such as preservatives or unintentionally added chemicals like pesticides, toxic metals, PCBs etc.

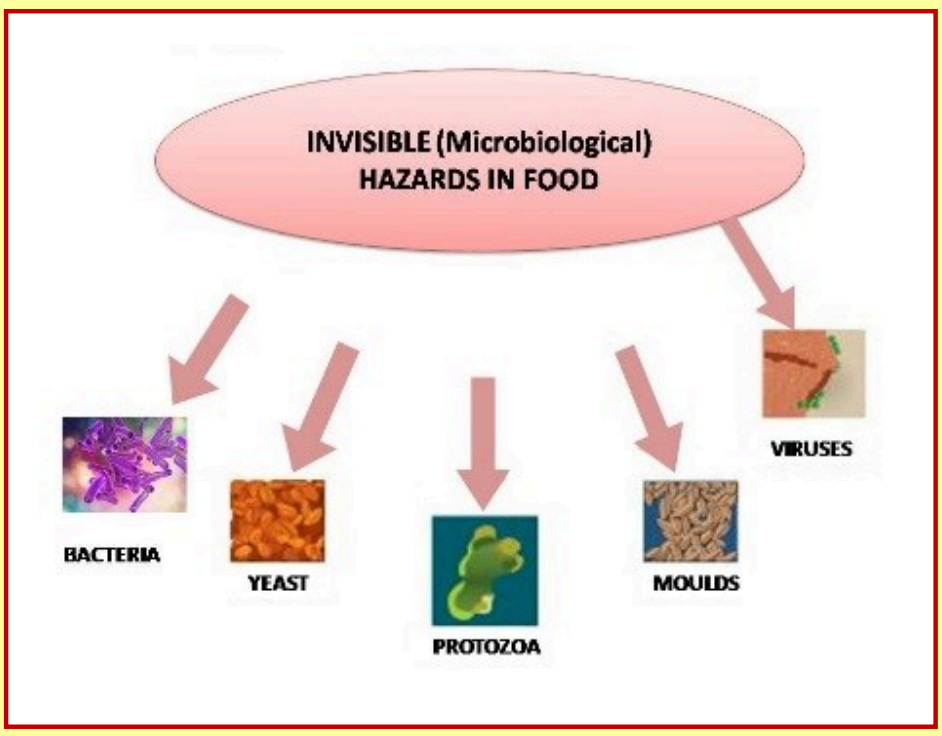


Food-borne hazards

Biological hazards

- Contamination of food by microorganisms like bacteria, viruses, fungi or parasites.
- Found in air, food, water, animals, and human body



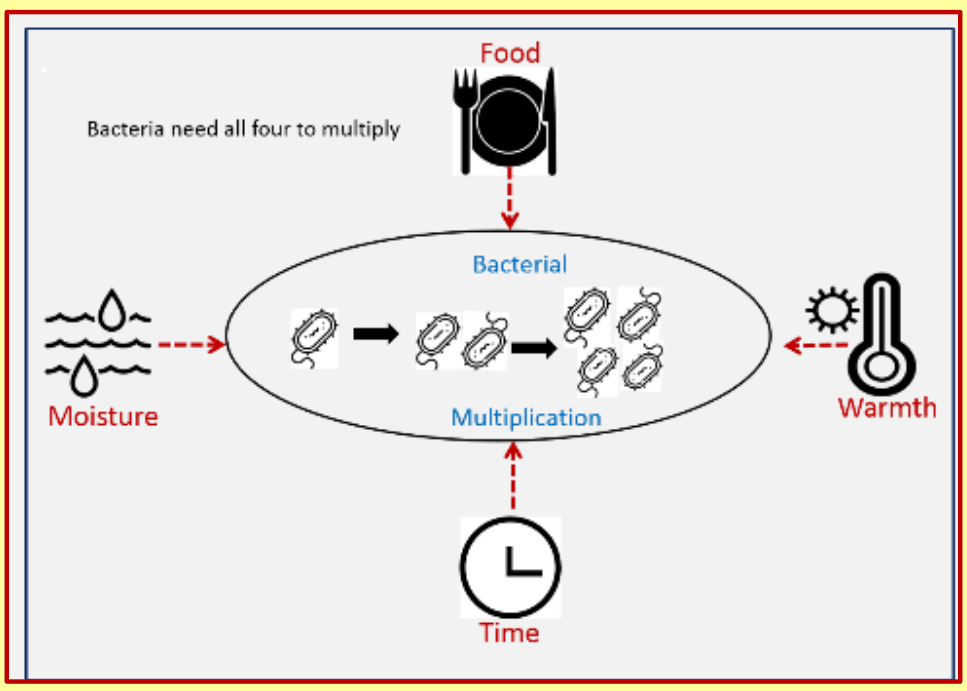


Food infection:
Ingestion of viable pathogens along with food leading to lodgement of pathogens in consumers' organ(s).

Food intoxications:
Ingestion of toxins already produced by microorganisms in the food.

