

GUIDE TO GOOD MANUFACTURING PRACTICE (GMP) REQUIREMENTS FOR CINNAMON PROCESSORS



Guide to Good Manufacturing Practice (GMP) Requirements for Cinnamon Processors

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Contents

	Page
The scope of this booklet	05
The importance of food safety in the local and international food trade	06
The role of food safety standards and certification in ensuring food safety	08
GMP standard as a foundation for food safety management	10
The relevance of GMP standard for the Sri Lankan cinnamon industry	10
The good manufacturing practices (GMP) required to be established in cinnamon processing to ensure compliance to the standard	
(1) Establishment: Design and facilities	
(A) Location	12
(B) Building and cinnamon handling areas	13
(C) Equipment and utensils	14
(D) Facilities	15
(2) Hygienic processing requirements	
(A) Raw material requirements	19
(B) Prevention of cross contamination	20
(C) Supervision of processing	21
(D) Packaging	21
(E) Storage of processed cinnamon (end product)	22
(F) Transport of the end product	22
(G) Sampling and laboratory control procedures	23
(H) Documentation and records	23
(3) Establishment of hygiene requirements	
(A) Maintenance	24
(B) Hygiene control program	24
(C) By-products	25
(D) Storage and disposal of waste	25

(E) Exclusion of domestic animals	26
(F) Pest control	26
(4) Personal hygiene and health requirements	
(A) Medical examination of communicable diseases and injuries	27
(B) Personal behavior	28
(C) Visitors	29
(5) Product information and documentation	
(A) Product information and recall procedures	30
(B) Lot identification and labeling	30
(C) Documentation and records	31
(6) Training	31
(7) Primary production	32
How to use the SLSI GMP standard to ensure conformity to GMP requirements in a cinnamon processing unit and obtain GMP certification	33
Future directions	35

The scope of this booklet

The Sri Lankan food industry is growing and the number of food manufacturers involved in food processing has increased over the years. Parallel to this expansion in the sector, a higher attention is paid by the regulatory authorities to enforce food safety aiming to promote local and global food trade. In this context, food hygiene practice in food establishments has made mandatory from the year 2012 and all employees who process, transport, distribute, handle, store or sale of food are expected to be aware of the principles of food hygiene to lay the foundation for food safety in food establishments. These hygiene requirements are also common to spice processing industry. Being the main producer of cinnamon to the world, a greater emphasis is needed to be paid to establish them in cinnamon industry, for Sri Lanka to remain as the main competitor in the world market. This booklet provides guidance on practical aspects of developing, implementing, and maintaining good manufacturing practices (GMP) within a cinnamon processing facility to protect cinnamon from chemical, microbiological and physical contaminations. Requirements highlighted in this booklet can be followed by the interested parties involved in cinnamon processing to obtain compliance to GMP.

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The importance of food safety in the local and international food trade

Safe food describes a food, which is free from hazards and thus such food will not cause any harm or injury to the consumer when it is eaten following the given instructions. Hazards are biological, chemical or physical in nature and, are harmful agents that can contaminate food at any point of the food chain leading to foodborne illnesses.

In the food trade, safety of food is identified at domestic, regional and international levels as a public health priority, as unsafe food causes illness in millions of people every year and result in many deaths all over the world. According to the World Health Organization, serious outbreaks of foodborne disease have been reported in every continent in the past decade and, in many countries the rates of related illnesses are increasing significantly. There are many reasons that food pose threat to human life and, the key global food safety concerns include spreading of microbiological hazards, presence of chemical food contaminants, and hazards resulting from new food technologies (such as genetically modified food) and thus a great emphasis is placed on strong food safety systems in most countries to ensure safety in local and global food chains.

According to the reports of public health authorities, industrialized countries have been facing with an increasing number of food safety problems in the past two decades and illnesses due to contaminated food are perhaps the most widespread health problem in the contemporary world and an important cause of reduced economic productivity. The situation is equally or more serious in developing countries, where infant diarrhea causes many illnesses and deaths. In addition to known foodborne diseases, public health communities are being challenged by the emergence of new or newly recognized types of foodborne illnesses, often with serious and chronic health consequences. Certain populations (Eg. pregnant women, the elderly, infants and children, immunocompromised persons, and the under- nourished) are particularly more vulnerable to food safety issues. In economic terms, foodborne illnesses are very costly for the industry, health services, and society as a whole and, many factors contribute to the increase in foodborne diseases globally. Industrialization, leading to increased wealth and urbanization, has revolutionized the food supply system, resulting in mass

production and an explosive increase in the number of food service establishments and food outlets. Mass production, environmental factors, and inadequate knowledge of the food handlers have contributed to increased contamination of primary foodstuffs.

The multinational approach to food production and distribution and the progressive opening up of world markets have allowed the international food trade to flourish. The globalization of food (and feed) trade, facilitated by the liberalization of world trade, while offering many benefits and opportunities, also presents new food safety risks. Because, infectious agents can be disseminated from the original point of processing and packaging to locations thousands of miles away. The globalization of foodborne diseases also results from increased travel. A person can be exposed to a foodborne illness in one country and expose others to the infection in a location thousands of miles from the original source of the infection.

