

QUALITY ASSURANCE FOR POTATO CRISPS PROCESSING A TRAINING MANUAL



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This training manual was produced jointly by the the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) and the International Institute of Tropical Agriculture (IITA) as part of the ‘Enhancing adoption of Harmonized Standards for roots and tubers in Eastern and Central Africa’ project.

The goal of the project is to enhance the livelihoods of small-holder value chain actors through commercialization and increased regional trade in roots and tuber crops in East and Central Africa. The key components of the project include creating awareness among the value chain actors on the available harmonized standards for cassava and potato in the region and building their capacity to apply the harmonized standards to improve the quality and safety of their products.

The project is funded by funded by the US Agency for International Development (USAID). Other project partners include Rwanda Bureau of Standards (RBS), Uganda National Bureau of Standards (UNBS) and University of Nairobi (UoN).

ASARECA

The Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) is a non-political organization of the National Agricultural Research Institutes (NARIs) of ten countries: Burundi, D. R. Congo, Eritrea, Ethiopia, Kenya, Madagascar, Rwanda, Sudan, Tanzania and Uganda. It aims at increasing the efficiency of agricultural research in the region so as to facilitate economic growth, food security and export competitiveness through productive and sustainable agriculture.

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ACKNOWLEDGEMENT

The authors are very grateful to the World Bank for funding the publication of this manual, and the Association for Strengthening Agricultural research in Eastern and Central Africa (ASARECA) for initiating a project on the development of standards for root and tuber crops which has led to the harmonisation of standards for cassava and related products in the East African Community. Gratification is made to the International Institute of Tropical Agriculture (IITA) for its guidance and great commitment to the production of this manual.

Thanks also to the Bureaus of Standards in: Tanzania, Uganda, Kenya and Rwanda for lending the assistance of their staff to the production of this manual. The Tanzania Food and Drug Authority (TFDA) and Tanzania Food and Nutrition Centre (TFNC) are acknowledged for sharing their experiences on cassava processing, which was valuable inputs to the manual.

While the authors cannot list or name all the experts who participated in the production of this manual, Anne Mhalu and Jasson Joel Kyaruzi, from Tanzania Bureau of Standard (TBS) and TFDA respectively, are particularly acknowledged.

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Correct citation

Abass, A.B., Assenge, E.S., Uzaribara, E., Nduruguru G.T., Mulwa, R.M. and Apolot, S. 2014. Quality Assurance for Potato Crips Processing: A Training Manual, ASARECA.

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TERMS

The following expressions or words - used for the purpose of this training manual - are defined according to the harmonized East African standards for cassava, and code of practice for hygiene in the food and drink manufacturing industry:

Cleaning	The removal of soil, food residues, dirt, dust, grease or other objectionable matter.
Container	Any enclosure for food, including but not limited to metal, plastic, or polypropylene sacs and polyethylene.
Contaminant	Any biological, chemical, or physiological agent, foreign matter or other substances not intentionally added to cassava flour which may compromise safety.
Detoxification	Process of reducing cyanide on fresh weight basis to acceptable level.
Filth	Impurities of animal origin, including dead insects.
Food grade material	One which will not transfer non-food chemicals into the food and contains no chemicals which would be hazardous to human health.
Foreign matter	All organic and inorganic materials such as sand, soil and grass.
Food hygiene	All conditions and measures necessary to ensure the safety and suitability of food (potato crisps).
Food safety	Assurance that food (potato crisps) will not cause harm to a consumer when it is prepared or eaten according to its intended use.
Flow diagram	A systematic representation of the sequence of steps or operations in the production of a particular food item.
Food handler	Any person who directly handles food, food equipment or utensils or food contact surfaces and therefore expected to comply with food hygiene requirements.

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I.0 Introduction

Potato is an important food and cash crop in Eastern and Central African (ECA) Countries. Potato production is increasing faster than other major tuber or root crops and cereals. However, the yields are low due to shortage of appropriate varieties, chronic shortage of quality seed of the improved varieties, sub-optimal cultural practices and poor access to market. Most potatoes produced in the ECA region are mainly consumed fresh, boiled. With population doubling every 25 years and urbanization continuing to increase by 1.3 percent yearly, feeding habits will continue to change in favor of easy-to-prepare foods such as crisps. There is great potential for the growth of processing industry and also good market access for both fresh and frozen potato chips in the region.

Potato is bulky and perishable, and these affect its marketability. While informal trade already exists it is restricted by a country's specific inputs, market logistics, and product regulatory regimes. With increased incomes, urbanization and changing eating habits, the demand for processed food has increased several-fold providing a rationale for improving the commercialization of the tuber crop. To enhance the value of potato, the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) initiated a project on harmonization of standards for potato and potato products in the East African Community (EAC). This led to the harmonization of four (4) standards for potato and related products. The harmonized standards were approved by the East African Standards Committee and subsequently declared by the East African Council of Ministers for use as East African Standards.

However, there still remain factors that are hindering the implementation of the harmonized standards and enhancement of trade along the crops' value chain. These include:

- (a) Inadequate awareness on the availability and requirements of harmonized standards for potato among the value chain actors and other stakeholders
- (b) Inadequate capacity in the application of standards among the value chain actors
- (c) Sub-standard and unsafe marketed products, and
- (d) Limited capacity of regulatory agencies in monitoring compliance with standards.

This training manual has been developed against this background to guide farmers and other processors - in a simple and direct manner - in the implementation of harmonized potato standards, focusing on potato crisps. The manual provides guidance and focuses on quality assurance of the raw materials, processing, hygiene, storage and transportation and packaging and labeling.

The manual outlines the operational steps or procedures to follow in manufacturing safe and quality potato crisps. These practices should be evaluated for effectiveness through monitoring and documentation in form of records. By following the simple descriptions of the technology and taking the necessary precautions, they will be able to produce potato crisps of consistent quality at minimal cost.

The manual will also be valuable to extension agents working with farmers and small-scale processors to help them develop the necessary skills for processing potato to products that meet the required quality and safety standards and supplying the product to the new, emerging markets.

