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**INCREASED PRODUCTION OF ROOT AND TUBER CROPS IN THE  
CARIBBEAN THROUGH THE INTRODUCTION OF IMPROVED  
MARKETING AND PRODUCTION TECHNOLOGIES**

**&**

**INCREASED PRODUCTION OF VEGETABLES & HERBS THROUGH THE  
USE OF PROTECTED AGRICULTURE IN THE CARIBBEAN**

## **TECHNICAL BULLETIN**

**PART I - FOOD SAFETY STANDARDS FOR FOOD SECURITY IN THE CARICOM  
REGION**

**PART II – FOOD SAFETY TRAINING MODULES**

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# **PART I - FOOD SAFETY STANDARDS FOR FOOD SECURITY IN THE CARICOM REGION**

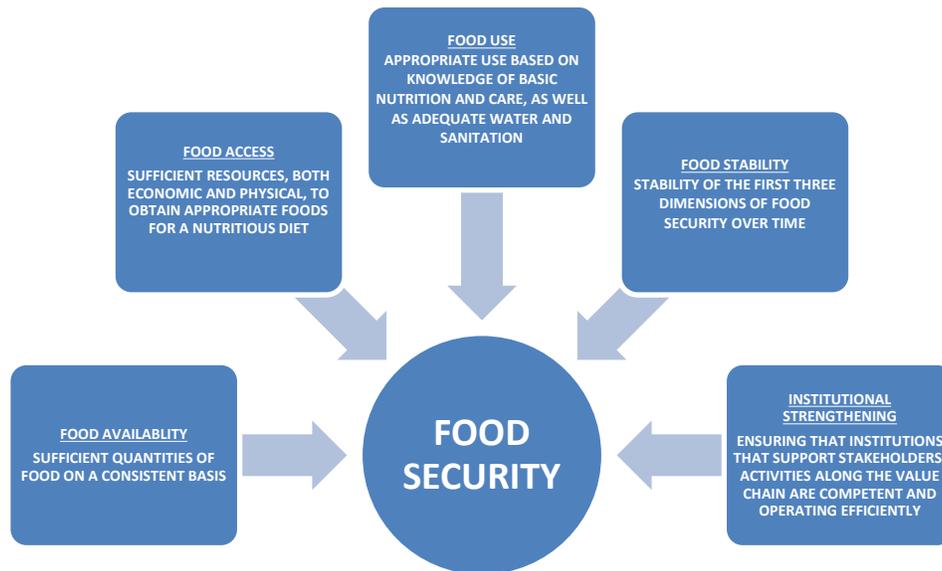
## **PREFACE**

Every year, across the world, millions of people suffer from food borne diseases or food borne illnesses; commonly known as food poisoning which is caused by the consumption of contaminated food including beverages. The financial impact of this preventable health challenge, which is largely due to lost productivity and the cost of medical care, is bewildering. Notwithstanding this fact, the food processing industry in the CARICOM region places greater emphasis on the quality of food rather than on food safety. Food safety should not only be addressed by primary producers, suppliers of ingredients and packaging materials and food processors but issues associated with the production of safe food should also be considered in the conversations which are in progress at the level of CARICOM and at national level regarding food security.

## **INTRODUCTION**

Food safety may be defined as a scientific discipline describing handling, preparation and storage of food in ways that prevent foodborne illnesses/food borne diseases/food poisoning and, therefore, ensure that food is safe for consumption. Food security, on the other hand, is considered to be 'when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life'. Many food security definitions speak to the five pillars of food security (Figure 1).

**Figure 1: Pillars of Food Security**



Food Safety impacts the first four pillars of Food Security. The fifth pillar, Institutional Strengthening, ensures that institutions which play a supporting role e.g. CARDI, IICA are adequately equipped to provide the necessary assistance to members of the value chain.

Across the world, improvements in food safety have been demanded by the urban middle class through pressure being placed on governments to guarantee a safe supply of food. As a result, food safety is no longer simply a public health issue or a luxury. It is now a market development issue and determines export market access by the developing countries of CARICOM. Export market access issues also significantly impact domestic market standards.

