

# TRAINING NOTEBOOK

- FOOD SAFETY -

## PRINCIPLES OF HYGIENE AND FOOD SAFETY MANAGEMENT



This training notebook was produced and designed by the Training, Information and Communication services of COLEACP. This publication was written by Bruno Schiffers with the collaboration of Babacar Samb for chapters 1 to 8 and Jeremy Knops for chapter 9.

This publication has been prepared by the COLEACP as part of the co-operation programmes funded by the European Union (European Development Fund – EDF), and in particular the Fit for Market (FFM) programme co-funded by the European Union and the Agence Française de Développement (AFD).

The COLEACP is solely responsible for the content of this publication, which may in no way be considered to represent the official position of the European Union or the AFD.

The COLEACP owns the intellectual property rights to the entirety of the document.

This publication is an integral part of a COLEACP collection, which is made up of educational tools and materials. All of them are suited to different types of learners and levels of education found in agricultural supply chains, production and sales.

This collection is available online for COLEACP members.

Subject to certain conditions, the use of all or part of this publication is possible within the scope of specific partnerships. To make any inquiries, please contact the COLEACP at [network@coleacp.org](mailto:network@coleacp.org).

# **- FOOD SAFETY -**

## **PRINCIPLES OF HYGIENE AND FOOD SAFETY MANAGEMENT**

<b>LEAFLET 1: Basic food safety concepts .....</b>	<b>1</b>
<b>LEAFLET 2: General principles of food hygiene .....</b>	<b>3</b>
<b>LEAFLET 3: Origin and nature of food risk.....</b>	<b>5</b>
<b>LEAFLET 4: Handling and preservation of fruit and vegetables .....</b>	<b>7</b>
<b>LEAFLET 5: The HACCP system .....</b>	<b>9</b>
<b>LEAFLET 6: Establishing a FSMS (Food Safety Management System) in a company .....</b>	<b>11</b>
<b>LEAFLET 7: The internal control and FSMS certification process .....</b>	<b>13</b>
<b>LEAFLET 8: Market access strategy.....</b>	<b>15</b>
<b>LEAFLET 9: Private standards (PS) .....</b>	<b>17</b>



# LEAFLET 1

## Basic food safety concepts

### EDUCATIONAL OBJECTIVES

On completion of this training sequence, the participant must be able to:

- Categorise the components of quality.
- List key health and safety concepts and briefly describe the relations between them.
- Establish the factors responsible for the risk of poisoning.
- Differentiate between the former “obligation to resources” approach and the current “obligation to results” approach as part of food health and safety.

### KEY MESSAGES

#### 1) The food health and safety situation

- Food poisoning is a major public health problem. The cost in human suffering is far too high, in particular for the most vulnerable population groups (infants, children, the elderly, etc.).
- Cases of food poisoning are constantly rising, and new hazards are discovered each year. This increase in the number of cases is the result of various interacting factors, including insufficient food hygiene and presence of contaminants, which can be toxic for the consumer.
- These risks can be reduced when simple and efficient hygiene rules are applied and all operators implement food safety management systems based on an analysis of hazards.

#### 2) The concept of product “quality”

- Quality is defined as the degree to which a set of inherent characteristics fulfils requirements. Quality requirements cover not only aspects relating to a product’s food safety (no plant protection products, etc.), but also to the way it was produced. Quality elements can include nutritional and organoleptic properties, production ethics, etc.
- Health and safety (health quality) is based on a few key concepts: hazard, risk and crisis, hygiene, product, food chain, process, system and traceability.

#### 3) The increasing responsibility of operators for health and safety

- Formerly, food safety was based on the obligation for operators to respect a long list of “requirements” (laid down in legal documents). Compliance with these requirements was supposed to guarantee a healthy and safe production. Under this system inspections were at the heart of this system to assess conformity. This approach was reassuring for producers, who merely had to apply the regulations strictly to be absolved of all responsibility.
-





# LEAFLET 2

## General principles of food hygiene

### EDUCATIONAL OBJECTIVES

On completion of this training sequence, the participant must be able to:

- Define the concept of food hygiene and name its two components.
- List the general principles of food hygiene.
- Connect the general principles with hygiene measures.
- Define the prerequisite programme (PRP) concept.
- Describe briefly the 5 factors involved in the hygiene of the production process.
- Describe the role of the PRPs in a health quality management system.

