

**INTRODUCTION TO HACCP  
(HAZARD ANALYSIS CRITICAL CONTROL POINT)**

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## **Objectives of the module**

By the end of this module, participants should be able to

- (a) Give a simple definition of HACCP
- (b) Explain the following terms: hazard, risk, critical point
- (c) List the benefits of the HACCP approach
- (d) Describe the different steps in a HACCP study
- (e) Construct and use simple flow diagrams

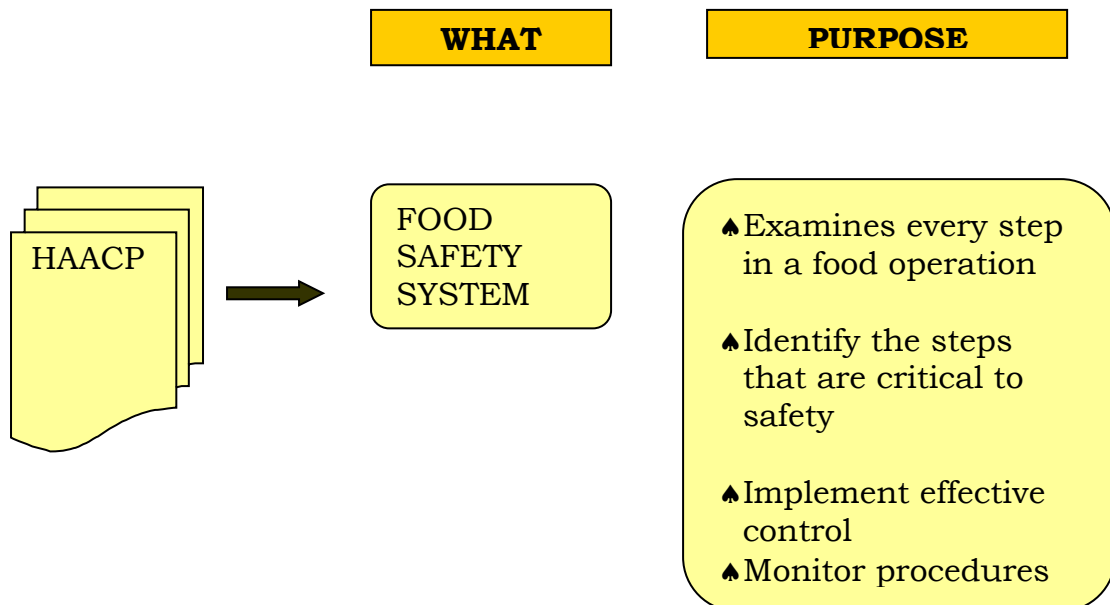
## 14 INTRODUCTION TO HACCP

### 14.1 WHAT IS HACCP?

Traditionally, industry and regulators have depended on spot-checks of manufacturing conditions and random sampling of final products to ensure safe food. This approach, however, tends to be reactive, rather than preventive **HACCP** which stands for **Hazard Analysis and Critical Control Point**, is a prevention-based **food safety** system which was developed nearly 30 years ago to ensure safe foods for astronauts. It has now been adopted by the food industry to ensure production of safe foods.

#### ■ **HACCP : HAZARD ANALYSIS CRITICAL CONTROL POINT.**

HACCP is a systematic approach to ensure food safety by examining every step in a food operation, identifying hazards and assessing their severity and risks and controlling these hazards.



### ***Benefits of HACCP***

- The system offers a rational approach to the control of hazards in foods
- It avoids the many weaknesses inherent in inspectional approach
- Its implementation focuses attention on the factors that directly affect the safety of a product ***at all stages of the food chain.***
- It increases confidence in the food supply
- Its use will lead to increased market access and reduction in production costs (reduced recall or wastage of food)
- Its application reduces risk of foodborne diseases

## **14.2 EXPLANATION OF TERMS**

### **HAZARD**

**A biological, chemical or physical agent in, or condition of, food with the potential to cause an adverse health effect.**

(Annex 1)

- One of the most serious hazards in the food industry is botulism caused by the toxin of the bacterium *Clostridium botulinum* which can even cause death.

### **RISK**

**Risk** is the estimate of the probability of a hazard occurring

- If the bacterium *Clostridium botulinum* is likely to be present and conditions exist that favour its growth, then there is a **high risk** of a problem occurring.