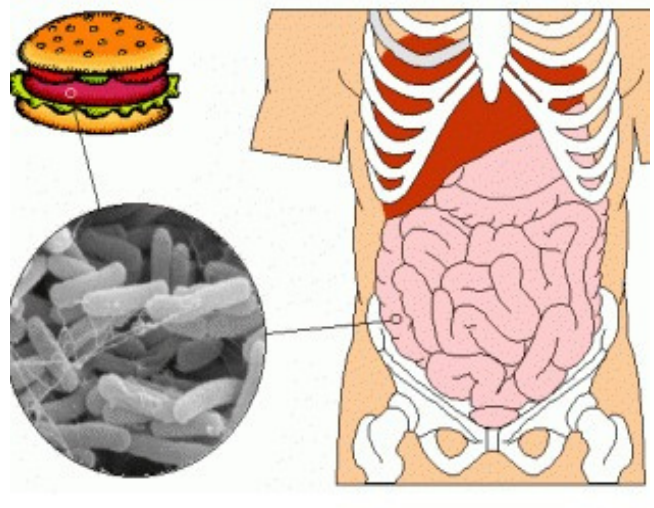
Toxi-infection:
Ingestion of microbes along with food, which then produce toxins *in situ* to bring about symptoms of poisoning.

Microbes prefer warmer, wetter environments, which make moist foods hotbeds for microorganism growth



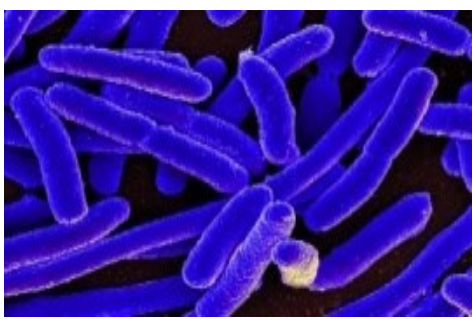
Transmission Sources

- Consumption of contaminated food, person-to-person body contact, or aerosols.
- Consumption of food contaminated either from an infected food handler during preparation or by contact with sewage, sewage sludge or polluted water
- Consumption of fish and shellfish harvested from sewage-polluted waters
- Contamination of fruits and vegetables fertilized with sewage sludge or irrigated with sewage-contaminated water
- Consumption of contaminated water and ice, or their use in food preparation
- Consumption of raw milk, partially cooked meat, or other products from infected animal
- Contamination of kitchen shelves, utensils or food by insects like cockroaches, lizards, and flies.
- Consumption of ready to eat foods contaminated after preparation or during storage at inappropriate temperature.



Ten Main Reasons for Food Poisoning

1. Food prepared too far in advance, and stored at warm temperature.
2. Storing hot food below 63°C.
3. Cooling food too slowly prior to refrigeration.
4. Not reheating food to high enough temperatures to destroy food poisoning bacteria.
5. Use of cooked food contaminated with food poisoning bacteria.
6. Under cooking.
7. Not thawing frozen poultry and meat for sufficient length of time.
8. Cross-contamination from raw food to cooked food.
9. Infected food handlers.
10. Use of leftovers.



Type of food viruses	Main source	Onset time
Hepatitis A	Shellfish, water, cooked foods after contact with infected food handler; fish from contaminated waters	15 to 50 days
Noroviruses	Contaminated water, food, or food contact surf aces	24 to 72 hours

Bacterial Foodborne illness chart

Food borne bacteria	Foods Involved	Onset Time
Bacillus cereus (toxico-infection)	cereal products, rice, custards, sauces	upto24 hours
Campylobacter jejuni (infection)	raw milk; poultry; beef liver; raw clams; contaminated water	2 to 5 days
Clostridium botulinum (intoxication)	home-canned low-acid food; garlic and oil mixtures; vacuum packed fish; marine mammals	18 to 36 hours
Clostridium perfringens (toxico-infection)	cooked meat; poultry; gravy; sauces; soups	8 to 22 hours
Escherichia coli O157:H7 (toxico-infection)	soft unpasteurized cheese; contaminated water; any undercooked animal-source foods, especially hamburger	24 to 72 hours
Listeria monocytogenes (infection)	unpasteurized milk; soft cheeses; undercooked poultry & meats; unwashed raw vegetables	2 to 70 days
Salmonella (Infection)	poultry, eggs, other food contaminated by feces of infected humans and other animals	12-36 hours, maybe6 to 72 hours
Shigella Infection	moist prepared foods, salads; raw fruits and vegetables; unpasteurized milk and dairy products; poultry	12 to 50 hours
Staphylococcus (intoxication)	ham; meat; poultry; cream-filled pastry; food mixtures; leftover foods	2 to 4 hours
Vibrio parahaemolyticus (infection)	undercooked or raw seafood, such as shellfish	4-96 hours
Yersinia (infection)	meats (especially pork, beef and lamb); tofu; oysters; fish; ice cream; powdered milk; unpasteurized milk; raw vegetables; soy products	24 to 48 hours