Food safety in the present context represents a transnational challenge requiring enhanced levels of international cooperation in setting standards and regulations and in strengthening surveillance systems. Simultaneously, consumers are becoming increasingly concerned over food quality and safety requirements. Such concerns have now been articulated via higher quality and safety standards required by markets, with producers under greater pressure to meet such standards in their efforts to build consumers' confidence. However, the responsibility of assuring food safety is a shared responsibility among all the stakeholder groups of the food chain. Everyone, including farmers and growers, manufacturers and processors, food handlers, consumers and the governments have a responsibility to assure that food is safe and suitable for consumption.

The role of food safety standards and certification in ensuring food safety

Food safety management is a scientific discipline describing ways and means that prevent foodborne illnesses. This includes a number of routines that should be followed to avoid potentially severe health hazards. When supply chains becoming increasingly globalized and complex, the need for standardized, internationally accepted food safety requirements become necessities for the food industry. In response to this need, many food safety management systems (FSMS) are becoming globally recognized as means to ensure food safety in a standardized manner. The food safety management system provides a preventative approach to identify, prevent and reduce food-borne hazards. This is a means to minimize the risk of food poisoning and to make food safe for consumption. A well designed FSMS with appropriate control measures helps food establishments to comply with food hygiene regulations and, ensure that food prepared for sale is hygienic and safe for the consumers.

Food safety standards that are developed based on FSMS sets out specific food handling controls related to the receipt, storage, processing, display, packaging, transportation, disposal and recall of food. Also other requirements relate to the skills and knowledge of food handlers and their supervisors, the health and hygiene of food handlers, and the cleaning, sanitizing and maintenance of the food premises and equipment within the premises. If complied with these requirements it will ensure that food does not become unsafe or unsuitable. Some of the examples for FSMS standards include GMP, hazard analysis and critical control points (HACCP), ISO 22000 and food safety system certification (FSSC) 22000. GMP standard provides the most basic requirements to ensure food safety through control of hygiene in the food establishment. A greater preventative approach is taken in HACCP. HACCP is a food safety management system, in which food safety is addressed through the analysis and control of biological, chemical, and physical hazards starting from raw material until the finished product reaches the consumer. In addition, HACCP can stand alone as a management tool in food business. It can also be successfully integrated with other management systems and most of the other food safety standards including ISO 22000 are developed based on HACCP principles. Therefore, HACCP supports the implementation of other similar food safety standards and shares common requirements for controlling food safety risks.

Food safety standard certification is becoming a common requirement for doing business throughout the food supply chain to confirm compliance. Some of the benefits of a fully certified FSMS include the consistency in product manufacture and compliance to the buyers' requirements. Due diligence is one other important aspect, because a FSMS can demonstrate that management is meeting its responsibilities in relation to food safety legislation and regulation and is doing effectively. These standards provide systematic approach to processes and ensure employees and other stakeholders are involved in the best practices and are aware of food safety concerns as they are well documented and function as day to day activities. Further, well-functioning FSMS will deliver long-term cost efficiencies by helping businesses to diminish their risk of contamination and waster, through costly food recalls. Food safety certification conveys to consumers and the marketplace, as well as to employees and key stakeholders, that a food sector business has successfully met the requirements of a national or internationally recognized best practice approach.

Planned audits conducted internally or by third party certification bodies provide means in maintaining food safety standards and certification, by providing transparency and assurance that requirements are maintained over the time. This transparency increases the collaborative capacity of stakeholders across the supply chain, and enhances safety, efficiency and continual improvement within individual organizations.

GMP standard as a foundation for food safety management

It is possible to control many of the potential hazards in a processing plant by using a standard set of principles and hygienic practices for the manufacturing and handling of food to manage food safety. These standard principles and practices are called good manufacturing practices (GMPs). They are sanitary and processing requirements applicable to all food processing establishments. Good manufacturing practices provide a set of regulations, codes and guidelines that control the operational conditions within the food establishment allowing a safe food production. These requirements cover design and facilities of the establishment, hygienic processing, establishment of hygiene in the premises, personnel hygiene and health of employees, transportation, product information and documentation and food safety training. Basic concepts of these guidelines remain to the ultimate goals of safeguarding the health of the consumers as well as producing good quality products; those are safe and suitable for human consumption. The GMP is also a part of quality assurance which ensures that the products are consistently produced and controlled according to the quality standards appropriate to their intended use and as required by the consumers /or product specification. Most importantly GMP constitutes a prerequisite for the implementation of HACCP food safety management system.

The relevance of GMP standard for the Sri Lankan cinnamon industry

Amongst the other agricultural exports from Sri Lanka, spices and allied products hold a greater share of the export revenue. According to information published by the Export Development Board, Sri Lanka has captured the interest of the world, specially the interest of western nations due to the supply of spices with a distinctive quality. Cinnamon, pepper, cloves, cardamoms, nutmeg, mace and vanilla have been popular in the international market and the demand seems to increase over the time. Among spices, cinnamon is the number one in the spice sector and currently Sri Lanka witness the pride of becoming the largest world producer and the exporter.