## SEVERITY

Not all hazards are equally dangerous.

**Severity** is the magnitude of the hazard, or the seriousness of possible consequence

Botulinum is a very serious hazard in the food industry because it frequently leads to death whilst some other types of food poisoning, although unacceptable, can lead to discomfort for a few days.

**Hazard Analysis** is therefore

1. the **identification** of potential hazards
2. the **risk of hazards** (microbiological, chemical and physical) occurring, considering
  - (a) potential sources and specific points of contamination
  - (b) the **probability that microorganisms will survive and/or multiply** during production, processing, distribution, storage and preparation for consumption and
3. the **assessment of risks** and **severity** of hazards identified

## CRITICAL CONTROL POINTS.

- Every possible hazard, bearing in mind its risk of occurrence, has to be controlled.
- Control can be exercised at different points in the food chain.

**A critical control point** is a step in a food operation where control is crucial to the safety of the food.

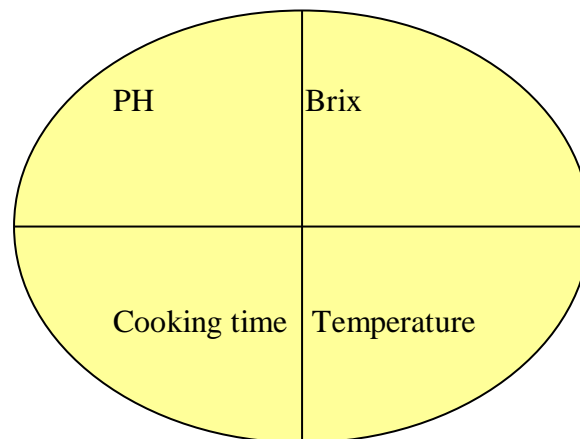
**A critical control point** is a location, practice, procedure or process at which control can be exercised over one or more factors which, if controlled, could minimise or prevent a hazard.

## **MONITORING**

Appropriate methods should be selected to check that a hazard has been controlled at a critical control point. We need certain criteria that indicate whether or not the operation is under control.

**Criteria** can be defined as characteristics that must be specified to ensure the control of product safety.

### **Examples**



- The monitoring must detect any deviation from the specified criteria.
- Any loss of control at a CCP must be quickly detected so that immediate corrective action can take place to regain control at this point and to prevent wastage of product.

**Monitoring** is the systematic observation or measurement at a CCP of the criteria for the control of the hazard. It detects any deviation from the specification and thus allows corrective action to be taken.

## **VERIFICATION**

Procedures need to be established to verify that the HACCP system is working.

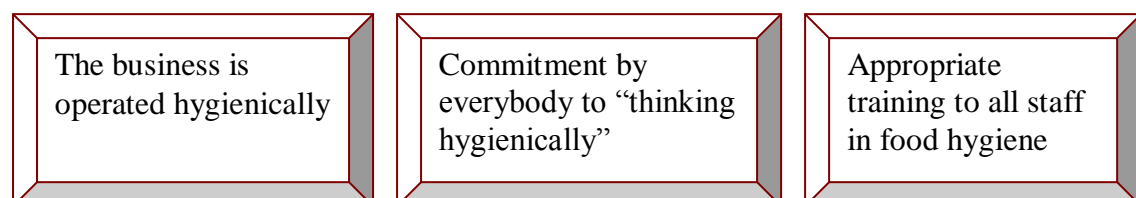
**Verification** is the use of supplementary information and tests to ensure that the HACCP system is functioning as planned

Verification procedures may include:

- Establishment of appropriate verification inspection schedules
- Review of the HACCP plan
- Review of CCP records
- Visual inspections of operations to observe if CCPs are under control
- Random sample collection and analysis

### **14.3 HAZARD ANALYSIS FOR THE INFORMAL SECTOR**

It is not possible to apply HACCP principles to any operation unless the following criteria are fulfilled:-



HACCP can be applied to large food industries (eg large cheese manufacturing plant) as well as to the small scale food business (cottage cheese industry) and to domestic kitchen (preparation of cheese sandwiches). Training of **all staff, at all levels** is important for the successful implementation of the HACCP system.