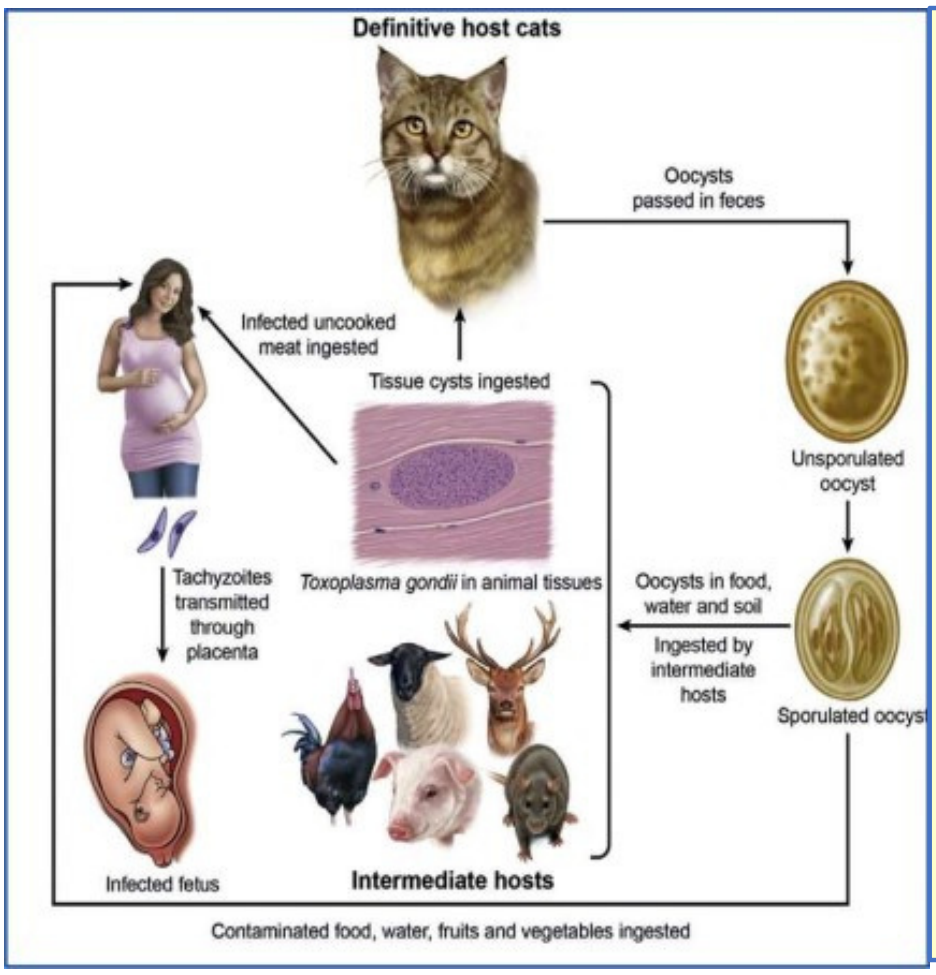
Parasites and Foodborne illness

Common foodborne parasites

Cryptosporidium parvum, Giardia spp, Cyclospora, Toxoplasma gondii, Trichinella spiralis, Anisakis Diphyllobothrium, T*aenia saginata*, *Taenia solium*

Transmission of parasites

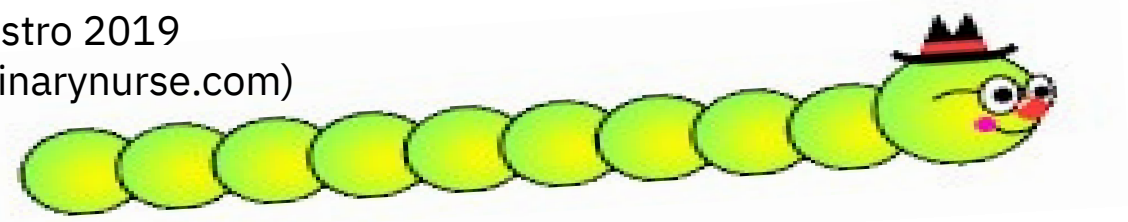
- Consumption of contaminated food, water, under-cooked meats, fish, crabs and mollusks
- Eating raw vegetables contaminated by human or animal feces
- Eating raw aquatic plants, such as water chestnuts and watercress etc.
- Touching hands to your mouth after gardening, handling infected pets, cleaning a pet's litter box, or anything that has come into contact with feces
- Mother-to-fetus



Picture source: Castro 2019 (https://www.the veterinarynurse.com)

For prevention of toxoplasmosis, pregnant women and immunocompromised people should avoid:

- Unpasteurized milk
- Raw or under-cooked meat/eggs
- Contact with cat faeces and soiled cat litter