Objectives of the manual

- To illustrate to potato crisps' processors the necessary steps and procedures needed to produce good quality and safe potato crisps.
- To help the processors to monitor all the factors related to good manufacturing practices (GMP).
- To help the processors to produce and package potato crisps in accordance with the code of hygiene and render the product safe and fit for human consumption.

2.0 Production of potato crisps

Potato crisps is a product prepared from fresh potato tubers (ware potato tubers) by peeling, washing, slicing, blanching, dewatering, frying, de-oiling and flavoring as shown in Figure 1 below.

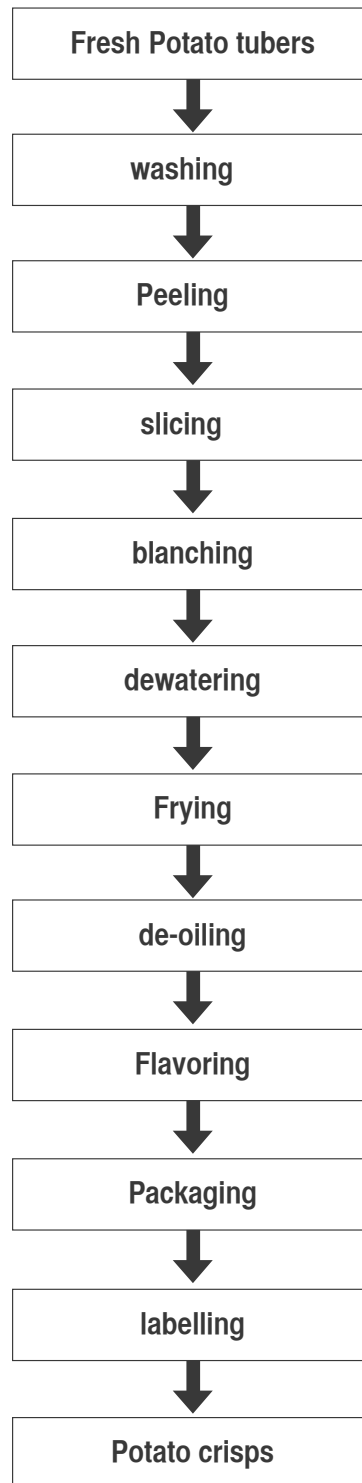


Figure 1: Flow Diagram for production of potato crisps

2.1. Fresh potato tubers (ware potato tubers)

- Harvest potato tubers at the right stage of maturity
- Ensure that potato tubers are fresh, firm, clean, wholesome, free from pests and diseases
- Segregate fresh potato tubers into whole, damaged, sprouted and diseased
- Sort fresh potato tubers according to size, shape, color and variety

2.2 Peeling and washing

2.2.1 Manual peeling and washing of potatoes

2.2.1.1 Peeling

- Do not peel the useful parts of the tubers.
- To prevent the production of low quality crisps avoid tiny, shriveled or spoilt tubers.
- Remove the peels and all spoilt portions from the potato tubers.
- Leave peeled tubers inside water before washing to avoid discoloration.



Figure 2: Manual peeling of potatoes

2.2.1.2 Washing

- Wash peeled tubers thoroughly with clean and safe water.
- Wash immediately after peeling to avoid color change.
- Wash several times in clean water until the peeled tubers are completely clean.



Figure 3: Washing of fresh potato tubers

2.2.2 Machine peeling and washing

Potatoes can be peeled and washed using a machine designed to protect the tubers from damage. The machine discharges clean potato automatically (Figure 4).



Figure 4: Mechanical peeling and washing of potatoes

2.3 Potato slicing

Slice peeled and washed potato tubers to the desired shape and size.

2.4 Blanching

Blanch the potato slices in water for 3 to 6 minutes in steam in order to wash out the starch on the surface of slices to prevent them from sticking together.



Figure 5: Potato blancher

2.5 Dewatering

Dewatering is the process of removing surface water from potato slices after they are cleaned. This step helps to reduce moisture and make the slices easy to fry.

2.6 Frying

- Fry potato slices to reduce the moisture to 5% and get them crispy.
- Use deep frying pan or deep frying machine (Figure 6).
- Use recommended oil for frying and change oil after every three (3) batches have been fried.



Figure 6 Potato deep-frying machine

2.7 De-oiling

Fried crisps are de-oiled in order to remove extra oil and ensure good taste de-oiled crisps are healthier for the human body.

2.8 Seasoning

Season the fried potato crisps with flavors, depending on the consumer preferences.

2.9 Packaging and labeling of potato crisps

2.9.1 Packaging

- Pack fried crisps using a vacuum nitrogen packaging machine (see Figure 7). Fried potato crisps are fragile, so nitrogen is used to keep the crisps fresh, tasty and without damage, and to maintain the overall quality of the product.
- Pack crisps within a short time after frying so as to keep the crispyness, taste and texture.
- Pack the product in food grade packaging materials that ensure the quality, safety and integrity throughout the storage period.
- Ensure that the packaging materials comply with the environmental legislation of the destination country.



Figure 7: Vacuum nitrogen packaging machine

2.9.2 Labeling

Label the package legibly and indelibly. Information to add includes:

- Common name of the product shall be “Potato crisps.”
- If spiced the product shall be labeled “Spiced potato crisps”
- Name, physical address and location of the manufacturer and /or trade/brand name
- Date of manufacture
- “Best Before” date
- Country of origin
- List of ingredients
- Net weight
- Lot identification
- Storage instructions
- Instructions on disposal of used package
- Declaration either salted or unsalted
- Declaration of flavoring agent or spice used

2.10 Storage and transportation

2.10.1 Storage

Applies to the storage of raw material, (fresh potato tubers), finished product (potato crisps), packaging material and spare parts.

Best recommended practices

- Store finished potato crisps in cool and dry place.
- Keep stores clean and free of vermin.
- Establish a rule of first in and first out in removing the stored raw materials and finished product.
- Ensure adequate lighting and ventilation in the storage area.
- Store finished products separate from raw materials.
- Store potato crisps and spare parts separately.
- Store bags of crisps on pallets in well ventilated storage rooms free from humidity and pests.

2.10.2 Transportation

- Use clean vehicles to transport packaged crisps for distribution or storage.
- Avoid contamination through split or leaking packages.

