

Cost-effective management tools for ensuring food quality and safety

FOR SMALL AND MEDIUM AGRO-INDUSTRIAL ENTERPRISES



Module 2: Systems and tools for improving quality and safety management in agro-industries



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Foreword

The Rural Infrastructure and Agro-Industries Division (AGS) of FAO works to improve and strengthen the capacities of small and medium agro-industries, the enterprises that provide them with services and materials and the relevant support organizations in order to ensure food quality and safety. It carries out these activities using an approach that integrates the different factors affecting the capacity of a business to produce foods to meet the demands of the market according to recognized standards, while maintaining and increasing the profitability and viability of the business. Management and technical aspects must be integrated within a practical and cost-effective approach. This ensures that higher incomes, sources of jobs and the food security of the rural population are also promoted.

The training manual entitled *Cost-effective management tools for ensuring food quality and safety – for small and medium agro-industrial enterprises* focuses on these objectives.

This manual is the result of a collaborative effort by technical staff of the Rural Infrastructure and Agro-Industries Division of FAO. It is based on case studies carried out in Bolivia and El Salvador on opportunities for the improvement of capacity of small- and medium-scale food processing enterprises, through training to meet the demands of the market.

These case studies, which were carried out as part of the FAO programme ‘Agribusiness Development: Small and Medium Post-production Enterprises’, identified the training needs of small and medium fruit and vegetable agro-industries. This sector had been chosen as representative of the food industries operating in Latin America.

In Bolivia, a range of agro-industries was evaluated. These produced: (i) processed dried fruits, jams and/or fruit pulps, particularly pineapple and peaches; (ii) processed vegetables such as faba beans and garlic; (iii) various processed products such as pickles.

In El Salvador, the study focused on the development of products such as tomato-based foods, fruit juices and nectars (including peaches, apples, grapes and tropical fruits), as well as other fruit and vegetable products. This made it possible to identify problems common to the different enterprises, such as low-quality raw materials, inefficient processing operations, lack of knowledge of the relevant quality and safety standards and their implementation and lack of entrepreneurial vision. There was a consensus among small-scale entrepreneurs that these problems could be overcome by implementing innovative training strategies. This consensus led to the idea of preparing this manual.

The manual is divided into four modules, each subdivided into themes. Module 1 discusses the use of market information as a tool for business decision-making. Module 2 covers systems and tools for improving the management of food quality and safety in agro-industry. Module 3 focuses on the principles of quality

management in small and medium agro-industrial enterprises. Module 4 discusses planning as a tool for the management of food quality and safety.

This manual includes case studies, exercises and bibliographic references, as well as a trainer's guide, PowerPoint presentations, appendices, further reading and links of interest.

The purpose of this manual is to assist trainers and entrepreneurs wishing to use the material for self-learning. With this manual, FAO can now provide the small and medium agro-industry sector in developing countries with an important tool for improving its competitiveness and its capacity to deliver high-quality products to consumers.

The English version has been revised to include references, recommended reading and links suitable for English readers. In Module 2, information on standards and regulations relating to quality and safety has been included in order to provide norms that are relevant worldwide.

Geoffrey C. Mrema

Director

Rural Infrastructure and Agro-Industries Division

Acronyms and abbreviations

ANSI	American National Standards Institute
BRC	British Retail Consortium
BSI	British Standards Institution
CAC	Codex Alimentarius Commission
CPMA	Canadian Produce Marketing Association
EAN	European Article Numbering Association
EFSA	European Food Safety Authority
EU	European Union
FSIS	Food Safety and Inspection Service (of the United States Department of Agriculture)
GAP	good agricultural practices
GLOBALGAP	pre-farm-gate standard for good agricultural practice (formerly known as EUREPGAP)
GMP	good manufacturing practices
GPP	good production practices
GTIN	global trade item number
HACCP	hazard analysis and critical control points
IFS	International Food Standard
IICA	Inter-American Institute of Cooperation in Agriculture (IICA)
ISO 14000	family of ISO standards on environmental management
ISO 22000	ISO standard on food safety management systems
ISO 8402	ISO standard on quality management and quality assurance vocabulary
ISO 9000	family of ISO standards on good quality management practices
ISO 9000:2000	ISO 9000 family of standards issued in 2000
ISO 9001	ISO standard providing a set of standardized requirements for a quality management system
ISO 9001:2000	ISO 9001 standard issued in 2000
ISO	International Organization for Standardization
PMA	Produce Marketing Association (United States)

PROMPEX	Office for the Promotion of Peruvian Exports
Regulation 178/2002	Regulation (EC) No 178/2002 of the European Parliament and of the Council of 28 January 2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety
Regulation 852/2004	Regulation (EC) No 852/2004 of the European Parliament and of the Council of 29 April 2004 on the hygiene of foodstuffs
SFI	Safe Food International
SPS	sanitary and phytosanitary
SQF 1000	Safe quality food standard for primary producers
SQF 2000	Safe quality food standard for manufacturers and distributors
STDF	Standards and Trade Development Facility
UCC	United States Uniform Code Council
UNECE	United Nations Economic Commission for Europe
UPC	Universal product code (United States)
USDA	United States Department of Agriculture
WHO	World Health Organization

Study guide for the module

SYSTEMS AND TOOLS FOR IMPROVING QUALITY AND SAFETY MANAGEMENT IN AGRO-INDUSTRY

Objectives	<ul style="list-style-type: none"> • To recognize the importance of a proactive approach to quality and safety in agro-industrial enterprises. • To review the tools and systems available for ensuring food quality and safety throughout the agrifood chain. • To illustrate the principles of product traceability and their importance as a support mechanism in food quality and safety programmes.
Content	<p>Theme 1: Management of food quality and safety in agro-industry</p> <ul style="list-style-type: none"> • Quality and safety assurance are the responsibility of every actor in the chain. • How to ensure food quality and safety. • General review of programmes and standards for improving quality and safety management: good agricultural practices. Voluntary and mandatory initiatives in food safety and quality standards. <p>Theme 2: The importance of product traceability in quality and safety management</p> <ul style="list-style-type: none"> • Advantages of applying product traceability principles in agro-industrial enterprises. • Steps in implementing product traceability tools. • Application of product traceability tools in accordance with mandatory and voluntary standards. • Considerations when adopting product traceability tools. • Product traceability approaches.
Activities	<p>Case study: Improving quality and safety as a strategy for enhancing the competitiveness of agro-industrial enterprises</p> <ul style="list-style-type: none"> • Exercise on Theme 1 <p>Case study: The importance of traceability in agro-industry</p> <ul style="list-style-type: none"> • Exercise on Theme 2
Assessment	<p>At the end of each theme the participants carry out an exercise to assess their general understanding of the theme.</p>

INTRODUCTION

The sustainability of an agro-industrial company depends largely on its capacity to obtain information on what is happening in the market and its skill in exploiting that information to react to market signals. Module 1 of this manual explains the importance of market information as a decision-making support tool.

Another important component for accessing markets is knowledge of customer requirements for quality and safety, combined with an awareness of the public and private standards within the target market. Consumer demands are not limited to the quality aspects, which they can judge themselves, but increasingly consumers are asking how products are produced and what guarantees a company can offer in terms of its commitment to quality and safety. These considerations apply not only to the final product, but also to how a company approaches all its management processes.

Module 2 illustrates some of the programmes, systems and tools for ensuring product quality and safety, as well as for improving the management of agro-industrial enterprises.

CONTENT

Module 2 is divided into two themes.

Theme 1: Management of food quality and safety in agro-industry

This theme presents the integrated chain approach to food quality and safety and describes the principal programmes and systems for ensuring quality and safety, as well as standards aimed at improving their management throughout the value chain.

Theme 2: The importance of product traceability in quality and safety management

This theme illustrates the importance, principles and advantages of product traceability, a tool that contributes to the effectiveness and efficiency of measures to improve safety and quality in agro-industrial production. This includes the application of these principles in small and medium agro-industrial enterprises.

ESTIMATED TIME

An estimated total time of 10 hours should be sufficient to complete this module, including the time required for carrying out formal training sessions, practical exercises, reviewing materials and other activities.

Theme 1: Management of food quality and safety in agro-industry

INTRODUCTION

Food hygiene and safety requirements for marketing have been increasing at both international and national level. This has led to changes in production and preparation processes to enable producers and agro-industrial managers to ensure the quality and safety of food products. This is done by controlling and preventing product contamination and loss of quality at each stage of the production, processing and distribution chain.

Over the past decade, more and more agro-industrial enterprises have been adopting programmes such as: good agricultural practices (GAP); good manufacturing or good production practices (GMP/GPP); hazard analysis and critical control points (HACCP); and quality and safety management systems such as standards ISO 9001 and ISO 22000. These systems have emerged in response to a loss of consumer confidence in food quality and safety, the need for the authorities to protect consumer health and the need to guarantee food quality and safety in commercial operations. Food safety has increasingly moved up the agenda of most countries, mainly in the developed world, especially since 1990 with the bovine spongiform encephalopathy (BSE) – or ‘mad cow disease’ – crisis, followed by the occurrence of the extremely pathogenic avian influenza virus H5N1 (‘bird flu’) in 2003. In many countries the situation has been aggravated by outbreaks of food-borne infections or diseases and by an increase in heavy metal contamination.

Pressure for better quality and safety is expected to increase. Producers and entrepreneurs must therefore adopt a proactive approach to quality and safety issues because, when problems occur, they have serious negative consequences for the company concerned. They could also have global repercussions on the entire sector producing and marketing the product.

EXPECTED RESULTS

By the end of this theme participants are expected to have a better understanding of the importance of:

- a preventive approach to quality and safety management;
- guaranteeing food quality and safety throughout the agrifood chain;

- implementing and improving quality and safety management programmes in agro-industrial enterprises;
- improving the links and synergies between product quality and safety systems and programmes.

SUPPORT MATERIALS

Case study: Improving quality and safety as a strategy for enhancing the competitiveness of agro-industrial enterprises

Reading for development of the theme: Quality and safety assurance in the agrifood chain

PowerPoint presentation: Theme 1

Exercise on Theme 1

Case study

Improving quality and safety as a strategy for enhancing the competitiveness of agro-industrial enterprises

Introduction

Peru is currently the world's largest exporter of fresh asparagus and is the second largest exporter, after China, of processed asparagus. Peru has achieved this by positioning itself in the global market as a supplier of asparagus of excellent and consistent quality. How has the Peruvian asparagus industry achieved such success in an increasingly demanding and competitive globalized market? What are the success and change factors that have made it possible to establish a sustainable industry that has significantly impacted the Peruvian economy by generating foreign exchange?

Development

Peru's world leadership as an asparagus supplier has been achieved mainly through the commitment of Peruvian industry to the quality and safety of exported asparagus, while incorporating into its strategic business plans competitiveness in terms of quality.

Commitment to asparagus quality and safety

Safety is the most important and critical element of quality standards for any food product. However, little is achieved if safety is not accompanied by the quality factors demanded by consumers in excess of statutory health requirements. Quality in the broadest sense of the word is vital when competing in the global market.

One of the main planks of Peru's export promotion policy is recognition that the success of agro-industry depends on the quality and safety of its food products. As part of government support programmes, the Office for the Promotion of Peruvian Exports (PROMPEX) has reinforced product standardization. It also supports exporting companies GAP, GMP, HACCP, standard ISO 9000, social responsibility and other programmes. The actions of the Ministry of Agriculture in the fields of plant health and agricultural practices, and of the Ministry of Health for inspection and control in packing houses and processing plants, are also important for the asparagus production chain.

These actions coincide with the commitment of the production sector, which is directly responsible for food safety. A system taking an integrated approach to the quality and safety of asparagus exports is being built and has been establishing itself successfully. This integrated approach ensures the quality and safety of Peruvian

asparagus throughout the production chain: (i) in the field, through the implementation of GAP; (ii) in the handling and processing phases, through the application of HACCP and (iii) in storage and shipment, through control of the cold chain. The asparagus industry applies other HACCP-compatible quality systems required by its customers; these systems provide quality management and environmental protection, while supporting the principles of social responsibility. Other systems are also being introduced to ensure security control for logistics within the chain.

Outcome

All asparagus exporting companies have now implemented the HACCP system and they have invested more than US\$1 million in quality improvement programmes (Campbell, 2006). These efforts have resulted in a product of the highest quality for the most demanding markets, witnessed by the rising volume of international exports.

Source: Based on the report of the Plant Health and Food Safety Programme of the Inter-American Institute for Cooperation in Agriculture (IICA) *Mejorando la competitividad y el acceso a los mercados de exportaciones agrícolas por medio del desarrollo y aplicación de normas de inocuidad y calidad. El ejemplo del espárrago peruano*, by O'Brian, T. & Díaz R.A., 2004.

CRITERIA FOR ANALYSING THE CASE

After reading the case study carefully, analyse the text, as follows:

- Identify the success factors of the Peruvian asparagus industry that could have motivated quality and safety innovations. Analyse the factors relating to the enterprise, to the Government and to organizations in the sector.
- Analyse the results of PROMPEX actions to develop quality and safety protocols that led to an improvement in the sector's competitiveness.
- Identify initiatives you have undertaken to guarantee food quality and safety (whether or not they have been consolidated), from which you have learned and made improvements.
- Identify lessons learned from the Peruvian asparagus industry that can be applied or considered in your company.
- Specify which of the market aspects studied in Module 1 contributed to the success of the Peruvian asparagus sector: product, price, place and promotion.
- Do you think that the success of the Peruvian asparagus agro-industry is also related to leadership, organization of the enterprises and a continual improvement approach?