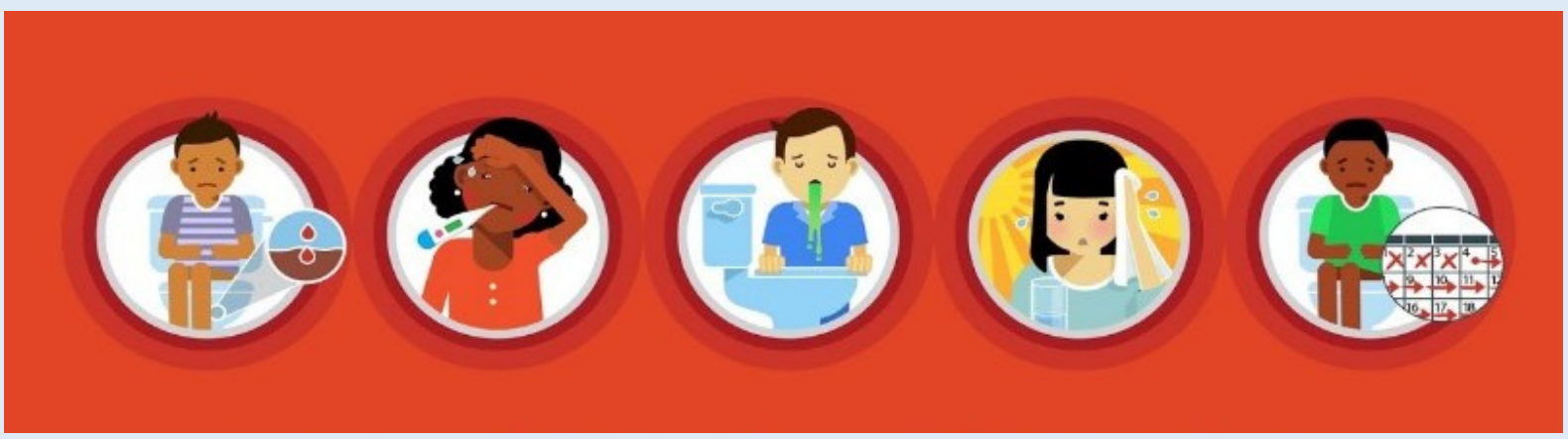


Symptoms of Foodborne Illness

Fever, Abdominal Pain
Stomach cramps
Diarrhoea
Nausea, Vomiting
Malaise

Signs of severe food poisoning

- Bloody diarrhea
- High fever (temperature over 102°F)
- Frequent vomiting
- Diarrheathat lasts more than 3 days
- Signs of dehydration, including little or no urination, a very dry mouth and throat, or feeling dizzy when standing up



People With a Higher Risk of Food Poisoning

Aged People

Nearly half of people aged 65 and older suffering from foodborne illness due to *Salmonella, Campylobacter*,*Listeria*or *E. coli* need hospitalization (CDC,USA).

Children Younger than 5 Years

Childrenyounger than5are threetimes morelikelytobehospitalized from *Salmonella*infection.1outof7children underage5with*E.coli*O157infection sufferfromkidneyfailure(CDC,USA).

People with Weak Immune System

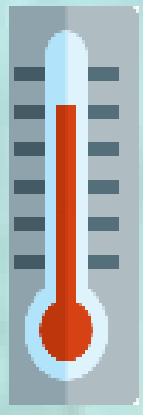
Theseincludepersonswith chronic diseases,diabetes,liveror kidney disease,alcoholism,HIV/AIDS;or under chemotherapy or radiation therapy

Pregnant Women

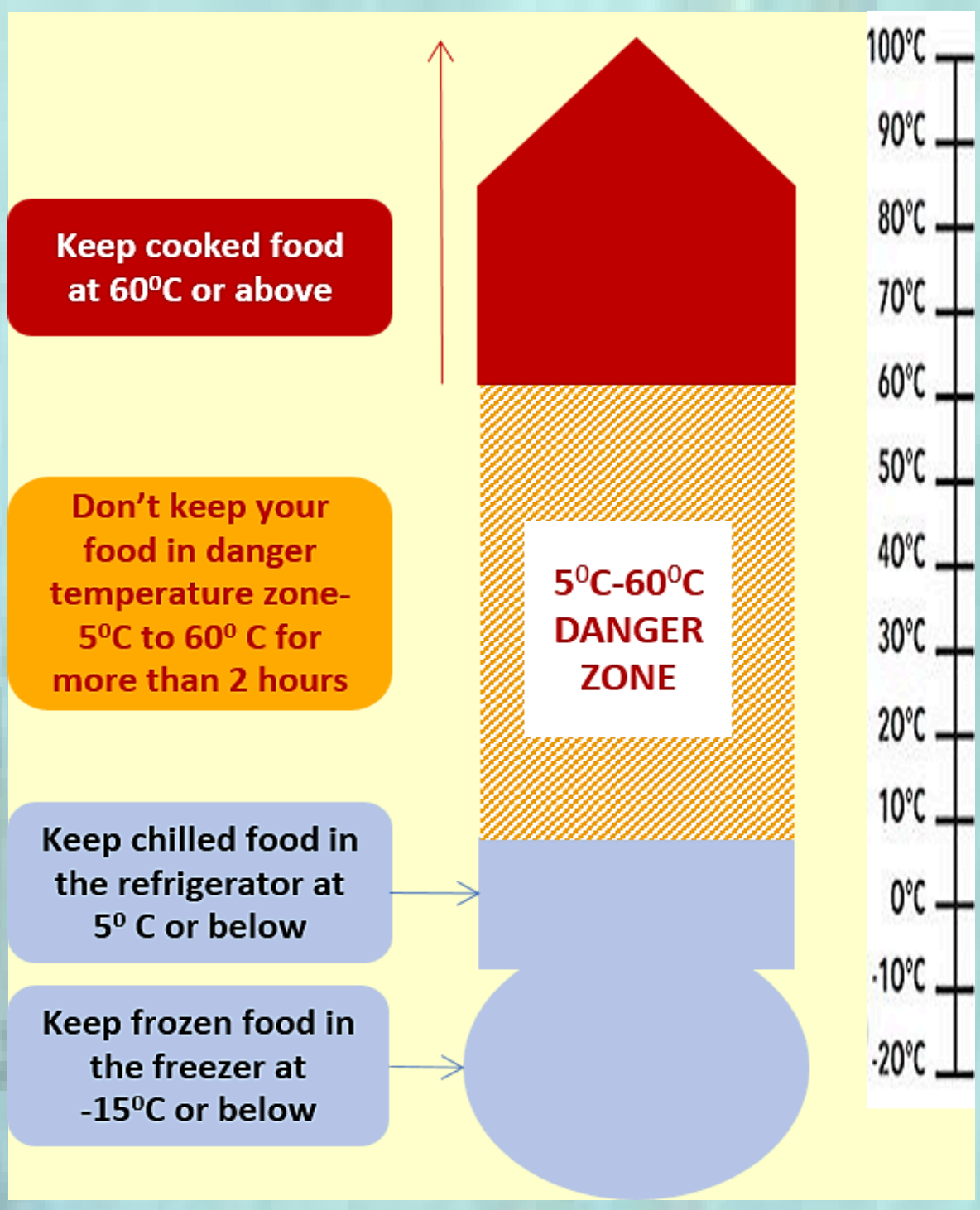
Pregnant women are more likely prone to suffer from food illnesseslike *Toxoplasma and Listeria*infection etc.