## 14.4 HACCP PRINCIPLES

HACCP consists of the following **seven basic** principles (WHO 1996):

**PRINCIPLE 1**

*Conduct a hazard analysis*

Prepare a flow diagram of the steps in the process. Identify and list the hazards and specify the control measures.

**PRINCIPLE 2**

*Identify the Critical Control Points*

Use a decision tree for identification

**PRINCIPLE 3**

*Specify criteria to ensure control*

Critical limits are established to ensure each CCP is under control.

**PRINCIPLE 4**

*Monitor each CCP*

Establish a monitoring system to ensure control of the CCP by scheduled testing or observations.

**PRINCIPLE 5**

*Establish the corrective action*

Establish the corrective action to be taken when monitoring indicates that a particular CCP is moving out of control.

**PRINCIPLE 6**

*Establish Verification procedures*

Establish verification procedures including appropriate supplementary tests, together with a review which confirms that HACCP is working effectively.

**PRINCIPLE 7**

*Establish documentation*

Establish documentation concerning all procedures and records appropriate to these principles and their application



## 14.5 STEPS IN HACCP ANALYSIS

### **Stage 1      *Select the team***

1. One quality Assurance / Quality control Specialist, One production specialist, One Engineer, One buyer, operator
2. Select a chairperson of the team

### **Stage 2      *Define Terms of reference***

HACCP study should consider microbiological, chemical or physical hazards (or any combination of these) - Product safety and / or microbiological quality. Terms of references must also clearly state whether product is to be judged safe at time of consumption or at point of manufacture with clear storage and use instructions

### **Stage 3      *Describe the product***

Composition, structure, processing, packaging system, storage & distribution conditions, required shelf life, instructions for use.

### **Stage 4      *Identify intended use of product by consumer***

### **Stage 5 :      *Construct a Flow diagram***

Each step should be outlined in sequence.

### **Stage 6      *On-site verification of flow diagram***

Verify if existing lines are an accurate representation of operation.

### **Stage 7      *List all hazards associated with each process step and list all measures which will control the hazards***

**Stage 8      *Apply HACCP decision tree (figure 1) to each process step in order to identify Critical Control Points***

No limit on number of CCP that may be identified in a study.

**Stage 9      *Establish target level(s) and tolerances for each CCP***

To monitor the CCP, target levels and tolerances must be specified for each preventive measure.

Levels & tolerances set for each CCP control measure must represent some measurable parameter related to the CCP. e.g assessing temperature, time, moisture level, pH, water activity, chemical analysis.

**Stage 10 :    *Establish a monitoring system for each CCP***

The monitoring system describes the methods by which management is able to confirm that all CCPS are operating with specification. It also produces an accurate record of performance for future reference in verification. Team also decides **WHO** should act and **HOW**

**Stage 11:    *Establish a corrective action plan.***

When the monitoring of the results shows that a CCP has deviated from its specified tolerance, actions need to be specified and taken to bring process back into control. Also disposition action for food when CCP was “ out of control”.

**Stage 12:    *Establish record keeping and documentation***

Efficient & accurate record keeping is essential to the successful application of HACCP to a food process.

Producer should be able to show that HACCP principles have been correctly applied. Examples of records :

- Nature, Source & quality of raw materials
- Listing of the HACCP team and assigned responsibilities;
- Description of the product and its intended use;
- Flow diagram food preparation indicating CCPs;
- Hazards associated with each CCP and preventive measures;