Cinnamon is a crop which has a higher potential to develop considering its adaptability to various soil and climatic conditions prevailing in Sri Lanka other than its increasing export potential. Cinnamon has grown in Sri Lanka for many years and at present, pure Ceylon cinnamon is marketed as a branded product to the world. Cinnamon is used by the buyers for several purposes. In terms of food uses it is mostly used as a spice or a flavor enhancer. However, it is becoming popular as a beverage in many countries. The functional and medicinal effects of cinnamon promote its use among the health conscious consumers. According to the market data it is becoming apparent that Ceylon cinnamon is losing few markets due to the poor quality substitute cassava. Further the loss of market is resulted due to Ceylon cinnamon does not adequately meet product specifications and compliance to food safety and quality standards. Being a food, the quality and the safety criteria of cinnamon need to be considered as vital parameters to be met in the cinnamon trade. Specially, when dealing with the exports, if the required quality and the safety are not ensured in products, it is not possible to anticipate long term competitiveness to acquire a good market and a good export potential for cinnamon. Because many stringent regulations, standards and specifications related to food quality and safety are appearing in the international trade due to safety related issues of food items experienced by the consumers. The compliance to the requirements is a requisite to exist in the international trade seeking a better future.

Both cinnamon cultivation as well as processing take place mostly under smaller scale, The high cost of production, low volumes, and poor quality and absence of food safety standards have lead the industry to lose the competitiveness in major export markets. Considering the scale of production and other limiting factors of the cinnamon processing industry in SL, it is ideal to establish basic food safety standards like GMP to lay the foundation for food safety demanded by the international market. GMP covers the basic conditions and activities that need to established in cinnamon processing to maintain a hygienic environment suitable for the production, handling and provision of safe end product and safe food for human consumption. Understanding the nature of the operations and the risks associated with production and processing, the organizational GMP program needs to be established, implemented and maintained in such a way, the likelihood of introducing food safety hazards to the product through the work environment is minimized to maintain the high quality standards of products to customers.

The good manufacturing practices (GMP) required to be established in cinnamon processing to ensure compliance to the standard

1. Establishment: Design and facilities

(A) Location

Environmentally polluted areas and industrial activities pose a serious threat of contaminating food. Therefore, potential sources of contamination need to be considered when deciding where to locate food establishments, as well as the effectiveness of any reasonable measures that might be taken to protect food.



- The location of the cinnamon processing center should be free from dust, smoke and odors. It is recommended not to place the establishment in areas where wastes, either solid or liquid, cannot be removed effectively.
- The surrounding should not be subjected to flooding. Logging of water harbor pests and diseases and they get access to the processing area through many paths.
- There should be adequate drainage to prevent flooding and provision should be made for cleaning the drainage lines. Construct drains in a way to prevent gas back-flow and equip them with traps and drain covers.
- Hard paved surfaces are recommended to roadways and areas used by wheeled traffic to prevent entry of dust and soil into the establishment.
- The boundaries of the processing site need to be clearly identified with a fence and access to the site need to be controlled.

(B) Building and cinnamon handling areas

Where appropriate, the internal design and layout of food establishments should permit good food hygiene practices, including protection against cross-contamination between and during food handling operations.

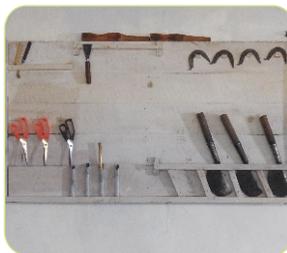


- The structures of the buildings and cinnamon handling areas should be soundly built of durable materials and be easy to maintain, clean and where appropriate, able to be disinfected.
- The processing area need to be separated and partitioned adequately in order to avoid cross contamination among different processing steps. (Eg. Raw material processing need to be separated from work-in progress or finished products.)
- For a specific processing step, adequate working space need to be allocated to ensure process is functioning hygienically and effectively.
- Prevent entering of pests and other contaminants. No direct openings in the processing areas to living areas, toilets, and raw material or waste collecting areas.
- Doors must be effectively protected with air curtains or by other effective means. Outside opening doors shall be self-closing (fitted with door closures), tight fitting, and maintained in good repair.
- Ceilings must be constructed of smooth, non-porous, easily cleanable material and free of crevices.
- Walls of processing and storage areas should be smooth without cracks, holes and crevices that would inhibit cleaning or provide harborage for soil or pests and should be made out with washable material. Walls need to be free of insects, dust, cobwebs, flaking paint and should be light colored in order to see the presence of possible contaminants.

- Ceiling surfaces as well as other overhead equipment such as, ventilation units, light fixtures, and electrical piping must be clean, in good repair, free of flaking paint, dust, rust, holes, unsealed openings, or other conditions that could result in product contamination.
- There must be no evidence of water leaks on the ceilings.
- In cinnamon processing, indoor hanging lines just below the roof are used to dry quills to ensure adequate drying. Therefore, it is essential to ensure that the roof does not act as a source of contamination through flaking, water leaking or accumulating any other contaminant.
- Close windows when outside conditions exist that may expose the plant to airborne contamination. All windows or similar openings must be free of damage, tight fitting and properly insect screened.
- Construct floors that are smooth, non-slip tiles without crevices and should be easy to clean and disinfect.
- Maintain floors in a clean and dry condition. Floors should be sloped to ensure no standing of water and facilitate easy cleaning.
- Ensure adequate provisions are in place to monitor and prevent against entering of pests, accumulation of dirt, trash, and filth that may potentially contaminate food.