Picture source: https://www.cdc.gov/foodsafety/people-at-risk-food-poisoning.html

What is the Danger Zone ?



- Danger Zone is the range of temperature between 5°C and 60°C at which bacteria reproduce/multiply the fastest.
- The longer a food spends (time) in the Danger Zone (temperature), the higher the risk of foodborne illness.



Avoiding the Danger Zone

- Store raw meat and milk at 4°C or below
- Frozen foods should be thawed in the refrigerator, on a tray or under cool running water or during the cooking process.
- Cooked foods like rice, vegetables and meats should be held above 60°C.
- Cooked foods should be rapidly chilled so they spend as little time as possible in Danger Zone.
- Ideally, hot foods (which are to be consumed later) should be cooled from 60°C to 4°C or less within 4 hours.
- Foods before consumption should be reheated quickly to above 73°C before serving, as reheating kills bacteria which may have multiplied while food was being cooled.
- Temperatures for both hot and cold foods should be checked at scheduled intervals with calibrated food thermometer.

If the food is being held in the Danger Zone, it should be discarded

Safety tips for preparing common foods

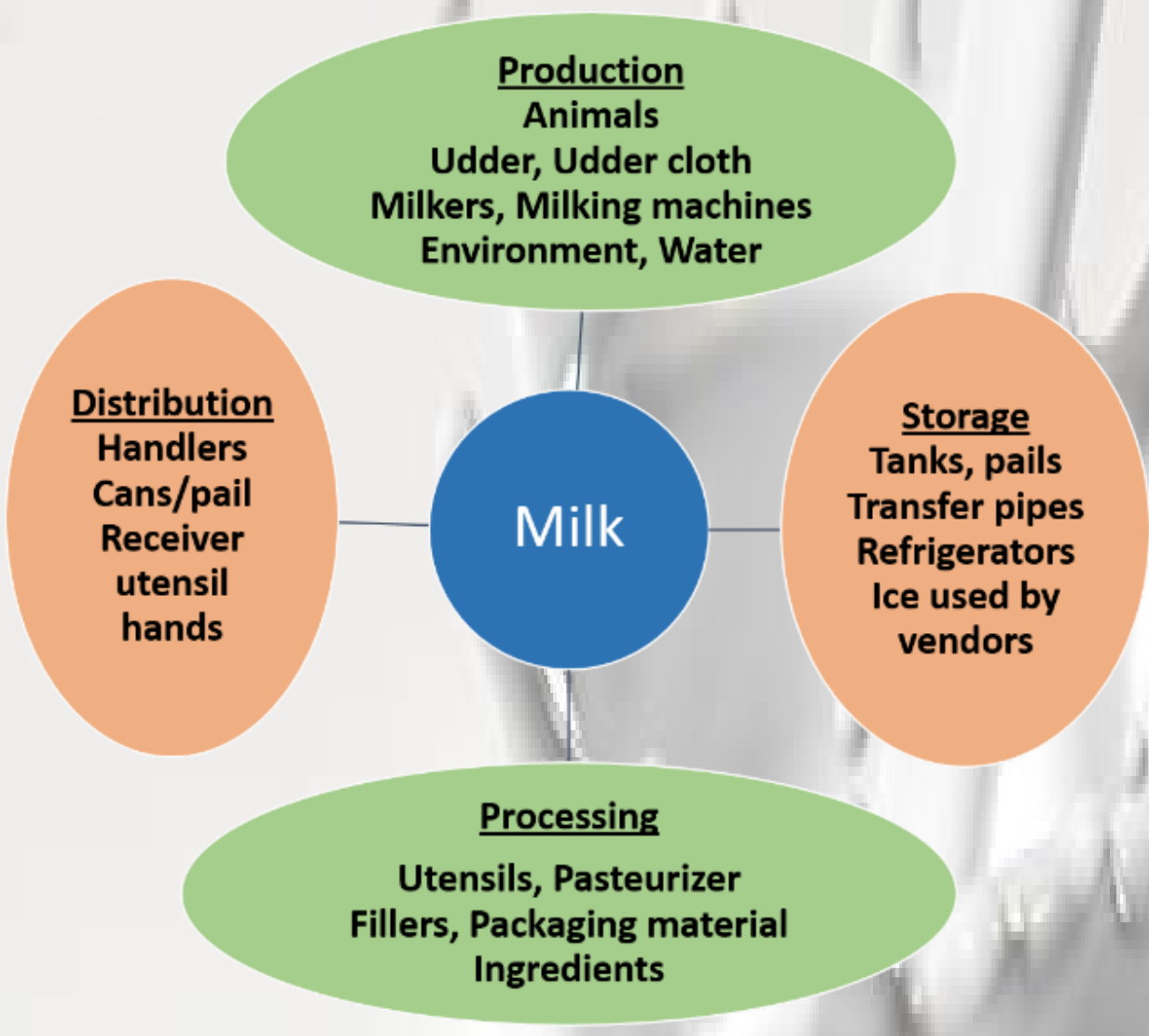
Type of food		Avoid	Better choice
	Meat & Poultry	Raw or under-cooked meat or poultry	Meat or poultry cooked to a safe internal temperature
	Sea food	Raw or undercooked fish, shellfish, or food containing raw or undercooked seafood, such as sashimi, some sushi and ceviche	•Seafood cooked to 145^{0}F •Canned fish and seafood •Refrigerated smoked seafood in a cooked dish, such as casserole.
	Dairy	Unpasteurized (raw) milk	Pasteurized milk
	Sprouts	Raw or undercooked sprouts, such as alfa-alfa, beans, or any other sprout	•Cooked sprouts
	Vegetables	Unwashed fresh vegetables Including lettuce and salads	•Washed fresh vegetables including salads •Cooked vegetables
	Cheese	Soft cheese made from unpasteurized milk, such as queso fresco, blue-veined, feta, camembert	•Soft cheese that are clearly labeled “made from pasteurized milk” •Processed cheeses, cream cheese, mozzarella, hard cheeses