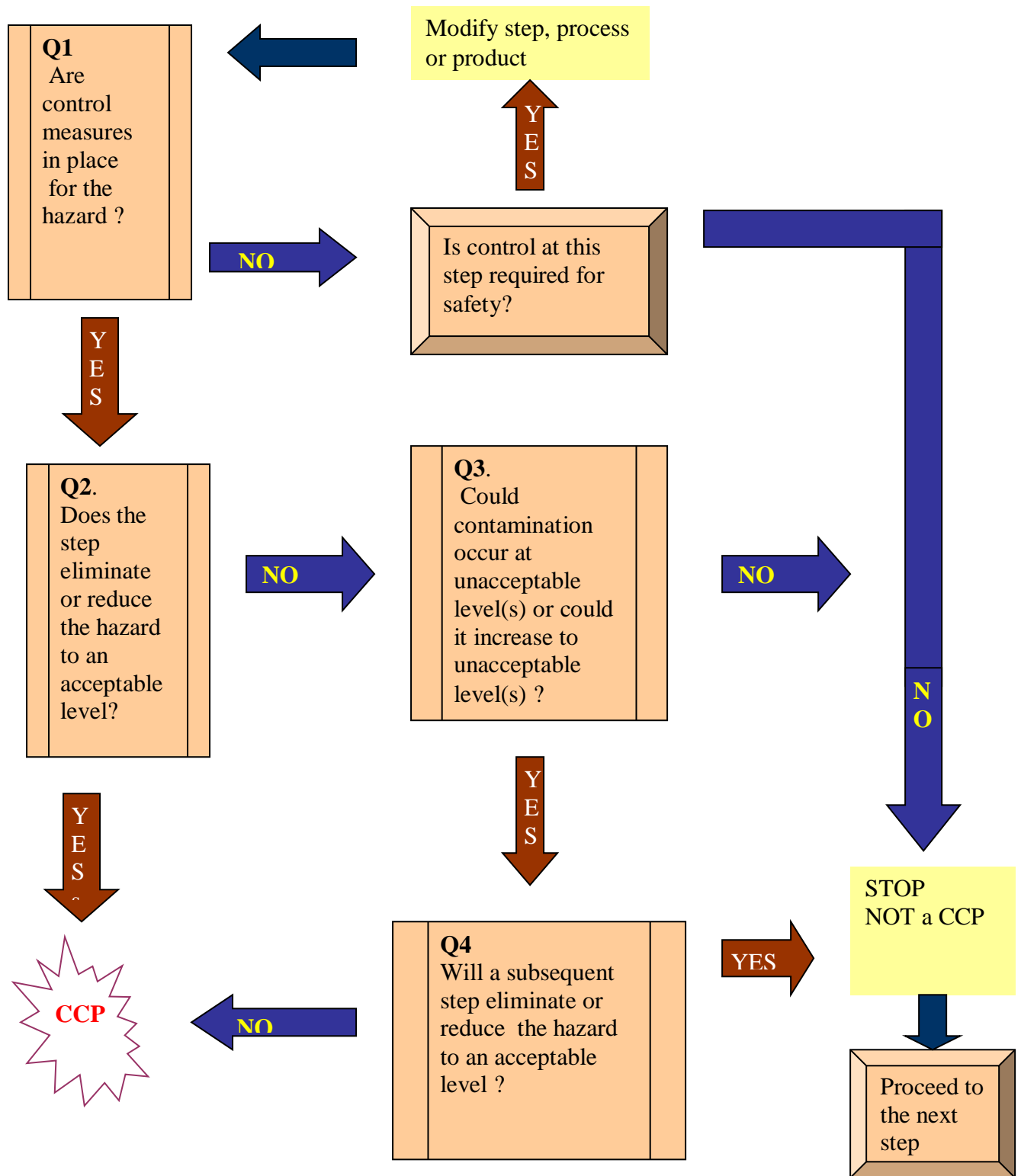
- Critical limits;
- Cleaning & disinfection records
- Deviations file
- Corrective / disposition action file

### **Stage 13    *Verification***

Verification should review entire HACCP system and records.  
Examples :

- Internal auditing systems
- Review of deviations & product disposition
- Surveys of the market place for unexpected health / spoilage problems
- Review of critical limits to verify that they are adequate to control hazards;