### **FOOD SAFETY: A CARICOM PERSPECTIVE**

The CARICOM food industry is characterised by a number of players (Primary Producers, Processors, Food Service, Suppliers, Service Providers, Distributors, Retailers) of varying size, complexity as well as levels of knowledge, development and implementation of Food Safety Management Systems. Food is produced for domestic consumption as well as for regional and extra regional export. Notwithstanding production of food for local, regional and extra regional consumption, a significant quantity of food is imported into the CARICOM region from many various extra regional countries.

Operating within CARICOM are a number of food regulatory bodies. These include the Bureaux of Standards which regulate food in all CARICOM countries except Trinidad & Tobago where the Chemistry, Food & Drugs Division of the Ministry of Health is the regulatory body. Veterinary Public Health Inspectorates as well as Public Health Inspectorates also play a critical role in

regulation. Throughout the CARICOM region, food safety legislation is at different stages of development and there are varying levels of enforcement. A regional body called the Caribbean Health & Food Safety Agency (CAHFSA) was established but it is not yet fully operational. National and regional Food Security Plans are also at different levels of development and implementation.

Within the CARICOM region, increased food safety awareness among domestic customers has been observed. CARICOM exports are subjected to scrutiny by importing countries e.g. US. Particularly noteworthy is the impact of exports of fish to the European Union by CARICOM countries on food safety developments. Suppliers to international companies operating in the region are also subjected to intense scrutiny.

Export food safety requirements have been impacting the domestic food safety landscape, even if a particular primary producer or processor does not export, as exporting countries generally require an acceptable country approach to food safety. Notwithstanding requirements of importing countries and improved approaches to food safety (domestically), a number of unregulated imports are allowed into CARICOM countries. Regardless of where the push for the development of food safety comes from, food safety should be key element of the regions food security thrust.

## **CHALLENGES IN THE DEVELOPMENT OF FOOD SAFETY MANAGEMENT SYSTEMS**

Within CARICOM, a number of challenges impact on food safety which should play a key role in the region's food security thrust. At the organisation level, the development, implementation, maintenance & continual improvement of Food Safety Management Systems to facilitate conformance to established requirements continue to represent a major challenge. Commitment and inability to dedicate adequate resources to the food safety thrust continue to challenge many organisations.

A number of questions should be answered as we consider food safety at national and regional levels and its impact on Food Security. These include, but are not limited to, the following:

1. Should each member of CARICOM develop a National Food Safety Standard?
2. Should CARICOM member countries develop one Regional Food Safety Standard?
3. Should CARICOM or individual CARICOM member countries attempt to develop Food Safety Standards from scratch or should Global Food Safety Initiative (GFSI) compliant standards be adopted and if so, should it be a wholesale adoption?
4. Should Food Safety standards apply only to domestic production or should they also apply to imports?

## FOOD SAFETY PLANNING FOR FOOD SECURITY

In planning for food security, food safety must be considered. In order to ensure that all the various issues have been adequately ventilated and addressed, the following stakeholders from the various CARICOM countries should participate in the conversation:

- a. Policy makers (Government Ministries)
- b. Regulatory bodies (Bureaus of Standards, Chemistry Food & Drugs (T & T), Veterinary Public Health, Public Health)
- c. Primary Producers
- d. Suppliers of ingredients and packaging material
- e. Processors
- f. Distributors
- g. Market – Customers & Consumers
- h. Support Agencies (CARDI, IICA)
- i. Research Institutions/Centres of Learning (SRC, CARIRI, Regional Universities)

These stakeholders all need to play a vital role in ensuring that Food Safety policies and systems are developed to guarantee food safety and therefore ensure that food security objectives are achieved. Each stakeholder plays a relatively unique role and will bring a specific perspective, which will facilitate the development of a comprehensive approach to Food Safety for Food Security.

## RECOMMENDATIONS

The conversation regarding a regional (CARICOM) approach to the development of food safety for food security may take some time. In the interim however, food producers and processors are still required to ensure a safe supply of food to customers. In order to achieve this, primary producers are advised to consider the development and implementation of simple systems to address the requirements of Global Good Agricultural Practices (Global GAP) while food processors should focus on Good Manufacturing Practices (GMP).