### KEY MESSAGES

#### 1) Definition of hygiene

- Hygiene can be defined as “the measures and conditions necessary to control the hazards and ensure fitness for human consumption of a foodstuff, taking into account its intended use”.
- Food hygiene comprises two components:
  - Food safety, which guarantees that food is harmless, with no adverse effect for the consumer’s health when prepared and/or consumed in accordance with its intended use.
  - Food suitability, which concerns the intrinsic characteristics of the product (taste, texture, smell, etc.).

Food safety and suitability must be guaranteed at every stage in the food chain.

#### 2) General principles of food hygiene

The *Codex Alimentarius* identifies the essential principles of food hygiene applicable throughout the food chain.

Within the production chain and in packing stations, these general principles relate to measures covering:

- Personnel hygiene (personal cleanliness, state of health, etc.).
- Production conditions (cleanliness of operating stations, etc.).
- Facilities; cleanliness of equipment and apparatus.
- Handling, transport and storage of products.
- Control of operations (commodities, water quality, etc.).
- Maintenance, cleaning and waste management.
- Personnel training.





# LEAFLET 3

## Origin and nature of food risk

### EDUCATIONAL OBJECTIVES

On completion of this training sequence, the participant must be able to:

- Describe the nature and origin of food risks.
- List the acceptability thresholds associated with each kind of risk.
- Define the concept of emerging risk.
- Identify the conditions leading to the appearance of an emerging risk.

### KEY MESSAGES

#### 1) Biological risks

- Biological risks arise from contamination of food by pathogenic organisms or micro-organisms, often associated with humans and raw products that enter in the food production chain.
- Their occurrence is above all due to a lack of hygiene and sanitary conditions. Faecal matter is the main vector and can contaminate food directly or indirectly.
- These organisms comprise foodborne viruses, bacteria (the highest of the risks of biological origin), mould, yeasts, fungi, worms, etc.

#### 2) Physical risks

- The origin of physical risks is the unintentional presence in a food product of either a foreign body (glass, wood, stones, metals, etc.) or of natural objects (fish bones, bone fragments, etc.).
- In fresh fruit and vegetables, physical risks are mainly associated with the presence of foreign bodies such as earth or sand, insects, wood, pest excrement, pieces of cardboard, etc.

#### 3) Chemical risks

- Chemical contaminants can exist naturally in food, be added to it during processing, migrate from packaging or even form during cooking.
- Chemical dangers can be classified into 4 principal categories:
  - Natural chemical compounds (mycotoxins allergens, shellfish toxins, etc.).
  - Industrial chemical compounds (agricultural products, food additives, dioxins, etc.).
  - Toxic compounds and elements (heavy metals such as lead and zinc, etc.).
  - Contaminants originating from packaging.



4) Acceptable risks and limits

- European regulations have established harmonised safety criteria for food acceptability. These criteria exist for biological risks and for chemical risks. They serve as references for authorities in charge of food controls and as objectives for food business operators. They define the acceptability of a food product or a process based on the absence, or presence of micro-organisms, and/or the quantity of their toxins/metabolites per unit of mass, volume, area or lot.
- For physical risks, there are no European regulations. The thresholds considered acceptable vary from one sector to another, from one industry to another.

5) Emerging risks

- An emerging risk “is a problem that may pose a risk to the food chain in the future”.
- Emerging health risks are related to:
  - significant exposure to a hazard not recognised previously as relevant ;
  - higher exposure to a known hazard ;
  - increased sensitivity of the population to a known hazard.

