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Short Term Training Course (STTC) “Safety and Quality in Innovative Food Production Systems”

20-26 May, 2018

Asian Institute of Technology, Thailand

Lecture 2:

Overview on Food Safety Issues



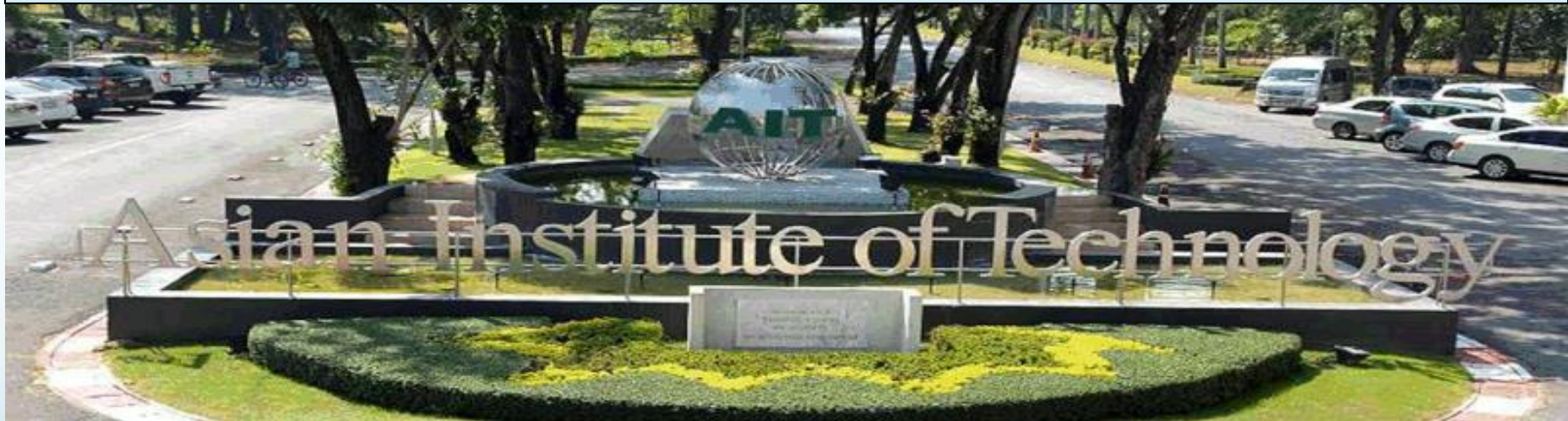
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Overview on Food Safety Issues

Rationale

- Greater concern of Food Quality and Food Safety
- Increasing need for greater quality assurance, transparency and traceability in the food supply chain and food safety
- Focuses on food quality control as the mechanism of the prevention of illness and food spoilage

Food Quality: General description

- The long-term acceptability of a new food product ultimately depends on its quality.
- A great deal of interest in the development of technologies for the **control, improvement and prediction of food quality**.
- Projection of future world food supply seems to concentrate on increased yields, food production and feed ratios.

As important as these are, QUALITY is the pivotal parameter in any future scenario involving more and better foods

FOOD Quality:

- **“Quality is the totality of features and characteristics of a product or services that bear on its ability to satisfy stated or implied needs”. (ISO 8402-1994).** This enforces to imply the needs of both the customers and the consumers with respect of food.
- **“Food quality is the quality characteristics of food that is acceptable to consumers”.** This includes external factors such as appearance (size, shape, colour, gloss and consistency), texture, and flavor; factors such as grade standards (e.g eggs); internal (chemical, physical and microbial), adulterants; and nutritional value.

- Other major attribute : **SANITATION**

It is important to ensure that the food processing environment is **as clean as possible** in order to produce the *safest possible food* for the consumers.