The same tasks are listed at the end of Theme 1 so that they can be completed based on the newly acquired knowledge.

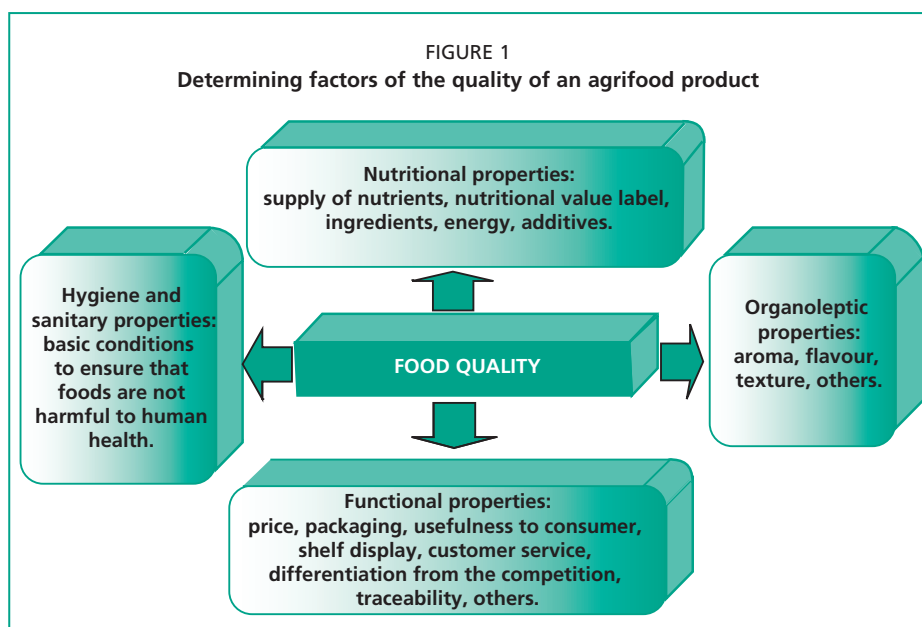
Reading for Theme 1

Quality and safety assurance in the agrifood chain

INTRODUCTION

Quality and safety assurance is the part of quality management aimed at creating confidence that local quality and safety requirements (or those demanded by target markets) are being met. As mentioned in Module 1, quality is an intrinsic characteristic of foods. This means that certain predefined requirements must be satisfied. The factors that determine food quality can be divided into four groups, as shown in Figure 1.

Product quality refers to the objective or subjective value attributed to one or more of the four qualitative properties identified below. Agro-industry therefore has a special responsibility for improving quality, especially in terms of safety. The *Codex Alimentarius* defines safety as the assurance that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use. From the safety viewpoint, the dangers associated with fresh products are classified into three groups: biological, chemical and physical. More information on these topics can be found in the FAO manual for trainers *Improving the quality and safety of fresh fruits and vegetables: a practical approach*. Programmes

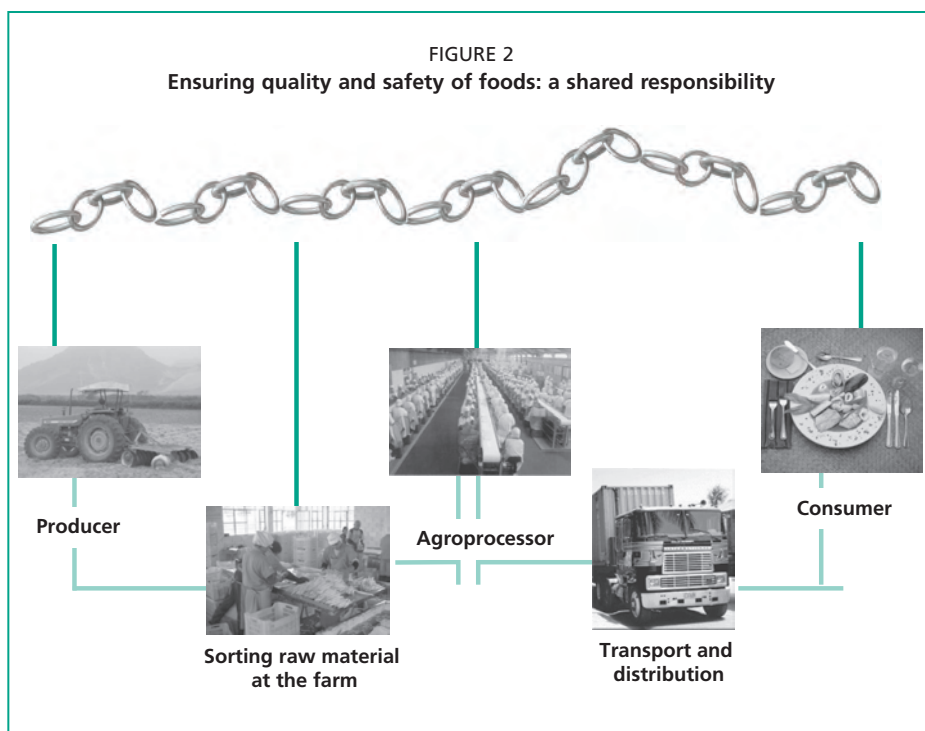


for ensuring food safety are based on the principle of risk assessment and on the application of preventive measures for controlling the occurrence of such dangers throughout the supply chain.

QUALITY AND SAFETY ASSURANCE ARE THE RESPONSIBILITY OF EVERY ACTOR IN THE CHAIN

All the actors in the chain – from primary producers (suppliers), processors, packers, transporters and distributors up to the point of sale, ending with the consumer – share responsibility for implementing measures to prevent and control food contamination and deterioration. As it is so important, each link in the chain must be aware of the problem and act responsibly. However, in most developing countries the various actors show very little awareness. This, together with deficiencies in production, processing and distribution infrastructure and poor control systems, limits progress in this area. Although many countries have made progress in the agrifood export sector, so far these developments have not had enough of an impact on production and distribution chains serving domestic markets (Figure 2).

One of the main challenges facing the institutions that promote food quality and safety is to raise awareness amongst agents involved in the chain of the relevance of food quality and safety and of each agent's role in achieving the necessary improvements. This has major implications for production, product-



handling, processing, distribution and associated practices. This includes the following concepts:

- Considering agriculture as a process for transforming resources into foods that people are going to eat; it is therefore vital to the sustainability of the agricultural sector, as well as agro-industrial businesses, to ensure food quality, safety and integrity .
- Understanding the need for closer integration between the various links in order to improve quality and safety.
- The importance of applying a chain approach where all the agents involved share responsibility for supplying safe and nutritious foods.

There is no doubt that, in the future, the food trade will be governed by rules and standards of conduct. In practice these rules will block access to markets by countries and enterprises that fail to comply with the:

- requirements of the domestic or international value chain in terms of voluntary or mandatory standards;
- demands of the control authorities of importing countries and of health protection programmes.

HOW TO ENSURE FOOD QUALITY AND SAFETY

Quality and safety management systems cover the policies, structures and procedures implemented by agro-industrial enterprises, as well as responsibility for the quality and safety of the products they produce and market. According to FAO (2006), a quality and safety management system should include the following.

- The implementation of good practices throughout the production chain. This entails implementing programmes with minimum prerequisites both at farm level (good agricultural practices) and at the handling, distribution, storage and processing stages (good manufacturing and good hygiene practices), as well as published standardized operational procedures.
- The application of HACCP system principles. The HACCP system is designed to identify and prevent risks that are unique or specific to the food or process in question and so it identifies critical points that reduce or eliminate these risks for a particular food. Each HACCP system is designed specifically for one food process or processing plant and is applicable only after the prerequisite programmes described above have been implemented.
- The implementation of a management system at senior management level that incorporates commitment and responsibility, monitoring and assessment of the entire system and application of the principles of continual improvement by senior management. Examples include the improvements required by ISO 9000 version 2000 standards, in terms of quality management, as well as those required by standard ISO 22000 in terms of safety management.

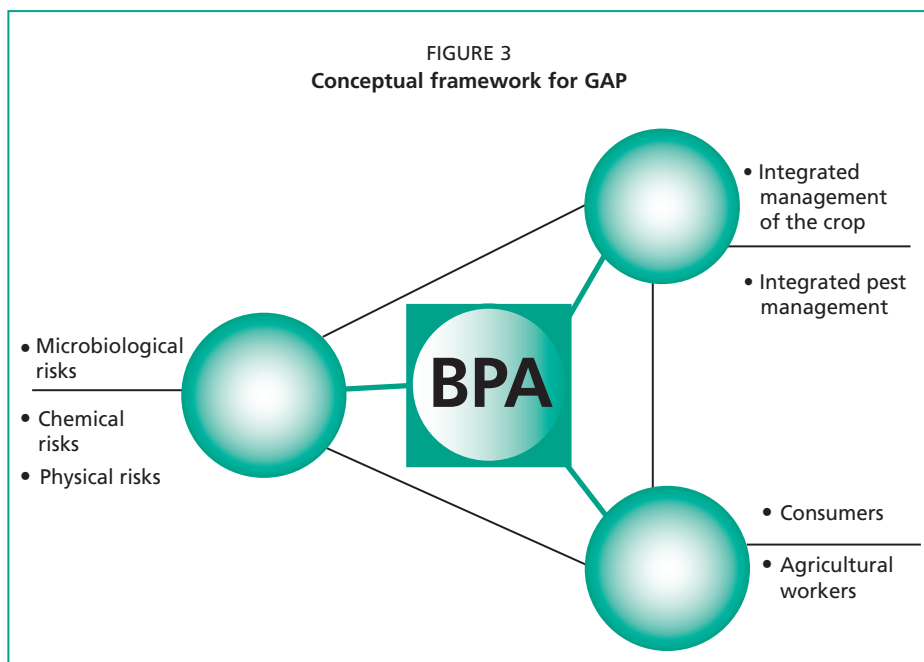
Many of the public and private standards aimed at ensuring optimal quality and safety at various stages of the production and processing chain are based on applying HACCP to the management of raw materials and other inputs.

GENERAL REVIEW OF PROGRAMMES AND STANDARDS FOR IMPROVING QUALITY AND SAFETY MANAGEMENT: GOOD AGRICULTURAL PRACTICES

Good agricultural practices refers to a set of principles, standards and technical recommendations aimed at improving conventional methods of production and handling in the field. They focus on risk and the prevention and control of risks affecting product safety, while at the same time reducing the negative impact of production practices on the environment, fauna, flora and workers' health.

The scope of GAP therefore extends beyond safety alone to incorporate environmental and social considerations as part of the economic, technical and environmental sustainability of production systems. Figure 3 illustrates the conceptual framework for GAP, for which FAO prepared a proposal: *Development of a framework for good agricultural practices* (Seventeenth session of the FAO Committee on Agriculture).

For agro-industrial enterprises, GAP is an important component that ensures the safety of the foods they offer. Companies whose activities extend to production have direct responsibility for applying GAP. Responsibility is indirect when a company's activities are confined to preparing and processing the product. In this case, the company is responsible for applying controls to the products entering the plant to ensure that they have been produced in keeping with a GAP approach and that the producer and the other actors involved have taken the necessary measures to reduce any risk of product contamination and deterioration.



Source: Adapted from *Manual de buenas prácticas para el sector hortofrutícola de exportación* (Fundación para el Desarrollo Frutícola de Chile), 2002.

A practical approach to the application of GAP programmes is illustrated in the FAO manual for trainers, *Improving the quality and safety of fresh fruits and vegetables: a practical approach*.

GOOD MANUFACTURING PRACTICES

Good manufacturing practices (GMP) are based on risk analysis and are designed to minimize and control risks to product safety during preparation and processing, while minimizing the negative impact on the environment, fauna, flora and workers' health. GMP implementation is based on applying the **General Principles of Food Hygiene of Codex Alimentarius**, the pertinent **Codes of Practice of Codex Alimentarius** and the corresponding legislation on food safety. The Codex Alimentarius *International Code of Practice – General Principles of Food Hygiene* identifies the key principles of food hygiene applicable throughout the food chain and recommends the application of HACCP criteria to improve food safety.

GMP programmes include recommendations in the following areas:

- requirements for the design of infrastructure and facilities;
- maintenance programmes for facilities, equipment and sanitation;
- control of operations, including food product risk control, hygiene, pest control, control of raw materials, packing, water quality, temperature control, management and supervision, documentation and records and procedures for rejects and the recall of unsafe products;
- staff hygiene;
- transport;
- information concerning the product and for the consumer (product identification and labelling and consumer information);
- staff training.

In many countries, GMP programmes in the agrifood sector have progressed from being a voluntary requirement to becoming part of the national regulatory framework and are now mandatory. This is the case in Argentina, Bolivia, Colombia, Ecuador, Mexico, Paraguay and Venezuela. In April 2006, the Central American countries agreed to a technical regulation on GMP for the region (*RTCA 67.01.33:06 Industria de Alimentos y Bebidas Procesados. Buenas prácticas de manufactura. Principios generales* [Processed food and beverage industry. Good manufacturing practices. General principles]). In the European Union, Regulation 178/2002 laying down the general requirements and principles of food law and all the subsequent regulations, especially Regulation 852/2004 on the hygiene of foodstuffs, there is a mandatory requirement to comply with the General Principles of Hygiene, plans based on the principles of HACCP and traceability of all foods circulating on European Union territory.

