RWANDA POLYTECHNIC

TVET LEVEL II

AGRICULTURE

Food Safety and Sanitation

TRAINEE MANUAL

RWANDA POLYTECHNIC

Approved by: Workforce Development Authority

USAID FROM THE AMERICAN PEOPLE

EDC Education Development Center

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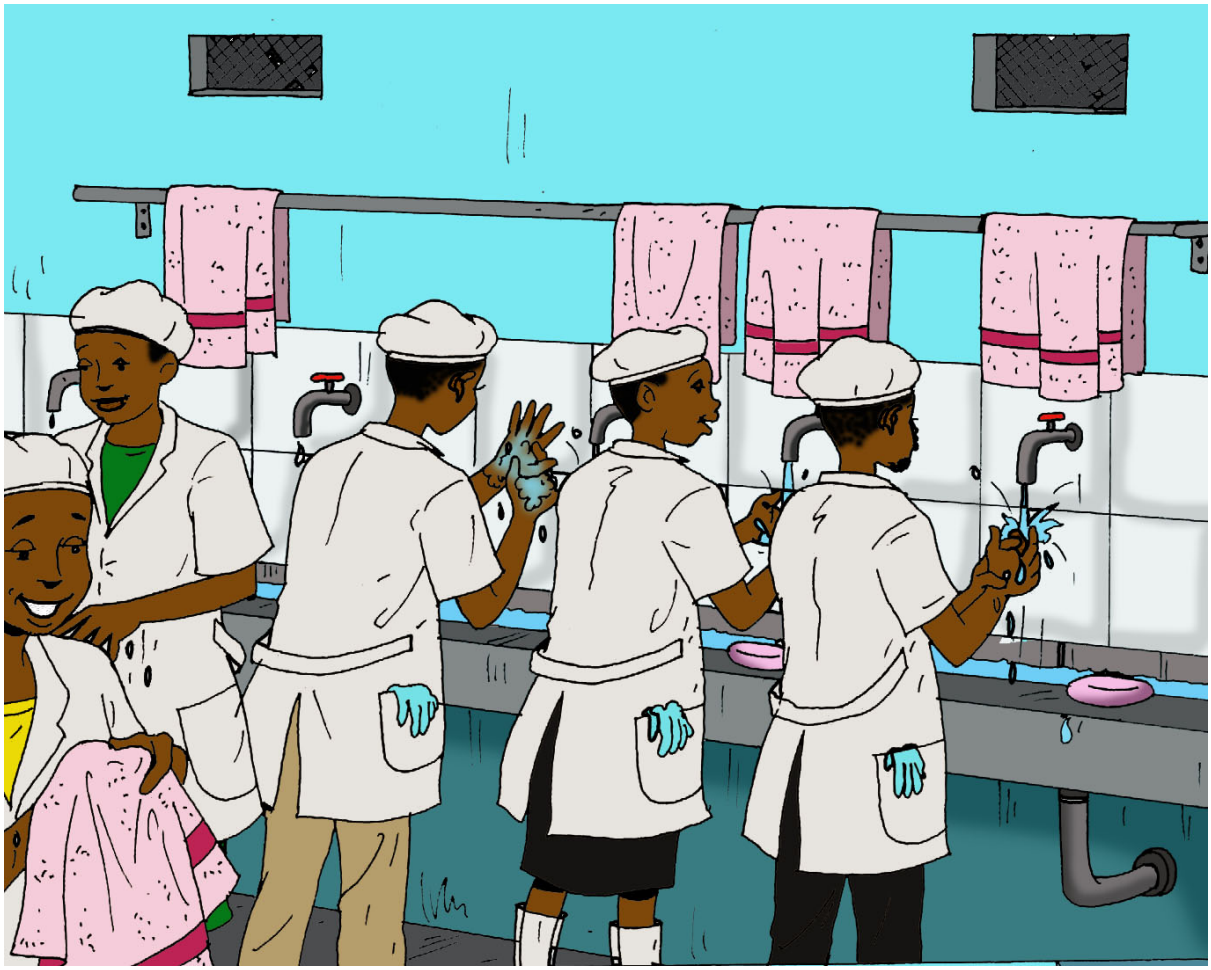
FOOD SAFETY AND SANITATION

Unit 1: Application of food safety and hygiene

Unit 2: Compliance with good manufacturing practices

Unit 3: Conducting routine maintenance

Unit 1: Application of food safety and hygiene



Topics

1.1 Identification of work area for cleaning and sanitation

1.2 Conducting food hygiene and sanitation practices

1.3 Respecting health and safety rules in the workplace

Unit Summary:

This unit describes the knowledge, skills, and attitudes required to apply food safety and hygiene in a food processing area. At the end of this unit, you will be able to identify a designated work area for cleaning and sanitation, conduct positive food hygiene and sanitation practices, as well as respect health and safety rules in the workplace.