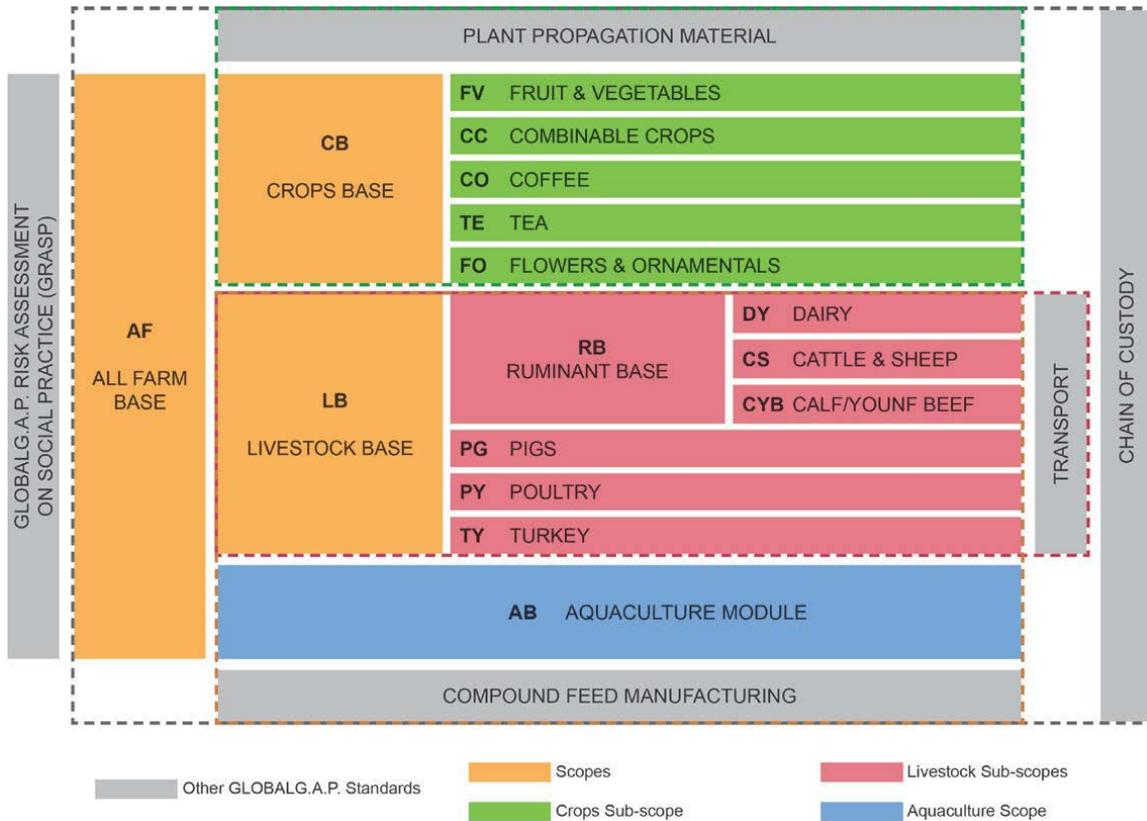
The Global GAP organisation recently introduced Local GAP for emerging producers, who may not be able to achieve Global GAP Certification. It is considered to be a stepping stone to Global GAP certification.

The Local GAP standard is available on the following levels:

- **Foundation Level** - Ideal for producers with fewer food safety risks who sell primarily on a local level. This is **only available** for fruit & vegetable producers.
- **Intermediate Level** - Incorporates stronger food safety criteria, accepted by select national retailers. This is available for fruit & vegetable, livestock and aquaculture producers.

The interaction of the Integrated Farm Assurance Standard and the Global GAP Standards and the elements of Good Manufacturing Practices are outlined in Figures 2 and 3.