(C) Equipment and utensils

Equipment and other arrangements in the food processing environment need to permit adequate cleaning and maintenance.



- Equipment, utensils and other arrangements are designed to prevent hazards and installation permits cleaning and supervision.

- Equipment, utensils and structures placed in the processing environment are resistant to corrosion and withstand repeated cleaning. These equipment should not transfer any smell, taste or chemicals that can change the properties of food.
- Working surfaces that come into direct contact with food should be in sound condition, durable and easy to clean, maintain and disinfect. They should be made of smooth, non-absorbent materials, and inert to the food, to the detergents and disinfectants under normal operating conditions.
- It is not recommend the use of wooden food-contact surfaces, as they are potential contaminants and are a good harborage for microbial contamination. It is almost impossible to sanitize wooden equipment.
- Containers for waste, by-products and inedible substances, should be specifically identifiable (labeled clearly), leak proof and, where appropriate, made of impervious material.

(D) Facilities

Appropriate facilities and procedures should be in place to ensure that any necessary cleaning and maintenance is carried out effectively, an appropriate degree of personal hygiene is maintained and process is carried out effectively and hygienically without space for cross contamination.

(i) Water supply



- Clean water free of any contamination should be available in buildings where cinnamon is cleaned or processed. It is advisable to have portable water for

processing activities and if any other water source is used, water quality testing need to be carried out to ensure its suitability in terms of chemical and microbiological parameters. Records of water quality testing need to be maintained.

- In cinnamon processing, many processors use water to soak the incoming cinnamon sticks placed in washing tanks. This is a processing step where the contamination of cinnamon sticks can be taken place if the water quality is not right. To avoid such contaminations, washing tanks need to have smooth surfaces without cracks and crevices in the interior walls which ensure prevention of accumulation of dirt, algae and bacteria. Washing tanks need to be routinely cleaned and managed. And frequent removal of water from the tank need to be practiced.

(ii) Employees' personal facilities



- Suitably located adequate changing facilities, toilets and dining areas should be provided and properly maintained.
- Ensure employee areas are well lit, clean, orderly, and effectively ventilated.
- Provide a designated storage area for employees' personal belongings (Eg. Lockers or cupboards). Signs should be posted informing employees of what is permitted or banned within their locker. Periodic locker inspections should be in force for hygiene purposes.
- Protective clothing need to be placed in cleaned environments and lockers can be provided for this purpose. These lockers can be placed in the areas where the employees used to enter into the processing line. Lockers should facilitate the segregation of clean and used protective clothing.

- Construct toilet doors to be self-closing and not directly opening into processing areas to avoid possible airborne contaminations. Hygienic hand washing, sanitizing and drying facilities should be provided adjacent to toilets. Post signs instructing employees to use toilets hygienically and specially to remove protective clothing before entering the toilets.
- Post signs in locker rooms, toilet facilities, and at entrances to work areas instructing employees about the proper hand washing and sanitizing procedures.

(iii) Hand washing and foot bathing facilities in processing areas



- Adequate and conveniently located facilities for hand washing should be provided in the processing area where required.
- These should be facilitated with liquid, non-scented soap, hands-free tap (Ex. foot- or elbow-operated) where possible, single-use paper towels or other drying device and display boards as hand washing only (utensil washing should be elsewhere).
- Foot bath is also need to be provided at all the entrance to the direct processing areas to avoid contaminations coming through the entry of workers. The water of these foot baths need to be added with a suitable disinfectant (sodium hypochlorite) and the water need to be frequently changed to ensure hygiene.

(iv) Disinfection facilities



- Where appropriate adequate facilities for cleaning and disinfection of working areas and equipment should be provided. Allocated cleaning equipment, sanitizing agents, identified personnel and their responsibilities, and knowledge about basic hygienic practices are essential components to ensure proper functioning of disinfection.
- Cleaning and disinfection equipment, sanitizing agents need to be separately stored away from the processing area and if not it might lead to cross contamination.

(v) Lighting



- Adequate natural or artificial lighting should be provided inside the building, particularly at processing areas and storage enabling to practice the operations in a hygienic manner.
- The intensity should be changed according to the nature of the operation
- Electrical lights and fixtures should not be made out of glass, where appropriate, be protected to ensure that cinnamon is not contaminated by possible breakages.

(vi) Ventilation



- Adequate means of natural or mechanical ventilation should be provided, in particular to minimize air-borne contaminations (aerosols and condensation droplets) of finished products, equipment, and packaging materials. Also ventilation becomes necessary to control ambient temperatures, and humidity.
- Ventilation systems should be designed and constructed so that air does not flow from contaminated areas to clean areas and, where necessary, they can be adequately maintained and cleaned.
- All ventilation systems such as louvers, exhaust fans must be cleanable and properly functioning to serve the purpose.
- Wall-mounted ventilation fans should be screened so that there is no pest ingress when fans are turned off.