Self-Assessment: Unit 1

1. Look at the Unit 1 illustration. What do you observe? What do you think this unit will be about? What topics might be covered?

2. Fill in the self-assessment below.

There are no right or wrong ways to answer this assessment. It is for your own use during this unit. Think about yourself as you read the statements across the top: Do you think you can do this? How well? Put a check in column that best represents your situation. At the end of this unit, we'll take this assessment again.

My experience Knowledge, skills, and attitudes	I don't have any experience doing this	I know a little about this	I have some experience doing this	I have a lot of experience with this	I am confident in my ability to do this
Make selection of tools, materials, supplies, and equipment					
Select and use PPE in workplace according to workplace requirements					
Observe cleanliness, sanitisation, waste collection, and disposal services during cleaning process					
Select tools, equipment, materials, and supplies to conduct cleaning and sanitization of the work area					
Clean and sanitize a food processing work area					
Collect and dispose waste in specialized facilities					

My experience Knowledge, skills, and attitudes	I don't have any experience doing this	I know a little about this	I have some experience doing this	I have a lot of experience with this	I am confident in my ability to do this
Follow code of conduct regarding food hygiene and safety practices					
Use the proper health and safety signs in checking them regularly in food processing, and explain their role in workplace area					
Respect health and safety rules, record observations, and follow-up for corrective action					

Topic 1.1: Identification of work area for cleaning and sanitation

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify appropriate tools, materials, supplies, as well as equipment for work area cleaning and sanitation	**1.** Make selection of tools, materials, supplies, and equipment	**1.** Attentive
2. Classify personal hygiene equipment, materials for work area cleaning, and sanitation procedures	**2.** Select and use PPE in workplace according to workplace requirements	**2.** Accurate
3. List procedures needed in maintaining food safety conditions in cleaning, sanitizing, waste collection, and disposal services	**3.** Observe cleanliness, sanitization, waste collection, and disposal services during cleaning process	**3.** Methodical

Getting Started: What do we know and where are we going?

Topic 1.1 Task 1:

1. Observe the Illustrations above and describe what you see. Discuss the following questions with a partner:
   a. What are the similarities and differences between the two situations in the pictures?
   b. Where could this picture have been taken?
   c. Have you ever visited local food processing units and observed a similar situation?

2. Volunteer to share and compare your answers. Listen as the trainer clarifies any misunderstandings.

3. Review the learning outcomes and Key Competencies table together.

Illustration 1

Illustration 2

Problem Solving Activity

Topic 1.1 Task 2:

1. Form two groups and discuss the following scenario:

Kampire and Kayira are emerging entrepreneurs interested in starting a new small-scale food processing unit. They want to process juice from pineapples, wine from beetroots, as well as milk and tofu from soya beans. Kampire and Kayira want to comply with the appropriate sanitation standards by setting up two rooms that follow safety regulations.

2. With your group, give them advice by answering the following questions:

a. How should Kampire and Kayira identify work area conditions for cleanliness and sanitation?

b. How should they identify and select equipment, tools, and materials for cleaning and sanitation?

c. How should they identify and select appropriate personal protective equipment (PPE) to be used in cleaning and sanitation?

d. Provide a minimum of three indicators that rooms have been properly cleaned and sanitized.

e. How should they dispose of waste?

f. What can they do to prevent food safety hazards that are results of cleaning activities?

3. After discussing, write your responses to each question on a piece of paper. Then, have one person from your group present your responses to the rest of the class.

4. Compare your answers. Did you have similar discoveries?

5. Read **1.1 Key Facts** together.

6. Using the information in **1.1 Key Facts**, review your responses and determine the correct answers as a class.

1.1 Key Facts

- **Cleaning**: The appropriate removal of all visible soil or dirty matter with the use of mechanical action, chemical action, or both.

- **Cleanliness**: The act of eliminating visible matter, such as dust, soil, food waste, or grease.

To identify conditions of work area cleanliness based on food safety regulations, consider:

- **Sanitation**: The act of eliminating any visible matter or microorganisms, such as amoebas and intestinal worm eggs.
- **PPE**: Refers to personal protective equipment, such as coverall, boots, gloves, and hair nets.
- **Importance of handwashing:** Facilities with hot water for handwashing must be provided and must be convenient to food handling areas. All personnel involved in food handling must thoroughly wash hands with soap under warm-running potable water. Hands must also be washed after handling contaminated materials and after using toilet facilities. When required, employees must use disinfectant hand dips.[1]

[1] Schmidt, R. H. (2017, February 21). *Basic elements of a sanitation program for food processing and food handling*. University of Florida, Institute of Food and Agricultural Sciences (IFAS). https://edis.ifas.ufl.edu/fs076

Considerations for identifying and selecting equipment, tools, and materials for cleaning and sanitation are:

- Assessing the area to be cleaned
- Identifying the type of dirt or soil to remove
- Application method (clean in place or clean out of the place)
- Environmental care while removing waste using the following:
  - Broom and squeegee
  - Shovel and hose
  - Dustpan and damp mop
  - Wheelbarrow
  - Soft wastes draining system
  - Water quality: The appropriate water for cleaning is pure portable water.

