

THE BASIC PRINCIPLES OF HACCP

- The Meaning of HACCP
- History of the HACCP System
- Traditional Inspection HACCP System
- The Seven Principles of HACCP

Meaning of HACCP :
Hazard Analysis and
Critical Control
Points

Why HACCP?

HA = Hazard Analysis
+
CCP = Critical Control Points

HACCP Application

- Basic Agriculture
- Food Processing
- Distribution and Marketing
- Catering Services
- Street Foods
- Use by consumers

HACCP Objectives :

- ✓ Eliminate or significantly reduce hazards
- ✓ Prevent or minimize microbial growth and toxin production;
- ✓ Control contamination.

HACCP:

- emphasizes process control
- focus control on critical points related to food safety
- values communication between food producer and inspection

HACCP

- Preventive and not reactive (traditional inspection)
- Tool used to protect food from biological, chemical and physical hazards

HISTORY OF HACCP

- In the 1960s the Pillsbury Company developed a program for the production of safe foods for NASA space program
- In 1971, Pillsbury presented HACCP system to the public for the first time
- In 1973, it was applied to low-acid canned foods

Recommendation of the National Academy of Science

In 1985, NAS recommended that food sanitary agencies, as well as food industry in the US, should apply HACCP .

In 1993 Directive CEE relative to the hygiene of foods.

Why HACCP?

The *Codex Alimentarius* Commission decided to adopt the acronym HACCP, regardless the translation of *Hazard Analysis and Critical Control Points* in any of the official languages of the United Nations



Uniform understanding

The *Codex Alimentarius* Commission, in its twentieth session, held in Geneva, Switzerland June 23 - 28, 1997, adopted the revised *Recommended International Code of Practice – General Principles of Food Hygiene*

PREREQUISITES FOR HACCP IMPLEMENTATION

- Prerequisite programs to implement HACCP:
 - Good Manufacturing Practices (GMP)
 - Sanitation Standard Operating Procedures (SSOP)
- Preliminary steps need to be accomplished before applying HACCP

Prerequisite programs

Preliminary steps needed to control conditions related to safe food production

Examples:

- Hygiene and sanitation of equipment
- Training of employees
- Preventive maintenance
- Product identification

Good Manufacturing Practices - GMP

- Prerequisite to implement HACCP
- Some aspects involved:
 - hygiene and personal health issues
 - design and maintenance of buildings and equipment
 - calibration of equipment
 - use of ingredients
 - cleaning and sanitation

THE SEVEN PRINCIPLES OF HACCP

THE SEVEN PRINCIPLES OF HACCP

- 1. Perform a Hazard Analysis (HA) and establish the corresponding preventative measures**
- 2. Determine the Critical Control Points (CCP)**
- 3. Establish critical limits for each CCP**
- 4. Establish a system to monitor control of the CCP.**
- 5. Establish the corrective action to be taken when monitoring indicates that a particular CCP is not under control.**
- 6. Establish procedures for verification to confirm that the HACCP system is working effectively.**
- 7. Establish documentation concerning all procedures and records appropriate to these principles and their application.**

PRINCIPLE 1: HAZARD ANALYSIS

**Conduct a hazard analysis and
identify the preventive
measures**

PRINCIPLE 1

APPLICATION :

1. Assemble HACCP team:

Accomplished by assembling a multidisciplinary team.

2. Describe product :

Including information of composition, physical/chemical structure (A_w , pH...), microbial composition, packaging, durability and storage conditions and delivery method.

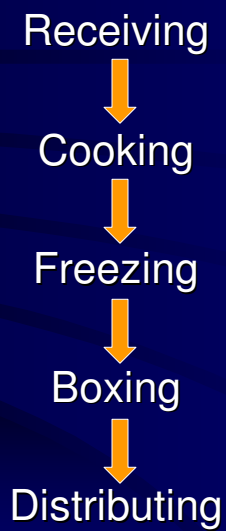
PRINCIPLE 1

3 Construct flow diagram :

The flow diagram should cover all steps in the operation.

4. List all potential hazards associated with each step, conduct a hazard analysis, and consider any preventive measures to minimize the identified hazards.

Example of a Flow Diagram



PRINCIPLE 1

Hazards can be:

- Biological
- Chemical
- Physical

PRINCIPLE 1

Biological hazard: bacteria, viruses and parasites, natural toxins, microbial toxins, metabolic toxins resulting from a bacterial source.

PRINCIPLE 1

Chemical hazard: pesticides, herbicides, inorganic contaminants, antibiotics, growth promoters, food additives, lubricants, paints, disinfectants.