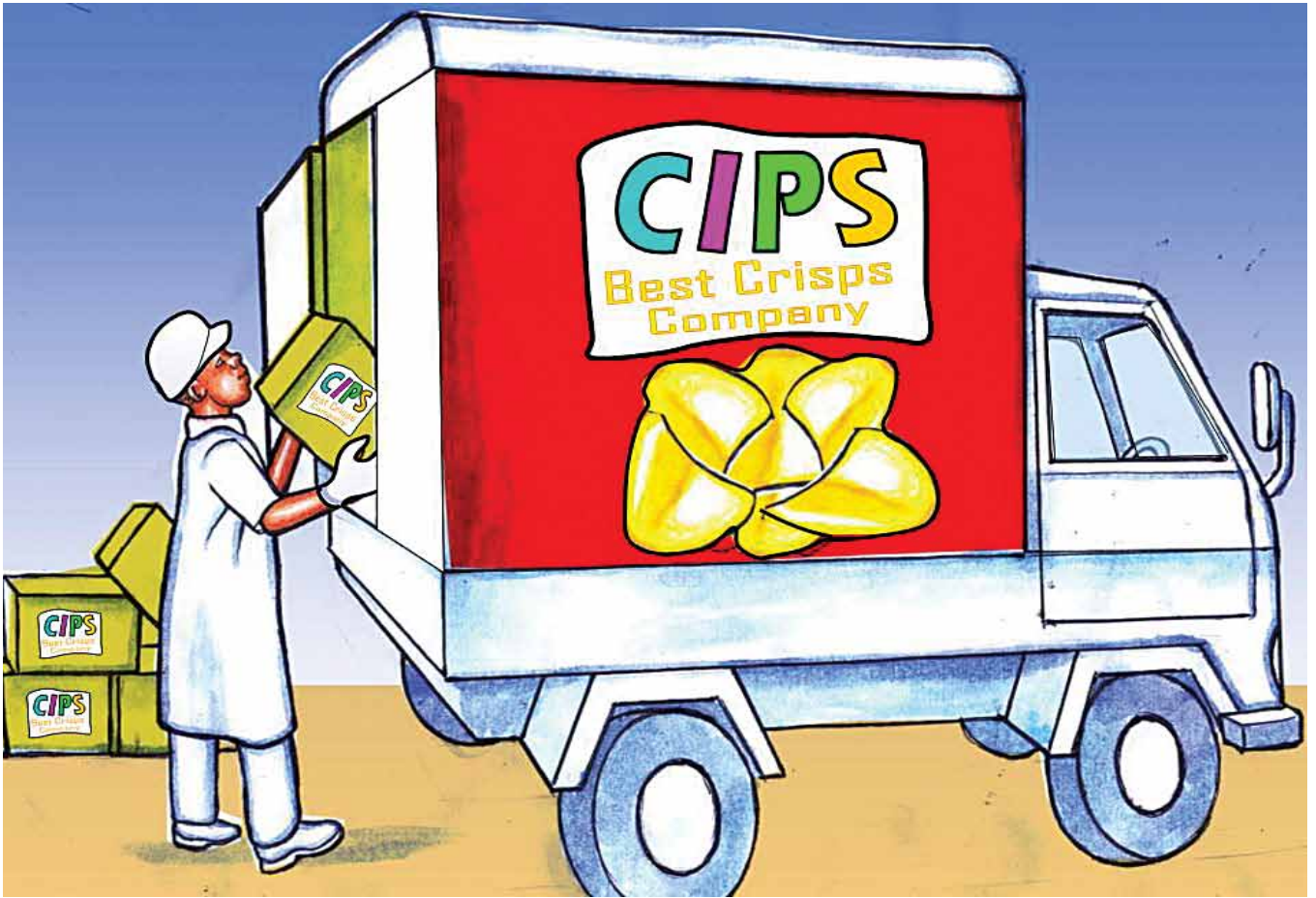


Figure 8: Transporting potato crisps to various markets

3.0 Quality assurance

Quality is the fitness of the product for use by consumers. The management of the quality shall be done at all levels of production (from receiving and handling of raw materials to storage of finished product) to ensure that quality attributes conform to the specification as stipulated in Appendix I.

3.1 Raw materials

The raw material for potato crisps is fresh potato tubers (ware potato tubers) Figure 9.

3.1.1 Fresh potato tubers (ware potato tubers)

- Harvest potato tubers at the right stage of maturity.
- Ensure that potato tubers are fresh, firm, clean, wholesome, and free from pests and diseases.
- Segregate fresh potato tubers into whole, damaged, sprouted and diseased.



Figure 9: Fresh potato tubers

3.2 Potato crisps quality assurance

A potato crisp is a thin slice of potato that is deep-fried until it becomes crunchy (See Figure 10).

3.2.1 Potato crisps

Ensure that potato crisps are:

- Light yellow to golden brown in color or have the typical color of the permitted additive used.
- Generally uniform in size and symmetry.
- Well cooked, crispy, and free from sogginess and excessive oil.

- Crispy in texture and the external surfaces do not show any noticeable separation from the inner portions.
- Not rancid, bitter, have off-odors or off-flavors, and are practically free from foreign matter, adulterants or any other blemishes.
- Practically free from filth in amounts that may present a hazard to human health.
- Safe and suitable for human consumption.
- Of less than 5% by mass in order to prevent mold growth.
- Of less than 10% by mass of small pieces, slivers and irregular pieces when packed.



Figure 10: Potato crisps

4.0 Hygiene management

4.1 Building / structure

This term is used to refer to constructions, including production rooms, stores, dressing rooms and toilets.

- Design and construct the building to facilitate easy cleaning and maintenance, with smooth walls, floors and ceiling (Figure 11).
- Make the building spacious enough to allow for free movement of staff, materials and installation of machinery.
- Ensure bulbs and fixtures above processing lines and packing rooms are shielded to prevent glass fragments from contaminating the potato crisps.
- Construct the building in a way that restricts the entry of rodents, insects and dust into the processing area.
- The building should be high enough, with adequate windows or openings to ensure maximum ventilation.