PHP: Personal Hygiene Practices

Good personal hygiene habits include:

- Washing the body often (at least once a week) with soap and shampoo using a wet sponge or cloth.
- Brushing teeth at least once a day or after meals.
- Washing hands with soap after going to the toilet.
- Waste disposal areas should:
  - Have clearly separated bins for recyclable matter and unrecyclable waste
  - Be free of garbage waste
  - Be odour free
  - Have good drainage

Guided Practice Activity

Topic 1.1 Task 3:

1. In this activity, you will simulate working in a food processing plant.

2. Separate into two groups that represent the staff in the food processing plant. At least one person in your group must have writing materials.

   a. Group One will represent the staff in the food processing plant and wear PPE.

   b. Group Two will also represent the staff in the food processing plant but will not use any PPE.

3. With your group approach the tools, equipment, and cleaning and sanitation materials. Spend two minutes familiarising yourselves with the equipment.

4. Now switch so that the group wearing PPE will take it off and the group that didn't will put the PPE on.

5. In your group, make a list that describes your experience when wearing a PPE compared to not wearing PPE. Consider how prepared you felt to handle different materials. Consider:
   a. Personal hygiene
   b. Health and safety in the workplace
   c. Neatness
   d. Work area instructions on cleaning and sanitisation

6. Share your list with the rest of the class. Discuss your observations together and summarise what you have learned.

7. Next, enter the appropriate storehouse where different kinds of PPE are stored. Select appropriate PPE when dealing with the following scenarios:
   a. Handling chemicals
   b. Working with liquids
   c. Fall prevention and fall protection
   d. Head, eye, and face injury protection
   e. Cut protection
   f. Thermal resistance
   g. Shock protection
   h. Gas and dust protection
   i. Noise protection

8. Share and discuss your responses.

9. Read **1.2 Key Facts** together and compare the information to your responses. Correct your responses as needed.

1.2 Key Facts

Identification and selection of appropriate PPE for the following factors or situations:

- **Handling chemicals:**
  - Special plastic gloves and/or gauntlets that are chemical resistant
  - Eye goggles
  - Respirators

- **Working with liquid:**
  - Waterproof equipment and materials
  - Boots (preferably white colour)
  - Coverall
  - Apron
  - Visitor coats
  - Overshoes

- **Fall protection:** Slide-proof footwear

- **Head injury protection**: Shock-proof head mask or helmet

- **Eye protection:** Goggles

- **Face protection:** Shock-proof mask

- **Heat:** Heat resistant equipment such as flame-retardant clothing

- **Cut protection:** Thick cut resistant gloves or gauntlets

- **Gas or dust:** Respirators

- **Noise:** Ear plugs/earmuffs

Application Activity

Topic 1.1 Task 4:

1. Form small groups of at least four people per group. For this filed visit, your group as a choice of which local business to visit. Choose one of the following:

a. A local business where an entrepreneur has a small-scale fruit processing unit

b. A milk collection centre

2. At the field site complete the four following tasks:

a. Identify conditions of cleanliness based on food processing regulations.

b. Identify types of equipment and materials used for personal hygiene and good grooming that comply with workplace requirements.

c. Identify the workplace waste disposal program. Are the types of garbage used applicable to the workplace health and safety requirement?

d. Identify the work tasks requirements for maintaining workplace cleanliness and food safety regulations.

3. After you have concluded your field activity, answer the following questions in order to clarify how practical work in the field is performed:

a. What are the characteristics of cleanliness in a food processing area?

b. What are the guiding criteria to identify the appropriate equipment and materials for personal hygiene in line with workplace requirements?

c. What is the reporting procedure for food safety hazards, health conditions, and illness? Are these procedures at the appropriate level of responsibility in the food processing unit and/or the milk collection centre?

Points to Remember

- Work area cleanliness is the most important issue for food safety in food processing centres.
- Personal hygiene begins at home. A clean body, clean hair, and clean clothing are essential elements for good hygiene.
- Personal protective equipment (PPE) is selected according to the cleaning and sanitation tasks as well as working conditions.