Clean Milk Production

Features of clean milk

•Produced from healthy animals in hygienic conditions
•May contain only a small number of harmless bacteria
•Free from debris and sediments •Free from hazardous chemical and antibiotic residues •Better keeping quality •High commercial value •Protection against diseases like typhoid, dysentry,

diptheria, septic sore throat etc.
•Produces good quality dairy products



Sources of Milk Contamination

Measures for production of clean milk

•Care for animal's health and hygiene
•Cleanliness of milchanimal's body and udder
•Milker'shygiene and hygiene during milking process
•Utensils / equipment hygiene
• Farm hygiene and environmental hygiene

Tips to handle chicken in kitchen

- Place chicken in a disposable bag before putting in refrigerator to prevent raw juices from getting onto other foods.
- Wash handswith warm soapy water for 20 seconds before and after handling chicken.
- Do not wash raw chicken.During washing, chicken juices can spread in the kitchen and contaminate other foods, utensils, and countertops.
- Use a separate cutting board for raw chicken.
- Wash cutting boards, utensils, dishes, and countertops with hot soapy water after handling and preparing chicken.
- Use a food thermometer to make sure chicken is cooked to a safe internal temperature of 165°F.
- The thermometer should be inserted into the thickest part of the chicken without hitting fat or bone.
- Refrigerate leftover chicken within 2 hours (or within 1 hour if the temperature outside is more than 90°F).

Proper internal cooking temperature is a MUST

Keep vegetables and raw meats separately

Handling Eggs

Bacteria like *Salmonella* can contaminate the inside of eggs or the egg shells may become contaminated withpoultrydroppingswhen laid.

Storing whole eggs

- Keep eggs refrigerated at 5°C Store eggs
- separately from ready-to-eat foods. Discard
- any cartons that contain spilt raw egg. Discard
- any cracked or dirty eggs. Do not wash eggs.
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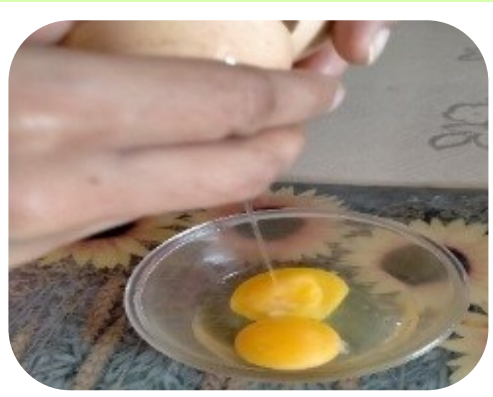


Handling eggs

- Do not separate raw egg white and yellow by using
- the shell or with bare hands.
  Avoid foods that contain raw or undercooked eggs, such as mayonnaise, raw egg salad dressings and raw egg high-protein smoothies.
- Dishes containing raw eggs should not be served to
- vulnerable people at greater risk from food poisoning.
- Cook eggs until the yolks and whites are firm, to
- an internal temperature of 160°F (71°C) or hotter.
- Do not taste or eat batter or dough with raw egg.
  If eggs get a crack while transport, discard or cook them thoroughly.
  Do not keep eggs or foods made with eggs warm or at room temperature for more than 2 hours.
- Wash handsand items that came into contact with raw eggs -including counter tops, utensils, dishes, and cutting boards.

Fish and Seafood hygiene

Characteristics of a Good Quality Fresh Raw Fish

- Bright and shiny appearance
- Scales are intact and adhere tightly to the skin
- Eyes are bright, clear, full and protruding
- Gills are red and free from slime
- Odour is fresh and mild & not fishy, or sour
- Flesh is firm, elastic & does not separate from bones
- Flesh springs back when pressed
- Fresh fillets should have firm flesh and red blood lines
- Shrimp, scallop, and lobster flesh should be clear with pearl-like colour and mild odour

Selecting Shellfish

- Throw away clams, oysters, and mussels if their shells are cracked or broken
- Live clams, oysters, & mussels close when shell is tapped "Tap Test"- if they don't close when tapped, discard them
- Select only live crabs & lobsters which show leg movement

- **Refrigerator or freeze fish in tightly wrapped package at 4°C or below.**
- **Most seafood should be cooked atleast to internal temperature of 63°C.**

What is Cross-contamination?

Cross contamination is the transfer of harmful bacteria or microbes from one food to another food via means of utensils, equipment or human hands.
It also can occur when a raw food touches or drips onto a cooked or ready-to-eat food.