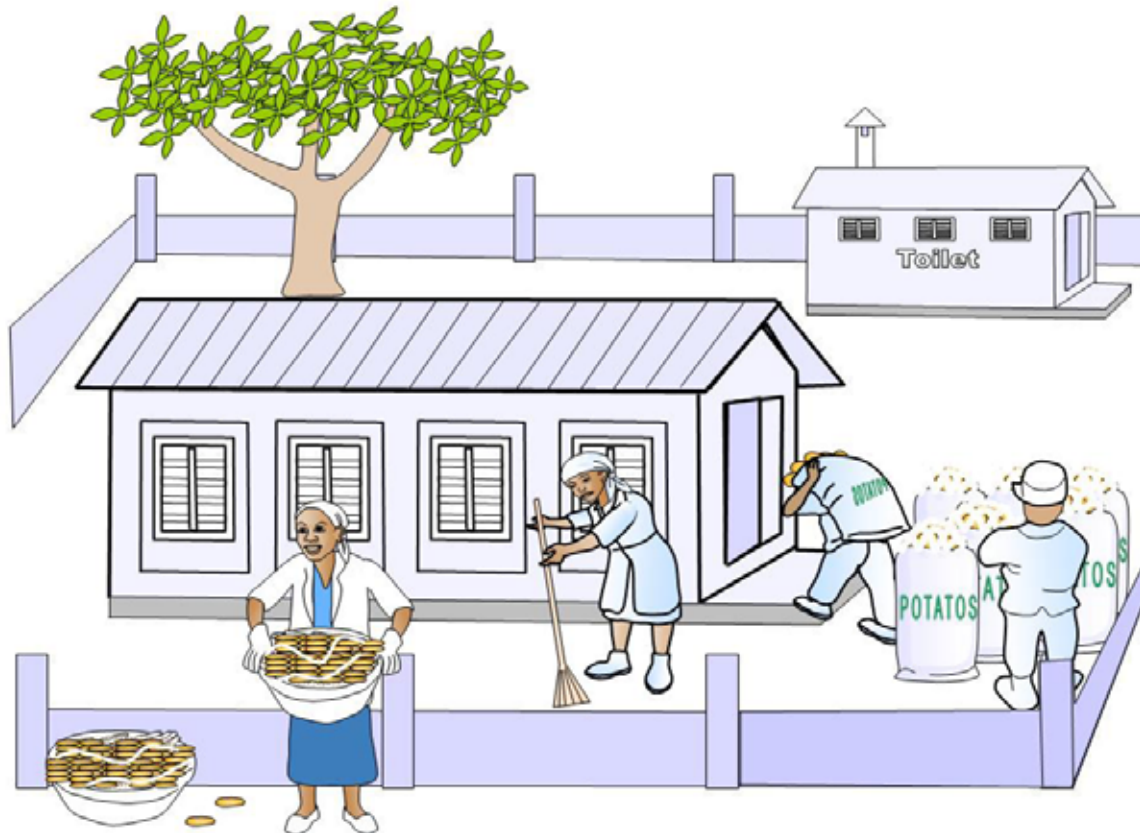


Figure 11 Building for potato crisps production

4.1.1 Site selection

Select production site with the following considerations in mind:

- Availability of required quantities of potato tubers all year round.
- Easy and low cost of transportation of fresh potato tubers to the plant.
- Easy access to clean water.
- Availability of high quality labor.
- Access to electricity, if electrically powered machinery is to be used.

4.1.2 Equipment and plant layout

4.1.2.1 Equipment

The major equipment used in potato crisps processing plants include peelers, washers, cutters, slicers, blanching machines, dryers, deep fryers, de-oiling and seasoning machines. Others are weighing scales, and packaging and labeling equipment.

4.1.2.2 Plant layout

The layout of the potato crisps processing plant shall be such that operational processes from the reception of raw materials to finished product, including packaging and storage, flow smoothly. Interruption in the sequence of flow of raw materials and intermediate products during processing shall be very minimal (Figure 12).

KEY:

1. Raw material delivery area
2. Washing area
3. Peeling & slicing area
4. Frying area
5. Cooling & packaging area
6. Store
7. Loading for transportation
8. Eating away from processing area
9. Sanitation before entering the processing area
10. Information board