Formative Assessment

Part I: Formative Evidence

Circle ONE answer that best demonstrates safety and sanitation standards in the workplace.

1. A clean and sanitary work area that complies with food safety regulations would have:
   a. A clear and easy to follow cleaning plan, no dirt, no grease, no bad smell, and no food waste.
   b. A clear and easy to follow cleaning plan, some water on the floor, no dirt, no grease, and no food waste.
   c. No dirt, no grease, some soil on surfaces, and no bad smell.
   d. Minor leaks in the ceiling, dusty areas, and clean doorknobs.

2. Personal hygiene and grooming safety standards in the workplace require:
   a. Using PPE whenever an employee feels like it.
   b. Using PPE only when the supervisor is around.
   c. Using personal hygiene materials and PPE whenever necessary in the work area.
   d. Sweeping the workplace without appropriate PPE.

3. Which of the following processes ensures that food safety regulations are maintained when cleaning?
   a. Cleaning requirements for food processing area is identified, there is regular maintenance of workplace cleanliness, there is control of movement around the workplace, as well as health conditions and/or illness are being reported.
   b. Identification and reporting of raw materials to be processed by time and date of arrival.
   c. A clearly identified dining room for employees to each lunch and having an identified street food vendor who sells avocados to staff in order to balance their nutrition.
   d. Removing health and safety signs that restrict movement during cleaning and allowing employees to wash their hands without soap when they are busy working on assigned tasks.

Part II: Performance Evidence

Bugabo has a small-scale milk processing unit that is 6 m^2 in size. He wants to improve the cleanliness and sanitation of his plant. As food safety and sanitation technicians, trainees are requested to identify and select cleaning equipment, materials, supplies, and PPE for the staff to clean the 6 m^2 processing area. This activity has to be performed within 45 minutes. All necessary equipment and PPE are stored in a warehouse accessible to trainees.

Topic 1.2: Conducting food hygiene and sanitation practices

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify tools, equipment, materials, and supplies for cleaning and sanitizing food processing centres	**1.** Select and prepare tools, equipment, materials, and supplies for cleaning and sanitization	**1.** Detail-oriented
2. Know the steps required to clean and sanitise a food processing work area	**2.** Clean and sanitise a food processing work area	**2.** Diligent
3. Define waste collection and disposal in specialized facilities	**3.** Collect and dispose waste in specialized facilities	**3.** Attentive

Getting Started: What do we know and where are we going?

Topic 1.2 Task 1:

1. Think about a situation or a past experience that required cleaning and discuss the following questions with a partner:

a. What are some examples of places that need to be cleaned every day?

b. What happens to these places if no-one takes care of them?

c. Can you think of a place that becomes dirty or unclean more frequently than others?

d. What tools, materials, and supplies are needed to clean these places?

2. Review the learning objectives and Key Competencies table together.

Problem Solving Activity

Topic 1.2 Task 2:

1. With a partner discuss the following scenario in pairs:

A busy restaurant in Muhanga is having issues with cross-contamination in their food preparation area. The restaurant has appropriate food preparation equipment in well-arranged places, however, most of the equipment and tools that they have are either very old or damaged. The cleaning detergent they use is locally made liquid soap and it is used to clean utensils, food preparation equipment, and mopping the floors in all areas of the restaurant.

The staff at the restaurant clean and remove visible waste in the morning around 6 am. They collect and dispose food waste in old leaking bags near the food preparation area. Between 8 am and 11 am, the restaurant starts having a serious problem of flies coming inside the food preparation area and in the dining rooms of the restaurant. These problems have caused the restaurant to lose clients because the clients fear they will get sick after eating food from this restaurant.

2. Discuss the following questions with a partner:

a. What do you think is the cause of these problems?

b. What is the connection between the scenario and food safety?

c. Have you ever seen a similar situation in a location that prepares and serves food?

3. Using your knowledge from the previous learning objective, answer the following questions about food safety reality based on the scenario above:

a. What factors need to be considered in selecting tools, equipment, and materials for cleaning and sanitizing the food processing area?

b. List the general steps taken to clean and sanitise the production area as well as surfaces that come in contact with food products during food processing?

c. What is the best way to deal with waste?

d. How should hazards be documented and reported? Who is responsible for this reporting?