**Figure 2: Interaction of the Integrated Farm Assurance Standard with the Global GAP Standards**



**Figure 3: Good Manufacturing Practices – Elements**



The implementation of Food Safety Management Systems based on these standards will facilitate the production of food which is safe and, therefore, will not result in food borne illness or food borne disease.

Most primary producers and food processors will however require some guidance in implementing these systems. Some may even require financial assistance to facilitate the contracting of qualified personnel, infrastructural improvements and acquisition of specific pieces of equipment.

## **CONCLUSIONS**

Food safety is such an integral and critical element of food security that no food security initiatives should proceed without ensuring that appropriate food safety requirements have been appropriately and adequately addressed. Food should not be available, accessible and used appropriately at all times but should also be safe for human consumption and appropriate institutions should be strengthened to facilitate this thrust.

## PART II – FOOD SAFETY TRAINING MODULES

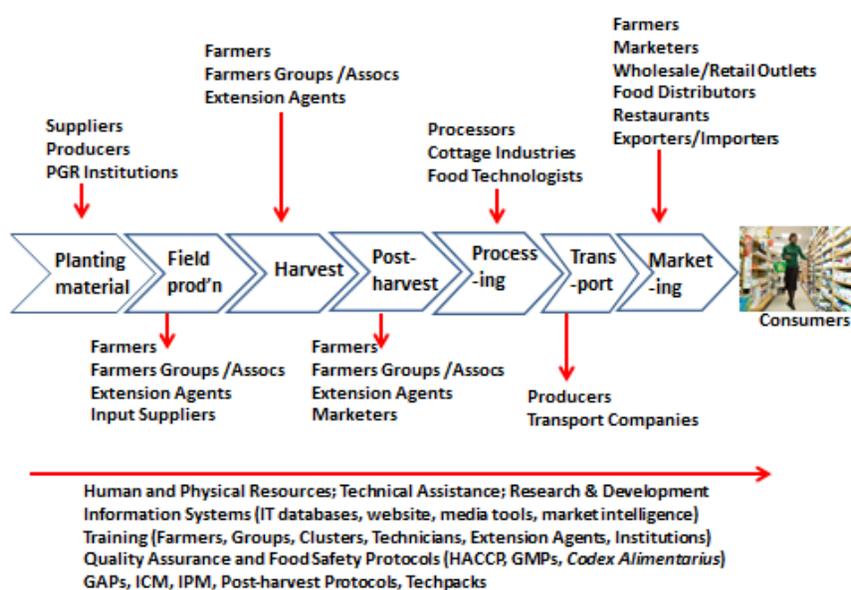
### PREFACE

Every year, across the world, millions of people suffer from food borne diseases or food borne illnesses; commonly known as food poisoning, which is caused by the consumption of contaminated food including beverages. The financial impact of this preventable health challenge, which is largely due to lost productivity and the cost of medical care, is bewildering. Notwithstanding this fact, the food processing industry in the CARICOM region places greater emphasis on the quality of food rather than on food safety. It is imperative however that food safety should be addressed by primary producers, suppliers of ingredients and packaging materials and food processors. In order to adequately address food safety issues, the key players along the value chain should be exposed to appropriate training to improve their ability to develop and implement the necessary food safety management systems.

### INTRODUCTION

Food Safety may be defined as a scientific discipline describing handling, preparation and storage of food in ways that prevent foodborne illnesses or foodborne diseases; commonly known as food poisoning and therefore ensure that food is safe for consumption. All members of the value chain play a role in ensuring food safety. While primary producers must ensure that food produced on farms is not contaminated with biological, chemical and physical hazards which can lead to the development of food borne illness or food borne disease, those involved in the manufacture of ingredients and packaging material as well as processing also play a significant role and must develop appropriate Food Safety Management Systems to control food hazards. The main players along the value chain are shown in Figure 4.

**Figure 4.** Main players along the commodity value chain. Factors operating along the entire chain are shown at the bottom of the diagram.



Members of the roots & tubers industry value chain were selected for food safety training by the Caribbean Agricultural Development Institute (CARDI) during the course of the two projects funded by the Common Fund for Commodities (CFC). The primary objectives of the training interventions were as follows:

1. To improve the participants' knowledge and understanding of food safety.
2. To assist them in developing and implementing systems to manage food safety hazards.