For agro-industrial enterprises, the responsibilities and benefits of implementing GMP programmes entail mainly compliance with national and international standards and regulations for improving quality and safety management in the company. This leads to improved efficiency and organization and, more

importantly, it reduces the risk of marketing contaminated products, with the resulting loss of reputation as a reliable supplier.

THE HAZARD ANALYSIS AND CRITICAL CONTROL POINTS SYSTEM

The HACCP system is used to identify, assess and control hazards that are significant for food safety. The systematic and preventative HACCP approach is designed to identify biological, chemical and physical risks and to establish measures for controlling these risks in order to guarantee the safety of the foods involved. The system focuses on prevention rather than inspection, coupled with testing of the final products.

PRINCIPLES OF THE HACCP SYSTEM

The Codex Alimentarius Commission (CCA) recommends the adoption of the HACCP system in order to increase food safety. The HACCP principles have been incorporated as an annex to the *International Code of Practice – General Principles of Food Hygiene. Guidelines for their application*. The system is based on seven principles:

1. Conduct a hazard analysis.
2. Determine the critical control points (CCPs).
3. Establish critical limit(s).
4. Establish a system to monitor control of each critical control point.
5. Establish the corrective action to be taken when monitoring indicates that a particular critical control point is not under control/s.
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.

FAO has produced a training manual that combines all the principles of GMP and food hygiene, together with guidelines on the components and applicability of the HACCP system: *Food quality and safety systems – A training manual on food hygiene and the hazard analysis and critical control point (HACCP) system*. The HACCP system has become the basis for official food control and the establishment of standards applicable to international trade.

In the majority of developing countries, there are public and private initiatives to establish HACCP training programmes. Various types of incentive and support have been set up to facilitate its application mainly by small and medium agro-industrial enterprises. With few exceptions, HACCP has become part of the mandatory regulations for the food sector in developing countries. The HACCP system has been incorporated into the regulations of several developed countries. For example, in the United States of America, it is mandatory in the juice, meat and citrus industries.

Implementation of the HACCP system, or other systems based on its principles, calls for a certain level of resources to be made available to support the necessary infrastructure investment and to ensure the operation of the HACCP

system itself. Additionally, there must be a sufficient number of qualified people that understand HACCP system principles and the importance of implementing the system. Access to the required financial, technical and administrative resources for implementing the HACCP system is often a constraint, especially in small and medium enterprises.

FAO is currently preparing a document to guide governments in designing policies and strategies that provide incentives for the application of the HACCP system and systems based on its principles. The joint FAO/World Health Organization (WHO) document, entitled *FAO/WHO guidance to governments on the application of HACCP in small and/or less-developed food businesses*, will be used as a basic tool for promoting the development of food quality and safety, principally in small and medium enterprises. It may be consulted by clicking on the relevant link on the FAO Food Safety and Quality web page (<http://www.fao.org/ag/agn/agns/>).

In addition, private standards established in importing countries have helped to promote quality assurance programmes based on HACCP or its principles. Some examples are: the British Retail Consortium's global standard for food BRC Global Standard for Food Safety Issue 5, and The American Safe Quality Food Institute's SQF 2000 Code. Many companies have opted for voluntary implementation of the HACCP system as a means to create confidence among suppliers and buyers concerning the company's commitment to product quality and safety.

The benefits to be gained by an agro-industrial company implementing the HACCP system include:

- guaranteeing the safety of its products;
- using the company's resources effectively;
- reducing costs and defective products, thereby increasing productivity;
- consolidating the company's image and credibility among its consumers;
- enhancing the company's capacity to respond to any safety problems that may arise.

In conclusion, while prerequisite programmes and the HACCP system are aimed at preventing and controlling food safety risks, the standards relating to quality and safety management demonstrate the company's commitment to higher quality and safety standards, mainly in the management and operational areas.

QUALITY MANAGEMENT SYSTEMS: STANDARD ISO 9001

The International Organization for Standardization (ISO) was established by many countries, both large and small, in every region of the world. ISO develops voluntary technical standards that add value to all types of business operations. The standards it develops help to make the development, production and delivery of products and services more efficient, safer and cleaner, as well as facilitating international trade. Some countries adopt ISO standards as part of their national standards or regulations.

ISO defines a quality management system as the structure within a company that is used to manage processes and activities to transform raw materials into

TABLE 1
Series of standards ISO 9000

ISO 9000	ISO 9001	ISO 9004	ISO 19011
Fundamentals and vocabulary	Requirements	Recommendations to improve performance	Audit
Describes the basics of quality management systems and specifies the terminology used	Specifies the requirements for quality management systems applicable to the enterprise	Provides instructions for improving the effectiveness of the company's management system	Provides requirements for auditing of quality and environmental management
	Certifiable		

products and services that satisfy business objectives, such as meeting customer quality requirements or complying with legal requirements. The benchmark for quality management systems is the ISO 9000 series of standards, applied in a range of sectors (see Table 1). Standard ISO 9001:2000¹, for which certification is granted, contains a number of requirements for the planning, implementation and continual improvement of a quality management system within a company to ensure that its products meet customer needs and expectations and comply with legal requirements and regulations.

Standard ISO 9001:2000 specifies the requirements for a company to:

- demonstrate its ability consistently to provide products that meet customer requirements and applicable regulatory requirements;
- enhance customer satisfaction through the effective application of the system, including processes for continual improvement of the system and the assurance of conformity to customer requirements and applicable statutory and regulatory requirements;

The eight quality principles on which standard ISO 9001:2000 is based are:

- customer focus;
- leadership;
- involvement of people;
- process approach;
- system approach to management;
- continual improvement;
- factual approach to decision-making;
- mutually beneficial supplier relationships.

These aspects will be analysed in detail in Module 3 of this manual. According to standard ISO 9001:2000, the benefits to be obtained by enterprises implementing quality management systems include:

- improvement in the quality of the company's products and processes and the company itself;

¹ The most updated version of this standard is the ISO 9001:2008. Link: http://www.iso.org/iso/iso_catalogue/management_standards/quality_management/iso_9001_2008/guidance_on_the_documentation_requirements_of_iso_9001_2008.htm

- continual improvement of the quality of management systems;
- increased efficiency of processes through more effective organization;
- conditions for international trade;
- easier contracting of suppliers and services from other companies;
- increased customer satisfaction;
- improved internal communications and communications with customers;
- improved staff skills.

Standard ISO 9001:2000 applies to all types of enterprise, regardless of their position in the supply chain. ISO 22000 is specific to the food sector.

STANDARD ISO 22000: FOOD SAFETY MANAGEMENT SYSTEMS – REQUIREMENTS FOR ANY ORGANIZATION IN THE FOOD CHAIN

Standard ISO 22000 specifies the requirements for a food safety management system when an enterprise in the chain needs to demonstrate its ability to control safety risks relating to the foods it produces, handles, transports or markets. The standard is applicable to all companies involved in any link of the food chain that wish to implement systems to ensure the consistent supply of safe products. The standard defines the elements that are generally recognized as guaranteeing safety throughout the food chain, up to the point of sale, such as:

- **Interactive communication throughout the food chain** as an essential element for guaranteeing the identification and appropriate control of all risks relevant to food safety.
- **System management** based on the quality principles described in standard ISO 9001.
- **Prerequisite programmes and application of HACCP system principles.**

VOLUNTARY AND MANDATORY INITIATIVES IN FOOD SAFETY AND QUALITY STANDARDS

Mandatory

It is clearly the responsibility of governments to regulate food safety and some aspects of food quality in view of the need to protect consumer health and to provide information to support consumer decisions. How responsibilities for food quality and safety are organized varies from one country to the next. This involves either several agencies and ministries coordinating responsibilities or a single agency coordinating or assuming full responsibility for this subject.

The mandatory regulations of the European Union merit special mention. They began with the White Paper on Food Safety of 12 January 2000, which proposed an integrated approach throughout the food chain and a new harmonized, transparent legal framework applicable from farm to fork. Based on Regulation 178/2002, a series of regulations and directives have been approved on this matter. Of particular interest is Regulation 852/2004 on food hygiene.

This set of regulations is based on six general principles that provide a conceptual framework for all its components: (i) the food chain (they apply to all links in the

chain); (ii) risk analysis (as a tool for analysing hazards and risks to human health); (iii) prevention and precaution (any suspicion that a food is unsafe means it must be recalled from the market); (iv) transparency in the market; (v) co-responsibility of all the various actors in the chain (all links in the chain share responsibility); and (vi) traceability (as a tool for tracking everything that has happened to a suspicious food or unsafe food and rapidly recalling it from the market).

This is particularly important for agro-industrial companies that intend to develop the European market because importers are responsible for compliance with hygiene requirements, implementation of HACCP procedures and traceability. In turn, importers put pressure on actors within the chain to ensure that they are complying with these requirements, and demand that suppliers from non-European Union countries provide quality and safety guarantees through certification in accordance with private protocols.

Voluntary

There are a number of types and sources of voluntary standards. To cope with some of these standards, FAO has prepared a document entitled *Strengthening national food control systems – Guidelines to assess capacity building needs*, which explains the components of national food control systems, with examples of organizational structures implemented by various countries. In addition, FAO and the World Health Organization published jointly the document entitled *FAO/WHO guidance to governments on the application of HACCP in small and/or less developed food businesses*.

Codex Alimentarius is an international group responsible for developing food quality and safety standards. National governments use these standards as a basis for drafting their own regulations. Documents such as the *Recommended International Code of Practice – General Principles of Food Hygiene* (which includes guidelines for the application of HACCP) and the *Code of Hygienic Practice for Fresh Fruits and Vegetables* are particularly important for establishing private protocols on best practice; they can be of great value to enterprises that are starting to work with this approach.

The ISO standards that have gained the widest recognition include the ISO 9000:2000 series, in particular standard ISO 9001 relating to the quality management systems of any organization, and the ISO 14000 series, which promotes the best environmental practices and helps enterprises demonstrate positive environmental management. The main aim of standard ISO 22000 is to reinforce food safety (referred to by the ISO as ‘food security’) in order to ensure consumer protection and increase consumer confidence, promoting cooperation between agrifood industries and encouraging the harmonization of an assortment of different standards that place unnecessary stress on company management.

Compliance with international standards does not necessarily guarantee access to a specific market. Agro-industrial entrepreneurs should be aware of the quality and safety requirements demanded by the government responsible for the target market, as well as by the product’s buyers. They should also be aware of national

authorities' quality and safety requirements for exporting the product. Once these requirements are known, producers can develop strategies and plan the activities required to achieve compliance.

PRIVATE INITIATIVES FOR IMPROVING QUALITY AND SAFETY IN AGRO-INDUSTRIAL ENTERPRISES

With respect to compliance with voluntary standards, a variety of private initiatives exist for certifying the implementation of good practices, the HACCP system and/or quality and safety management systems. For example, the GlobalGAP protocol certifies good agricultural practices, but also includes components of quality management systems, such as control of raw materials and requirements for traceability, as well as some environmental considerations and aspects of workers' welfare. Standards SQF 1000 and SQF 2000 are similar.

Other initiatives certify quality attributes related not to safety but to product differentiation for consumers interested in particular attributes. This category includes fair trade, organic production and certification of origin. Section V of the FAO trainers' manual entitled *Improving the quality and safety of fresh fruits and vegetables: a practical approach* discusses the subject of private certification in greater depth.

For an enterprise wishing to implement quality improvements, the process may be guided by the answers to certain questions, such as:

- a. What is the reason for deciding to initiate the process?
 - to comply with a market requirement;
 - to differentiate the product;
 - to differentiate your company;
 - to reduce losses resulting from quality problems.
- b. What is the desired ideal situation?
- c. Is there a standard or programme that assists in achieving this objective? Which would be the most appropriate standards?
- d. How wide is the gap between the ideal situation and the company's present situation?
- e. What needs to be done to reduce or eliminate this gap?
- f. Which public and private institutional platforms are required to proceed with these measures?
- g. How will the application of these gap reduction measures affect the company's costs? What resources will be required?
- h. What are the benefits resulting from these measures?

The answers to these questions will assist entrepreneurs in preparing an action plan. Module 4 provides a detailed explanation of the steps to follow.

Exercise**COMPLETING THE CASE STUDY**

After reviewing the content of this theme and comparing it with your own experience, review your responses to the tasks listed initially and try to correct or supplement them. Link your replies to the topics that have been covered in this section.

APPLYING THE EXERCISE

Prepare a diagram (i.e. a pyramid) in which you try to establish the interrelation and complementarities between the food quality and safety management systems discussed in this theme. To facilitate the preparation of this diagram, first endeavour to complete the following table.

Feedback: [click here](#) for an example of a diagram illustrating the relationships between the programmes and systems.

Programme/System	GMP	GMP	HACCP	ISO 9001	ISO 22000
Objectives					
Point in the chain where it is applied					
General principles of the system					
Degree of interrelation among the systems					

Assessment of the theme

Complete these tasks, using additional pages as required.

- 1. Define in your own words what is meant by the ‘new approach of quality and safety management throughout the food chain’.

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- 2. From your position as an entrepreneur in the agro-industry sector, describe your responsibility for maintaining product quality and safety.

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- 3. State which tools you have available for compliance with the responsibility identified above.

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- 4. Indicate the areas of application and how the following programmes and systems would complement your efforts: GAP, GMP, GHP, HACCP, ISO 9001 and ISO 22000.

