




INTELLIGENCE LEARNING



**BOE313/ BOE413/BOE313H/ BOE413H
FOOD SCIENCE & NUTRITION**

UNIT 4 ONE SHOT



**Healthy
life**

INTELLIGENCE LEARNING



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SYLLABUS

Unit 4

4.1 Quality: Various definitions of Quality, Quality Attributes of foods. Quality Control Cycle. Concept of Total Quality Management (TQM). Names of Regulatory and Accreditation Bodies.

4.2 Food Security and Food safety, Meaning and its significance. Food Borne Illness. Adulteration in Foods, Concept of HACCP.

Quality: Definitions in Food Context

General Definition

Food quality refers to the degree of excellence of food, based on consumer expectations, safety, and nutritional value. Food quality means how good, safe, and acceptable a food is to the person who eats it. It includes things like taste, smell, color, freshness, safety, and nutrition.

Codex Alimentarius (FAO/WHO)

"Food quality includes all characteristics that influence a product's value to the consumer — including safety, nutritional content, organoleptic (sensory) properties, and labeling."

In Simple Word:- "Food quality includes everything that makes food valuable to the consumer — like **taste, safety, nutrition, and labeling.**"

ISO (International Organization for Standardization)

"Quality is the totality of features and characteristics of a product that bear on its ability to satisfy stated or implied needs."

In Simple Word:- "Quality is how well a product meets people's needs or expectations."

Quality Attributes of Food

Food quality is judged based on **two types** of attributes:

A. Intrinsic Quality Attributes (Physical, chemical, and biological)

These are **inside the food** — related to how it looks, feels, or tastes.

| Attribute | What It Means | Example |
|-------------------|------------------------------------|----------------------------------|
| Appearance | Color, shape, shine of the food | Red color in tomatoes |
| Texture | How food feels in the mouth | Crunchy chips, soft bread |
| Flavor | Combination of taste and smell | Sweet and fruity mango |
| Nutritional Value | Amount of vitamins, proteins, etc. | Iron in spinach, calcium in milk |
| Shelf Life | How long food stays good | Milk expires in 3–5 days |
| Safety | Free from bacteria or chemicals | Clean, properly cooked food |

B. Extrinsic Quality Attributes (Perceived by consumers)

These are **outside the food** — things that affect the customer's choice.

| Attribute | What It Means | Example |
|---------------|---------------------------------|--------------------------------------|
| Packaging | Wrapping to protect and attract | Chips in air-tight packets |
| Labeling | Information on the pack | Ingredients, expiry date, FSSAI mark |
| Brand Name | Known and trusted company | Amul, Nestlé |
| Price | Value for money | Good quality rice at fair price |
| Certification | Approved by food authorities | FSSAI, Organic, ISO marks |

Quality Control Cycle (Also known as the PDCA Cycle)

The Quality Control (QC) Cycle is a step-by-step method used to check, maintain, and improve the quality of products, including food. It helps to ensure that food is safe, consistent, and meets standards.

The 4 Steps of the Quality Control Cycle: PDCA

| Steps Name | What Happens in This Step |
|------------|---|
| P – Plan | Set goals for quality. Decide what needs to be improved. Make a plan. |
| D – Do | Put the plan into action. Start the new process or changes. |
| C – Check | Measure results. Compare them with expected results. Look for errors or problems. |
| A – Act | Fix problems if needed. Make successful changes permanent. Plan the next improvement. |

How It Works in Food Industry:

Example: Improving hygiene in a food factory

- **Plan:** Identify that many workers don't follow handwashing rules. Plan a training program.
- **Do:** Conduct the training for all staff.
- **Check:** Monitor hygiene compliance after training.
- **Act:** If results improve, make the training regular. If not, improve the plan.

Why the QC Cycle is Important:

1. Ensures high food quality and safety.
2. Reduces waste and rework.
3. Improves customer satisfaction.
4. Supports continuous improvement.

Total Quality Management (TQM)

Total Quality Management (TQM) is a continuous process where everyone in the organization works together to improve the quality of products, services, and processes. It's not just the responsibility of the quality control team — every employee, from top management to workers, is involved in maintaining and improving quality.