(2) Hygienic processing requirements

(A) Raw material requirements

Raw material acceptance is the first step in the processing of cinnamon. Therefore, the criteria used for accepting good quality cinnamon sticks become very vital to ensure food safety in finished products.



- Cinnamon sticks should not be accepted if they are found to contain contaminants (Eg. fecal matter) that cannot be reduced to acceptable levels by cleaning using water, to ensure that the sticks will not contaminate the processing area.
- Also inspection should cover the vehicle condition to identify if any type of contamination has been taken place during transportation.
- During the inspection and unloading procedure, systems should be in place to prevent entry of birds, insects and other pests to the facility.
- Cinnamon sticks can be transferred to the peeling section through a specified entry point constructed across the wall and cleanliness of this operation need to maintained and supervised.

(B) Prevention of cross contamination

Pathogens can be transferred to processed cinnamon, through raw materials, food handlers, contact surfaces or air. As important preventive measures to control cross contamination, it is required to physically segregate areas designated for processing and storage, identify work responsibilities and restrict access to the processing facility.



- Unprocessed cinnamon sticks should be effectively separated physically from work-in progress, finished products or refuse. A separate entrance for unloading the sticks and removal of refuse should be used.
- It is advisable to gain access to processing areas only via a changing facility. Personnel may need to be required to put on clean protective clothing including footwear and wash their hands before entering.
- Surfaces, utensils and equipment should be thoroughly cleaned after handling.
- Processing areas should not be used for any purpose other than processing.

(C) Supervision of processing

The task of supervision needs to be assigned to a person with knowledge on food hygiene principles to monitor the entire process and practices and take actions if issues arise pertaining to food safety.



- Managers and supervisors should have enough knowledge of food hygiene principles and able to judge potential risks, take appropriate preventive and corrective action, and ensure that effective monitoring and supervision takes place at every processing step starting from raw material receiving.
- Cinnamon processing is a manual operation and through all the steps personal hygiene need to be ensured through supervision to prevent contamination of products from human intervention.
- A special care need to be given to the processing step which involves air drying of the peeled bark on open racks, outside the processing area. In this process, cinnamon barks should be placed on raised racks and should be adequately fenced to prevent entry of birds and other animals. Racks need to be frequently cleaned and maintained to avoid contamination. Care should be taken to prevent wetting by rain or condensation.

(D) Packaging

Packaging is a processing step which needs greater attention as it can easily leads to food contamination and the suitability of the packaging material is important to ensure food safety.

- All packaging should go through a formalized quality control check when it arrives on site.
- Procedures shall be in place to ensure that the products are packed into correct packaging (based on buyer requirements and chemical safety) and correctly labeled.

(E) Storage of processed cinnamon (end product)

Cinnamon bales which is the end product of cinnamon processing need to be protected from cross contamination through good practices during storage.



- Storage facility of the end product should be segregated and constructed to permit adequate maintenance and cleaning, avoid pest access and harborage, and enable food to be effectively protected from contamination during storage.
- Cinnamon bales should be stored off the floor (on plastic or wooden pallets) and away from walls.
- Storing of bales on pallets should allow for easy inspection and cleaning and help to prevent any risk of product dampness from condensation from the floor.
- This area is best painted in a light color to ease inspection of contamination and rodent activity.
- Suitable temperature, ventilation and humidity are maintained inside.
- Storage of packaging material needs to be done away from products.
- Any material other than finished products that potentially contaminate them should not be stored in this area.

(F) Transport of the end product

Sanitary conditions of vehicles, maintenance of conditions during transport and inspection are important factors that need to be considered to avoid arising food safety issues during end-product transportation.

- Vehicles used for the transport of cinnamon should be clean and well protected to ensure that the products are not exposed to weather.

- Bales should be transported under conditions that maintain the integrity of the packaging and cinnamon within it.
- Containers should be inspected prior to loading. This inspection should be documented and this inspection should cover presence of holes that can allow pests or rain to get onto the product, aroma of the container, flaking paint, door seals, presence of non-food residues, and presence of any oil, grease or other liquid.
- Where third-party contractors are employed, all the requirements indicated here shall be defined in the contract and verified.

(G) Sampling and laboratory control procedures

Test reports need to be provided based on buyer requirements to show the required specifications are met.

- Processed cinnamon samples need to be tested depending on the buyer's requirements. When the product is supplied to export market, requirements are different from when supplying to local market. Basically buyers ask for moisture testing to ensure if the end product contains the required level of moisture (maximum 12-14%). Residual sulphur content is a requirement for the exportation of cinnamon.

(H) Documentation and records

The entire process flow starting from the receipt of cinnamon sticks until dispatch of end products need to be documented and records need to be maintained for future reference.



- The processing steps along with the control measures to ensure food safety at every point need to be documented for easy functioning.
- Where necessary, appropriate records of processing, production and distribution should be kept and retained for a period that exceeds the shelf-life of the product. Documentation can enhance the credibility and effectiveness of the food safety control system (GMP).
- The establishment 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.