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Summary

- Food hygiene and phytosanitary requirements for marketing have been increasing at both international and national level. Quality and safety management systems are based on the assessment of risks and on their prevention and control.
- For these reasons, adjustments had to be made to production and preparation processes to enable agro-industrial producers and enterprises to ensure the quality and safety of food products, which is achieved by controlling and preventing contamination and loss of product quality at each stage of the production, processing and distribution chain. This has favoured the adoption of programmes such as GAP, GMP, GHP, HACCP systems and ISO 9001 and 2200 standards.
- **Good agricultural practices** are a set of principles, standards and technical recommendations relating to agricultural production to guarantee the production of safe foods with minimum environmental impact and fair conditions for workers.
- **The HACCP system** presents a systematic and preventive approach to the identification, prevention and control of biological, chemical and physical risks in order to guarantee food safety.
- **Standard ISO 9001** is a set of requirements for the planning, implementation and continual improvement of a quality management system within a company to ensure that its products meet customer needs and expectations and comply with legal requirements and regulations. The principles of standard ISO 9001 are as follows:
 - customer focus;
 - leadership;
 - process approach;
 - system approach to management;
 - continual improvement;
 - factual approach to decision-making;
 - mutually beneficial supplier relationships;
 - involvement of people.
- **Standard ISO 22000** specifies the requirements for a food safety management system where an enterprise in the food chain needs to demonstrate its ability to control food safety risks to ensure that the food it produces is safe at the point of consumption. The key elements are
 - interactive communication;
 - system management;
 - prerequisite programmes and HACCP principles.

Theme 2: The importance of product traceability in quality and safety management

INTRODUCTION

Product traceability has become an increasingly important requirement for the development of worldwide voluntary and mandatory food standards aimed at ensuring quality and safety. Codex Alimentarius² defines traceability as the ability to follow the movement of a food through specified stage(s) of production, processing and distribution.

In the context of a food control and certification system, traceability is a tool that can be used to protect consumer health by guaranteeing food safety and ensuring correct practices in the food trade, thereby contributing to the effectiveness and efficiency of the various integrated measures for food safety. However, a tool such as traceability is not sufficient in itself to improve results relating to food safety or to ensure the application of correct practices in the food trade. This only happens when the tool is applied in conjunction with supplementary measures and appropriate requirements. As a tool, traceability does not replace food safety measures but plays a key role in improving effectiveness and efficiency.³

This theme illustrates the importance of systems for tracking products throughout the food supply chain (from the farm to fork), as part of the overall improvement of quality and safety management.

EXPECTED RESULTS

Upon completion of this theme, participants are expected to have a better understanding of the importance of:

- using tools to ensure the traceability of products throughout the supply chain;
- product traceability as a tool to complement food quality and safety measures, improving their effectiveness and efficiency;
- adopting tools that ensure product traceability in accordance with predefined objectives, taking into account the company's technical, administrative and financial resources.

² Available at: http://www.codexalimentarius.net/download/standards/10603/CXG_060e.pdf

³ Codex Committee on Food Import and Export Inspection and Certification Systems Codex. ALINORM 06/29/30

SUPPORT MATERIALS

Case study: The importance of traceability in agro-industry

Reading for development of the theme: The importance of product traceability in the quality and safety management systems of agro-industrial enterprises

PowerPoint presentation: Theme 2

Appendix 3: Exercise on Theme 2 – Tools implemented throughout the agrifood chain to facilitate product traceability

Case study**M
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The importance of traceability in agro-industry

The problem

The processing company CONFIRICOS makes sweets and fried snacks. Recently the company faced a difficult situation after some of its products were returned because of a bad smell (rancidity) and the presence of mould. The company initiated an immediate investigation. Several samples were analysed and two lots were identified, one of candied peanuts and another of fried peanuts, both with high levels of rancidity and the presence of aflatoxins (toxic substances produced by the fungus *Aspergillus flavus*). As a result of these analyses, the company halted production and recalled all contaminated products from the market. The company reviewed its records in order to identify its main customers and to recover products that had not been marketed.

The importance of leaving a trail

With this information, specialists began tracing the product to identify the phase of the process where the contamination had occurred. It was found that the ingredients were well-known, good quality brands and that the peanuts, from Bolivia, had a quality certificate from the exporting company. Documents indicated that the analyses carried out on the oil and sugar prior to production showed values that complied with established standards. Reports on the quality of preservatives and colouring agents were reviewed and it was found that the correct controls had been carried out with satisfactory results, as was the case with the other ingredients.

During the document review, it was found that a delay of approximately 20 days had occurred in the delivery of peanuts from Bolivia owing to a labour problem on the border between Peru and Bolivia, which had held up the shipment. However, the quality testing carried out on the raw material upon arrival at the company indicated that the peanuts were of satisfactory quality. After several tests and a review of various documents, the company contacted the Bolivian supplier of the peanuts and established that the problem was associated with the storage period. The raw material was near the end of its shelf life when the company acquired it; however, it was stored for some time before being processed (10 days for the first batch and a further 12 days for the second batch). This delay allowed the minimal fungi present to multiply, producing rancidity. The high temperatures used for frying and candying increased the rancidity to the point where the final products were unfit for consumption.

Conclusion

The problem probably developed when the raw material was subjected to poor storage conditions for more than 20 days in the coastal region of Peru. Inappropriate storage conditions are often responsible for corn, nuts and other products becoming contaminated by fungi-produced toxins.

Source: based on material from a number of different companies.

CRITERIA FOR ANALYSING THE CASE

After reading the case study carefully, carry out an analysis and attempt to answer the following questions:

- Which tools did the company use to facilitate tracking of the product?
- What is the practical value of product traceability tools and how does traceability contribute to ensuring product quality and safety?
- What lessons can be learned that are applicable to your company?

At the end of Theme 2 the same questions are posed so that they can be answered based on the newly acquired knowledge.

Reading for Theme 2**M
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The importance of product traceability in the quality and safety management systems of agro-industrial enterprises

INTRODUCTION

According to Codex Alimentarius, product traceability is the ability to follow the movement of a food through specified stages of production, processing and distribution. A traceability system provides a response to unexpected and emergency situations (EAN, 2006).

In standard ISO 8402, traceability is the ability to separate a material or product into individual lots or units and to trace the history, application or location of an entity (production or operations applied to a product) by means of records.

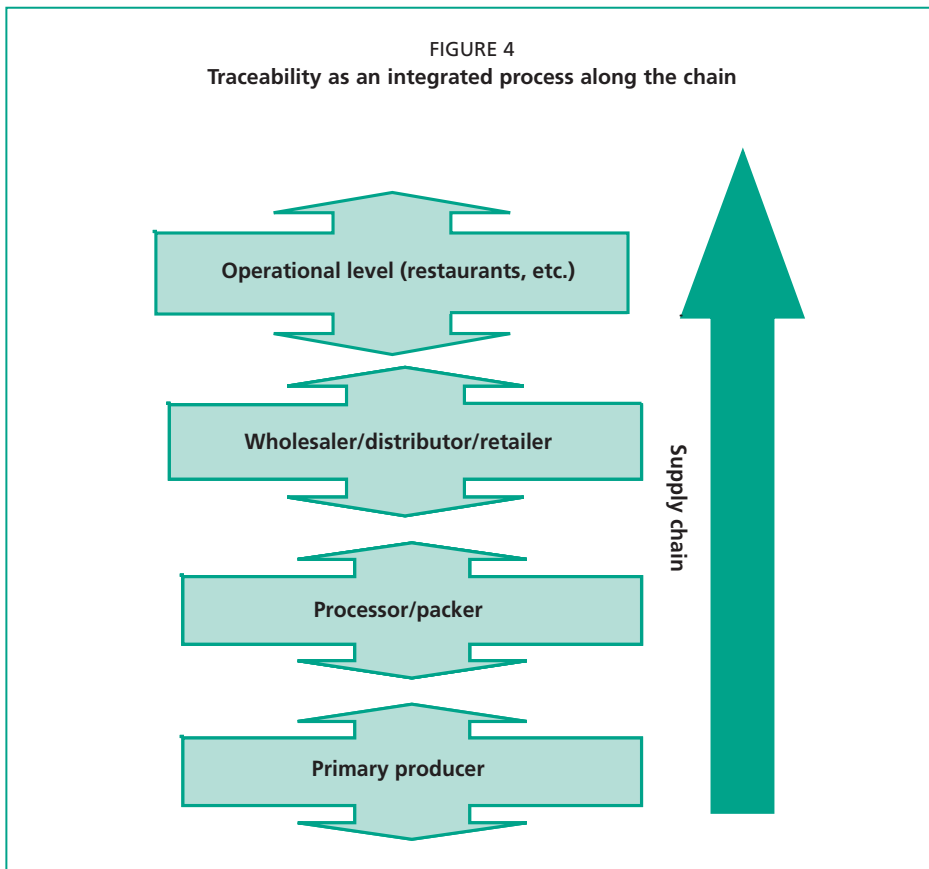
According to Article 3 of Regulation 178/2002, the European Union considers traceability to mean the ability to trace and follow a food, feed, food-producing animal or substance intended to be, or expected to be incorporated into a food or feed, through all stages of production, processing and distribution.

Standard ISO 9000 defines traceability as the ability to trace the history, application or location of anything to do with food.

Although these definitions vary in the degree of information needed to track a product, some of them include not only the location of the product but also the materials of which it was made. An essential aspect of traceability tools is that they can be applied to all links in the food chain (from production to distribution) and should be able to identify the source of the food (the previous stage) and its destination (the next stage) at any point in the chain.

Traceability is an integrated process along the entire supply chain, as illustrated in Figure 4, which helps to answer the following questions:

- How do we guarantee quality and confidence in our products?
- How can we deliver safe products to our customers and consumers?
- What has happened to our products in the supply chain?
- Where do the products come from and where will they be shipped?
- What is the lot number or other detailed information concerning the products received or shipped?
- How can we differentiate our products based on confidence in their characteristics, components, processes and channels?
- How can we reduce risks and improve safety and confidence in our products?



Source: *Fresh produce traceability: a guide to implementation*. Produce Marketing Association (PMA)/Canadian Produce Marketing Association (CPMA).

HOW CAN THE HISTORY OF A PRODUCT BE TRACED?

Traceability is divided into two main stages: (a) following the path from the product's origin until the point of final consumption and (b) identifying the product's origin from the point of final consumption back through the chain. The main objective is to ensure the supply of safe food and best trade practices. This risk-management approach may be used in the food chain but should also be employed by the company itself, as well as by producers and exporters' organizations. It should be used inside the company, within the internal supply chain, and at the global level, until the product reaches the final consumer.

Any system that is established must be comprehensible and, whenever there is a suspicion that the product could affect consumer health, it must be possible to backtrack quickly through the chain and withdraw the product from the market. Faults can occur at any stage of production, handling or transport, or at any point in the chain. There may be several reasons, such as an error in a specific processing step, an inadequate process design, a poorly implemented control system, ignorance or even intentional acts.

WHAT IS NEEDED TO TRACK A PRODUCT INSIDE OR OUTSIDE A COMPANY?

1. A specific form of product identification.
2. Information on the product.
3. A record that connects one link to the next in the chain.

ADVANTAGES OF APPLYING PRODUCT TRACEABILITY PRINCIPLES IN AGRO-INDUSTRIAL ENTERPRISES

Traceability is an information tool for tracking products along the entire chain from production to distribution. This is very useful for improving the effectiveness and efficiency of processes inside the company. In this sense, it provides support to the agro-industrial entrepreneur in:

- taking measures when a risk has been identified to facilitate the rapid removal of the food from the market, thereby minimizing any potential negative impact on consumer health, economic losses or future detrimental effects on trading, including damage to the brand image;
- improving the company's competitive position in the market by increasing consumer confidence in the product, as well as by guaranteeing the product's authenticity, the accuracy of the product information and the product characteristics (e.g. organic agriculture, animal welfare, etc.)
- managing, controlling and optimizing production processes;
- pinpointing within a group of producers marketing as a group to domestic or foreign markets: (i) where a fault occurred; (ii) which producer is responsible; (iii) how much of the product needs to be removed from the market and (iv) where the product is located.

OTHER ADVANTAGES FOR ENTERPRISES: INCREASED SECURITY AND ECONOMIC BENEFITS

The cost of making the necessary changes to ensure product traceability is offset by the potential benefits that an entrepreneur can expect from an instrument that:

- protects human life and health to a high degree;
- provides information inside the company to facilitate process control and management;
- contributes to product quality assurance and certification;
- makes it easier to pinpoint problems, halt production, and, where necessary, recall food and feed effectively;
- supports decision-making on the use of lots or units of affected products (e.g. reprocessing or rerouting of animal feed), with the resulting economic implications;
- pinpoints the source of the problem promptly. This is especially important when considering whether or not to take responsibility for the problem (which is crucial in demonstrating innocence or blame in cases of alleged public health offences or of infringements relating to the commercial

quality of products or the honesty of commercial transactions or consumer interests. It also makes it possible to take action to prevent a recurrence of the problem);

- assists in dealing with customer complaints (actors in the chain or consumers) concerning the products delivered, providing information on causes detected anywhere in the chain from their point of origin to sale to the consumer;
- increases market share by promoting the safety of food products and winning or regaining consumer trust.

ADVANTAGES FOR THE CONSUMER: INCREASED CONFIDENCE

Traceability systems reassure consumers that products have been produced with the required transparency along the entire agrifood chain, from producer to consumer.