PRINCIPLE 1

Physical hazard: glass, metal and wood fragments or other objects that may cause physical damage to the consumer

**PRINCIPLE 2:
CRITICAL CONTROL POINTS**

Identify the Critical Control Points (CCP) in the process.

PRINCIPLE 2

Critical Control Point (CCP)

"a step at which control can be applied and where it is essential to prevent or eliminate a food safety hazard or to reduce it to an acceptable level."

PRINCIPLE 2

Points identified as CCP when hazards can be avoided:

- Introduction of pathogenic microorganisms or drug residues can be avoided during the reception of raw material
- Chemical hazards can be avoided by controlling formulation steps and addition of ingredients

PRINCIPLE 2

CCP When hazards can be avoided

- Contamination of final product by pathogenic microorganisms can be avoided by addition of preservatives and/or pH adjustment.
- Growth of pathogenic microorganisms can be avoided by refrigeration.

PRINCIPLE 2

Points identified as CCP when hazards can be eliminated:

- Thermal processing for adequate time/temperature can eliminate pathogenic microorganisms or reduce them to acceptable levels

PRINCIPLE 2

CCP When hazards can be eliminated

- Metal pieces can be detected or removed using metal detectors, sifter screens, destoners, clarifiers, air tumblers
- Freezing processes can kill parasites (*Trichinella spiralis*, *Cysticercus celulosae*, *Anisakis* spp.)

PRINCIPLE 2

Points identified as CCP when hazard can be reduced to acceptable levels:

- The presence of foreign matter can be minimized by manual and/or automatic collector
- Some biological or chemical hazard can be minimized by proper selection of suppliers of raw material

PRINCIPLE 2

CCP are specific to a product and process

Many factors affect a CCP:

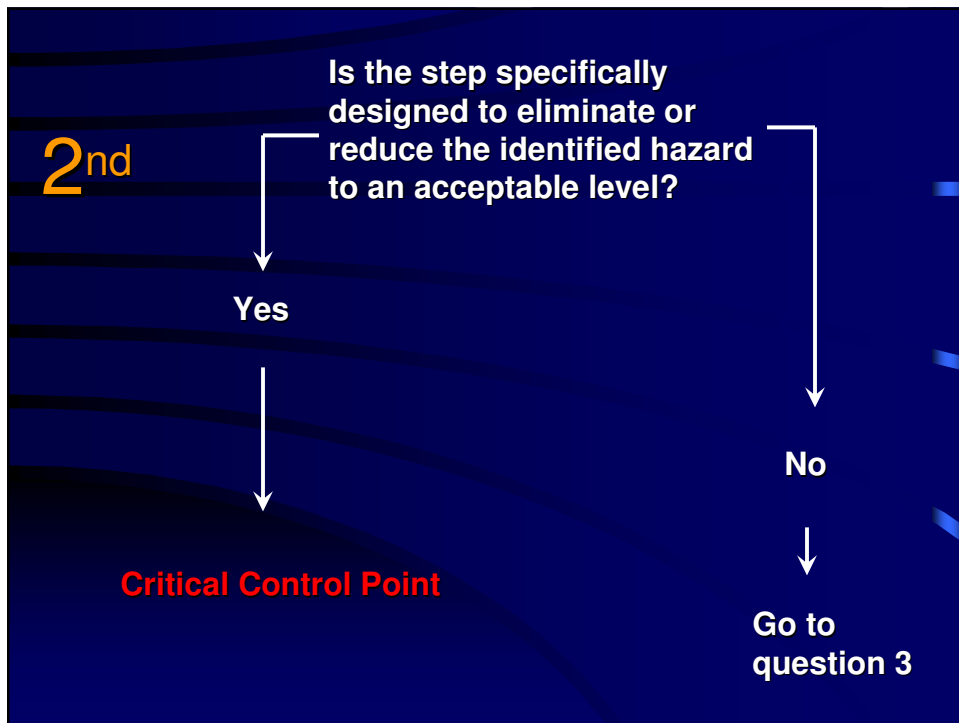
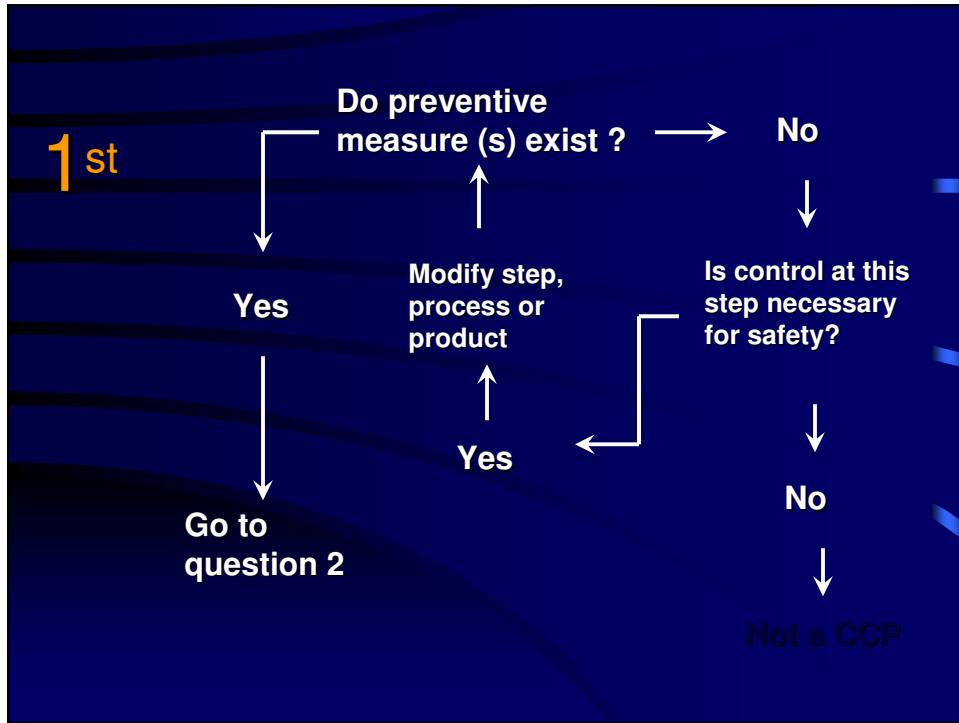
- Replacement of equipment
- Changes in product formulation
- Changes in operational flow
- Size of packaging
- Changes in GMP and SSOP