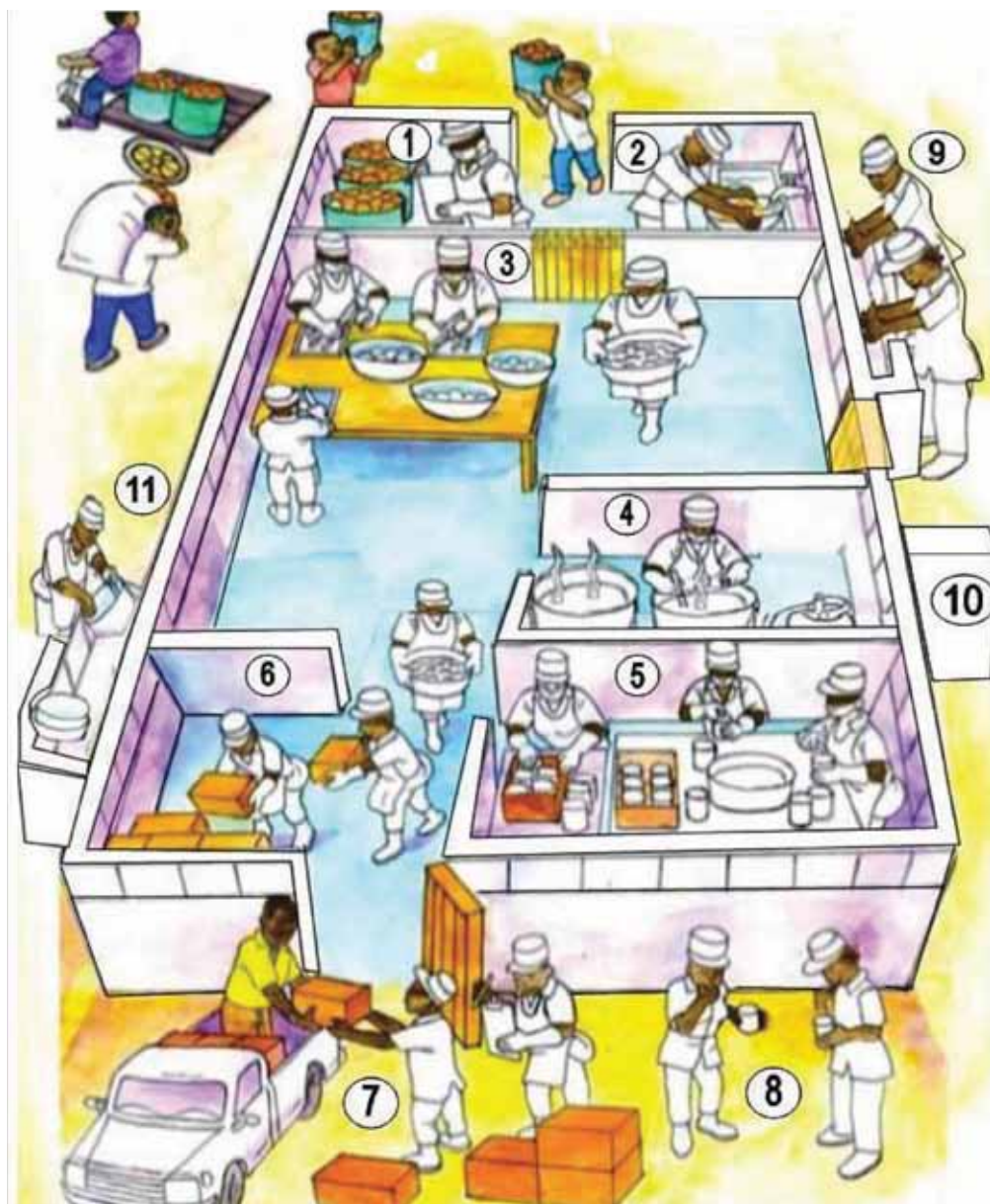


Figure 12: Layout of potato crisps processing plant

However, the following shall be observed in plant layout of a potato crisps' processing plant:

- Separate the area by temporal structures or by constructing a concrete wall.
- Separate areas for storage of raw materials, intermediate products, and finished products.
- Separate the peeling section from the other unit operations.
- Prevent movement of dust into the production room, packing and storage of the finished product by fixing appropriate fittings.
- Ensure adequate supply of clean water, drainage system, facilities for cleaning and hand washing.
- Ensure that toilets are located away from the processing, packaging and storage areas.

4.1.2.3 Zoning / separations or demarcation

This applies to the flow of the product (raw material, processing, finished product and by-product) as well as the people.

Cross contamination of food may arise from the machinery, people or mixing of the finished product with either the raw material or by-products. To avoid cross contamination of potato crisps, clear demarcation of areas for different functions such as cleaning area, storage of raw materials, finished product, packaging material and processing area is recommended.

Best recommended practices

- Install machines in such a manner that the product, including the movement of persons flows in one direction without any criss-crossing.
- Do not allow by- product (peels, water) to share the same outlet with the product but the two should move in a parallel direction.
- Separate the sections by either temporal structures or permanent wall
- Clean the packaging area thoroughly and restrict movement of unauthorized persons by posters such as, "UNAUTHORIZED PERSONS NOT ALLOWED."
- Do not allow people to eat, smoke or sleep in the processing room or area.

4.1.3 Facilities

Facilities such as water, lighting, toilets, changing rooms and dining room are prerequisites for any food processing plant.

Best recommended practices:

- Provide toilets with covers and keep these clean at all times.
- Toilets should face away from the processing plant.
- Provide hand washing facilities with soap and disinfectants at key areas such as toilets, production and packaging areas.
- Supply adequate potable water where applicable in plant facilities.
- Ensure adequate lighting in the stores, production room, changing rooms, plant compound and in other facilities.

4.2 Processing environment and equipment

This applies to the cleanliness of the processing environment, raw materials, processing environment, stores, equipment and other facilities within the premises.

4.2.1 Premises and surrounding environment

- Keep the surrounding environment clean free from dust, debris, litter, waste and garbage at all times.
- Keep the grass short to prevent harboring of pests such as rats.
- Construct a perimeter wall that clearly separates processing premises and the rest of the environment if possible.

4.2.2 Processing equipment

- Keep processing equipment / machines free from dust and dirt
- Establish cleaning and maintenance programs.
- Clean equipment before and after use to prevent dust and dirt.

4.2.2.1 Maintenance

Maintenance is one of the main activities that any industry engages in to prevent machine break down. The activity - if not properly done - could lead to potato crisps contamination. As a preventive action the following shall be done:

- Keep spares including any metal parts out of the production and packaging rooms at all times when not in use.
- Ensure that all metals are removed after maintenance or machine repair.
- Clean equipment or machines after repair or maintenance and before use.
- Do not weld within the production area.
- Use food grade grease for greasing.
- Do not use oil during welding.

4.3 Personnel hygiene

Basic workers' hygiene is critical as pathogens can be transmitted from people to the product. Contamination can occur through hand contact, from dirty clothes, and coughing and sneezing. Processors shall provide adequate training on employee hygiene and monitor staff hygiene practices and health.

Best practices for worker hygiene

- Train all workers in hygiene and sanitation.
- Ensure that all employees in direct contact with food to have medical examination against communicable diseases such as Tuberculosis (TB), typhoid and cholera; keep records.
- Keep records of training dates.
- Do not allow workers with open sores, infected wounds or serious illnesses (vomiting, diarrhea, fever) in the processing room. Keep records to track serious illnesses as required.
- Make washrooms and hand washing facilities available and easily accessible.
- Smoking, coffee and lunch breaks shall be conducted in a separate area away from production and packaging areas to avoid any contamination.