PRODUCT TRACEABILITY:

- Ingredient packaging suppliers, should a recall of the product required.
 - *Deals with labeling issues to ensure that is correct ingredient and nutritional information.*

SOME of EXPECTATIONS OF THE CONSUMER IN RELATION TO FOOD QUALITY

Good for health

- No acute danger and not harmful for the long run

Delivery

- At the right time and right quantity

No uncertainty about spoilage

Product

- The right product types, species
- Defined properties
- Composition (No doubt about the composition or contents)

Packaging

- In the right packaging , good condition
- Proper information
- Easy to use and recyclable

Price: a correct and reasonable price

Dimensions

Operational quality

Do we reach our goals as a company? In this dimension the quality costs are the primary criteria to be considered.

Relation quality

Are we able to make friends and remain so? The satisfaction of customers and fellow workers are the prime importance.

Functional quality

Do we supply products and services as wanted by our customers and consumers? The functional properties of the product and service are interesting performance criteria

Professional quality

What is the quality, including the safety of our food products in the opinion of various experts? Professional quality criteria such as sensory characteristics, water activity, pH, composition etc. are of prime importance.

FOOD SAFETY

Definition of Food Safety

"**Food safety** is a scientific discipline describing the handling, preparation and storage of food in ways that prevent **foodborne illness**. This includes a number of routines that should be followed to avoid potentially severe **health hazards**."



“Food Safety” implies absence or acceptable levels of:

- contamination adulterants
- naturally occurring toxins or
- any other substances that may make food quality as complex for its value of acceptability to consumers.

Other quality attributes:

- **Nutritional value** (essential vitamins, minerals, energy, proteins, etc.)
- **Organoleptic properties** (appearance, colour, texture, taste) and
- **Functional properties** (functional foods)

Why is Food Safety a Top Priority?



- ❑ Foodborne illness is considered a major public health problem.
- ❑ 76 million cases of foodborne illness occurred each year in the United States
- ❑ 325,000 hospitalizations and 5,000 deaths related to foodborne illnesses each year

- ❑ Food safety is the responsibility of every person who is involved in foodservice
- ❑ Every action in foodservice has the potential to impact the safety of the food, either during purchasing, storage, preparation, holding, service, or cleanup .

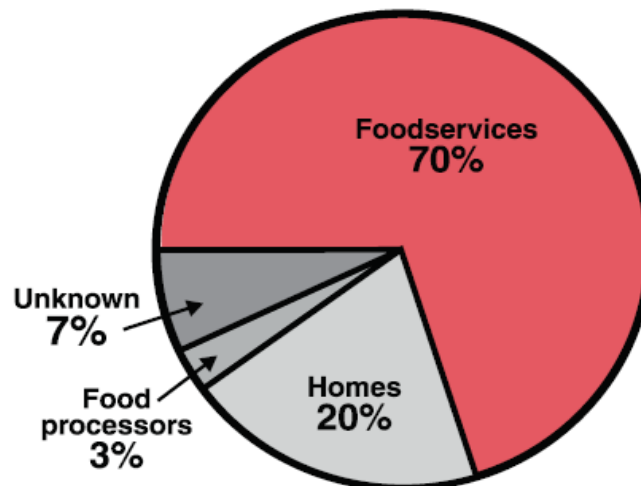
What is Foodborne Illness

- **A foodborne illness**, commonly referred to as food poisoning, is a disease that is transmitted to humans by food.

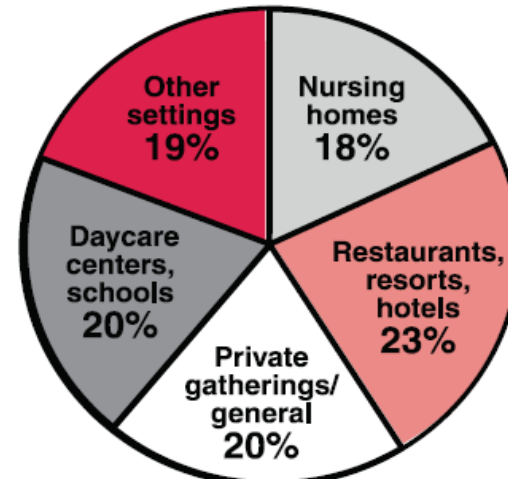


- **A foodborne outbreak** is an incident in which two or more people experience the same illness symptoms after eating a common food.