Main Features of TQM

| Feature | What It Means |
|-------------------------------|--|
| Customer Focus | The final goal is customer satisfaction. All processes aim to meet customer needs. |
| Continuous Improvement | Quality is improved step-by-step every day (not a one-time fix). |
| Employee Involvement | Every worker is responsible for quality, not just the QC department. |
| Process-Oriented | Focus is on improving the process, not just fixing problems afterward. |
| Fact-Based Decisions | Use data and measurements to make decisions. |
| Integrated System | All departments (production, packaging, service) work as one system. |

TQM in the Food Industry

Ensures food safety, hygiene, consistency, and customer satisfaction.
Helps meet FSSAI, ISO, HACCP and other quality certifications.
Builds consumer trust in brands.

TQM Cycle (Steps):

1. **Identify** customer needs
2. **Design** the process to meet those needs
3. **Measure** results
4. **Improve** based on feedback
5. **Repeat** — for continuous quality growth

Benefits of TQM:

- Fewer defects.
- Happier customers.
- Lower costs.
- Better teamwork.
- Higher market value.

Regulatory and Accreditation Bodies in India

| Body | Full Form | Role |
|---------------|---|--|
| FSSAI | Food Safety and Standards Authority of India | Regulates food safety, hygiene, labeling, and additives |
| AGMARK | Agricultural Marketing | Certifies quality of agricultural products (e.g., grains, spices) |
| BIS | Bureau of Indian Standards | Sets Indian food product standards and quality marks (ISI mark) |
| APEDA | Agricultural and Processed Food Products Export Development Authority | Promotes export and quality of agricultural and processed food products |
| MPEDA | Marine Products Export Development Authority | Regulates and promotes seafood exports |
| ISI | Indian Standards Institution | Provides quality certification (ISI mark) for industrial and some food items |
| NABL | National Accreditation Board for Testing and Calibration Laboratories | Accredits food testing laboratories for quality testing |
| EIC | Export Inspection Council | Ensures quality control of export products |

International Regulatory and Accreditation Bodies

| Body | Full Form | Role |
|-------------------------------|--|---|
| FAO | Food and Agriculture Organization (UN) | Develops food policy, nutrition guidelines globally |
| WHO | World Health Organization | Sets international health and food safety standards |
| Codex Alimentarius Commission | Joint FAO/WHO Body | Develops global food standards, guidelines, codes of practice |
| ISO | International Organization for Standardization | Sets international standards (e.g., ISO 22000 for food safety management) |
| HACCP | Hazard Analysis and Critical Control Points | Food safety system to control risks during production |
| US FDA | United States Food and Drug Administration | Regulates food safety, labeling, and additives in the USA |
| EFSA | European Food Safety Authority | Provides scientific advice on food risks in the EU |
| GFSI | Global Food Safety Initiative | Ensures global food safety practices in the supply chain |

Food Security

Food security means having enough safe and nutritious food for all people, at all times, to live an active and healthy life.

4 Pillars of Food Security:

| Pillar | What it Means |
|--------------|--|
| Availability | Enough food is produced and supplied. |
| Access | People can afford and obtain the food they need. |
| Utilization | Food is nutritious and people know how to use it properly. |
| Stability | Consistent access to food over time (no seasonal shortages or crises). |

Goal of Food Security:

“No one should go hungry.”

It includes reducing hunger, poverty, and malnutrition, especially in rural or poor populations.

Food Safety

Food safety means ensuring that food is free from harmful chemicals, bacteria, or physical hazards, and is safe to eat and also is properly handled, cooked, stored, and labeled.

Main Aspects of Food Safety:

| Aspect | Explanation |
|---------------------|---|
| Hygiene | Clean handling, storage, and cooking to avoid contamination |
| Pest Control | Keeping insects and rodents away from food |
| Proper Cooking | Killing harmful bacteria and parasites |
| Safe Additives | Using only approved preservatives and coloring agents |
| Labeling and Expiry | Informing consumers about ingredients and shelf life |

Significance of Food Security

Prevents Hunger & Malnutrition

Ensures that people especially the poor get enough food daily.

Supports National Development

A healthy population is more productive and contributes to the economy.

Promotes Social Stability

Reduces poverty, crime, and unrest caused by food shortages.

Encourages Agricultural Growth

Focus on food security leads to better farming, storage, and supply chains.

Significance of Food Safety:

Protects Public Health

Prevents foodborne diseases and poisoning.

Builds Consumer Trust

Ensures that people can rely on food brands, hotels, and markets.

Meets Legal Standards

Complies with food laws (like FSSAI, HACCP, ISO 22000).

Ensures Quality in Exports

Boosts international trade by meeting global safety norms.