4. Next, read **1.3 Key Facts** together to supplement your answers.

1.3 Key Facts

- **Standard cleaning plan**: A set of rules or requirements established by an organisation or company

- **Common cleaning equipment**:
  - Dishcloth and sponges scouring pads
  - Mops and brooms
  - Buckets and pans
  - Dusters and window cleaning equipment
  - Wet floor signs and cleaning trolleys
  - Bowls, mop buckets, and wringers
  - Mop, squeegees, and brushes
  - Vacuum cleaners and garbage receptacles

Food contaminant considerations:

- With light contamination, the pre-clean and main clean stages can be combined.
- Some surfaces do not need to be disinfected after every wash (e.g. floors and walls).
- Disinfect any items which come either into direct contact with food (e.g. meat slicers, work surfaces, chopping boards) or with the hands of food handlers (e.g. refrigerator door handles).
- Try to air dry, but if this is not possible, then use paper towels or a clean dry cloth.
- After using the cleaning equipment, it should be cleaned and dried before being stored.
- Store cleaning materials and equipment in separate cupboards or rooms, away from food. Never put cleaning materials into unmarked containers or food containers.
- Ensure staff are trained to 'clean as they go' and to clean up any spillages immediately to prevent cross-contamination.

Types of cleaning

- **Cleaning in the Place (CIP):** An automatically performed method of cleaning to remove residue from inside the equipment pipeline without opening the container. For example, in milk or beverages pipeline cleaning.
- **Cleaning Out of Place (COP):** Method of cleaning pieces of equipment that are small, complex, or hard to clean.
- **Mechanical Cleaning**: Uses specialised equipment in cleaning.
- **Manual Cleaning:** Completely disassembling for cleaning and inspection.

4 step process for preparation working spaces:

- **Step 1** – **Preparation**
  - Remove loose dirt and food particles. Rinse with warm, potable water.
- **Step 2** – **Cleaning**
  - Wash with hot water (60 °C) and detergent. Rinse with clean potable water.
- **Step 3** – **Sanitizing**
  - Bacteria killing stage
  - Treat with very hot, clean, potable water (75 °C) for at least 2 minutes.
  - Apply sanitizer as directed on the label.
- **Step 4** – **Air drying**
  - Leave benches, counters and equipment to air dry.
  - The most hygienic way to dry equipment is on a drying rack.[2]

Categories of chemical cleaners:

- **Detergent** is designed to remove soils, such as soap or cleaning solutions.
- **Sanitizer** is usually used to refer to a product containing both a detergent and disinfectant, such as bleach, iodine, or quaternary ammonia solutions.
- **Disinfectant** is a product, which kills microbes without employing a soil removal action.

Chemical cleaning supplies:

- Acid cleaners and brighteners: Used for food with soil containing mineral deposits
- Rust inhibitors: Products to fight corrosion
- Drain cleaners: Products specific to dissolve a mixture of food soil
- Degreasers: Products specific for grease removal on the surface
- Floor cleaners: Products for floor cleaning without damaging the material or causing sliding effects after cleaning
- Powdered and liquid chemicals: Used for special cleaning
- Solvent cleaners: Appropriate chemicals to clean equipment in food processing
- Steam cleaners: Cleaning using chemicals combined with steam in some food industries

Mixing chemical solutions:

- Always read product labels before using or mixing any chemicals. If in doubt, leave it to the manufacturers to do the mixing!

[2] Government of Western Australia, Department of Health. (2020, July 14). *Cleaning and sanitising food premises and food equipment*. https://ww2.health.wa.gov.au/Articles/A_E/Cleaning-and-sanitising-food-premises-and-food-equipment

- Chemical cleaners are concentrated chemicals diluted with another agent such as water.
- Diluting chemical cleaners is usually measured in ppm (parts per million of the pure concentration of the chemical) which is a very low concentration of a solution.
- Every supplier sells the products with specific calculation done or the formula to use and recommend the user how much water he/she need to mix in a given quantity of chemical to get a certain concentration.
- Recommended concentration for disinfection has been 600-800 ppm of chlorine bleach and 50 to 200 parts per million (ppm) for sanitising.
- Do not use two drain cleaners together, or one right after the other.

Dilution Example:

Household bleach with chlorine concertation of 5.25-6.15% sodium hypochlorite				
Dilution	**Chlorine (ppm)**	**Bleach**	**Water**	**Application**
1:20	2,625-3,075	2 l	1 L	Hospital grade
1:100	525-615	100 ml	1 L	Disinfectant for food processing
1:280	200-234	4 ml	1 L	Sanitisation for food processing

DO NOT MIX the following together because they can be very harmful:

- Do not mix bleach and ammonia.
- Do not mix bleach and acids.
- Do not mix bleach with hot water, only cold.

Note:

- Sometimes a time and temperature specification will be given regarding the use of the chemical cleaner. Follow the instructions!

Guided Practice Activity

Topic 1.2 Task 3:

1. Your class will clean an area of the training centre following hygiene and sanitation standards. Your trainer will set up storerooms for you to use where you should select the proper materials for cleaning. This should be done to a standard which could be used for food processing. Alternatively, you may refer to the following images of each zone/storeroom.