Sources of Foodborne Illness Outbreaks



Where the Outbreaks Occurred in Foodservices



Multistate Foodborne Outbreak in 2018

Source: Center of Disease control and Prevention

- ❑ When two or more people get the same illness from the same contaminated food or drink, it is know as, "foodborne disease outbreak".



Food Source	Pathogen	Reason	Consequences
Chicken salad	<i>Salmonella typhimurium</i>	Selling of recalled chicken	<ul style="list-style-type: none">• 265 people infected• 94 hospitalized• 1 death reported
Romaine Lettuce	<i>E. Coli</i>	Contamination of lettuce with Shiga toxin-producing E. coli	<ul style="list-style-type: none">• 172 people infected• 75 people hospitalized• 20 people developed type of kidney failure• 1 death
Shell eggs	<i>Salmonella Braenderup</i>	Use of recalled eggs	<ul style="list-style-type: none">• 35 people infected• 11 people hospitalized• non death
Raw sprouts	<i>Salmonella Montevideo</i>	Contamination of sprouts	<ul style="list-style-type: none">• 10 people infected

E. coli

1993

Jack in the Box hamburgers



100 ill
4 deaths

2006

Dole baby spinach



205 ill
3 deaths

2006

Taco Bell fast food



71 ill
0 deaths

2015

Chipotle Mexican Grill fast food



55 ill
0 deaths

Salmonella

2009

PCA peanut butter



714 ill
9 deaths

2011

Cargill ground turkey



136 ill
1 death

2013

Foster Farms chicken



634 ill
0 deaths

2015

Mexican cucumbers



907 ill
1 death

Types of Food Hazards

Hazard



A biological, chemical or physical agent that is reasonably likely to cause illness or injury in the absence of its control

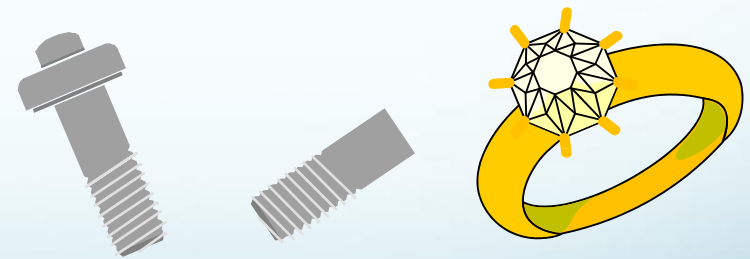
- 1. Physical Hazards**
- 2. Chemical Hazards**
- 3. Biological Hazards**



1. Physical Hazards

Food can be contaminated by a foreign object getting into the food accidentally.

- Dirt
- Hair
- Nail polish flakes
- Insects
- Broken glass and crockery
- Nails
- Staples
- Metal or plastic fragments
- Bits of packaging materials



Physical contaminants

1. Physical Hazards

The guidelines for helping prevent physical contamination



- ✓ Use a commercial scoop rather than a glass for portioning ice.
- ✓ Designate a source of ice for use in beverages and foods.
- ✓ In a preparation area, store toothpicks and non-edible garnishes on lower shelves.
- ✓ Place shields on lights.
- ✓ Clean can openers regularly and keep the blades sharp and in good repair.
- ✓ Remove staples, nails, etc. from boxes in the receiving area when food is received.
- ✓ Never reuse a single-use container.

- ✓ Avoid repairing equipment temporarily with items that could potentially fall into food.
- ✓ Clean and sanitize equipment on a regular basis.
- ✓ Do not wear nail polish or artificial nails.
- ✓ Wear a hair restraint.
- ✓ Do not wear jewelry, earrings.
- ✓ Do not carry a pencil or pen behind the ear since it could fall into food.
- ✓ Use only food containers or bags that are approved for food storage.
- ✓ Have routine pest control maintenance administered by licensed personnel.