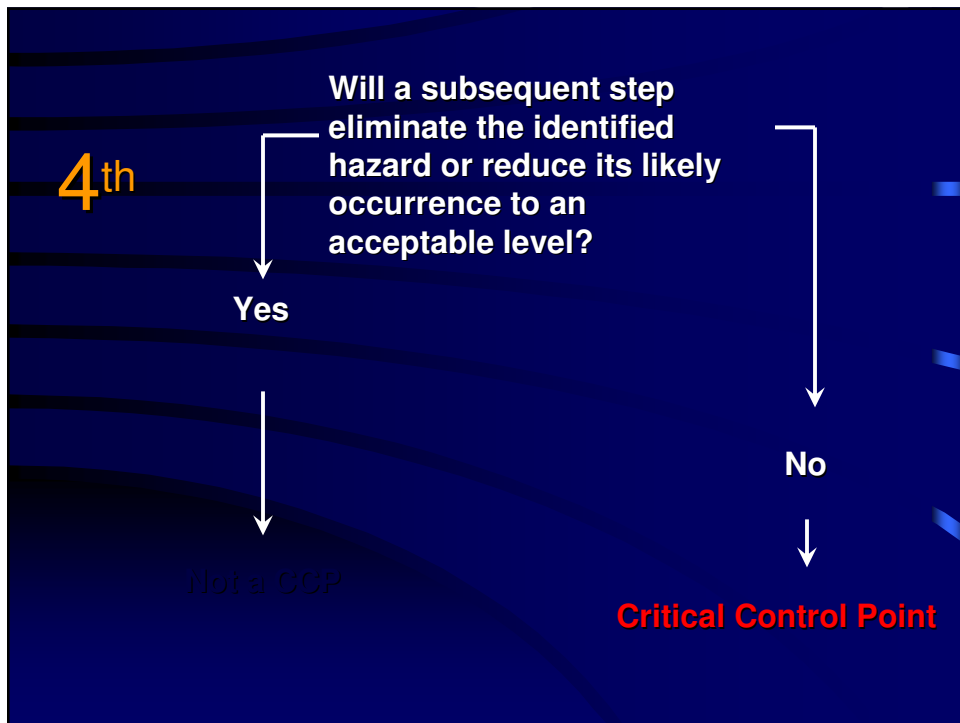
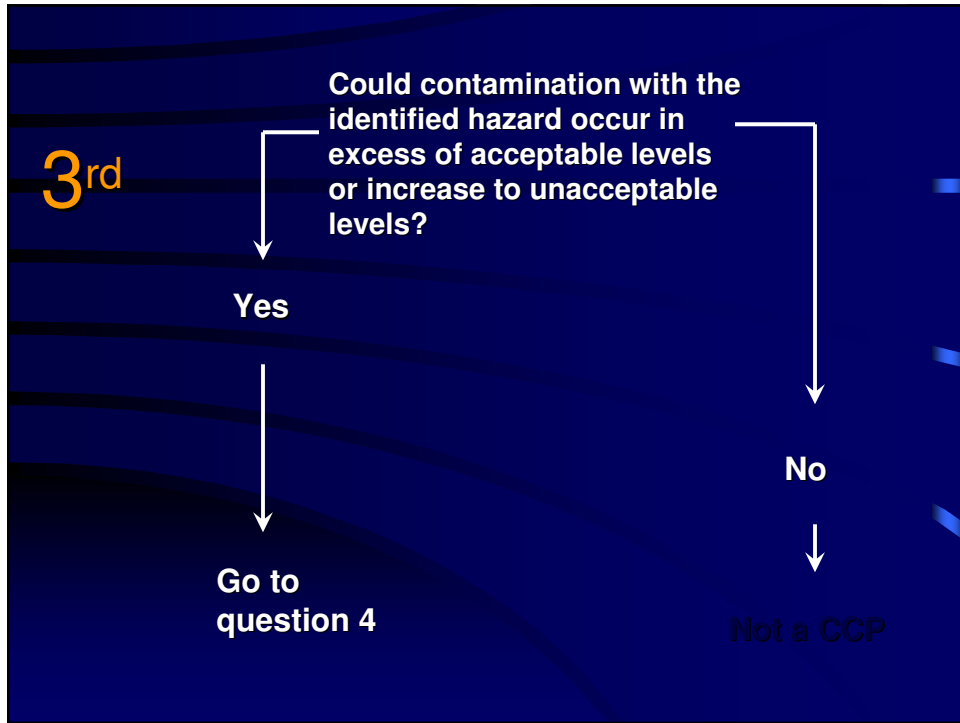
PRINCIPLE 2