(3) Establishment of hygiene requirements

(A) Maintenance

Maintenance becomes important for smooth functioning of the process without any space for contamination.

- The buildings, equipment, utensils and all other physical facilities of the establishment should be maintained in safe, hygienic and working conditions.

(B) Hygiene control program

Facility and equipment sanitation need to be conducted at identified intervals, responsibility need to be assigned for inspection and record keeping must be maintained to confirm the hygiene control program is functioning properly.

- A regular cleaning and disinfection schedule should be drawn up for each establishment to ensure that all areas are appropriately cleaned. Cleaning program is routinely implemented as per the cleaning schedule and should cover the washing tanks, scraping and peeling areas, drying areas and finished product storage.
- Periodical inspections need to be carried out by a supervisor in monitoring the effectiveness of the implementation of cleaning programs.
- Documented cleaning procedures shall be kept and include responsibility for cleaning, item/area to be cleaned, frequency of cleaning, method of cleaning, cleaning chemicals and concentrations, cleaning materials to be used, cleaning records and responsibility for supervision.

(C) By-products

By-products need to be segregated, label and removed from the processing area frequently. If it is not handled properly, they might lead to cross contamination.



- By-products of processing not classed as waste material and which may have some future use should be stored and handled separately to avoid contamination of cinnamon products. By-products of cinnamon processing may include scrapings and peeled sticks and should be removed from the work area daily or more frequently when necessary.

(D) Storage and disposal of waste

Waste materials have the potential of getting contaminated and harboring of pests. For this reason there should be a formalized waste management system for all types of waste within a facility.

- Waste material should be kept separate from work in progress or final products and removed from the work place daily or more frequently when required.
- It is recommended that each type of waste container be clearly marked to show the type of waste that should go into the container.
- Waste bins themselves should be on a cleaning regime to ensure that they do not become the harborage for bacteria or pests.
- If the waste bin is to have a lid then it is recommended that this lid is foot operated so that employees do not have to soil their hands by lifting the dirty waste bin lid.
- Larger waste bins that are located outside of the building should be fitted with lids to prevent pest activity and should be located away from doors that open regularly to prevent any pest activity becoming an issue within the facility.

(E) Exclusion of domestic animals

Domestic animals act as carriers of infections especially through possible fecal contamination.



- No animals should be permitted in the establishments. A fence is recommended around the processing center perimeter to prevent access of cats, dogs and other large animals.

(F) Pest control

Pest infestation makes food unsafe and unsuitable for consumption. Preventive approaches are required to ensure pests do not become a source of food contamination.

- Holes/gullies in the building and the surrounding areas should be adequately covered.
- Potential sources of pests are subject to regular inspection in the premises, control through effective cleaning and sanitation and proper waste disposal.
- The most effective way of controlling pests is monitoring possible pest harborages. Therefore, establishment and surrounding areas are regularly examined for infestation.
- The pest control program should list all pests that are covered by the program and consideration must be given to local pests (Eg. lizards) that might be applicable.
- The use of toxic chemicals should be avoided if possible. If they are used, they should be carefully controlled to prevent product and process contamination.
- Store pesticides in a designated, locked room.
- If there are critical situations in relation to pests, outside contract services can be obtained. Establish a method and location for storing and maintaining all records relating to pest control services.

- In the event of an infestation or any evidence of pest activity, immediate action shall be taken and any potentially affected products should be handled according to non-conforming product procedure.
- Fly killer devices and/or pheromone traps shall be placed correctly. If there is a danger of insects being expelled from these devices and contaminating the product, the units should be relocated or fitted with a catch tray that prevent insect fragment ingress into the product or the process.

(4) Personal hygiene and health requirements

(A) Medical examination of communicable diseases and injuries

The workers should be medically fit to handle cinnamon processing to ensure that they would not act as a source of contamination.

- Personnel who come in contact with the food in the course of their work should be subjected to medical check-up. Normally, at the recruitment or after the recruitment within a month, all employees should be subjected to an examination by a registered medical officer for their suitability in handling of food items, and records of such examinations should be maintained. Medical examination of a worker should also be carried out at other times when clinically or epidemiologically indicated.
- Supervisors need to monitor personal hygiene and health requirements of workers on daily basis and maintain records.
- People known, or suspected, to be suffering from, or to be a carrier of a disease or illness likely to be transmitted through food, should not be allowed to enter any food handling area. Any person so affected should immediately report illness or symptoms of illness to the management.
- Employees are requested to report the following conditions to the management for possible exclusion from processing areas: jaundice, diarrhea, vomiting, fever, sore throat with fever, visibly infected skin lesions (boils, cuts or sores) and discharges from the ear, eye or nose.
- Any person who has a cut or wound should not continue to handle the material until the injury is attended to and completely protected by a waterproof dressing. Adequate first-aid facilities should be provided for this purpose.

(B) Personal behavior

All persons working in direct contact with cinnamon, food-contact surfaces, and packaging materials shall conform to hygienic practices while on duty to the extent necessary to protect against contamination of cinnamon.



