FOOD QUALITY AND SAFETY

Purushotham Rudraraju
Food and Agribusiness Consultant
Food quality can be considered as a complex characteristic of food that determines its value or acceptability to consumers.

Besides safety, quality attributes include:

- Shelf Life
- Nutritional value
- Organoleptic properties: Appearance, Color, Texture, Taste
Safety of food is a basic requirement of food quality. "Food safety" implies absence or acceptable and safe levels of:

- Contaminants,
- Adulterants
- Naturally occurring toxins
- any HAZARD that may make food injurious to health on an acute or chronic basis
The Importance of Food Quality and Safety

Hazards can arise everywhere along the food supply chain:

- Vehicle emission
- Agricultural practices
- Industrial emissions and effluents
- Crops
- Processing
- Livestock
- Storage
- Seafood
- Distribution
- Retail
- Preparation
The Importance of Food Quality and Safety

- To reduce the risks associated with consumer exposure to contaminated or unsafe foods.
- For domestic and international trade
- Building up the trust and confidence of importers in the quality and safety of food supply systems
- Improving Food Quality and Safety makes economic sense also.
- Reduce the business cost of ensuring food safety
Food Safety on farm and off farm: GAP

The International Standard for Safe and Sustainable Agriculture
GOOD AGRICULTURAL PRACTICES

GAP is designed to

• Reassure consumers about how the food is produced on the farm
  • To reduce the use of chemical inputs
  • To minimize the detrimental environmental impacts of farming operations,
  • Ensuring a responsible approach to worker health and safety as well as animal welfare.
Good Agricultural Practices (GAPs) covers a wide gamut of:

- On-farm and post-farm activities
- Traceability
- Pesticides Handling and Safety
- Food quality and food security,
- Environmental impacts of agriculture

Social objectives:

- Animal health
- Workers Welfare
Pre-Harvest Food Safety Issues

- Pesticides residues and MRLs.
- Microbial and Toxins Contamination

1. IPM Chillies /Residue Free Chillies
2. Traceable Produce
3. Safe Food/Organic Food
4. Aflatoxin free Groundnut/Chillies/ Maize
5. Arsenic Free Rice
Harvest Food Safety Issues

- Harvesting Procedures – Manual versus Mechanical
- In-Field Packing Operations
- Equipment Cleaning
- Post-Harvest Water Quality
- Pre-cooling considerations
- Temperature and Humidity Management
- Packing, Storage and Transportation
Worker Health and Food Safety

- Relationship Between Worker Health and Hygiene
- Employee Symptoms Indicating Potential for Contamination of Food
- Exclusion of Sick Workers from Food Handling

1. Workers Training in Health and Hygiene
2. Personal Hygiene of Agricultural Workers
3. Correct Hand washing Procedure
Food Safety on Processing: HACCP

Hazard Analysis Critical Control Point

- WHAT hazards can enter the product?
- Where do these hazards occur?
- How can we control or eliminate these hazards?
Food Safety on Processing: HACCP

- Science based
- Step wise process:
  - Identifies hazards
  - Installs preventive measures to eliminate or reduce hazards in foods
- Proactive rather than reactive
- Risk based
Food Safety on Processing: HACCP

- Does not rely on end product testing and hazards may not be evenly distributed and can be missed in sampling
- Need to test large quantities
- Product would need to be destroyed or reworked
Food Safety on Processing: HACCP

- Starts from the beginning of the process
  - Receiving of ingredients,
  - packaging through process steps
  - to final product and shipping
**Food Safety on Processing: HACCP**

**Prerequisites to HACCP**
- Good Manufacturing Practices and Sanitation (US)
- Good Hygiene Practices (Codex)
- Other Prerequisite Programs
- Relationship of Prerequisite Programs to HACCP Program

**Preliminary Steps in Developing a HACCP Program**
- Assemble the HACCP Team
- Food Product Description and Distribution
- Describe Intended Use and Consumers of Food Product
- Develop a Flow Diagram Which Describes the Process
- Verify the Flow Diagram
HAZARD Identification

Three are three main types of hazards

- Biological hazards
- Chemical hazards
- Physical hazards
Biological Hazards

Microorganisms they are divided into five major classifications:
- Bacteria
- Yeasts
- Molds
- Parasites
- Viruses

Sources of Contamination
- Water
- Manure
- Sewage fluids
- Air
- Humans
- Animals
Chemical Hazards

Some Naturally Occurring Chemicals Hazards
- Allergens (e.g. weeds)
- Mycotoxins (e.g. aflatoxin)
- Mushroom toxins
- Alkaloids

Added Chemical Hazards
- Pesticides
- Antibiotics
- Heavy Metals
- Preservatives
- Carbide
Physical Hazards :-

- Glass
- Wood
- Insulation
- Plastic
- Personal: jewelry, hair, clips, pens
Prerequisite program

- Premises
- Transportation and Storage
- Equipment
- Personnel/Training
- Sanitation and Pest Control
- Recall
- Allergen Control
- Supplier Quality Assurance
Premises

Outside property and building
- Design, construction & maintenance
- Lighting
- Ventilation
- Waste disposal
- Inedible areas
- Employee & sanitary facilities
- Water/Steam/Ice
Transportation and Storage

- Food Carriers
- Temperature Controls
- Receiving and Storage
- Incoming ingredients and packaging
- Non-Food Chemicals
- Finished Product Storage
Equipment