ADVANTAGES FOR THE ADMINISTRATION: MORE EFFECTIVE INCIDENT MANAGEMENT

Traceability systems ensure that the authorities have greater confidence in food companies, which facilitates official control activities within the chain. By optimizing traceability systems in the food sector, the authorities are able to take more effective action in terms of handling food safety incidents, crises or alerts. Guidelines to the implementation of product traceability are presented below. A company may adapt them to its own characteristics and circumstances.

STEPS IN IMPLEMENTING PRODUCT TRACEABILITY TOOLS

Step 1: Define current product traceability in the company

The first step is to carry out a detailed study of the company's record-keeping practices (e.g. records for the implementation of prerequisite programmes and HACCP programmes), and then assess their contribution to tracking products. Some companies have made considerable progress in the field of product traceability.

Step 2: Communicate with suppliers and customers

Entrepreneurs must be informed about systems for tracking raw materials or products requested by customers, the target market's tracking requirements and whether there are documents and guidelines to support the application of product traceability principles.

Step 3: Define the context

Product traceability systems require information that tracks the step immediately preceding the step in which the company is involved, as well as the step immediately after. This is often termed **backward** and **forward** tracking of the product. The same applies to an agro-industrial enterprise carrying out preparation, processing, etc. In this case the company should implement internal processes to maintain the

identity of products that enter the plant and pass through the different processing stages within the company. This is known as internal traceability or process traceability.

Most agro-industrial enterprises record information on the products that enter the company and the associated suppliers. They also record how these products were used inside the company, as well as information on the products prepared and the customers to which they were delivered. The idea is that the system should contain information about each stage involved in the production, processing and distribution of the products.

Step 4: Define criteria for grouping products for traceability

In any product traceability system, all the product units that a company produces, manufactures, packages or manages must be grouped. In addition, the group must be given a unique identity. If the enterprise is in the primary sector or if it is a processing enterprise, these groups can be configured according to different criteria, such as:

- the period (hourly, daily, weekly);
- the production line;
- the farm or lot;
- the place and date.

A wide variety of **identification** systems is available, from handwritten labels to barcodes and radio frequency chips. When selecting the grouping methods for products within an enterprise, the varying degrees of precision must be considered. A balance should be found between the economic benefits of more precise groupings and the complexity and cost of working at this higher level of precision.

Step 5: Establish information systems, records and necessary documentation

The documentation for the system implemented should include a clear definition of objectives and responsibilities and a detailed description of the traceability system and its application, as well as its relationship with its customers' and suppliers' tracking systems. The information should be collected and stored as it passes through the chain, and there should be a procedure for reviewing and updating the system.

The information to be recorded includes:

- at the reception stage of raw materials – name of supplier, description of product received, quantity, location of received products and other relevant information;
- at the processing stage – how the products received were used, the mixtures, the quantities used, a description of the final product;
- at the product delivery and sale stages – information on the customer, the quantity and the characteristics of the product delivered.

Step 6: Establish mechanisms for validation or verification by the company

The system should be reviewed regularly to ensure that it is operating effectively. This can be done by checking:

- the accuracy of the information that has been collected and stored;
- the response time when a problem occurs.

The system should be reliable in terms of the accuracy of the information collected and efficient in terms of the rapid provision of information needed to solve problems.

Step 7: Establish communication mechanisms between companies

The functioning of a product traceability system throughout the chain depends on how efficiently the participants fulfil their role, on collecting information from the preceding and subsequent stages and on the ability to make this information available to the other members of the chain. The information on product traceability must be shared in order to maintain the integrity and functioning of the product supply chain.

Step 8: Establish procedures for locating, immobilizing and, where necessary, recalling products

The company must establish rapid reaction mechanisms to ensure that, when an incident occurs, it is possible to: identify the nature of the incident; take corrective measures to protect consumer health and the company's reputation; eliminate the cause of the incident and prevent its recurrence.

Step 9: Product traceability and voluntary and mandatory standards

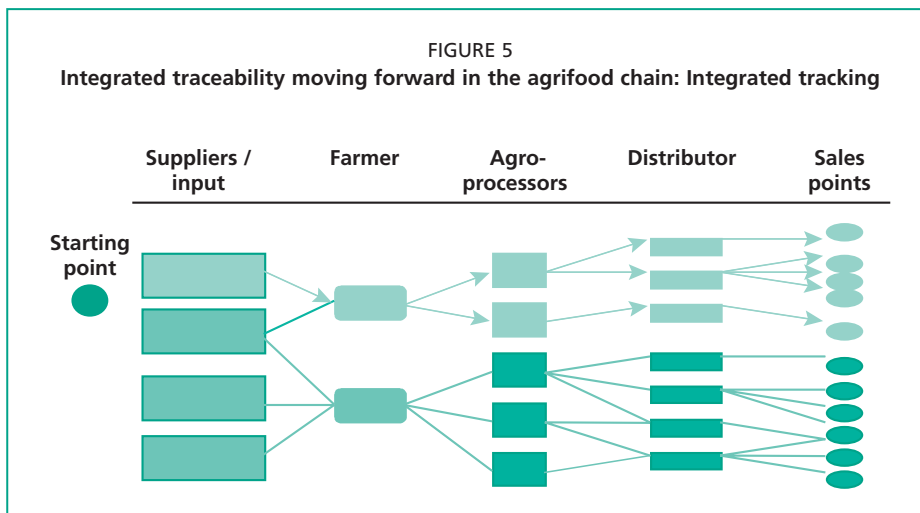
The standards approach is based on segmentation, which means that each actor involved in the chain is responsible for keeping records that identify the origin of the product and the recipient of the product in the subsequent link in the chain. Although the approach is segmented, it means that product traceability is integrated throughout the entire chain (Figure 5 and Figure 6).

In almost all food supply chains, some or all of the information required for product tracking is available from food safety and quality management programmes, such as those for prerequisite programmes and the HACCP system. It is important that this information is organized in such a way that it serves the stated objectives.

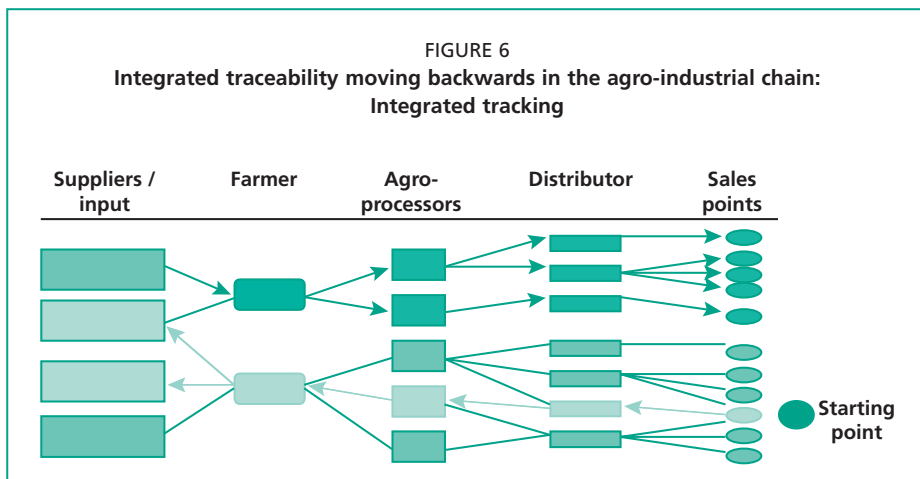
APPLICATION OF PRODUCT TRACEABILITY TOOLS IN ACCORDANCE WITH MANDATORY AND VOLUNTARY STANDARDS

Initiatives to integrate product traceability into food regulations have been led by the European Union (*EC 178/2002*), the United States of America through its bioterrorism regulations (*Bio-Terrorism Preparedness Act, 2002*) and Japan (*Food Sanitation Law in Japan. Standard Information Service, Jetro, March 2003*).

Many of the standards in private initiatives incorporate traceability as a requirement in food quality and safety management systems. In such cases



Source: *Integrated traceability moving forward in the agrifood chain – Integrated tracking*. European Article Numbering Association (EAN). Code EAN/UCC – 128, Reference Guide EAN-UCC – 14, Global users manual EAN-UCC.



Source: *Integrated traceability backwards in the agrifood chain – Integrated tracking*. European Article Numbering Association (EAN). Code EAN/UCC – 128, Reference Guide EAN-UCC – 14, Global users manual EAN-UCC.

traceability is a prerequisite and should be considered as interdisciplinary to ensure quality, safety and secure distribution. Below are some examples:

- Requirement 7.5.3 of standard **ISO 9001** on identification and traceability states that the organization must control and record the unique identification of the product.
- Section 2.13 on traceability of the global food standard of the **British Retail Consortium (BRC)**, aimed at companies supplying foods to the British market, states that the company must have a system for following products from the origin of the raw materials through to the finished product.

- The **International Food Standard (IFS)**, aimed at companies supplying foods to the French and German markets, indicates under number 4.18: “The organization shall establish and apply a traceability system that enables the identification of product lots and their relation to batches of raw materials, processing and delivery records. The traceability system shall be able to identify incoming material from the immediate suppliers and the initial distribution route of the end product.”

CONSIDERATIONS WHEN ADOPTING PRODUCT TRACEABILITY TOOLS

As a first step, each agro-industrial enterprise should define the objectives of its product traceability programme, for example: (i) to comply with a legal requirement or regulation; (ii) to satisfy a requirement of buyers in the target market and (iii) as a tool to improve company and marketing management. Based on these objectives, the entrepreneur should assess the costs and benefits of implementing the system and, on the basis of this assessment, should define whether the traceability tools will be aimed at meeting minimum requirements or whether they will also collect valuable management information. These are different approaches that entail different costs and different levels of efficiency.

The system should be geared to the company’s objectives and to its technical, administrative and financial capacity to ensure that the system can be implemented and operated effectively and efficiently.

PRODUCT TRACEABILITY APPROACHES

The minimum requirement for a company is to have a document-based traceability system for tracking the product one step back and one step forward within the chain. While electronic systems facilitate product traceability, less elaborate document-based systems can be used to collect and share all the information needed for traceability, much of which forms part of quality and safety programmes such as GAP, GMP and the HACCP system.

Some agro-industrial companies have opted to implement electronic systems of varying levels of complexity, from the simplest systems, based on data capture using barcodes, to more elaborate and costly systems using radio frequency identification (RFID). The main obstacle to the use of barcodes is that many companies use their own numbering systems and data is not synchronized with that of other actors in the chain. This makes it difficult to track the product all along the chain (PMA/CPMA, 2006). Standardized barcodes have emerged to solve this problem, as well as data synchronization systems (by product and location), combined with electronic commerce. Barcodes that define any product or standardized group of products (boxes, pallets) are used to facilitate handling, storage and shipping. International standards use Global Trade Item Number (GTIN) codes where a globally unique 14-digit number is used to identify units, products or services. GTIN⁴ is also a general term that refers to a family of data structures that comprise:

⁴ For more information on GTIN consult the web page: <http://www.gtin.info/>

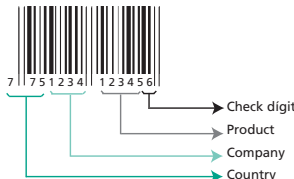

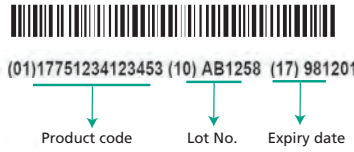
- GTIN – 12 (UPC)
- GTIN – 13 (EAN-13)
- GTIN – 14 (EAN/UCC – 128 or ITF – 14)
- GTIN – 8 (EAN-8)

Universal Product Codes (UPCs) are administered by the the United States Uniform Code Council (UCC) and the European Article Numbering Association (EAN). These are the best known families of data structures or codes, which are similar and, in practice, are being combined.

Table 2 gives an example of EAN codes and their field of application. EAN-UCC standards allow:

- the unique identification of companies in the chain;
- the unique identification of products (units of consumption);
- the unique identification of logistical units (pallets, containers);
- the unique identification of locations and processes in the chain;
- the flows of information and electronic exchange of documents.

TABLE 2
The use of barcodes in the identify different product groups

Level	Code	Application (examples)	Explanation
Point of Sale	N-13	Product	<p><i>GTIN = Global Trade Identification Number</i> <i>UCC = Universal Code Council</i></p>  <p>7 1751234 123456 </p> <p>→ Check digit → Product → Company → Country</p>
Storage and Distribution	EAN-14	Boxes	<p><i>Logical units - boxes</i></p>  <p>1 775 1234 56789 3</p> <p>↓ ↓ ↓ ↓ ↓ Logical Country Company Product Digit variable control</p>
Logistical Applications	EAN-128	Pallets	<p><i>Logical units - variable inf.</i></p>  <p>(01)17751234123453 (10) AB1258 (17) 981201</p> <p>↓ ↓ ↓ Product code Lot No. Expiry date</p>

The approach to be used by any agro-industrial entrepreneur to ensure effective product tracking should be based on a cost/benefit analysis of each system. Simple documentation systems, when properly applied, achieve the same objectives as more elaborate systems.

Exercise

COMPLETING THE CASE STUDY

After reviewing the content of this theme and comparing it with your own experience, review the responses to the initial questions and try to correct them or supplement them. Link your answers to the topics that have been covered in this section.