**PERSONAL NOTES AND REFERENCE MATERIAL**

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

# LEAFLET 4

## Handling and preservation of fruit and vegetables

### EDUCATIONAL OBJECTIVES

On completion of this training sequence, the participant must be able to:

- List the conservation objectives for fresh fruit and vegetables.
- Describe the factors making fresh fruit and vegetables suitable for conservation.
- Classify the types of deterioration of fresh fruit and vegetables, and give examples for each type.
- Give the 2 most common factors acting on conservation and give examples of their actions.
- List techniques for preparing fruit and vegetables.
- Give examples of conservation techniques.

### KEY MESSAGES

#### 1) The objectives of preservation

- Once harvested, and therefore separated from their natural source of nutritive substances, fruit and vegetables deteriorate.
- The aim of preservation is therefore to protect the products during post-harvest operations and prevent the development of organisms capable of posing a threat to consumer health or alter the commercial quality of the products.
- Suitability for preservation depends on:
  - Inherent natural preservation properties of each product,
  - The effectiveness of appropriate techniques.

#### 2) The nature of the deterioration

Fruit and vegetables, once harvested, lose their quality through various types of deterioration:

- Physical (such as dehydration),
- Physiological, chemical and enzymatic (ageing, respiration, transpiration, etc.),
- Deterioration caused by insects, rodents and pathogens,
- Deterioration due to mechanical damage.

#### 3) Storage conditions

- The two main and most common factors in the deterioration of fruit and vegetables are:
  - Temperature,
  - Humidity.

It is important to be aware of the ideal conditions (temperature-relative humidity pairing) for each





# LEAFLET 5

## The HACCP system

### EDUCATIONAL OBJECTIVES

On completion of this training sequence, the participant must be able to:

- Describe the role of HACCP in the food health and safety field.
- Define the principle on which HACCP is based.
- List the 7 principles of HACCP and briefly describe them using examples.
- List the 2 phases and 12 steps of HACCP.

### KEY MESSAGES

#### 1) Definition of HACCP

- HACCP is the acronym for Hazard Analysis Critical Control Point.
- HACCP is a systematic and rational strategy for controlling hazards in order to ensure the safety of a product. As part of food safety, emphasis is placed on inspection and improvement during production, rather than on finished product inspection. This relies on this principle: Prevention is better than cure.
- The *Codex* and European regulations governing food hygiene have instituted the HACCP system as the reference standard for food safety management.
- HACCP is a method and is therefore not a “standard” as such in the strict sense of the term. Certification of this method is not based on a regulatory requirement but on a voluntary approach.

#### 2) The 7 basic principles of HACCP

- Conduct a hazard analysis
- Identify Critical Control Points (CCP)
- Establish critical limit(s)
- Establish a CCP monitoring system
- Establish corrective actions to be taken (in case of uncontrolled CCP)
- Establish verification procedures
- Establish files and maintain records

#### 3) Implementing the HACCP method

- Implementation requires that prerequisite programmes (Good Agricultural Practices, etc.) must already be in place.
- The 7 principles are applied following a 12-step strategy consisting of 2 phases:
  - The preparatory phase (5 steps): Set up the HACCP team – Describe the character-





# LEAFLET 6

## Establishing a FSMS (Food Safety Management System) in a company

### EDUCATIONAL OBJECTIVES

On completion of this training sequence, the participant must be able to:

- List the advantages of setting up a FSMS.
- List and briefly describe the 4 steps leading to the establishment of a FSMS.
- Understand how to construct a product life cycle.
- Define the process concept.
- List the components of a documentary system for managing a FSMS.

### KEY MESSAGES

#### 1) The principles for establishing a Food Safety Management System (FSMS) in a company

- Quality approaches come from voluntary application. They allow suppliers to differentiate their services and inspire confidence in their customers. However, some customers now require producers to follow a “quality standard” and require them to obtain “certification” of their quality management system.
- Advantages of a FSMS:
  - Improve the safety of products.
  - Improve the production of consistent quality products.
  - Provide customers with quality assurance.
  - Give the company’s staff members more confidence and pride in performing their tasks.
- More broadly, the FSMS may be integrated into the company’s “quality policy”. Any policy must be validated by the company’s senior management and shared throughout the organisation.