2. Chemical Hazards



A foodborne illness can result from a harmful chemical getting into a food that is then eaten by a person.

Hazardous chemicals:

- Sanitizers
- Pesticides
- Whitening agents
- Detergents
- Polishes
- Glass cleaners
- Caustics
- Cleaning and drying agents

How chemicals present in food?

- Contaminants are widespread in our **environment**, and may enter the food chain and be present in all plant and animal products that we eat (e.g. dioxins)
- Chemical components of **materials** which come into contact with food, such as **packaging materials**, may be absorbed into our foods
- Chemicals may form during food **processing or cooking** (e.g. polycyclic aromatic hydrocarbons)
- Chemicals used in **farming**, such as pesticides and veterinary medicines may remain in the products we eat

2. Chemical Hazards



How chemicals present in food?

- **Additives** are deliberately added to food in order to provide some useful purpose, such as flavours and preservatives, which allow the consumer to select a varied diet from preserved foods all the year round
- Some **natural components of plants** may themselves cause toxicity (eg glycoalkaloids in potatoes), while some may be harmful if not cooked properly (eg lectins in pulses). There are also some foodstuff which can cause allergies in susceptible individuals (e.g peanuts).
- Chemicals may be produced by **moulds** which contaminate crops during storage, such as aflatoxins.



**MELAMINE STORY -
CHINA 2008**

2. Chemical Hazards



The guidelines for helping prevent chemical contamination

- ✓ Proper training to employee using chemical.
- ✓ Proper storage of chemicals (at right place, right containers with proper sealing, away from cooking place and food storage places.
- ✓ Clearly labeled to identify the chemicals.
- ✓ Proper use of Materials Safety Data Sheets (MSDS) to ensure that all chemicals are stored and used correctly. MSDS should be readily accessible to all employees.
- ✓ Always measure chemicals in accordance with manufacturer's recommendations.
- ✓ Allow only authorized personnel to have access to cleaning chemicals.
- ✓ Always test sanitizing solutions.
- ✓ Wash hands thoroughly after working with chemicals.
- ✓ Wash fresh produce that will be served whole, peeled, or cooked in cold, running water. Scrub thick-skinned produce with a brush designed for food preparation.
- ✓ Monitor procedures used by pest control operators to be sure pesticides do not contaminate food. Only professional operators should apply pesticides.

2. Chemical Hazards



Metals are another potential source of contamination.

Highly acidic foods, such as tomatoes or lemons, **can react with metals** during cooking or storage, causing the metal to leach out into the food.

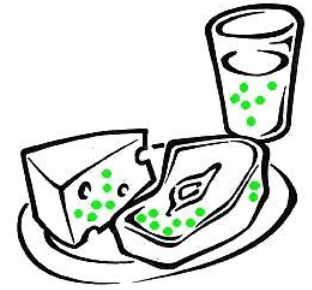


To prevent this problem:

- Use metal containers and metallic items only for their intended uses.
- Do not use galvanized containers to prepare or cook acidic foods like lemonade, tomato products, and salad dressing.
- Avoid enamelware, which can chip and expose underlying metal.
- Do not use metal mixing bowls for holding hot foods.
- Never store food in an open can; transfer to an appropriate, covered storage container and label.

3. Biological Hazards

Biological = Living Organisms



Foodborne illness mostly refers to illnesses caused by microorganisms consumed through food or beverages.