- Communicate the rules regarding use of protective clothing (Eg. apron, hair cap, and gloves), emphasizing the fact that protective clothing is used to protect the product from the employees, thus eliminating a potential source of contamination. Need to wear, where appropriate, in an effective manner, hair nets, headbands, caps, beard covers, or other effective hair restraints.
- Keep protective clothing reasonably clean during working.
- Advise the workers to remove protective clothing (Eg. overall, head cover, apron) before visiting the toilets and while taking meals.
- Footwear shall be removed and kept in the personnel entrance during the use of toilets.
- Prohibit jewelry while working, since loose jewelry may fall into the cinnamon quills.
- Prohibit eating, and drinking in the processing and storage areas. Also the workers should refrain from any behavior which could result in contamination of food, for example smoking, spitting, chewing beetle, sneezing or coughing over unprotected cinnamon.
- Educate the employees and visitors of the increased danger of product contamination when touching the face, wiping the forehead, or placing fingers in the mouth, nose or ears.
- Keep fingernails clean and properly trimmed.
- Advise all employees and visitors regarding hand washing station locations and hand washing protocols.

- Wash hands thoroughly (and sanitizing to protect against contamination with undesirable microorganisms) before starting work, after each absence from the work station, immediately after using toilet and at any other time when the hands may have become soiled or contaminated.
- Prohibit any person who is affected with, has been exposed to, or is a carrier of communicable disease from entering the production environment.
- Set up procedures to ensure that no one with open sores, infected wounds, or other potential sources of microbiological contamination has access to any work area.
- Set up procedures so that workers report any communicable disease to ensure that food safety is maintained at all times. Consideration should be given to relocate such the employee to non-food activities, thus supporting the reporting program.
- Advise the workers to store clothing or other personal belongings in areas other than where food is exposed or where equipment or utensils are washed.

(C) Visitors

Visitors to the cinnamon processing areas should wear appropriate protective clothing and adhere to the other personal hygiene requirements.



- Each visitor should be informed of the food safety and quality requirements associated with their visit.
- All visitors must, as a minimum, follow the same hygienic procedures as any other employees do.
- Visitor record needs to be maintained.

(5) Product information and documentation

(A) Product information and recall procedures

Product information is important to handle immediate health hazards.

- Raw materials, by-products and finished products should be clearly marked with batch identification number or product name and/or reference number. Stock status (Eg. approved, under test, rejected or restricted use) can be maintained for future tracing.
- Managers should ensure effective procedures are in place to deal with any food safety hazard and to enable the effective recall of the implicated lots of the finished goods from the market or suppliers.
- Recall system shall include written procedures to ensure rapid identification and removal of products from the market in a timely manner.
- Where a product has been recalled because of an immediate health hazard, other products which are produced under similar conditions, and which may present a similar hazard to public health, should be evaluated for safety and may need to be withdrawn.
- Products should only be released after necessary controls are made and specification limits are achieved.
- Initiate corrective action in response to customer complaints.

(B) Lot identification and labeling

Lot identification becomes important to trace back if any issue arises related to food safety.

- The establishment 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.

(C) Documentation and records

Documentation can enhance the credibility and effectiveness of GMP

- Maintain all records to provide evidence of conformity to requirements of GMP and of the effective operation assuring food safety. The main document relevant to this activity is the GMP manual which describes the conformity to all the requirements related to GMP in the establishment. Specific operations are covered in records such as water quality testing record, personal medical examination record, daily employee hygiene and health record, pest control record and training record.
- Records are maintained in a manner that they remain legible, readily identifiable and retrievable.
- List of records is maintained to establish the traceability of all records.

(6) Training

Inadequate hygiene training, and/or instruction and supervision of all people involved in food related activities pose a potential threat to the safety of food and its suitability for consumption.



- Those who are engaged in food operations and come directly or indirectly into contact with food should be trained, and/or instructed in food hygiene to a level appropriate to the operations they are to perform.
- Food safety training covering good hygienic and manufacturing practices can be conducted with the help of outside trainers and internal training of employees by the supervisors according to planned arrangements in order to

ensure that all the employees are aware of the relevance and importance of their role within the system to ensure proper functioning of GMP and are competent enough to do their job.

- The establishment shall prepare a training plan identifying the need for training which is essential for the implementation and maintenance of GMP. The need for training shall be reviewed at appropriate intervals.
- The training requirement should be analyzed. Factors to be taken into account in assessing the level of training required include the manner in which the food is handled and packed, probability of contamination, the conditions under which the food will be stored and the expected shelf life.
- Record of training shall be maintained

(7) Primary production

It is important to reduce the likelihood of introducing a hazard from the growing environment which may adversely affect the safety of cinnamon or its suitability for processing.

- Good agricultural practices in land preparation methods to minimize soil contaminations, selection and management of fertilizer types and amounts, appropriate crop establishment methods such as planting density, effective weed control, pest and disease control methods, proper water management and irrigation, harvest methods and on-farm storage methods need to be included to prevent entering of potentially harmful substances during cinnamon cultivation.