#### 2) The key steps for setting up a FSMS in a company

- Define the product. You must provide a full description of the product (characteristics, its use by the consumer, perishability), meet customer’s needs (which are also found in private standards) and meet legal requirements.
- Construct the operations flow diagram (or product life cycle). A product’s life cycle is the central tool for food safety;
  - It identifies the operations carried out in a company in a logical sequence. The basic concept underpinning this approach is that of “process”; a set of interrelated or interacting activities that transform inputs into output.
  - The process must be repeatable, measurable and must interact with other processes.
  - A company consists of a series of interrelated processes. Interactions are very im-

portant. Therefore, as part of the FSMS, they must be identified as fully as possible.

- Processes in a company can be divided into several categories: the organisation's management processes (strategic planning), resource management processes (support process), Implementation processes (operational process) and measurement, analysis and improvement processes (or steering process).
- Establish control and self-evaluation procedures at each step of the process.
- Set up a documentation system. This system means collecting all the documents needed to manage the FSMS. It formalises expertise, helps with training new staff and controls non-quality risks. This documentary system can be represented as a pyramid that moves from the more general (quality manual) to the more precise (individual records).

## PERSONAL NOTES AND REFERENCE MATERIAL

A large section of the page consisting of approximately 25 horizontal dotted lines, intended for taking notes or providing reference material.



# LEAFLET 7

## The internal control and FSMS certification process

### EDUCATIONAL OBJECTIVES

On completion of this training sequence, the participant must be able to:

- List and briefly describe the 4 parts of an FSMS monitoring and verification system.
- Define the concept of certification.
- List the different steps leading to certification of a FSMS.

### KEY MESSAGES

#### 1) Assessment of the Food Safety Management System (FSMS)

Any quality management system (QMS) must have an internal and/or external verification system. Assessing the FSMS means ensuring that:

- The procedures in place actually work and are effective;
- The records made confirm and prove evidence of food safety management.

#### 2) The 4 components of FSMS monitoring and verification system:

- Ongoing controls (qualitative or quantitative):
  - These generate records analysed by the quality and traceability managers and their team to ensure that limitations and thresholds for each risk are never exceeded.
  - These measures (visual controls, measurements, inspections or analyses) can be made at different times (pre-harvest, post-harvest, etc.).
- The internal audits assess the application and efficiency of the FSMS in all its components to ensure that the system has not deviated from its objectives, to check that it is updated regularly, and to identify possible progress paths.
- The Periodic Management Review of the FSMS is simply a review and decision-making meeting organised in the presence of the company's senior management, the quality and traceability management and all company executives. This is the place and time to put the "customer" at the heart of the company's concerns, anticipate market expectations, look at the company's quality results and motivate the entire organisation towards new and even more ambitious goals.

These first three components cover the internal audit.

- External audits and inspections (third party) with certification in mind.
  - "Certification" provides companies with an external and independent guarantee of the conformity of its FSMS with the selected standard.
  - Certification of food may be based on a range of inspection activities which can include continuous on-line inspection, auditing of quality assurance systems and

examination of finished products.

- The “Certification preparatory phase” (often 2 to 3 years between the project formulation and the audit application) begins with choosing a quality standard and studying its various requirements. It will conclude with a “diagnostic audit” which assesses whether the company is ready to apply for certification from an independent certification body (ICB).
- The organisation of certification audits starts with an initial audit, which aims to demonstrate that the FSMS meets the requirements. A monitoring audit, less detailed, will follow and take place every year to check if it still meets the legal or other requirements. Later there will be a renewal audit, similar to the initial audit, so that the certification can be renewed. Certification then becomes reliable evidence of the company’s progress and can validly form a basis for customer confidence.