The 5 basic categories of foodborne illness agents related to microorganisms

1. Bacteria
2. Viruses
3. Parasites
4. Food toxins
5. Unknown sources

Microorganisms

- The major cause of a foodborne illness
- Cannot be felt, seen or tasted
- Can multiply very quickly in potentially hazardous foods
- Most of the foods we eat contains one or more types of microorganisms

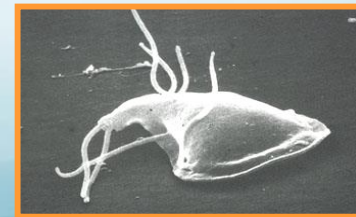
The harmful microorganisms, called **pathogens**



Bacteria

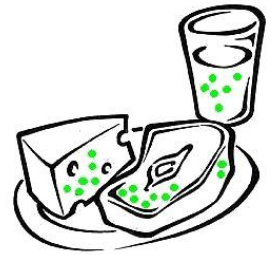


Parasite



Virus

3. Biological Hazards



- **People** spread organisms from their bodies to food by unclean hands, coughing, or sneezing.
- **Unsanitary facilities and equipment** may spread harmful organisms to people or food.
- **Disease-spreading pests**, such as cockroaches, flies, or mice, which are attracted to food preparation areas, may contaminate food, equipment, or service areas.

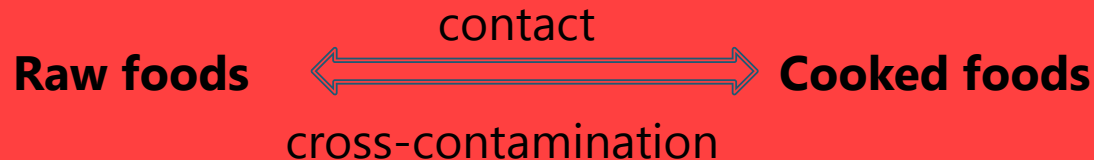


Did you know sneezing is the fastest way of spreading bacteria across food and equipment?

How is Food Contaminated?

1. Food to Food

Food can become contaminated by bacteria from other foods.



2. People to Food

- Handling foods after using the toilet without first properly washing your hands.
- Touching raw meats and then preparing vegetables without washing hands.
- Using an apron to wipe your hands between handling different foods, or wiping a counter with a towel and then using it to dry your hands.

3. Equipment to Food



Poor Personal Hygiene

Leading cause of foodborne illnesses

STOP SPREADING GERMS!

Cover your mouth and nose when you sneeze or cough. Or wear a mask.

Clean your hands often with soap and water.

Avoid touching your eyes, nose and mouth.

Stay healthy by maintaining good habits such as eating right and exercising.

Stay at home when you are sick and see a doctor if required.

Simple actions can stop the spread of germs and prevent illnesses.

Healthy Habits can Help Protect You and Your Family.

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Together We Care

Washing hands - How?

How to wash your hands in 60 secs flat.

1. Rinse hands in warm/hot water
2. Apply enough soap for wash
3. Wash arms up to your elbows
4. Right palm to rear of left hand
5. Palm to palm, fingers interlaced
6. Scrub under fingernails, wash between fingers
7. Rinse off soap thoroughly
8. Dry hands with paper towel

Cleaning and Sanitizing

Cleaning Involves the removal of food, residues, dirt, and grease

Sanitizing Reduces harmful microorganisms to a level that is safe through the use of chemical sanitizing solution



Clean & Sanitize



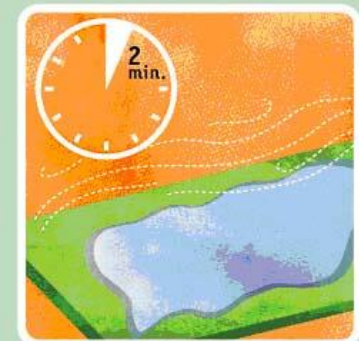
1 Mix fresh each day.