APPLYING THE EXERCISE

Improve your understanding of the principles of product traceability by carrying out the following exercise:

- Figure A3.1 in Appendix 3 gives an example of a system for tracking a product during different stages of the artichoke supply chain. Taking into account the information provided, and referring to your company's specific activities in the chain (production, processing, etc.), identify the types of document or tool currently used by your company that could become part of your product traceability system.
- Taking into account your position in the supply chain, or the interactions between processes within your own company, identify measures that you could take to improve the system to make it comply with the minimum requirements for product traceability.

Assessment of the theme

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Answer these questions, using additional pages as required.

1. Is traceability a tool that can be used for quality and safety management of agro-industrial products? Explain your answer.

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2. What are the benefits to an agro-industrial company of implementing a traceability system for its products?

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3. What does it mean to be able to track products forward and backward?

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4. What does *internal traceability* mean and what is its purpose?

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5. Which constraints affect the implementation of the traceability tool in your particular company?

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Summary

- Product traceability has become an increasingly important requirement worldwide for voluntary and mandatory food standards for quality and safety management.
- According to Codex Alimentarius, product traceability is the ability to follow the movement of a food through specified stage(s) of production, processing and distribution.
- In the context of standards and codes of practice led by the public and private sectors, the interchangeable term most commonly used for product tracking is “traceability”. Traceability provides responses across all agricultural and agro-industrial processes and is particularly useful when problems or emergency situations occur.
- Traceability supports agro-industrial entrepreneurs in:
 - i. taking measures when a risk has been identified to facilitate the rapid removal of a food from the market, thereby minimizing any negative impact on the health of the consumer, economic losses and possible detrimental effects on trade, including damage to the brand image;
 - ii. improving the company’s competitive position in the market by increasing consumer confidence in the product, as well as by guaranteeing the product’s authenticity, the accuracy of the product information and the product characteristics (e.g. organic agriculture, animal welfare, etc.);
 - iii. managing and controlling the productive processes and their optimization.
- In almost all food supply chains, some or all the information required for product tracking is available from food safety and quality management programmes, such as those for prerequisite programmes and the HACCP system. It is important to organize the information in such a way that it serves the stated objectives.
- There are different approaches to product traceability that entail different costs and different levels of efficiency. The chosen system should be geared to the company’s objectives and its technical, administrative and financial capacity to ensure that the system can be implemented and operated effectively and efficiently.

References

THEME 1

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- FAO.** 2002. *Food quality and safety systems: a training manual on food hygiene and the hazard analysis and critical control point (HACCP) system*. Rome.
- FAO.** 2003. *Development of a framework for good agricultural practices*, Committee on Agriculture (Seventeenth Session). 21 March–4 April (available at http://www.fao.org/ag/agn/CDfruits_es/others/docs/bpa.doc)
- FAO.** 2004. *Improving the quality and safety of fresh fruits and vegetables: a practical approach*. Manual for trainers (available at http://www.fao.org/ag/agn/agns/foodproducts_fresh_en.asp)
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- ISO.** 2000. ISO 9000 international standard certified translation. *Quality management systems: concepts and vocabulary*. ISO 2000.
- UNIT.** 2001. *Quality management systems ISO 9000*. Uruguayan Institute of Technical Standards. Uruguay.

THEME 2

- Araya, E.** 2004. *Traceability: concepts and bases for defining a standard for the Chilean export fruit industry*. Presentation at the Seminar on Traceability, Santiago, April 2004.
- CIES.** 2004. The Food Business Forum. *Implementing traceability in the food supply chain* (available at <http://www.ciesnet.com>)
- Codex.** 2006. Codex Committee on Food Import and Export Inspection and Certification Systems Codex. ALINORM 06/29/30 (available at <http://www.codexalimentarius.net/web/archives.jsp?lang=en>)
- Codex.** 2006. *Report of the Codex Alimentarius Commission*. Twenty-ninth session (available at <http://www.codexalimentarius.net/web/archives.jsp?lang=en>)
- PMA/CPMA.** 2006. *Fresh produce traceability: a guide to implementation*. Second version. Produce Marketing Association (PMA) and the Canadian Produce Marketing Association (CPMA) (available at <http://www.pma.com/>).
Web page of the Global Trade Identification Number: <http://www.gtin.info/>

Appendix 1

Recommended further reading on Module 2 themes

THEME 1: FOOD QUALITY AND SAFETY MANAGEMENT IN AGRO-INDUSTRY

Reading 1: Improving the quality and safety of fresh fruits and vegetables: a practical approach. Manual for trainers

Author: Piñeiro, M. and Díaz, L.

Publisher: FAO

Year: 2004.

Manual:

http://www.fao.org/ag/agn/agns/foodproducts_fresh_en.asp

Description

We recommend reading Modules 4 and 5 of this manual, which is aimed at the practical application of technical knowledge for the implementation of quality and safety assurance of fresh fruits and vegetables in the business context, at local, regional, national and governmental levels in each country.

Reading 2: Manual on food hygiene and on the hazard analysis and critical control points (HACCP) system

Author: FAO

Publisher: FAO

Year: 2004.

Manual:

http://www.fao.org/ag/agn/CDfruits_en/others/docs/sistema.pdf

Description

Chapter 2 of this manual is recommended for those interested in the application of the GMP programmes, while Chapter 3 is more appropriate for who want to know more about HACCP.

Reading 3: Development of a framework for good agricultural practices (GAP)

Author: FAO. Committee on Agriculture (Seventeenth Session)

Publisher: FAO

Year: 2003.

Document:

http://www.fao.org/ag/agn/CDfruits_en/others/docs/bpa.doc

Description

This document is recommended for those interested in the basic principles and components of GAP. The document describes the context and the approach of GAP in food safety and in all the stages of the food chain and examines the current applications of GAP by the public and private sectors, civil society and farmers. The document includes a proposal for developing a framework of principles and generic and practical indicators to guide debate and for the preparation of GAP guidelines for agricultural production and all the subsequent stages of the chain.

Reading 4: Code of hygienic practice for fresh fruits and vegetables – Codex Alimentarius

Author: Codex Alimentarius

Publisher: Codex Alimentarius

Document:

http://www.codexalimentarius.net/download/standards/10200/CXP_053e.pdf

Description

This document is suggested for those who are interested in reducing microbial contamination in primary production. The code deals with good agricultural practices and good manufacturing practices, which help to control the risks – microbiological, chemical and physical – associated with the entire production stage of fresh fruits and vegetables from primary production to packing.

Reading 5: Guide to minimize microbiological risk in fresh fruits and vegetables

Author: Center for the Control and Prevention of Disease, Food and Drug Administration (FDA), United States of America

Publisher: FDA

Document:

<http://www.fda.gov/Food/GuidanceComplianceRegulatoryInformation/GuidanceDocuments/ProduceandPlanProducts/ucm064574.htm>

Description

This guide is recommended for those interested in guidelines covering the safety of fresh products in the United States of America. These guidelines provide some basic principles and practices, which are recommended for operators to minimize any microbiological risk in the production, packing and transport of fruits and vegetables.

Reading 6: Assuring food quality and safety: back to the basics – quality control throughout the food chain

Author: Abalaka, J.A.

Publisher: FAO, Conference on International Food Trade Beyond 2000. Science-based decisions, harmonization, equivalence and mutual recognition.

Year: 1999.

Document:

<http://www.fao.org/docrep/meeting/X2669E.htm>

Description

Full reading of this article is recommended in order to improve understanding of the role of governments in ensuring food quality and safety.

THEME 2: IMPORTANCE OF PRODUCT TRACEABILITY IN FOOD QUALITY AND SAFETY MANAGEMENT**Reading 1: Traceability for fresh fruit and vegetables – Implementation guide**

Author: GS1

Publisher: GS1

Year: 2009.

Document:

http://www.gs1.org/sites/default/files/docs/gsmpt/traceability/Global_Traceability_Implementation_Fresh_%20Fruit_Veg_i1.pdf

Description

Guidelines to how GS1 traceability solutions work in practice and how to implement the GS1 Traceability Standard.

Reading 2: The complete barcode guide

Author: Polylabel.com – Cressman Consultants Limited

Publisher: Polylabel.com – Cressman Consultants Limited

Document:

<http://www.polylabel.com/barcodes/barcodeguide.php>

Description

This guide will provide you with information regarding barcodes, the different barcode label symbologies and their specifications and a glossary of common terms relating to bar coding. There is also a section that discusses checkdigit (a barcode generator to allow you to generate barcode images) and, last but not least, a simple user asset management software utility.

OTHER LINKS OF INTEREST FOR MODULE 2

Fresh fruit and vegetable quality and safety database

Author: FAO

Publisher: FAO

Year: 2004.

Database:

<http://www.fao.org/ag/agn/fv/ffvqs?m=catalogue&i=FFVQS&p=nav&lang=en>

Description

The database contains about 800 references relating to the quality and safety of fruits and vegetables, including laws, regulations, standards, codes of practice and training materials.

Generic standards for small producers' organizations

Document:

<http://www.fairtrade.net/standards.html?&L=0>

Euro-Retailer Produce Working Group (EUREP)

Document:

<http://www.eurepgap.org/fruit/Languages/English/documents.html?Lang=English>

Portal GS1

Presents guidelines for the application of traceability in various sectors, using case studies.

Document:

<http://www.gs1.org/productssolutions/traceability/implementation/>

Traceability implementation in developing countries, its possibilities and its constraints. A few case studies

Author: FAO

Publisher: FAO

Year: 2005.

Document:

http://www.fao.org/ag/agn/food/control_essaytrace_en.stm

Description

Presents interesting case studies relating to the application of traceability systems.

Food and Drug Administration of the United States of America (FDA) – The Bioterrorism Act of 2002. Maintenance of Records

Document:

<http://www.fda.gov/oc/bioterrorism/bioact.html>

Food Safety: From the Farm to the Fork. European Union site

Document:

http://www.ec.europa.eu/food/index_en.htm

Appendix 2

Information on quality and safety standards and regulations in Central America, the United States of America and Europe

CENTRAL AMERICA

Standards and regulations of the Central American Customs Union.

Information is provided on the technical regulations for approved foods or for those that are undergoing public consultations and have coverage in the Central America region.

<http://www.reglatec.go.cr/prUAPublica.htm>

Central American Technical Regulation – Processed food and beverage industry. Good manufacturing practices. General principles.

This regulation came into force in April 2006. Its objective is to establish the general rules on hygiene and operational practices during the processing of food products in order to ensure the safety and quality of foods. These rules will be applied to every food industry that operates and distributes its products within the Central American countries. Excluded from this regulation are operations dedicated to the cultivation of fruits and vegetables, the raising and slaughtering of animals, storage of foods outside of the factory, and food service to the public or to retailers, all of which are governed by other sanitary regulations.

Signatories: Costa Rica, El Salvador, Guatemala, Honduras and Nicaragua.

International Regional Organization for Plant and Animal Health (OIRSA)

Members of OIRSA are Belize, Costa Rica, El Salvador, Guatemala, Honduras, México, Nicaragua and Panama. This agency is responsible for integration in the areas of animal and plant health and has recently begun to work in the area of food safety. The web page provides information on regulations for importing and exporting plant and animal materials, as well as documents and publications on good practices.

<http://www.oirsa.org/>

Regional Portal on Food Safety, Animal and Plant Health – PRISA

This portal facilitates trade in food and agricultural products and supports the execution of the Agreement on Sanitary and Phytosanitary measures (SPS), thereby providing a single access point for national standards and regulations in the Latin American and Caribbean region relating to food safety and plant and animal health.

<http://prisa.fao.org/Es/default.jsp>

Msfinfo.com – Sanitary and phytosanitary measures for fruits and vegetables

This site provides a series of links with specific information related to the topic of food safety. It gives access to home pages for government organizations, international agencies, non-governmental organizations and local governments. It also includes materials relevant to good agricultural practice and good manufacturing practice in the fruit and vegetable sector.

<http://msfinfo.com/index.php>

COSTA RICA

International portal on Food Safety, Animal and Plant Health – Information on Costa Rica

This link includes information on standards relating to food safety, animal and plant health in Costa Rica.

<http://www.ipfsaph.org/id/cthttpwwwfaoorgaosipsaphgeographycr?language=en>

GUATEMALA

International portal on Food Safety, Animal and Plant Health – Information on Guatemala

This link includes information on standards relating to food safety, animal and plant health in Guatemala.

<http://www.ipfsaph.org/id/cthttpwwwfaoorgaosipsaphgeographygt?language=en>

EL SALVADOR

Centro de información de normas y reglamentos técnicos, certificación y metrología

This site provides information on food regulations and standards.

<http://www.infoq.org.sv/>

Extensive work has been carried out on the harmonization of national standards with the standards of the Codex Alimentarius; these standards include the following:

- **Agreement 687 – NSR 67.00.283:99** on directions for the application of the hazard analysis and critical control points system (HACCP).
- **Agreement 402 – NSO 67.10.01:03** on the labelling of prepacked foods.
- **Agreement 679 – NSR 67.00.278:99** on practices for the packing and transport of fresh tropical fruits and vegetables.

- **Agreement 216** – Technical sanitary standards for the authorization and control of food establishments.
- **Agreement 789 – NSR 67.00.241:99** on codes of practice on general principles of food hygiene.