## PERSONAL NOTES AND REFERENCE MATERIAL

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....



# LEAFLET 8

## Market access strategy

### EDUCATIONAL OBJECTIVES

On completion of this training sequence, the participant must be able to:

- List the items to be considered by the company when it drafts its development strategy.
- Give the characteristics of the European market.
- Classify European markets according to their requirements by associating examples with each class.

### KEY MESSAGES

#### 1) Business positioning and market access strategy

- Entrepreneurs must formulate clearly their company's strategic objectives and the extent to which its products are geared to the markets it is targeting.
- This approach requires an analysis of all the company's functions as well as its environment:
  - Products (quantity, packaging, etc.), markets (export-local, customer) and their current and future legal and commercial requirements,
  - Production context – product sources (proprietary production, collection from outworkers, etc.),
  - Partners and alliances/competition,
  - Expertise and activities,
  - Organisation of the company and of its resources (status, available workforce, capital, etc.).
- Based on the collected data, the company will be able to define its business position (simple trader, exporter with high added value, etc.) and strategies.

#### 2) The characteristics of the European market

- Although European product safety regulations have been fully harmonised, the European market is still heavily diversified (each country has its foibles, its different market structures, its access conditions, etc.).
- European consumers are aware of food safety and product traceability problems. They are actively concerned by these issues. Some 99% of food hygiene and plant protection regulations have been harmonised in the EU.
- However, there is a clear diversity concerning other types of requirements (ethics, environment, local criteria etc.).





# LEAFLET 9

## Private standards (PS)

### EDUCATIONAL OBJECTIVES

On completion of this training sequence, the participant must be able to:

- Explain the reasons for the emergence of PS.
- Classify PS according to the various criteria.
- List examples of PS for each PS category.
- Name the main PS in the field of food safety and briefly describe their characteristics.
- Name the main PS in the field of sustainable development and briefly describe their characteristics.

### KEY MESSAGES

#### 1) The emergence of Private Standards (PS)

- Increasing consumer concerns about what's in their plate have had repercussions in the agrifood industry. To shield itself against all risks, the private sector has developed self-regulation systems or private standards (PS), which are based on the food industry's codes of good practice.
- Suppliers (producers, exporters, etc.) are now asked to comply with a series of PS, that cover their production, processing and distribution methods.

#### 2) Categories of PS

- Subjects areas and origin of these standards.
  - These topics cover food safety, environment, social responsibility, etc.
  - When it comes to PS on food safety, a new distinction can be drawn based on the stakeholders that prepare the standards (Individual PS of retail and distribution firms, Collective and national PS drawn up by professional associations, Collective and international PS).
- Business-to-Business or Business-to-Consumer.
- Obligation to resources or obligation to results.
- PS for product, processes, and management system:
  - The product standards focus on characteristics related to a product's quality and safety,
  - The process standards refer to the conditions under which products and services are to be produced, packaged or processed,
  - The management system standards assist organisations in managing their operations. They are often used to help create a framework that then allows the organisation to meet the requirements set out in product and process standards.



# COLEACP E-LEARNING PLATFORM

RECEIVE YOUR ACCESS TO OUR DISTANCE LEARNING PLATFORM. RESERVED FOR STAKEHOLDERS IN THE AGRICULTURAL SECTOR IN AFRICAN, CARIBBEAN AND PACIFIC COUNTRIES.

TEST AND IMPROVE YOUR KNOWLEDGE AT YOUR OWN RHYTHM!



<https://training.coleacp.org>



SUSTAINABLE PRODUCTION AND  
TRADE

PLANT HEALTH

**FOOD SAFETY**

AGRICULTURAL PRODUCTION AND  
PROCESSING

SOCIAL ACCOUNTABILITY AND  
EMPOWERMENT

ENVIRONMENTAL MANAGEMENT

BUSINESS MANAGEMENT AND  
DEVELOPMENT

TRAINING METHODOLOGIES

FEBRUARY 2018



**COLEACP**