Six processors in Trinidad & Tobago, Jamaica and Haiti along with nine farmer groups were identified as beneficiaries. Some of the processes which they utilise in primary production or processing which can impact food safety were evaluated and the members/employees were subjected to food safety training in different areas. Participants were involved in either the production of roots and tubers (open field) or other crops using protected agriculture systems or processing of roots and tubers. In the case of Haiti, some University students were also exposed to the food safety training.

## BENEFICIARIES

The beneficiaries of the intervention and the products processed are outlined in Table 1.

**Table 1: Food Safety Training Beneficiaries**

COUNTRY	ORGANISATION	PRODUCTS
Trinidad & Tobago	Trinidad & Tobago Agribusiness Association	Sweet potato fries, cassava fries, raw grated cassava, frozen cassava & sweet potato
	Louis D'Or Processing Unit (Tobago House of Assembly)	Cassava flour
	Cassava Products Company Limited (Tobago House Of Assembly)	Farine
	Tobago Farmers	Cassava (no value addition)
	Cunupia Farmers' Association	Sweet Potato (no value addition)
	Rio Claro Cassava Farmers' Group	Cassava (no value addition)
Jamaica	RADA/Twickenham Bammy Industry	Bammy, cassava pan cake mix, cassava flour, farine, gari (fermented product)
	Roots & Tubers Farmer Groups (South Manchester United Farmers' Association, Bernard Lodge United, Progressive Farmers' Association, Tate Community Development Group, St. Thomas Women's Agricultural Initiative)	Cassava & sweet potato (no value addition)
	United Greenhouse Growers' Co – Operative Association	Sweet peppers, tomatoes, hot peppers, lettuce, etc.
Haiti	Organisation Des Planteurs De Mailloux, Gaita Et Troirac (OPMAGAT)	Cassava bread
	Asosyasyon Tèt Ansanm Laval (ATAL)	Farine & cassava flour

## FOOD SAFETY EVALUATIONS/GAP ASSESSMENTS

Food Safety Gap Assessments were conducted prior to the training only for the following beneficiaries:

1. Trinidad & Tobago Agribusiness Association
2. Louis D'Or Processing Unit – Tobago House of Assembly
3. Cassava Products Company Limited (farine processors)
4. RADA/Twickenham Bammy Industry
5. United Greenhouse Growers' Co – Operative
6. Organisation Des Planteurs De Mailloux, Gaita Et Troirac (OPMAGAT)
7. Asosyasyon Tèt Ansanm Laval (ATAL)

Only in the case of the processors listed at 1 and 2 were detailed evaluations done. In all other cases, time did not permit the conduct of detailed evaluations and they were not done long enough in advance of the training for the findings to have been factored into the training.

### **TRAINING PROGRAMMES**

Food Safety training for the Trinidad & Tobago Agri Business Association and Louis D'Or Processing Unit was based on the results of the Gap Analyses. Food safety training for the farine processors was based on the results of the inspections which were conducted at the premises of some of the farine processors. These programmes were modified to address the anticipated needs of the organisations in Jamaica and Haiti as the assessments in Jamaica and Haiti were not sufficiently detailed and were not done long enough in advance of the delivery of the training to facilitate the development of specific programmes for the primary producers and processors. The food safety training summary is given in Appendix 1.

In all food safety training programmes, material was presented on the following:

1. Food safety definitions
2. Food safety incidents
3. Types of contamination
4. Implementation of food safety measures.

The following specific elements were included in training programmes based on the target audience and the specific training objectives:

#### **Target audience: processor - leadership/management team**

- Topics
  - Evolution of the food chain
    - ✦ impact of food safety issues on trade
  - What's new internationally (standards)
    - ✦ requirements for export markets
  - Implementation of food safety
    - ✦ management commitment