International portal on Food Safety, Animal and Plant Health – Information on El Salvador

This link includes information on standards relating to food safety, animal and plant health in El Salvador:

<http://www.ipfsaph.org/id/cthttpwwwfaoorgaosipfsaphgeographysv?language=en>

NICARAGUA

International portal on Food Safety, Animal and Plant Health – Information on Nicaragua

This link includes information on standards relating to food safety as well as to animal and plant health in Nicaragua:

<http://www.ipfsaph.org/id/cthttpwwwfaoorgaosipfsaphgeographyni?language=en>

- **NTN 11 004-02** on basic requirements for the safety of products and subproducts of vegetable origin.
- **NTN 03 026-99** on sanitary requirements for food handling.

HONDURAS

International portal on Food Safety, Animal and Plant Health – Information on Honduras

This link includes information on standards relating to food safety, animal and plant health in Honduras.

<http://www.ipfsaph.org/id/cthttpwwwfaoorgaosipfsaphgeographyhn?language=en>

MEXICO

Secretary of Economy – Catalogue of Official Standards

The Ministry of the Economy is responsible for codifying official Mexican standards (NOM) by subject, and for maintaining the inventory and collection of standards, including reference standards and international standards. This link provides access to the official standards catalogue in Mexico, including those for the food sector.

<http://www.economia.gob.mx/?P=144>

International portal on Food Safety, Animal and Plant Health – Information on Mexico

This link includes information on standards relating to food safety, animal and plant health in Mexico.

<http://www.ipfsaph.org/id/cthttpwwwfaoorgaosipfsaphgeographymx?language=en>

DOMINICAN REPUBLIC**International portal on Food Safety, Animal and Plant Health – Information on República Dominicana**

This link includes information on standards relating to food safety, animal and plant health in the Dominican Republic.

<http://www.ipfsaph.org/id/cthttpwwwfaoorgaosipfsaphgeographydo?language=en>

PANAMA**International portal on Food Safety, Animal and Plant Health – Information on Panama**

This link includes information on standards relating to food safety, animal and plant health in Panama.

<http://www.ipfsaph.org/id/cthttpwwwfaoorgaosipfsaphgeographypa?language=en>

CUBA**International portal on Food Safety, Animal and Plant Health – Information on Cuba**

This link includes information on standards relating to food safety, animal and plant health in Cuba.

<http://www.ipfsaph.org/id/cthttpwwwfaoorgaosipfsaphgeographycu?language=en>

UNITED STATES OF AMERICA**American National Standards Institute**

As the voice of the United States standards and conformity assessment system, the American National Standards Institute (ANSI) empowers its members and constituents to strengthen the United States marketplace position in the global economy while helping to assure the safety and health of consumers and the protection of the environment. The institute oversees the creation, promulgation and use of thousands of norms and guidelines that directly impact businesses in nearly every sector: from acoustical devices to construction equipment, from dairy and livestock production to energy distribution, and many more.

<http://www.ansi.org/>

Food and Drug Administration (FDA)

The United States Food and Drug Administration (FDA) is an agency within the Department of Health and Human Services and consists of centres and offices, which are listed in menu at left. The FDA is responsible for protecting public health by assuring the safety, efficacy, and security of human and veterinary drugs, biological products, medical devices, the nation's food supply, cosmetics, and products that emit radiation. The FDA is also responsible for advancing the public health by helping to speed innovations that make medicines and foods more effective, safer, and more affordable; and helping the public get accurate, science-based information in order to use medicines and foods to improve their health.

<http://www.fda.gov/>

Gateway to Food Safety Information

FoodSafety.gov is the gateway to food safety information provided by government agencies. The Federal Government of the United States of America enhances www.foodsafety.gov to better communicate information to the public and include an improved individual alert system allowing consumers to receive food safety information, such as notification of recalls.

<http://www.foodsafety.gov/>

United States Department of Agriculture (USDA)

The United States Department of Agriculture (USDA) provides leadership on food, agriculture, natural resources and related issues based on sound public policy, the best available science and efficient management. It has created a strategic plan to implement its vision. The framework of this plan depends on these key activities: expanding markets for agricultural products and supporting international economic development; furthering the development of alternative markets for agricultural products and activities; providing financing needed to help expand job opportunities and to improve housing, utilities and infrastructure in rural America; enhancing food safety by taking steps to reduce the prevalence of food-borne hazards from farm to fork; improving nutrition and health by providing food assistance and nutrition education and promotion; and managing and protecting America's public and private lands working cooperatively with other levels of government and the private sector.

<http://www.usda.gov/wps/portal/usdahome>

USDA Food Safety and Inspection Service

The Food Safety and Inspection Service (FSIS) is the public health agency in the United States Department of Agriculture responsible for ensuring that the nation's commercial supply of meat, poultry, and egg products is safe, wholesome, and correctly labelled and packaged.

<http://www.fsis.usda.gov/>

EUROPE

British Retail Consortium

The British Retail Consortium is the lead trade association representing the whole range of retailers, from the large multiples and department stores through to independents, selling a wide selection of products through centre-of-town, out-of-town, rural and virtual stores.

<http://www.brc.org.uk/>

British Standards Institution

BSI British Standards is the United Kingdom's national standards organization that produces standards and information products that promote and share best practice. It serves the interests of a wide range of industry sectors as well as

governments, consumers, employees and society overall, to make sure that British, European and international standards are useful, relevant and authoritative.

<http://www.standarduk.com>

EU Directorate General for Health and Consumers

The Directorate General for Health and Consumers has the task of keeping related laws up to date. It is the national, regional or even local governments in the European Union (EU) countries that actually apply the EU's health and consumer protection laws. It is their job to make sure traders, manufacturers and food producers in their countries observe the rules. Nonetheless, part of the job of the Directorate is to check that this is really happening and that the rules are being applied properly in all EU countries.

http://ec.europa.eu/dgs/health_consumer/index_en.htm

EU Export Helpdesk for Developing Countries

The Export Helpdesk is an online service provided by the European Commission to facilitate market access for developing countries to the European Union. The European Union is the world's largest single market and by far the most important trading partner for developing countries. The wide range of preferential and bilateral trade agreements that the EU is offering partners in the developing world allows them to benefit from more open access to the EU market. This degree of openness is unmatched by any other major economy and demonstrates the EU's commitment to putting trade at the service of development, not only in theory, but also in practice.

http://exporthelp.europa.eu/index_en.html

European Food Safety Authority (EFSA)

The European Food Safety Authority (EFSA) is the keystone of European Union risk assessment regarding food and feed safety. In close collaboration with national authorities, and in open consultation with its stakeholders, EFSA provides independent scientific advice and clear communication on existing and emerging risks. EFSA's role is to assess and communicate on all risks associated with the food chain. Because EFSA's advice serves to inform on the policies and decisions of risk managers, a large part of EFSA's work is undertaken in response to specific requests for scientific advice. Requests for scientific assessments are received from the European Commission, the European Parliament and the EU Member States. EFSA also undertakes scientific work on its own initiative, so-called self-tasking.

http://www.efsa.europa.eu/EFSA/efsa_locale-1178620753812_home.htm

EU Food Safety – From the Farm to the Fork

The aims of the programme are to:

- assure effective control systems and assess compliance with EU standards in the food safety and quality, animal health, animal welfare, animal nutrition

and plant health sectors within the EU and in third countries in relation to their exports to the EU;

- manage international relations with third countries and international organizations concerning food safety, animal health, animal welfare, animal nutrition and plant health;
- manage relations with the European Food Safety Authority (EFSA) and ensure science-based risk management.

http://ec.europa.eu/food/index_en.htm

EU Legislaton (EUR-Lex)

EUR-Lex provides direct free access to European Union law. Here you can consult the Official Journal of the European Union as well as the treaties, legislation, case law and legislative proposals. You can also use the extensive search facilities available on EUR-Lex.

You can read about EU law, legislative procedures and EU institutions. You can also consult the selection of new documents on the home page, or consult the thematic files.

EUR-Lex also offers links to the budget of the European Union, the institutions' registers and other documentation and information sources.

<http://eur-lex.europa.eu/en/index.htm>

GlobalGAP

The challenge of globalizing markets is nowhere greater than in the primary food sector. GLOBALGAP (formerly known as EUREPGAP) has established itself as a key reference for good agricultural practices in the global marketplace by translating consumer requirements into agricultural production in a rapidly growing list of countries – currently more than 80.

www.globalgap.org

UNECE Standards

At the United Nations Economic Commission for Europe (UNECE) global agricultural quality standards are developed to facilitate international trade. The standards encourage high-quality production, improve profitability and protect consumer interests. UNECE standards are used internationally by governments, producers, traders, importers, exporters and international organizations.

They cover a wide spectrum of agricultural products: fresh fruit and vegetables (FFV), dry and dried produce (DDP), seed potatoes, meat, cut flowers, eggs and egg products.

<http://www.unece.org/trade/agr/welcome.htm>

INTERNATIONAL ORGANIZATIONS

Codex Alimentarius

The Codex Alimentarius Commission was created in 1963 by FAO and WHO to develop food standards, guidelines and related texts such as codes of practice

under the Joint FAO/WHO Food Standards Programme. The main purposes of this programme are protecting the health of consumers and ensuring fair trade practices in the food trade, as well as promoting coordination of all food standards work undertaken by international governmental and non-governmental organizations.

www.codexalimentarius.net

International Organization for Standardization (ISO)

The International Organization for Standardization (ISO) is the world's largest developer and publisher of International Standards. ISO is a network of the national standards institutes of 162 countries, one member per country, with a Central Secretariat in Geneva, Switzerland, that coordinates the system. It is a non-governmental organization that forms a bridge between the public and private sectors. Many of its member institutes are part of the governmental structure of their countries or are mandated by their governments. On the other hand, other members have their roots uniquely in the private sector, having been formed by national partnerships of industry associations.

www.iso.org

Safe Food International

Safe Food International (SFI) is a project designed by and for consumer organizations that want to improve food safety on a global scale. SFI aims to unify and focus the efforts of consumer organizations worldwide that are working to ensure a safer food supply by ensuring that their national food safety programmes address common food safety problems, approve foods before they are consumed or exported to other countries, and deter the use of food as a target of intentional contamination.

www.safefoodinternational.org

Standards and Trade Development Facility

The Standards and Trade Development Facility (STDF) is a joint initiative in capacity building and technical cooperation aimed at raising awareness on the importance of sanitary and phytosanitary (SPS) issues, increasing coordination in the provision of SPS-related assistance, and mobilizing resources to assist developing countries in enhancing their capacity to meet SPS standards.

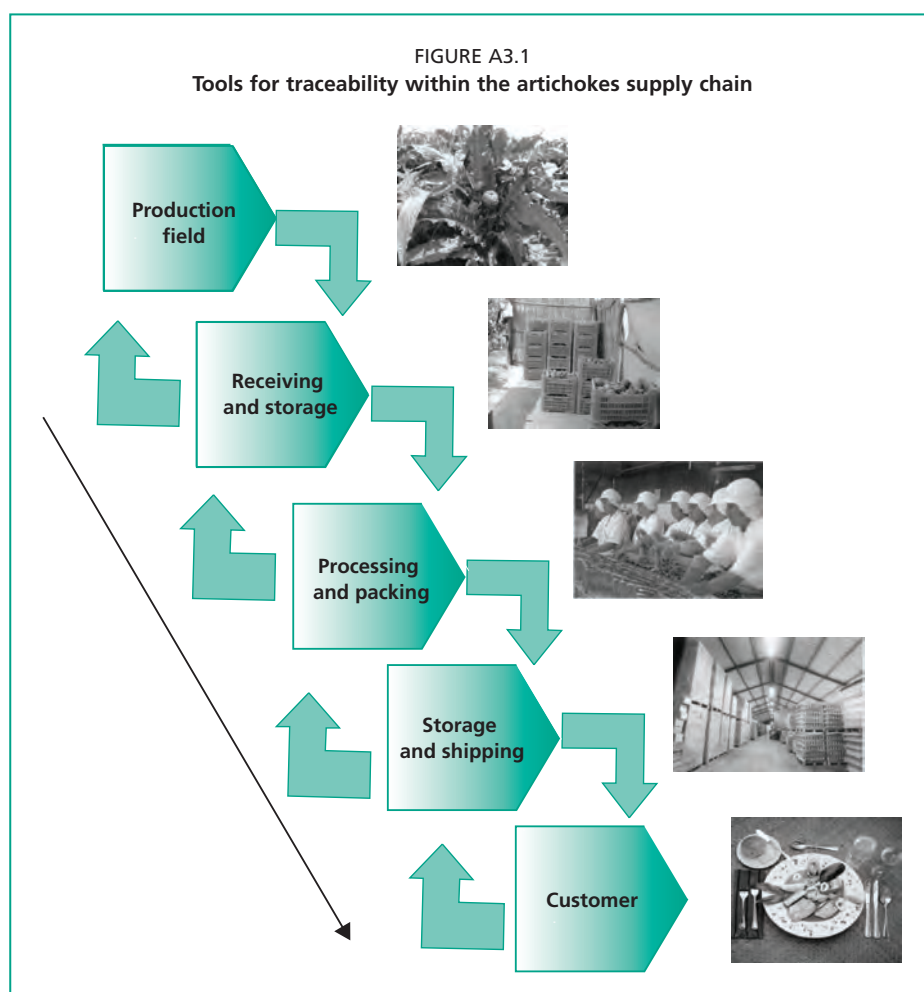
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Appendix 3

Exercise on Theme 2

TOOLS IMPLEMENTED WITHIN THE AGRIFOOD CHAIN TO FACILITATE PRODUCT TRACEABILITY

Apply the topics covered in Theme 2 by preparing a diagram similar to the one in Figure A3.1 for your company's activities. As part of this process, identify the tools/documents currently used by your company that could become part of a traceability system for your company's products (Figure A3.2). In addition,



identify measures that could be taken to improve the current system to make it comply with the minimal requirements for tracking the product one step backward and one step forward in the chain (Figures A3.3, A3.4, A3.5).