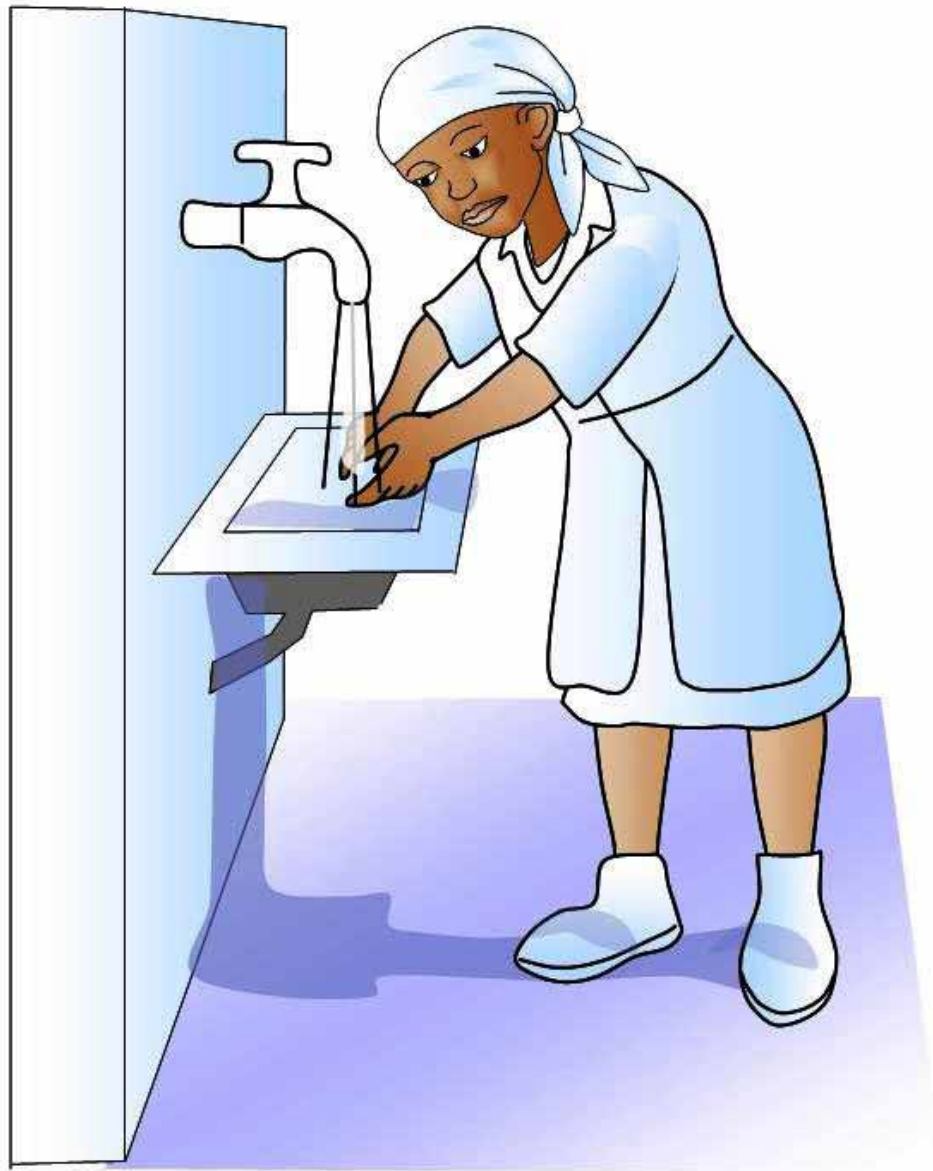


Figure 13 Workers must observe good hygienic practices

4.4 Pest control program

Animals, rodents, birds and insects are potential contaminants. Using effective control measures can reduce the risk of contamination. The most effective pest control program is prevention of pest through general cleanliness of the surrounding environment, proper disposal of garbage, using doors with tight fitting and windows with mesh.

Best management practices for pest control

- Keep the ground clean and free of waste.
- Mow grass around the premises regularly.

- Empty rubbish and waste regularly.
- Keep waste containers clean and covered to reduce flies.
- To avoid contamination of bird droppings and rodent faeces keep birds and rodents out of the facilities.
- Build perimeter walls to keep off pests such as cats, domestic animals.

4.5 Waste management

- Install appropriate solid and liquid waste management systems.
- Construct a soak away pit to manage all liquid wastes and washing waters, channeling all drains from the processing area into it.

Questions & Answers on Food Standards

There are some common questions and answers on the standards for roots and tubers, especially potato crisps.

Qn:What is a standard? A standard is a document, established by consensus that provides rules, guidelines, or characteristics for activities or their results.

Q:Why are standards important? Standards establish size or shape or capacity of a product, process, or system.They can specify performance of products or personnel.They also can define terms so that there is no misunderstanding among those using the standard.

Qn.What is accreditation?

Accreditation is the formal recognition by an approved competent third party that the relevant requirements of a specific task have been fulfilled after conducting a conformity assessment.

Qn.What is certification?

Certification is the procedure by which a third party gives written assurance that a product, process, or service conforms to specified requirements.

Qn.Why are accreditation and certification important?

Accreditation gives consumers and other stakeholders (traders, export marketers) confidence in the results, and ensures the quality of products. To regulators, accreditation is both a basis for policy making and a means of market regulation. They ensure that their requirements for protecting society, including health and safety, environment, security, and other societal protection are met.

For industry, accreditation helps to ensure valid results during the development and production of products, strengthens domestic and international trade, and overcomes technical barriers to trade.

Qn.What is conformity assessment?

Conformity assessment is any activity concerned with determining, directly or indirectly, that relevant requirements are fulfilled.The key elements are:inspection, testing or gauging, and verification. Conformity assessment is important as it helps:

- Exporting countries to protect their markets.
- Consumers to protect themselves against safety hazards and economic exploitation, and producers (manufacturers, farmers) to ensure that their products conform to standards.

Qn. How is the conformity assessment undertaken?

There are two types of conformity assessment regimes: the pre-market conformity assessment regime and the supplier conformity assessment regime. Pre-market conformity assessment regimes take the form of product

approvals, product registrations, licenses, or inspections. Supplier declaration regimes rely on the manufacturer or supplier, rather than the regulatory agency, taking on the responsibility for complying with the relevant regulations. The conformity assessment regime selected for a particular regulatory system will depend on the following, among others:

- Nature of expected risks
- Availability of resources
- Availability of expertise
- Organizational level of regulated parties
- Impact on the economy
- Envisaged period of regulation (temporary or permanent measures).

Qn. What quality parameters are required for conformity assessment?

There are three main parameters: physical, chemical, and microbiological.