Decision Tree to identify CCP

(Based on *Codex Alimentarius*)

Answer the questions in sequence.





PRINCIPLE 2

Examples of CCP:

Pasteurizer

Dryer

Frying pans

Freezers

PRINCIPLE 3

**Establish critical limits for each
CCP**

PRINCIPLE 3

Critical Limit

Critical limit is a criterion which should be met for each measure associated with a CCP, to ensure safety

Each CCP may have one or more critical limits associated with each significant hazard.

PRINCIPLE 3

Examples of critical limits to destroy/ prevent pathogens

- Time/ temperature requirements for thermal processes such as pasteurization, cooking,

PRINCIPLE 4

Establish monitoring systems for each CCP

PRINCIPLE 4

Monitoring

The act of conducting a planned sequence of observations or measurements of control to assess whether a CCP is under control;

The record of this observation shall be used on futures verifications

PRINCIPLE 4

Monitoring

- **What?:** usually a measure or observation to evaluate if the CCP is operating within the critical limits
- **How?:** usually physical or chemical measures or observations. Should be taken and recorded in real time

PRINCIPLE 4

- **When (frequency)?:** can be continuous or non-continuous.
- **Who?:** Someone trained for the activity which will be monitored.

PRINCIPLE 4

What will be monitored?

- ◆ Measurement of the time and temperature of a thermal process
- ◆ Measurement of cold-storage temperature
- ◆ Measurement of pH
- ◆ Measurement of A_w
- ◆ Speed of production line
- ◆ Certificate of origin of raw material
- ◆ Harvest area of molluscan shellfish

PRINCIPLE 4

How will critical limits and measures be monitored?

- Thermometers
- Clocks
- Scales
- pH-meters
- Water activity meters
- Analytical equipment

PRINCIPLE 4

Monitoring frequency

- Continuous monitoring (if possible)
 - Thermographs
 - Metal detectors
- Discontinuous monitoring
 - Internal temperature of cooked products
 - Evaluation of seam measures of canned food
 - Sensory evaluation

PRINCIPLE 4

Responsibility for monitoring

- Production personnel
- Equipment operators
- Supervisors
- Maintenance personnel
- Quality assurance personnel.