Zone 1: PPE and personal hygiene materials

Zone 2: Cleaning and sanitizing equipment, tools, and materials

Zone 3: Chemical cleaning supplies such as soap, detergents, and sanitizers

2. With the help of your trainer, assess the area to see what kind of cleaning must occur and what supplies are needed.

3. Assign one member of your group to document your group's experience of what you learn as well as any difficulties you encounter.

4. Select the following:
   a. Appropriate PPE
   b. Appropriate cleaning equipment, tools, and materials
   c. Appropriate chemicals

4. Carefully read labels for all chemical cleaners. With the help of you trainer, mix and dilute a chemical cleaning solution appropriate for the cleaning work.

5. Pay attention to trainer's instructions to prepare the area to a standard which could be used for food processing.

6. Conduct the cleaning and sanitation using the proper equipment, tools, materials, and cleaning agents following the guidance from your trainer.

7. Discuss and review what your group experienced and record it.

8. Present your work to the other groups and discuss. Consider the information in **1.4 Key Facts** and the trainer's explanations to supplement your group's answers

1.4 Key Facts

Tools, equipment and materials for waste collection may include:

- Forks and rakes
- Tube brushes
- Shovels/spade
- Brooms and deck scrub brushes
- Wheelbarrows to avoid cross contamination
- Food waste containers
- Sealed certified plastic bags,
- Paper goes in recycle bins,
- Colour-coded garbage containers in specialised facilities for different types of waste

Documentation, record, and reporting

- In the food business, these are the most important operations to evaluate the food processing compliance with food safety regulations.
- Cleaning record: Cleaning and sanitation record is a good system for keeping information to maintain food safety and quality. It can be a useful reference in the future.

Application Activity

Topic 1.2 Task 4:

1. Form groups of six trainees and get ready for fieldwork at a small-scale poultry food processing unit. You will work in team and with the experienced staff.

2. First, your group should go to the storehouse and select the appropriate items for cleaning and sanitizing the contact surfaces in the poultry food processing unit. These include:
   a. The cleaning and sanitizing equipment
   b. Tools, materials, and supplies
   c. PPE and personal hygiene materials

3. During practical activity, each group should first observe the workers, and record the following:
   a. What is the method of preparation for the cleaning solutions, and equipment, tools and materials to clean and sanitize the poultry processing unit?

   b. What cleaning and sanitizing and waste collection procedures were applied in the poultry processing unit?

   c. How are documentation, record keeping, and reporting procedures in the processing unit performed?

4. After the field visit is complete, compile your answers in your group and be prepared to share them with the rest of the class.

Points to Remember

- Cleaning chemicals should be handled and used carefully and stored with caution.
- Always follow manufacturer's instructions on how to dilute chemical cleaners.
- Documentation, record keeping, and reporting in food business are the most important operations to evaluate the food processing compliance with food safety regulations.

Formative Assessment

Read the following and circle the correct answer.

1. The sanitation standard operating procedure includes the following considerations:
   a. Cooperation between the factory security guard and the marketing manager for security of products.
   b. Applicable workplace cleaning plan, consideration of the type of food soil to remove during cleaning, and the consideration of products types to be processed after cleaning.
   c. Regular staff meeting to discuss personal financial problems and family planning.
   d. Good presentation of the vehicle that transports materials needed for repairing the fence at processing units.

2. Which of the following items are appropriate PPE and cleaning chemicals for a food processing area?
   a. Flipchart, marker pens, notebooks, and a first aid box
   b. Coverall suit, white boots, hypochlorite, sodium hypochlorite, and hydrochloride
   c. Gloves, earmuffs, respirators, goggles, a t-shirt, school uniform, and earrings
   d. Tube brushes, brooms, deck scrub brushes, a wheelbarrow, and dust bins

Determine if each statement is True or False for the parts of food safety practices and standards:

3. The selection of cleaning and sanitizing equipment is done depending on the will of the food processing staff.
4. SSOP refers to sanitation standard operating procedure.
5. When preparing to conduct cleaning activities in a food processing area, the selection of PPE is related to the nature of the task.
6. Waste disposal conditions have no impact on the image of a food processing unit. The most important issue for the processing unit is marketing.

Topic 1.3: Respecting health and safety rules in the workplace

Key Competencies:

Knowledge	Skills	Attitudes
1. Indicate factors for code of conduct regarding food hygiene and safety practices	**1.** Follow code of conduct regarding food hygiene and safety practices	**1.** Consistent
2. Select the types of health and safety signs to check regularly in food processing and their roles in the workplace	**2.** Use the proper health and safety signs in checking them regularly in food processing, and explain their role in the workplace	**2.** Observant
3. Outline health and safety rules, how to record observations, and follow–up for corrective action	**3.** Respect health and safety rules, record observations, and follow–up for corrective action	**3.** Diligent

Getting Started: What do we know and where are we going?