1. Physical parameters such as dimensions, temperature, pressure, electrical light intensity, etc.
2. Chemical parameters such as pesticide residues, active ingredients in chemicals, toxins, food nutrients, heavy metals, etc.
3. Microbiological parameters such as bacterial counts of different types, pathogens, viral loads, yeasts, and molds, etc.

Qn. What is regulation?

Regulation can be defined as any measure or intervention implemented under government authority that acts to control the behavior of individuals or groups that come within the domain of that authority. Regulation includes the primary laws and subordinate instruments developed by government and the rules issued by government and nongovernmental agencies under delegated powers.

Whilst regulation will continue to be an important tool for protecting public interests, it is recognized that regulations can become an obstacle to achieving the very economic and social well-being for which they are intended. Recognizing the potential gains from the pursuit of good regulatory practices, economies are coming under increasing pressure to adopt good regulatory practices as applied at both national and international level. As a result, many governments have established central agencies to oversee the development and review of regulation to avoid duplication and unnecessary excesses. Also they are adopting standardized and systematic analytical tools to aid their decisions in relation to the review of current regulations and the vetting of new regulatory proposals.

Qn. How do the regulatory bodies ensure compliance?

The development of standards is only meaningful if these standards can be implemented. Additionally, implementation of standards is only meaningful if compliance can be demonstrated through conformity assessment.

After setting the standard the users (farmers, processors, traders, etc.) must be informed. Parameters to assess for conformity are then identified, conformity assessment capacity is built or outsourced, and finally an implementation date is set and communicated to stakeholders.

Qn.Are there any laws governing regulation?

Yes.The regulation of products is governed by different bodies,regionally and globally.TheWorldTrade Organization’s regulations, for example, apply globally.

According to Article 2.2 of the World Trade Organization’s Technical Barriers to Trade (WTO TBT) Agreement,“.... Members shall ensure that technical regulations are not prepared, adopted or applied with the view to or with the effect of creating unnecessary obstacles to international trade. For this purpose technical regulation shall not be more trade restrictive than necessary to fulfil a legitimate objective...”

Qn.What are some of the good regulatory practices?

Good regulatory practices include:

- Developing regulations that are flexible
- Using risk management principles
- Being consistent in guidance and decision-making
- Being efficient in information and records management
- Measuring and maintaining performance and transparency
- Being accessible and reaching out reach out to stakeholders (consultations)
- Being aware of changing regional and global standards and other factors.

Qn.What principles govern good regulation?

Economic progress - Businesses have a right to do business and any regulatory actions must promote this and only intervene where there is a clear case for protection of human health and safety.

Education, advice, and guidance - The primary role of the regulator is to educate, advise, and provide guidance to the economic operators to enable them to comply.The regulatory institutions should ensure that advice and guidance is easily accessible and cheap to convey to the economic operators.

Risk assessment - Regulators often do not have sufficient resources. Risk assessment enables resources to be allocated to areas that pose a greater risk to human health and safety.

Proportionate action - Any enforcement actions taken need to be proportionate to the risk or level of non-compliance.

Openness - Regulatory institutions must make known what they expect of the economic operators and what the economic operators expect of them.

Integrity - Inspectors must act with integrity in undertaking monitoring and inspection activities (independently, impartially, and without bias).

Accountability - Inspectors must be accountable for all their actions.

What are the prerequisites for successful market monitoring and inspections?

Necessary powers and authority

Regulatory authorities should have the necessary powers and authority to monitor products placed on the market and take appropriate action to enforce compliance in case of non-compliance. Inspectors need to understand their powers as stipulated in their respective regulations.

Where the power to take action in case of non-compliance is limited, it may be necessary to collaborate with other regulatory institutions, including the Police in enforcing corrective actions.

Clearly defined essential requirements and compliance criteria

This is the basis of all your market monitoring and inspection decisions. Essential requirements as provided in the standards need to be clearly understood, including other criteria that may be contained in other relevant regulations.

Planning

Preparation is the key to success of any market monitoring and inspection program. It involves prioritizing or deciding which activities to undertake and how to allocate resources in order to maximize efficiency and effectiveness (impact).

Resources must be concentrated where risks are high or non-compliance more frequent.

The key outputs from planning include a surveillance program (annual), the necessary resources and competencies for implementing the surveillance program, and clear monitoring and inspection criteria.

Qn. What is involved in regulating compliance to potato and cassava standards at the market and entry points?

This is done through regular market monitoring and inspection of cassava and potato and their products to ensure that the products placed on the market meet the requirements of the standards and other relevant regulations. Regulators make regular visits to commercial, production/manufacturing, and storage premises, and if appropriate, to places where cassava flour is used in bulk, for example, schools, hospitals, bakeries, and so on. They organize random and spot checks, taking samples of the products for laboratory examination and testing. They also gather required information from the person in possession of the product in order to take appropriate action.

Appropriate action includes bringing non-compliant products into compliance and applying sanctions where necessary to prevent circulation or withdrawal of non-compliant products from the market.

Qn. When and where is the inspection and surveillance intervention carried out?

Inspection and surveillance can be conducted at the following points:

- Entry points - Imported foods and chemical products are inspected for quality and safety, samples are retained for laboratory testing before they are released.
- Markets - Shops, supermarkets, stores, etc. are randomly inspected and where necessary, samples are taken for testing.

- Factories are inspected for Good Manufacturing Practices (GMP), Good Hygiene Practices (GHP), Hazard Analysis Critical Control Point (HACCP), Certification to ISO 9001 Quality Management Systems (QMS), Product Certification, and Calibration of industrial measuring and testing equipment to ensure accuracy in measurement.
- Pre-delivery inspection (batch certification) - This involves inspection, sampling, and testing of consignments at suppliers premises for clients before delivery
- Follow up on complaints and information from the public.

Qn. How do I ensure that I comply with the standards on potato and cassava standards at production level of my cassava flour?

A. This involves ensuring you use the right raw material and then follow the processing requirements. The cassava flour should meet the safety and quality standards and the packaging and labelling should be properly done.

Raw material requirements: Ensure good raw materials are used in the process so as to produce good products. If substandard raw materials are used the end product may well be substandard “Garbage in, garbage out”.