Control measures

Biological hazards

- Temperature/time control
- Heating and cooking
- Cooling and freezing
- Fermentation and/or pH control
- Addition of salt or other preservatives,
- Drying

Control measures

Chemical hazards

- Control of raw materials
- Processing control
- Proper segregation of non-food chemicals during storage and handling
- Control of incidental contamination from chemicals
- Labeling control

Control measures

Physical hazards

- Control of raw material
- Processing control, e.g. use of magnets, metal detectors, sifter screens, de-stoners, clarifiers, air tumblers
- Control of processing environment
- Preventive maintenance of equipment used in food processing

PRINCIPLE 5

Establish corrective actions to be taken when monitoring indicates deviation from critical limits

PRINCIPLE 5

Corrective Actions

Any action to be taken when the results of monitoring at CCP indicates loss of control.

PRINCIPLE 5

Components of Corrective Actions

- Correct and eliminate the cause of the deviation and restore the control of process.
- Identify product produced during process failure and determine its use

PRINCIPLE 5

Steps to determine the use of food when critical limits are violated

1st Step: Determine if the product present a public health risk, based on:

- experts evaluation
- results of chemical and/or microbiological analysis

2nd Step: If the evaluation above does not show any risk, release the product to be consumed or to follow the process

PRINCIPLE 5

3rd Step: If the evaluation indicates that a hazard occurred, determine if the product should be:

- reworked/ reprocessed
- deviated to another use

4th Step: If it is not possible, the product should be destroyed. It is the most expensive option and will be used only as the last alternative

PRINCIPLE 6: VERIFICATION

Establish procedures for verification that HACCP is working correctly

PRINCIPLE 6

Verification

Application of methods, procedures, tests and other types of evaluation, in addition to monitoring, to determine compliance with the HACCP plan.

PRINCIPLE 6

Verification gives elements to ensure that the HACCP plan is based on scientific principles.

PRINCIPLE 6

- HACCP plan validation
- CCP verification:
 - Calibration of monitoring equipment
 - Targeted sample collection and testing
 - Review of monitoring records
- HACCP plan verification:
 - Audits
 - Microbiological analysis of the final product

PRINCIPLE 6

Validation

Validation is the act of assessing whether the HACCP plan for a specific product and process identifies and controls all significant food safety hazards or reduces them to an acceptable level.

It shall be performed before the HACCP plan implementation.

PRINCIPLE 6

Validation involves ensuring that the HACCP plan is based on current good science and current information and is appropriate for the actual product and process

PRINCIPLE 6

Who performs verification?

- HACCP team
- Persons qualified by training and experience

What kind of activities compose the validation?

A scientific and technical review of each part of HACCP plan, from hazard analysis to the strategy for the verification of each CCP

PRINCIPLE 6

Calibration of monitoring instruments

Calibration of appropriate equipment and instruments used in the development and implementation of the HACCP plan should be performed:

- At a frequency sufficient to assure continuous accuracy
- By checking accuracy against a recognized standard

PRINCIPLE 6

Targeted sample collection and testing

Every time the reception of raw material is considered a CCP, purchase specifications should be issued to ensure the achievement of the critical limits. A sample may be collected and analysed to ensure that the specifications were met

PRINCIPLE 6

Analysis of the final product

- The final product can be tested to ensure compliance with the critical limits
- The effectiveness of HACCP plan to ensure that the identified limits have not been exceeded

PRINCIPLE 6

- Analysis of the final product should be used to verify if the process is under control
- Analysis are not a valuable tool to monitor routinely a CCP

PRINCIPLE 6

HACCP plan verification

- Annually;
- Always when there is a failure in the system or an important change of product or process.

An adequate recall procedure should be established if the result of the final product analysis shows some deviation which can suppose a risk to the consumers

Principle 7

**Establish effective record
keeping procedures that
document the HACCP System**

PRINCIPLE 7

Records

Records are essential source of information and constitute a documental prove that CCP are operating within critical limits and deviation are treated appropriately

PRINCIPLE 7

Information record

Information obtained during the monitoring activities should be recorded at the moment of the observation

False or incorrect records bring disbelief to the HACCP plan

PRINCIPLE 7

Record Review

Record reviews must be conducted periodically by qualified staff members of HACCP plan to ensure it's working properly

PRINCIPLE 7

Records that should be part of HACCP system

- HACCP plan and all background documentation
- CCP monitoring records
- Corrective action records
- Verification records (internal and external)

PRINCIPLE 7

To assure product safety and to document process and procedures, HACCP records must contain the following information

Title and date of the record

Product identification (code, including time and date)

Materials and equipment used

Operations performed

PRINCIPLE 7

Critical criteria and limits

Corrective action to be taken and by whom

Operator identification

Data (presented in a orderly format)

The reviewer's initials and date of review