### **Stage 14 :    *Review HACCP Plan***



**Figure 1: The Decision Tree to identify CCP**

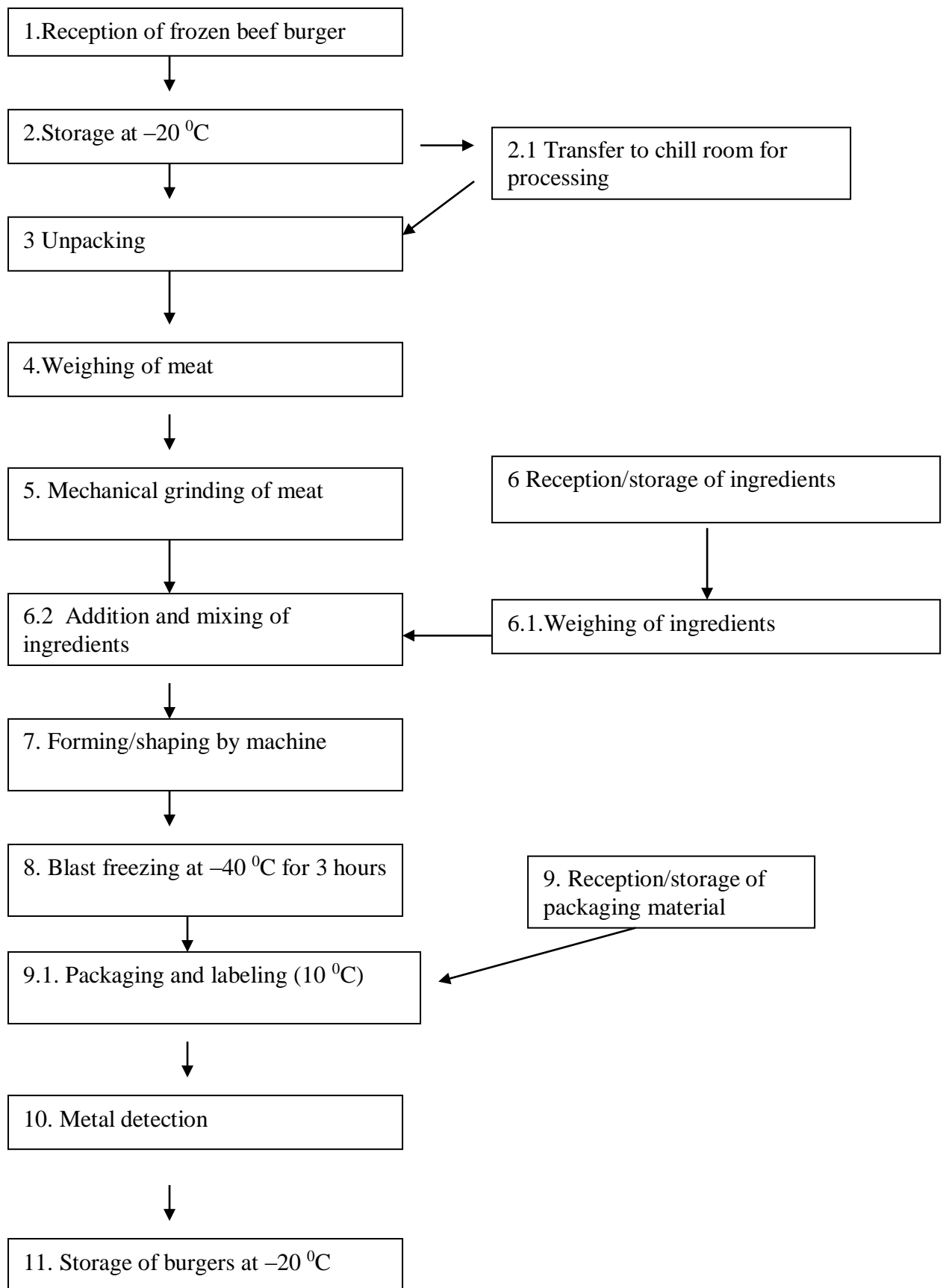
### **GROUP EXERCISE ACTIVITY**

This is a HACCP group exercise. You are provided with a flow chart for the manufacture of frozen beef burgers. Carefully study the flow diagram and product characteristics.

- 1 Identify the potential hazards that can arise and their possible causes.
- 2 Indicate the control measures required to prevent these hazards
- 3 Making use of the Critical Control Point decision tree, apply its methodology for each process step in the flow diagram, in sequence, to identify whether the process is a CCP or not.

Each group will be given 1 hour to complete the HACCP study. After the exercise, each group will deliver a 15 minute presentation of the results.

### Flow diagram for the production of raw, frozen beef burger



### Annex 1: Hazards associated

Food item	Hazards
Raw vegetables	Microbiological Soil particles Pebbles Insects Unwanted plant materials Pesticide residues
Cooked vegetables	Microbiological Pesticide residue Chemical
Pulses	Microbiological Soil particles Pebbles Insects Unwanted plant materials Pesticide residues Natural toxins
Fresh meat	Microbiological Parasite Physical contaminants (feathers, fur) Veterinary residues (Hormones)
Fresh fish	Microbiological Toxins Parasites Heavy metals
Water	Microbiological Physical contaminants Metals

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