Two most common mistakes:

- Using the same knife and cutting board to cut chicken and vegetables without cleaning the equipment first.
- Placing a thawing piece of meat on the refrigerator shelf above the one with ready to eat/cooked meals

Preventing cross contamination

- Wash, rinse & sanitize cutting boards, knives, utensils & kitchen countertops after contact with raw meat

- Store raw meat below and away from all ready-to-eat foods in refrigerator

- Wash hands before handling food and after touching raw meat

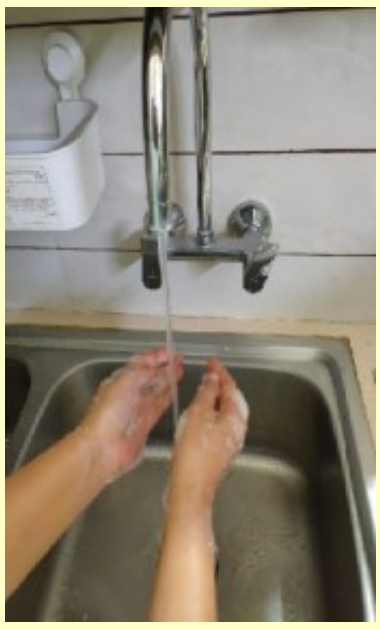
Four Steps to Food Safety

CDC (USA) & FSSAI (India) recommends Four Core Practices to reduce the risk of foodborne illnesses

CLEAN

Wash your hands and surfaces frequently

- Wash hands for 20 seconds with soap and water before, during & after preparing food & before eating.
- Wash your utensils, cutting boards, & countertops with hot, soapy water.
- Rinse freshfruits & vegetables
- under running water.



SEPARATE

Separate: Don't cross-contaminate

- Keep raw meat, poultry, seafood, and eggs away from other foods in grocery shopping carts, grocery bags and refrigerator.
- Use separate cutting boards, knives and plates for raw meat, poultry, and seafood.
- Never place cooked food on a plate that previously held raw meat, poultry, fish, seafood or eggs.

Four Steps to Food Safety

COOK

Cook to the right temperature

- Meats should reach a safe minimum internal temperature of 165°F.
- Cook eggs until the yolk and white are firm, not runny. Don't use recipes in which eggs remain raw or only partially cooked.
- Cook fish to 145°F or until the flesh is opaque and separates easily with fork.
- Bring sauces, soups & stocks to a boil when reheating.
- Heat leftovers thoroughly to 165°F.
- Make sure there are no cold spots in food (where bacteria can survive) when cooking in a microwave oven.

CHILL

Chill: Refrigerate promptly

- Keep your refrigerator at 40°F or
- below.
  Refrigerate perishable food within 2 hours. (If outdoor temperature is above 90°F, refrigerate within 1 hour)
- Thaw frozen food safely in the refrigerator, in cold water, or in microwave.

Food Safety Management Systems

Hazard Analysis Critical Control Points (HACCP)

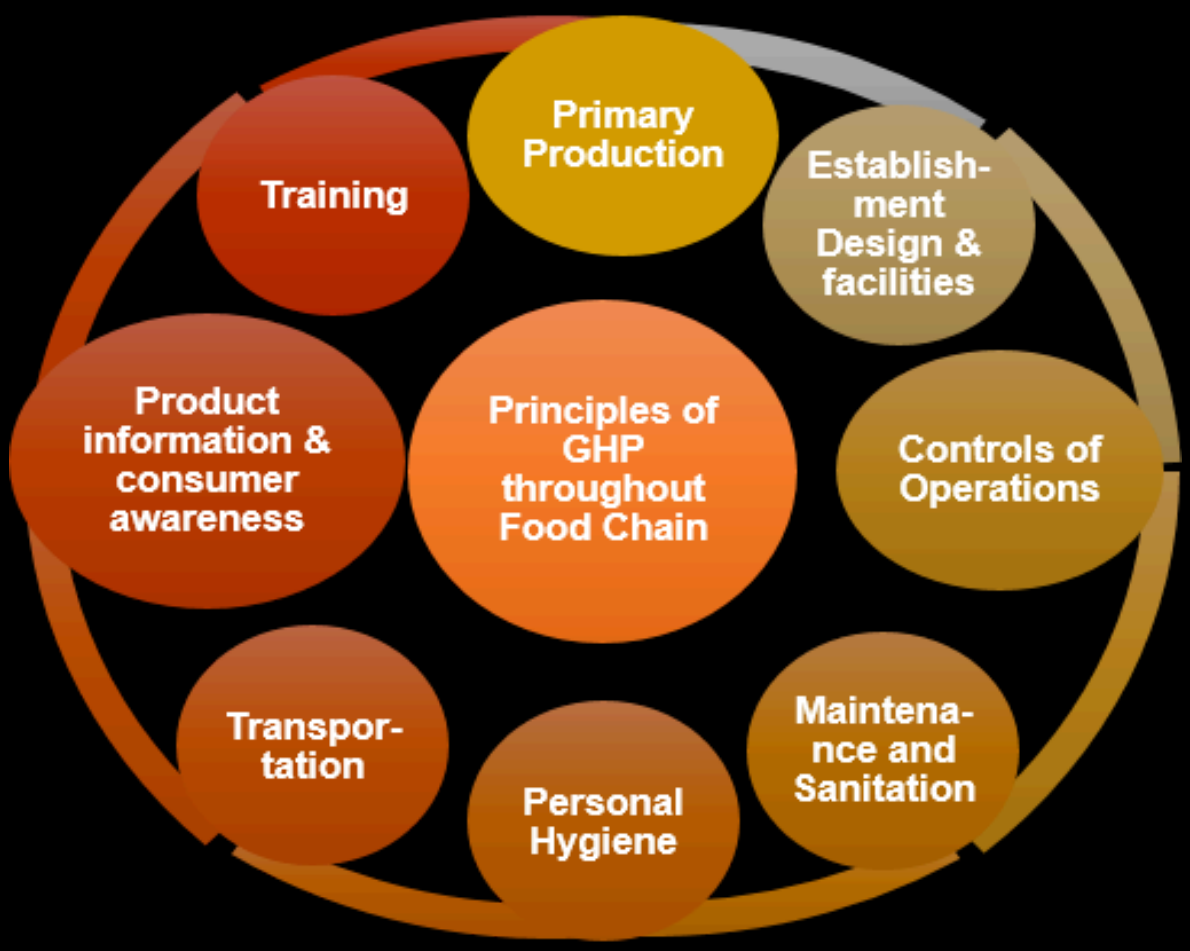
Good Manufacturing Practices (GMP)