2 Clean dirty surfaces with detergent and water.



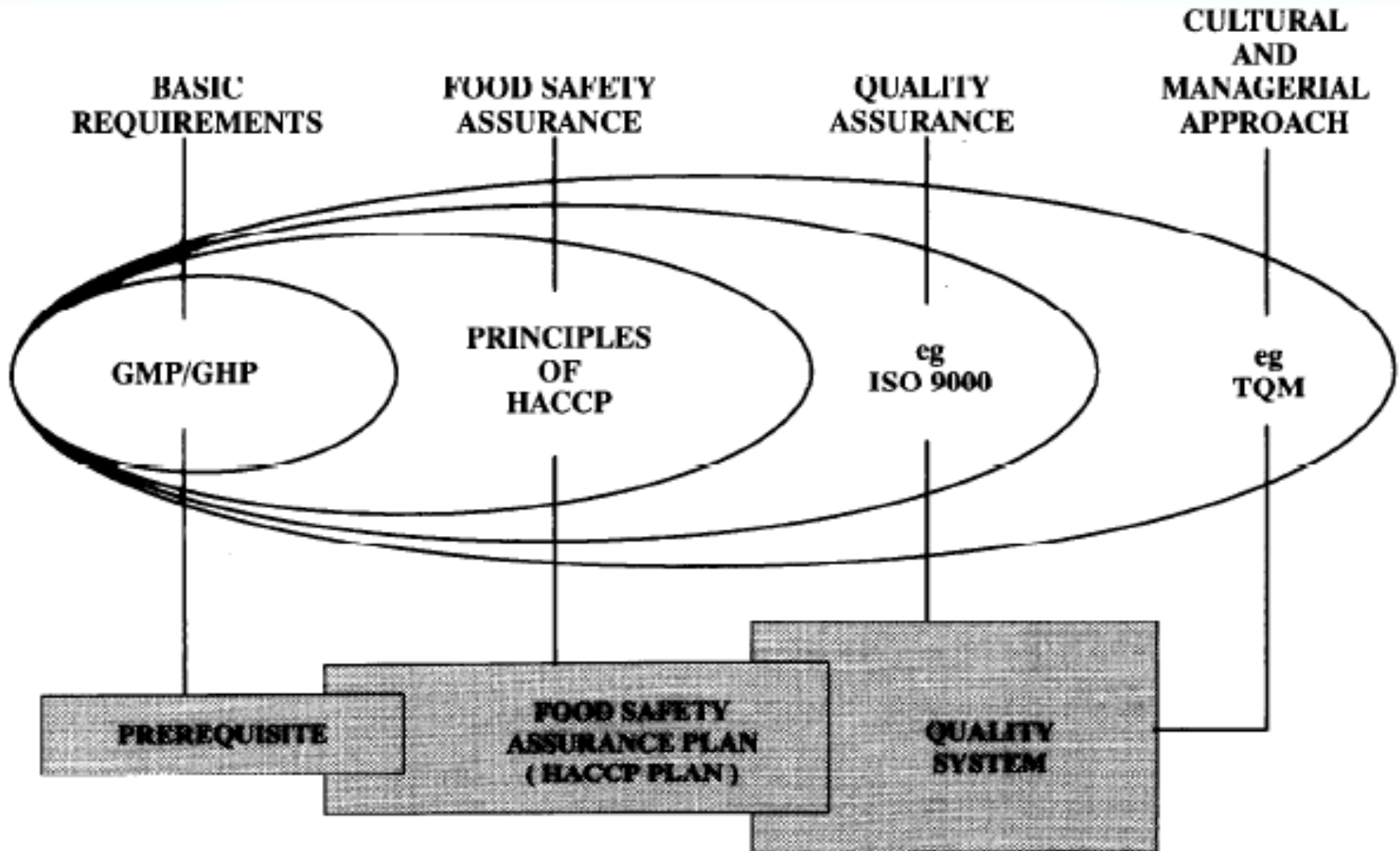
3 After cleaning, **spray** thoroughly with bleach mixture.



4 Let **air dry** for two minutes.

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Food Quality and safety: An Integrated Approach



NEED REVOLUTION and URGENT ATTENTION FOR ABUNDANCE, QUALITY AND SAFER FOOD PRODUCTION AND SUPPLY.

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