Food Security vs. Food Safety

| Feature | Food Security | Food Safety |
|----------------|---------------------------|--------------------------------------|
| Focus | Having enough food | Ensuring food is safe to eat |
| Concerned with | Quantity and availability | Quality and cleanliness |
| Related to | Hunger, access, poverty | Health risks, hygiene, contamination |
| Goal | No one goes hungry | No one gets sick from eating food |

Summary:-

Food security ensures that everyone gets enough food.
Food safety ensures that the food we get is clean and safe.
Both are essential for health, economy, and development.

Food Borne Illness (Food Poisoning)

Food borne illness is a sickness caused by eating contaminated food. The contamination may be due to bacteria, viruses, parasites, chemicals, or toxins in the food. It is also known as food poisoning.

Causes of Food Borne Illness

| Cause | Examples |
|------------------|---|
| Bacteria | Salmonella, E. coli, Listeria. |
| Viruses | Norovirus, Hepatitis A. |
| Parasites | Giardia, Toxoplasma. |
| Chemicals | Pesticides, food additives, heavy metals. |
| Toxins | From spoiled or improperly stored food. |

Common Symptoms

- Nausea or vomiting
- Stomach cramps
- Diarrhea
- Fever
- Weakness or dehydration

Symptoms may appear within a few hours or after a few days depending on the cause.

Prevention of Food Borne Illness

| Practice | How It Helps |
|-------------------------|--|
| Hand Washing | Prevents transfer of bacteria from hands to food |
| Proper Cooking | Kills harmful microbes in meat, eggs, etc. |
| Refrigeration | Slows down bacterial growth |
| Clean Utensils/Surfaces | Avoids cross-contamination |
| Safe Water Use | Prevents contamination in cooking and drinking water |
| Avoid Expired Food | Reduces risk of chemical or microbial hazards |

What to Do If Infected

Drink plenty of fluids to stay hydrated.

Rest and avoid heavy meals.

See a doctor if symptoms are severe or last more than 2 days.

Adulteration in Foods

Adulteration means mixing harmful, low-quality, or non-edible substances into food, either accidentally or intentionally, to increase quantity or shelf life, or reduce cost. This lowers food quality and can harm health.

Types of Food Adulteration

| Type | Example |
|---------------|--|
| Intentional | Adding water to milk, mixing stones in grains. |
| Unintentional | Contamination during handling, poor hygiene. |

Harmful Effects of Adulteration:

- Food poisoning.
- Cancer (due to toxic dyes or chemicals).
- Kidney or liver damage.
- Weak immunity and poor nutrition.

How to Avoid Adulteration:

- Buy from trusted sources or brands
- Look for FSSAI certification
- Avoid unusually bright or colored products
- Perform simple home tests (e.g., water test for milk, iodine test for starch)

Common Examples of Food Adulteration

| Food Item | Adulterant | Effect |
|-----------------|------------------------------|--------------------------------------|
| Milk | Water, starch | Reduces nutrition, may cause illness |
| Turmeric Powder | Lead chromate (yellow color) | Toxic to kidneys, brain |
| Tea Leaves | Iron fillings | Dangerous to health |
| Chilli Powder | Brick powder or salt powder | Irritation, health hazard |
| Honey | Sugar syrup or jaggery water | Increases sugar level unnaturally |

Concept of HACCP (Hazard Analysis and Critical Control Points)

HACCP is a food safety management system used to identify, prevent, and control hazards (biological, chemical, or physical) in food production. It ensures that food is safe at every step from farm to fork.

What HACCP Does

- Finds possible dangers (hazards) in the food process.
- Sets control points to stop or reduce those dangers.
- Monitors each step carefully.
- Helps prevent food contamination.

Why HACCP is Important

1. Prevents food poisoning.
2. Builds customer trust.
3. Mandatory for many food exports and global trade.
4. Required for certifications (ISO 22000, FSSAI compliance, etc.).

7 Principles of HACCP

| Principle | Explanation |
|-----------------------------------|---|
| 1. Hazard Analysis | Identify possible risks in raw materials/processes |
| 2. Critical Control Points (CCPs) | Points where control is needed to prevent risk |
| 3. Critical Limits | Set limits (e.g., temperature, time) to ensure safety |
| 4. Monitoring | Check if CCPs are working correctly |
| 5. Corrective Actions | Steps to fix problems if limits are not met |
| 6. Verification | Make sure the system is working properly |
| 7. Documentation | Keep records of all actions and checks |



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