Food Safety Management Systems

Techniques/ways to maintain/ensure food safety, quality and hygiene

- Documented procedures developed by food establishment
- Cleaning & sanitizing food production facility
- Procedures for maintaining sanitary food processing environment
- Sanitation Standard Operating procedures
- Procedures for employee hygiene
- Must to maintain records for implementation and monitoring of SSOPs
- Prevents adulteration of product

Sanitation Standard Operating Procedures (SSOPs)



Good Handling Practices (GHP)

International Organization for Standardization

Non-Government body, designed to enable organizations to control food safety along food chain
Global standards for Food Safety Management Systems

- √ ISO 9001 –Quality Management System (QMS)
- √ ISO 14001 –Environmental Management System (EMS)
- √ ISO 22000-Food Safety Management Systems (FSMS)

ISO 22000 works for maintaining good hygiene practice in meat production by integrating the principles of HACCP system to ensure food safety

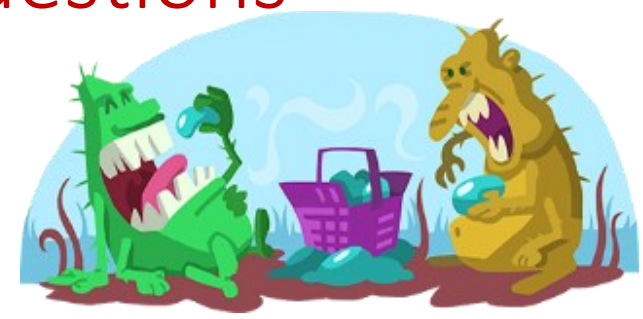
Benefits of ISO 22000 Certification

- Global recognition as a reputable supplier
- Proven business credentials
- Customer satisfaction
- Ability to win more business
- Legal compliance
- Respond to situations compromising food safety

Applications of ISO in hygienic meat production

- It helps organizations identify and control food safety
- hazards
- Applicable to all types and sizes of organizations
- Provides a layer of reassurance within global food supply chain
  Helping products cross borders and bringing people food that they can trust

Frequently Asked Questions (FAQs)



1. What is the importance of food hygiene?

Food hygiene implies adopting practices and behaviours that protect food from being unsafe. It is an important aspect of public health since many diseases canbetransmittedtohumansvia unsafefood.

2. What is Food Control?

Food control is the system that regulates the food industry by checking that food laws and regulations are followed. It covers all stages in the food supply chain, from the producers on the farm, through all stages of processing and transport to the consumer.

3. What is Quality Control (QC)?

Quality control may be defined as a planned system of activities to provide quality food product.

4. Why is it important to adopt a 'farm to table' approach?

This is important because food hazards may arise at any stage and, by monitoring the whole supply chain, preventive measures can be put in place at the appropriatepoint.

5. What is Good Manufacturing Practice?

The part of a food control operation aimed at ensuring that products are consistently manufactured to a specified quality appropriate to their intended use.

6. What are different categories of licensing by FSSAI ?

As per FSS (Licensing & Registration) Regulations, 2011, there is a 3-tier system for licenses i.e. Registration,StatelicenseandCentralLicense.

7. What is the eligibility for FSSAI registration certificate for Small Food Business Operators (FBOs)?

Small FBOs with annual turnover upto Rs. 12

Lacs and/or whose production capacity is below 100 kg or litres/day, or handling milk is upto 500 litres/day, or slaughter upto 2 large animals/10 small animals/ 50 poultry birds/day should obtain FSSAIRegistrationCertificate.

8. What is a Critical Control Point (CCP) ?

It is a step at which control can be applied in its food process (stable to table) and essential to prevent or eliminate a food safety hazard or reduce it to an acceptable level.

9. What does the ‘use by’ date mean?

Highly perishable foods will have a use by date. This is the date that the food must be used by. It is illegal to use food beyond its use by date becauseitcancompromisesafetystandards.

10. What does the ‘best before’ date mean?

Best before dates often apply to longer shelf life foods and usually relates to quality of the food rather than the safety. It is common practice to destroy food beyond its best before date because the food will have reduced quality.

Finally, Never Forget:

Good Food Handling Practices are the Most Important Aspect of Food Hygiene.

Follow and Adhere to Right Practices, and you should Achieve Food Safety.

https://www.cdc.gov/foodsafety/communication/socialmedia.html