How to use the SLSI GMP standard to ensure conformity to GMP requirements in a cinnamon processing unit and obtain GMP certification

The hygienic practices recommended in this booklet are developed based on two SLS standards, SLS 143:1999 - Code of Practice for General Principles of Food Hygiene and SLS 1327:2008 - Code of Hygienic Practices for Spices and Other Dried Aromatic Plants. These practices provide a foundation for a food safety management system in cinnamon processing establishments in par with the requirements specified by the Codex standard for food hygiene, and are in line with relevant provisions made under the Sri Lankan Food Act No. 26 of 1980 and the regulations framed thereunder.

Any cinnamon processing company expects to obtain GMP compliance should first develop a checklist by compiling the requirements listed in this booklet and compare the gaps between existing conditions and the expected level of performance in all the requirements. This assessment should not merely be a checking activity but a comprehensive assessment of the site to determine the level of GMP compliance. If there are areas that require improvement, actions need to be taken to bring them to the expected level of performance. If all the basic requirements are in place, implementation of the procedures and controls within the organization can be done to operate GMP effectively in line with the standard. To assist in the effective implementation of GMP within the cinnamon processing establishments, it is advisable to document procedures on how the establishment is going to implement relevant GMP. Equally important is to maintain records to support that GMP have been implemented. The main document which compiles all the good practices recommended in the GMP standard is the company GMP manual. Other relevant records also need to be developed and maintained to ensure transparency in the functioning of the GMP in the food establishment. Development of these documents and records might require assistance from another party. However, if there are competent employees in the company, they can undertake this task without company spending money on this purpose.

Cinnamon processor who would like to proceed with the GMP certification should contact a suitable certification body who has been accredited for providing the GMP certification. Following are some of the institutions and companies involved in GMP certification in Sri Lanka.

- ✓ Sri Lanka Standards Institution (SLSI)
- ✓ SGS Lanka (Pvt) Ltd
- ✓ Control Union
- ✓ Ind-Expo Certification Ltd
- ✓ Bureau Veritas Lanka (Pvt) Ltd
- ✓ DNV.GL

Upon contact, the certification body will make a visit to conduct a preliminary assessment of the system where they recommend required modifications, improvements and necessary developments. After fulfilling the requirements and meeting the expected level of performance in criteria specified in the GMP certification, through a final assessment, the GMP certification body would decide on awarding the GMP certificate. However, GMP certificate needs to be renewed annually through a normal third party audit which is conducted by the same certification body. In general the certification procedure costs around Rs.35 000/= and it varies with the certification body and nature of the certification process.

Benefits for food processors obtained through GMP certification:

1. Improve management commitment towards ensuring food quality and safety mainly through resource provision to enhance hygiene in the processing environment.
2. Improve the knowledge of employees about sanitation and accordingly they understand their responsibility in assuring food safety through good practices.
3. The risk of emerging any food quality or food safety issue in processed products is minimized and it ensures no loss due to discard of non-conforming products.
4. Early detection of processing and management problems that can lead to

- food safety issues and allow to practice preventative approach.
5. Meeting the requirements specified by laws and regulations and ensures no legal implications against the food business.
 6. Improve local and international credibility about the company and the products.
 7. Enhance customers' long-term confidence in the organization.

Future directions

Cinnamon industry is becoming more important among other industries in the country as it contributes a considerable amount of foreign exchange earnings to the national economy. It is predicted by many that this industry will continue to grow due to the increasing demand for pure cinnamon in the world market. However, to stay competitive the industry needs to pay higher attention to meet the requirements of international trade specially focusing on food safety demands. Food safety standard certification is the best method that can be adopted to show the compliance to food safety requirements. Several attempts have been taken by several organizations including the Sri Lankan Spice Council and Export Development Board to promote food safety certification schemes for cinnamon processors to be in par with international food safety and hygienic standards. Among them, necessity for adhering to GMP and HACCP certification are frequently highlighted and several attempts have been taken to promote such food safety certifications among cinnamon processors. However, the enthusiasm among cinnamon processors towards such certifications is not satisfactory. This is mainly due to the fact that the processors are unaware of the importance associated with such food safety certifications to ensure food safety to continue the business without any possible legal implications. Also the processors are not convinced about the short-term and long-term benefits that they encounter through such certifications.

However, it should be understood that food safety management is paramount to any food business, whatever its size or location. Though the Sri Lankan cinnamon processors are mainly operate the businesses in small or medium-scales, the

requirements for food safety remain the same for these businesses. Therefore, everyone should understand the responsibility in meeting food safety to promote the cinnamon industry in Sri Lanka and should strive to achieve conformity through food safety certification schemes such as GMP and HACCP. Good manufacturing practices and HACCP both are systems that intended to ensure food safety. Good manufacturing practices lays only the foundation to food safety, as another series of principles need to be fulfilled to ensure that products meet legal prerequisites for safety and quality. Therefore, attempts need to be taken to promote food safety certifications such as HACCP, which provides a systematic approach to production that is designed to prevent hazards from occurring. Besides enhancing food safety, other benefits in applying HACCP include more effective use of resources and more timely response to food safety problems. In addition, the application of the HACCP system satisfy the requirements specified by food control and regulatory authorities and promote international trade by increasing buyer confidence in food safety.

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