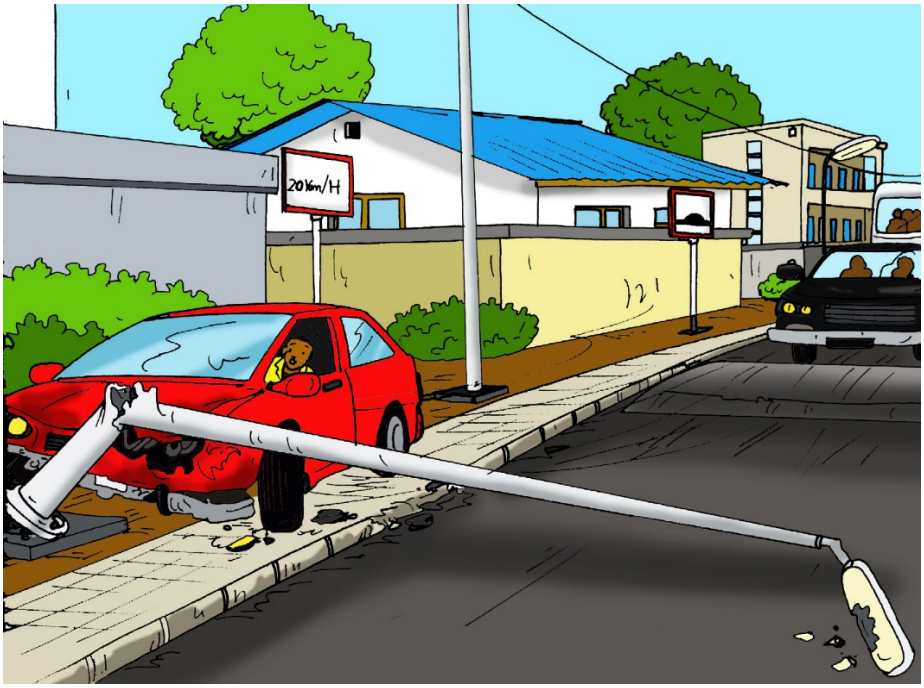
Topic 1.3 Task 1:

1. Observe the picture and discuss the following questions with a partner:
   - **a.** What is happening in the picture?
   - **b.** Have you seen or heard of a similar situation?
   - **c.** What are the possible causes and consequences on such situations?
   - **d.** How might this relate to food processing?

2. Volunteer to share your answers with the rest of the class.

3. Consider how this scenario related to following proper safety procedures in food processing.

4. Review the learning outcomes and Key Competencies table for this topic.



Problem Solving Activity

Topic 1.3 Task 2:

1. Think back to the scenario in **Topic 1.2** about the restaurant in Muhanga.

2. Now that you have experience with cleaning food-related workplaces, you have been asked to help the owners. You must draft a code of conduct that will ensure that the workers operate at a high standard and the food follows correct hygiene and safety practices. These measures should be followed not just tomorrow, but each and every day.

3. Apply your knowledge and experience by answering the following:

a. What materials are needed?

b. What are the objectives of each task?

c. Whose responsibility is each task?

d. What is the frequency of each task?

e. What are the procedures?

f. How will the processes be recorded?

g. How should corrective actions be made and followed-up on?

4. Take the time to think about your answers individually and write them down.

5. Once you have answered the questions above, proceed to do the following with your group:
   a. Write your answers on the flipchart or board.
   b. Choose a presenter to share the results with the other groups.
   c. Listen carefully and provide comments to the other groups.
   d. Compare answers between groups.

6. Refer to **1.5 Key Facts** and review them together.

7. Discuss the following questions as a class:
   a. What is the meaning of hygiene and protective clothing?
   b. What is the proper hand washing protocol in food processing?
   c. What control measures prevent staff health challenges and sickness from contaminated food?
   d. How are personal belongings and conduct controlled to protect food?

1.5 Key Facts

- **Health and safety rules:** The laws, rules, and principles that are intended to keep people safe from injuries (accidents) or disease at work as well as public place.

- **Workplace cleaning plan**: A set of instructions that describe everything that needs to be done in order to maintain the food processing premises in a clean and sanitary condition.