- Design and installation
- Maintenance and Calibration
Personnel

- Trained for their job
- Understand food safety
Sanitation and Pest Control

Sanitation
- Equipment and Utensils
- Floors
- Locker rooms
- Lunch rooms
- Washrooms

Pest control
Recall

- Product identification
- Locating product
- Returning product
Allergen control

Identification of Allergens
- Control of allergens
- Special handling
- Segregate
- Special sanitation procedures
- Rework
- Proper labelling
Supplier Quality Assurance

- Vendor approval process
- Product specifications
- Inspect incoming materials
Now on to the HACCP plan ....
Sequence of 12 Steps

- Assemble HACCP team
- Describe product
- Identity intended use
- Construct process flow and plant schematic
- On site verification of flow and schematic
- List hazards associated with each process step (principle #1)
Sequence of 12 steps

- Apply HACCP decision tree to determine CCP’s (Principle #2)
- Establish critical limits  (Principle #3)
- Establish monitoring procedures    (Principle #4)
- Establish deviation procedures   (Principle #5)
- Establish verification procedures   (Principle #6)
- Establish record keeping/documentation principles 1 - 6   (Principle #7)
HACCP Team

People chosen that have expertise in different areas:
- Production
- Shipping
- Quality Assurance
- Sanitation
- Maintenance
- Sales
Product Description

- Product Name(s)
- Important Product Characteristics
- How it is to be used
- Packaging
- Shelf Life
- Where it will be sold
- Labelling Instructions
- Special Distribution Control
- Specific Ingredients
Define the processing steps

- Receiving
- Storage and Holding
- Preparation
- Packaging and Labelling
- Storage
- Distribution
Construct Plant Schematic

Your Establishment Plant Schematic Here
Determine hazards

- Look at each input- ingredients
- Determine possible hazards
- How are they controlled?
CCPs

- Critical control points
- Place where you can prevent, remove or reduce a hazard
- If there is not step in the process that can eliminate or reduce the hazards- use labelling, cooking instructions to inform how control can be achieved
Our CCPS

- Metal detector
- Metal is a hazard in our facility
- Not fully controlled by any prerequisite program
- Metal detectors specifically designed identify product containing metal
- That product can be removed
- No other step will remove the metal
CCPs

- What is your role?
- Monitor
- Look, smell, measure
- Record
- Corrective actions
- Verify
- Monitor people doing activity
- Take corrective actions when necessary
- Complete records properly
TQM In Food Safety
Principles of TQM

1. Leadership: Quality Oriented management
2. Customer Focus
3. Empowerment: Involving (entire) work force
4. Continuous improvement
5. Supplier Partnership
1. **Quality Oriented Management**

- The mission and vision should be such that balance the need of both company and customers.
- Management (as a leader) should inspire and motivate the entire workforce.
- Management must be a role model in ethical behavior, communication, and in coaching. I.e., role model in communication, their should be openness with both customer and employees.
2. **Focus on customer**

- Customer is consider as most important asset of an organization
- Consumer buy products and if they are satisfied will purchase more, in turn the organization will more profitable AND can stay competitive in the market
- Thus an organization must define all its process and function with customer point of view
3. Involving Entire Work Force

- A satisfy employee will work his best for the attainment of organization goal.
- Employee empowerment simply is the individual responsibility for decision making on organization behalf.
4. Continuous improvement

- Continuous improvement means bringing perfection in all organization function and process
- Dissatisfaction with current level of performance
- Eliminating waste when it occurs through rework.
- Adapt with a customer need.
5) Supplier Partnership

- A supplier is considered as partner because:
- Need of trust supplier that supply the quality material
- J.I.T concept
- Principles of customer and supplier relation
- Mutual responsibility for quality material
- Both should independent from each other
- Contract on Quality, quantity, price of material
6) **Measuring performance**

- Measuring performance means judging what have been planned either achieved or not
- Indicate the process gain or loss
- Compare the goal with what been achieved
- Determine what process need to improve
- Determine the overall performance of the organization
TQM Applications in Food Safety and Quality

1. Quality oriented Management
   - Continuous improvement in all areas of food safety
   - Identity Preservation and Traceability of the food
   - Ensure quality of incoming raw materials
   - Ensure modern techniques on record keeping and analysis
   - Ensure proper calibration of instruments for accurate analysis
   - Ensure standardization of processes
   - Reduction of customer complaints
TQM Applications in Food Safety and Quality

2. Customer Focus

- Customer satisfaction and safety
- Customer oriented quality innovation
- Complaints redressal mechanism
- Safety of the employees
- Improvement of machines for safe working conditions
- More organized working place
3. Involving the Entire Work force
   - Training on Hygiene and Sanitation
   - Employee Empowerment
   - Brain Storming
TQM Applications in Food Safety and Quality

4. Continuous Improvement
   - Globally standardized processes, advanced machineries and equipments
   - Latest processes on Product Recall
   - Ensuring automation in Identity Preservation and Traceability
5. Suppliers Partnership

- To ensure safe and quality raw materials are supplied
- Product quality is at its best
- High grade products are utilized
6. Measuring Performance

- Benchmarking
- High end quality checking and Data
- Maintains efficiency of processing machines
- Latest calibration equipment (gauges, digital measuring devices, etc.)