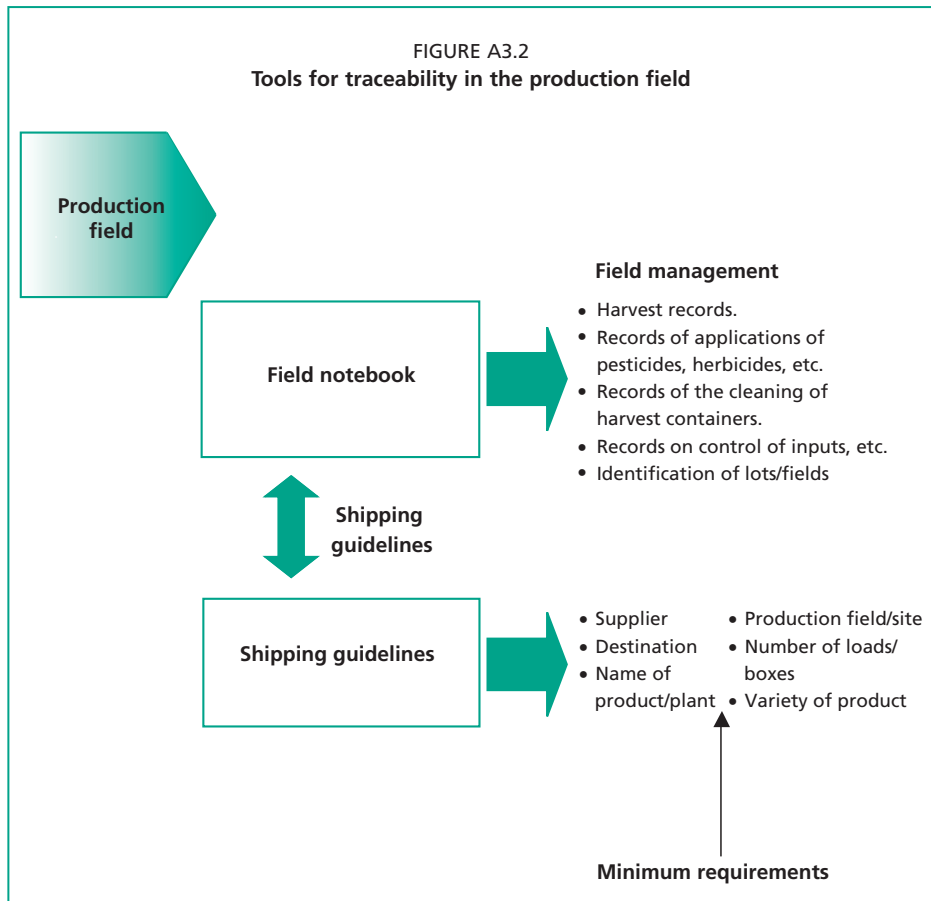
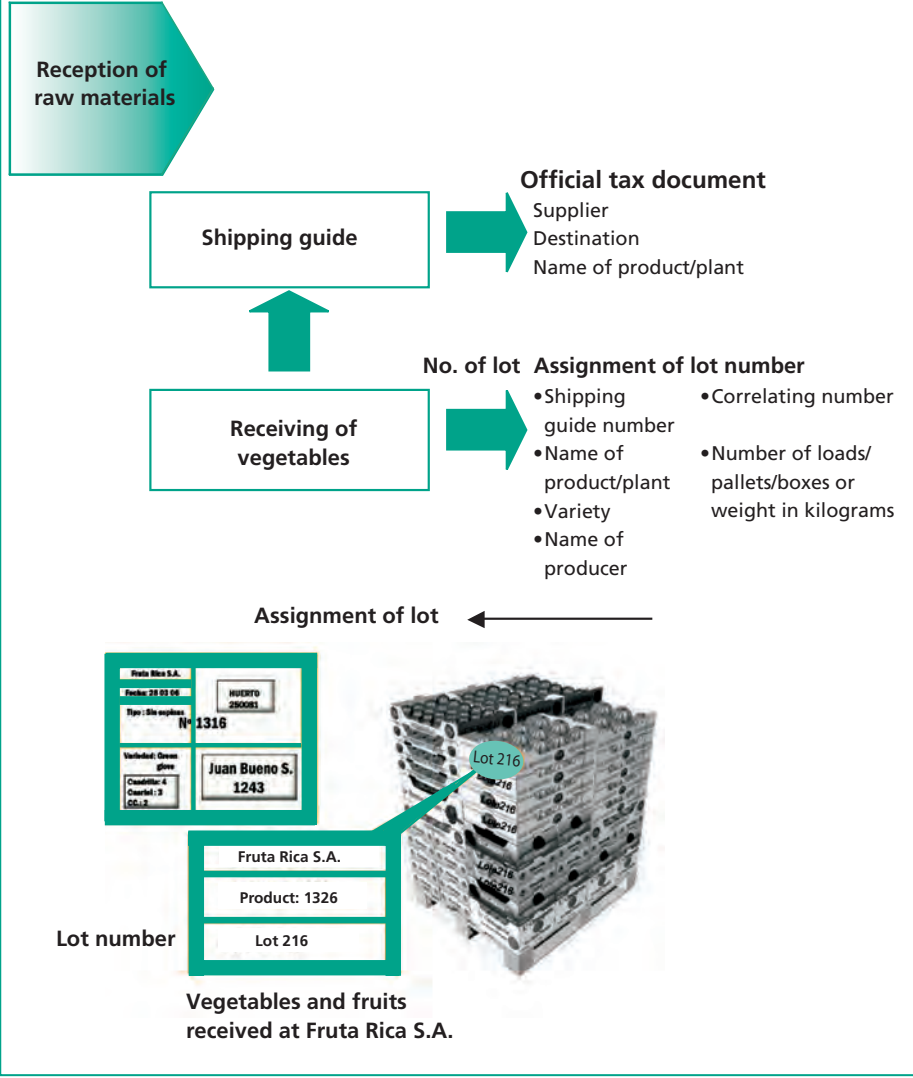


FIGURE A3.3

Tools for tracking within the company: reception of raw materials from lots or farms



Reception of raw materials

Shipping guide

Official tax document

- Supplier
- Destination
- Name of product/plant

Receiving of vegetables

No. of lot Assignment of lot number

- Shipping guide number
- Name of product/plant
- Variety
- Name of producer
- Correlating number
- Number of loads/pallets/boxes or weight in kilograms

Assignment of lot



Fruta Rica S.A.
Product: 1326
Lot 216

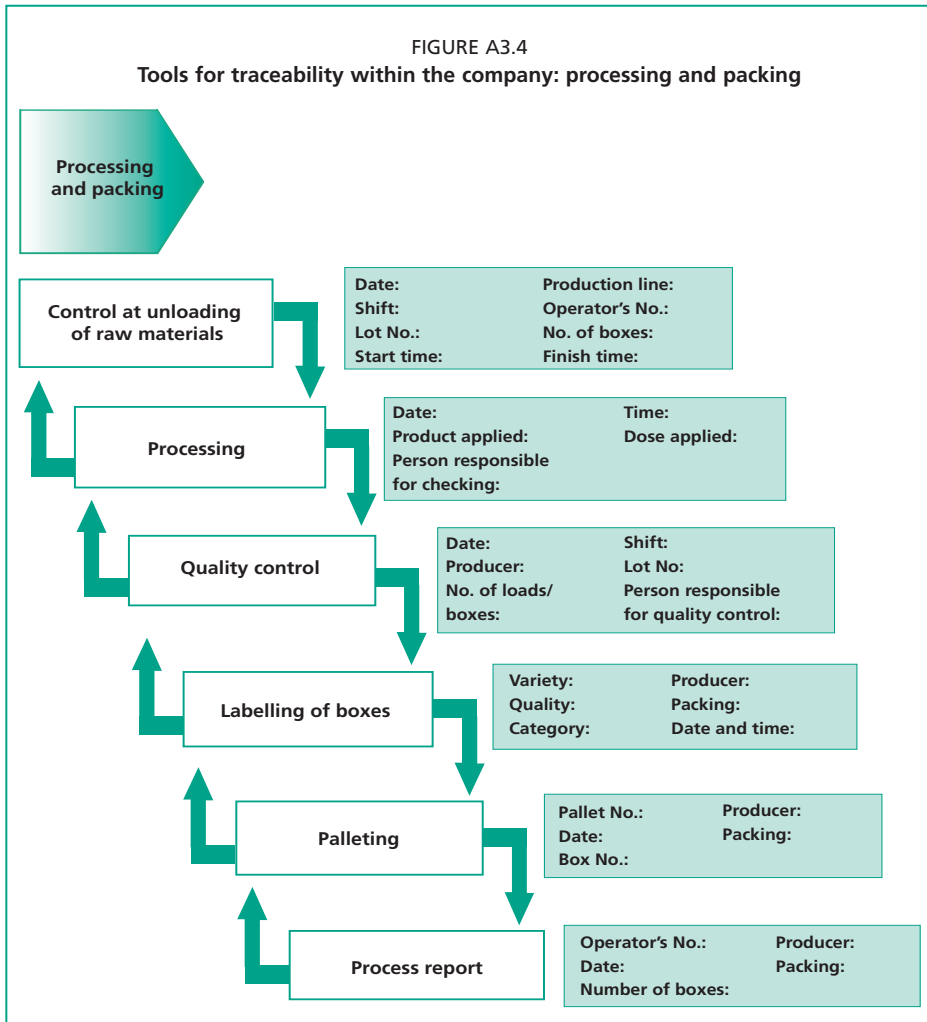
Lot number

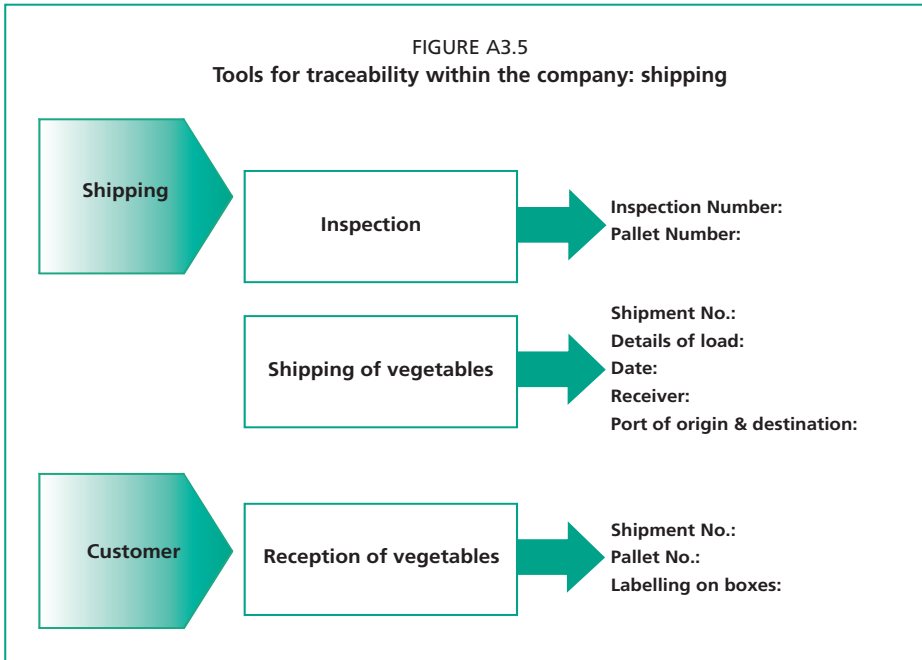
Vegetables and fruits received at Fruta Rica S.A.

MODULE 2

SUPPLIER

Representative:		Customer details:			
N° of loads/boxes:					
Shipping mode:					
Point of delivery:					
Date:		Shipping note N°:		Order N°:	
Code	Quantity	Description	Unit price	Department	Total cost
Signature and Name:		Observations:		Accompanying documents	
Received by:					
Transport:					





Cost-effective management tools for ensuring food quality and safety

FOR SMALL AND MEDIUM AGRO-INDUSTRIAL ENTERPRISES

The purpose of this manual is to improve and build the capacities of small and medium agro-industrial enterprises in order to guarantee the quality and safety of food products. The approach integrates the different factors that affect the capacity of a business to produce foods to meet market expectations and recognized standards, while maintaining and increasing the profitability and life of the business. Management and technical aspects are integrated through a practical and cost-effective approach.

The manual includes four modules on the following subjects: the use of market information for improving quality management; systems and tools for improving quality and safety management in agro-industry; the application of quality management principles in small and medium agro-industrial enterprises; planning as a tool for improving quality and safety management.

The manual contains case studies, exercises and bibliographic references, as well as a trainers' guide, PowerPoint presentations (on CD-ROM), appendices with further reading, links of interest and a glossary. The manual aims to assist trainers and entrepreneurs wishing to use the material for self-learning. With this manual, the Food and Agriculture Organization of the United Nations (FAO) provides the small and medium agro-industry sector in developing countries with an important tool for improving competitiveness and the capacity to deliver high-quality products to consumers.

Module 2: Systems and tools for improving quality and safety management in agro-industries