#### **Target audience: processor - non managerial administrative staff**

- Topics
  - Ten food safety myths

#### **Target audience: processor - non managerial operations staff**

- Topics
  - Good manufacturing practices

**Target audience: processor - HACCP team**

- Topics
  - *Codex Alimentarius* general principles of food hygiene
  - Prerequisite programmes
  - Introduction to HACCP
  - Seven principles of HACCP
  - Implementation of HACCP

**Target audience: farmers groups - not engaged in value addition**

- Topics
  - Importance of food safety in fresh fruits & vegetables
  - Contamination hazards in fresh fruits & vegetables
  - Food safety incidents - fresh fruits & vegetables
  - Global gap overview
  - Control points & compliance criteria - all farm base
  - Control points & compliance criteria - crops base
  - Control points & compliance criteria - fruits & vegetables

**Target audience: farmer/processor - managerial & non managerial staff**

- Topics
  - Importance of food safety in fresh fruits & vegetables
  - Contamination hazards in fresh fruits & vegetables
  - Food safety incidents - fresh fruits & vegetables
  - Global gap overview
  - Control points & compliance criteria - all farm base
  - Control points & compliance criteria - crops base
  - Control points & compliance criteria - fruits & vegetables
  - What's new internationally (standards)
  - *Codex Alimentarius* general principles of food hygiene
  - Good manufacturing practices
  - Prerequisite programmes
  - Introduction to HACCP
  - Seven principles of HACCP
  - Implementation of HACCP

**Target audience: farmer/processor groups – value addition in short term plans**

- Topics
  - Evolution of the food chain
  - Food safety definitions
  - Food safety incidents
  - Types of contamination
  - Ten food safety myths
  - Importance of food safety in fresh fruits & vegetables
  - Contamination hazards in fresh fruits & vegetables
  - Global gap overview
  - *Codex Alimentarius* general manufacturing practices of food hygiene (GMP)
  - Prerequisite programmes

- Introduction to HACCP
- Seven principles of HACCP
- Implementation of HACCP

**Target audience: farmer groups – value addition in long term plans**

- Topics
  - Importance of food safety in fresh fruits & vegetables
  - Contamination hazards in fresh fruits & vegetables
  - Food safety incidents - fresh fruits & vegetables
  - Global gap overview
  - Control points & compliance criteria - all farm base
  - Control points & compliance criteria - crops base
  - Control points & compliance criteria - fruits & vegetables
  - What's new internationally (standards)
  - *Codex Alimentarius* general principles of food hygiene (GMP)
  - Prerequisite programmes
  - Introduction to HACCP

**TRAINING CHALLENGES**

Some of the challenges which were encountered during the training intervention were as follows:

**1. Leadership and management awareness and commitment to food safety**

The leadership and management teams of some of the organisations were not sufficiently aware of food safety and the negative impact that food safety incidents could have on human health and on their businesses. As a result, those teams did not appear to be particularly committed to food safety.

**2. Organisations' role in the coordination of training**

All organisations were required to play a role in planning and coordinating the training. The role played by some organisations was inadequate and therefore did not facilitate the smooth execution of the training programmes.

**3. Inadequacy of some training facilities**

The facilities which were used for some of the training programmes were inadequate e.g. hot, cold, cramped, frequent interruptions, not opened on time.

**4. Attendance at training sessions by employees/members of some organisations**

The attendance at the some of the programmes was inadequate. No reasons were given for the absence of employees/team members in most cases.

**5. Literacy of participants (Pre/Post Questionnaires & Evaluation Forms)**

For most training programmes, participants were required to complete Pre/Post Questionnaires and Evaluation Forms. Some participants were unable to complete the Pre/Post Questionnaires, which were largely multiple choice questions. In Trinidad & Tobago and Haiti, the Pre/Post Questionnaires and the possible responses were read to the participants by the National Coordinators to assist those who had literacy challenges. In Jamaica, the Pre/Post Questionnaires and Evaluation Forms for some groups, which were trained, were delivered in groups as opposed to individually. This

approach did not however adequately capture the knowledge and understanding as well as the views on the training of individual participants.