Process requirements: “Look after the critical parts of the process, the finished product looks after itself”. Ensure good agriculture practices as regards soil, water, surfaces, and hands. Observe inputs such as planting materials and pesticides. Ensure good manufacturing practices by looking at provisions, training, documentation, and audits.

6.0 Conclusion

Potato is an important food crop in East Africa. It is grown by subsistence farmers for both cash and food security. As food and cash crop, farmers have been processing fresh potato tubers into various products such as potato crisps, chips and starch in addition to selling the crop in fresh form.

Potato crisp has been the main product of preference for sale in both local and urban markets, and seems to have big market potential in East Africa. Currently, there are a number of groups and companies which process potato crisps in East Africa. But the quality and safety of the product do not always conform to the existing standards for East African Community markets. As such the product has very low consumer demand especially in the urban areas.

Farmers and processors do not comply with the standards for potato crisps due to lack of technical know-how of the general manufacturing practices (GMP), code of hygiene and procedures for handling processes.

This training manual outlines the operational steps or procedures to follow in manufacturing safe and quality potato crisps. The practices should be evaluated for effectiveness through monitoring and documentation in form of records. By following the simple descriptions of the technology and taking the necessary precautions, processors will be able to produce potato crisps of consistent quality at minimal cost. Consequently, processors will be able to penetrate the East African Community markets and beyond earning greater incomes to sustain their livelihoods.

References

1. East African Standards for Fresh Potato Tuber (Ware Potato Tuber) Specification: EAS748:2010, ICS 67.080.20
2. East African Standards for Potato Crisps Specification: EAS745:2010, ICS 67.080.20
3. East African Standards for Fried Potato Chips Specification: EAS747:2010, ICS 67.080.20
4. Frozen Potato Chips Specification: EAS 746:2010: ICS 67.080.20

Appendix I: Quality assurance parameters

	Parameter	How to check	Acceptance criteria	When to check	Who does it?
1. Potato crisps					
1.1	Moisture	Use a moisture meter	<5 percent	After frying	• Supervisor • Technician
1.2	Appearance	<ul style="list-style-type: none"> Physical observation Surface or internal pigmentation, black speckss and spots, blisters, sogginess. Size and shape: small pieces, slivers and irregular pieces. 	<1 percent <10 percent	After frying	Supervisor
1.3	Sensory properties	<ul style="list-style-type: none"> Check for rancidity, bitterness and off-odors and flavors. Check color. 	<ul style="list-style-type: none"> Free from rancidity, bitterness, off-odors and flavors. Light yellow to golden brown or typical color of the permitted additive used. 	Finished product	• Supervisor • Technician
2. Raw materials					
2.1 Fresh potato tubers					
2.1.1	Appearance	<ul style="list-style-type: none"> Examine for cut, shriveled, sprouted rotten, small and green tubers. Get information from the supplier 	Wholesome, free from sprouts, free of any foreign smell, free of discoloration in the flesh, free from weevils, free from rot and greening.	During buying the roots	Purchasing officer
2.2 Spices and condiments					
2.2.1	Appearance	Check for mold and contaminants	Free from molds and contaminants	During buying	Purchasing officer
3.0 Packaging					
3.1	Physical observation	Check if the packaging materials are clean, have no leakage and of the required size.	<ul style="list-style-type: none"> Free from dirt Intact package Appropriate size 	Check before use	• Supervisor • Technician
3.2	Weight	<ul style="list-style-type: none"> Check using a scale (electronic scale is preferred) to see if the crisps packed meets the “Weights and Measures” requirements Weighing equipment has to be calibrated by weights and measures (respective agency). 	Net weight	After packaging	Supervisor
3.3	Labels	Check if the labels have the mandatory information as required by the standards for potato crisps.	Required information is indicated on the label and is readily legible.	Before marketing	Supervisor

Appendix II: Hygiene management

Cleaning	How to do it	When do you do it	Who does it?
Compound	Sweeping, burning, slashing and emptying waste bins	Daily and general cleaning once a week	Cleaner / Garden keeper
Building and premises	<ul style="list-style-type: none"> • Clean premises and buildings to remove dust, cobwebs, debris and waste • Drain the compound in case of stagnant water 	Weekly When this occurs	Cleaner
Processing equipment (Slicer, fryer, de-oiler, etc)	Scrubbing with water, air blowing, and dry mopping to remove dirt and other waste materials	Daily after and before use	Machine operator Cleaner
Floors, walls and roofs	Sweeping, scrubbing , mopping	Floor daily and the walls and roof weekly	<ul style="list-style-type: none"> • Casual workers • Supervisor
Storage			
Raw materials	<ul style="list-style-type: none"> • Clean and sorted raw materials stored separately from unclean raw materials • Dry chips bagged and stored on the pallets in separate room 	After receiving, cleaning After receiving	Workers Supervisor
Spares	Separate room using shelves	Common practice	Management
Personnel hygiene			
Health	<ul style="list-style-type: none"> • Train all workers in hygiene and sanitation. • Medical examination of all employees in direct contact with food against communicable diseases such as Tuberculosis (TB), typhoid and cholera and records to be kept. • Workers with open sores, infected wounds or serious illnesses (vomiting, diarrhea, fever) should not be allowed in the processing area. 	As required i.e. for every new employee and once or twice a year for continuing employees Medical examination once a year Daily checks	Manager
Cleanliness	<ul style="list-style-type: none"> • Provide workers with uniform, boots, masks and changing rooms • Provide washrooms and hand washing facilities at key areas of production filtering and packaging • Smoking, coffee and lunch breaks should be conducted in a separate area away from production and packaging areas to avoid any contamination. • Provide a canteen for meals. 	Daily checks	Supervisor

Pest control	<ul style="list-style-type: none"> • Keep the surroundings clean and free of wastes and grass around the facilities mowed • Ensure rubbish containers / facilities are kept away from the processing area and are emptied and cleaned properly to avoid or reduce flies. • Exclude bird and rodents from the processing room to avoid their droppings in the food • Perimeter wall to keep off pests such as cats and domestic animals is recommended 	<p>Cleaning daily and general cleaning weekly</p> <p>Keep rubbish pit far from the processing area daily</p> <p>Use wire mesh on the windows, tight fitting doors and rat traps</p>	Owner of the processing plant
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