## **RESULTS OF TRAINING**

The results of the completed Pre Post Questionnaires as well as the Evaluation Forms were evaluated and a report was compiled and submitted for each Training Programme. In all cases, the participants' knowledge and understanding was improved on completion of the training. Many participants requested additional training in other areas and also provided suggestions for improvement of training interventions. No reviews of the processors operations were conducted following the training to determine the impact on the training on Food Safety Management Systems in the plants.

## **THE WAY FORWARD**

The following are suggested in order to facilitate continual improvement in food safety among the primary producers and processors:

1. Provision of assistance in construction of detailed Project Plans for the development and implementation of the FSMS (inclusive of GAP, GMP and HACCP where applicable).
2. Assistance in implementation of corrective action to address identified non-conformances and opportunities for improvement.
3. Training in:
  - Project management.
  - Development of FSMS documentation.
  - Internal food safety audit.
  - Nomination, responsibilities and, training of a Lead Auditor.
4. Periodic review of status of development and implementation of Food Safety Management Systems of the primary producers and processors.

## **CONCLUSION**

In order for primary producers and processors to implement Food Safety Management Systems, they must be exposed to appropriate and adequate food safety training. While the training is very important, the implementation of corrective actions based on the training is essential. Primary producers and processors are encouraged to build simple systems which address the basic elements of food safety before proceeding to more complex systems. They must always focus on the objective of the production of food that is always safe for human consumption.

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6. Food Safety Management System Gap Analysis Report – Louis D’Or Processing Unit
7. Report on Visits to Tobago Farine Processors
8. GMP Assessment Report – Twickenham Bammy Industry
9. GMP Assessment Report – OPMAGAT
10. GMP Assessment Report – ATAL
11. CFC-funded projects training reports

## APPENDIX 1- FOOD SAFETY TRAINING SUMMARY

COUNTRY	ORGANISATION	PRODUCTS	NAME OF PROGRAMME	DURATION	SESSIONS	PERSONS TRAINED
Trinidad & Tobago	Trinidad & Tobago Agribusiness Association	Sweet potato fries, cassava fries, raw grated cassava, frozen cassava & sweet potato	Leadership For Quality & Food Safety	½ day	1	12
			Quality & Food Safety Awareness	½ day	5	185
			HACCP Team Training	5 days	1	15
	Louis D'Or Processing Unit (Tobago House of Assembly)	Cassava Flour	Leadership For Quality & Food Safety	½ day	1	9
			Quality & Food Safety Awareness	½ day	1	9
			Quality & Food Safety Awareness & Good Manufacturing Practices	½ day	1	12
			HACCP Team Training	3 days	1	8
	Cassava Products Company Limited (Tobago House Of Assembly)	Farine	Quality & Food Safety Awareness & Good Manufacturing Practices	½ day	1	8
	Tobago Farmers	Cassava (No value addition)	Farm Food Safety	½ day	1	
Cunupia Farmers' Association	Sweet Potato (No value addition)	Farm Food Safety	½ day	1	14	
Rio Claro Cassava Farmers Group	Cassava (No value addition)	Farm Food Safety	½ day	1	10	
Jamaica	RADA/Twickenham Bammy Industry	Bammy, cassava pan cake mix, cassava flour, farine, gari (fermented product)	Food Safety In A Nutshell	1 day	1	20
	ROOT & TUBER FARMER GROUPS (South Manchester United Farmers Association, Bernard Lodge United, Progressive Farmers Association, Tate Community Development Group, St. Thomas Women's Agricultural Initiative)	Cassava & sweet potato (No value addition)	Farm Food Safety	1 day	1	19
	United Greenhouse Growers' Co - Operative	Sweet peppers, tomatoes, hot peppers, lettuce, etc.	Food Safety For A New Processor	½ day	1	9

COUNTRY	ORGANISATION	PRODUCTS	NAME OF PROGRAMME	DURATION	SESSIONS	PERSONS TRAINED
Haiti	Organisation Des Planteurs De Mailloux, Gaita Et Troirac (OPMAGAT)	Cassava bread	Food safety - Part 1	½ day	1	19
	Asosyasyon Tèt Ansanm Laval (ATAL)	Farine & cassava flour				