- **Example of a simple cleaning checklist:**
  - Looks clean and neat
  - No dirt
  - No food wastes
  - No grease
  - No other visible dirty matter

- **Cleaning schedule:** An easy and effective way of ensuring all food premises equipment are regularly cleaned.
  - Clear and easy to follow cleaning checklist
  - Evaluation of cleaning based on written procedures

- Inspection: An evaluation done by authorities
- Direct observation of personnel

Example of a detailed cleaning procedure:

Reference:	244								
Authorized by:	HAKIZIMANA, Felicien								
Date:	August 10th								
Area/item	CIP Procedure for surface sanitation of food processing								
Frequency:	DAILY	Cleaned by:	MUGISHA, Moïse		Opperator				
PRODUCT INFORMATION					Personal Protective Equipment				
Use	Area, surface, machine product	Chemial Type	Dilution	Application equipment					
Sanitizing	Counter tops, handling materials.	Bleach 5.25% sodium hypochlorite (chlorine)	`1:100, **525 PPM**	spray bottle, sponge	X	X	X	X	X
Disinfectant	Processing surfaces with direct contact to food products	Bleach 5.25% sodium hypochlorite (chlorine)	`1:280, **200 PPM**	spray bottle, sponge	X	X	X	X	X
CRITIAL REQUIREMENTS		Processing machines must be instpected tomorrow for preventative maintiene,							

Guided Practice Activity

Topic 1.3 Task 3:

1. Refer back to **1.5 Key Facts** and the example of the cleaning procedure. What signs are used to show which PPE should be worn?

2. In a group of four, your task is to look around the training centre for similar signs that you think might show something about safety.
   a. Record your observations about the colour, shape, image, and possible message these signs are trying to communicate. If you have smart phones, take pictures of these signs.

   b. Additionally, look for places in the training centre where additional safety signs might be helpful or needed. Try to think of types of situations when the sign would be used in a food processing work area.

3. After exploring the training centre, your trainer will have signs ready in the classroom. Look at these signs and discuss if you have seen them before and what you think their

meanings are. Try to think of types of situations when the sign would be used in a food processing work area.

4. Finally, review **1.6 Key Facts** together.

1.6 Key Facts

- **Safety signs**: Used throughout the workplace to communicate and indicate very specific messages often related to health and safety.
- Always follow the rules and regulations indicated by workplace signage to the best of your knowledge and awareness.
- Here are some of the most common and universally used safety signs:

Application Activity

Topic 1.3 Task 4:

1. For this activity, you will do a field visit by observing the health and safety rules at a fish processing unit or meat processing unit.

2. With your group, perform the following tasks:
   a. Locate the code of conduct in place for food hygiene and safety practices. Where is it and what factors might have been considered when putting in place?

   b. Classify the main tips a food processing employee should follow to prevent food poisoning by using good personal hygiene.

   c. Locate and record all of the proper health and safety signs to check for regularly in food processing. What is their role in workplace area according to health and safety regulations?

   d. Observe and record the compliance of and respect for workplace health and safety rules. How are infractions followed-up on for corrective action? How are they reported to appropriate personnel according to workplace procedure?

3. Share your group's answers and ask the trainer for clarification as needed.

Points to Remember

- Respecting work area health and safety signs is mandatory.
- Regular handwashing is a mandatory practice and a critical part of any food safety system.

Formative Assessment

Part I: Formative Evidence

Read the following questions carefully and circle ONE correct answer.

1. Which of the following statements includes the main factors for following the code of conduct regarding food hygiene and safety practices?
   a. Personal cleanliness and positive behaviour in food processing area and eating food in the food processing area because of busy work.
   b. Minimizing hand contact with food, and not putting on PPE because of wearing clean expensive personal clothes in food processing area.
   c. Recording and reporting accidents, incidents, hazard and corrective actions, and allowing ill staff with diarrhoea to work in food processing area and report illness to the concerned personnel.

d. Appropriate procedure of hand washing, proper use of PPE and restricted entrance of unauthorized persons in food processing area, personal cleanliness and positive behaviour in food processing area

2. Which of the following signs is correct, based on its message and colour?
- **a.** A red sign for warning of danger
- **b.** A blue coloured sign indicating the need to use eye equipment or gloves
- **c.** A green sign that says no smoking
- **d.** A yellow sign to show the exit

3. Which of the following includes prohibited behaviours or practices by food handlers?
- **a.** All cuts, wounds, or sores should be covered with a waterproof dressing.
- **b.** Over-clothing should be clean and present no risk of contamination to food.
- **c.** Hair should be tidy and covered where necessary to prevent the risk of it falling into food.
- **d.** Smoking in food areas, coughing, sneezing, spitting over food, wearing strong smelling perfumes worn when handling foods, wearing nail varnish when handling food, wearing jewellery other than a plain wedding band or sleeper in food processing.

Part II: Performance Evidence

Bwiza has a small-scale tea processing unit and wants to follow the code of conduct regarding food hygiene and safety practices. As a food safety and sanitation technician, you are requested to post the health and safety signs in the workplace area of 49 m^2 and check that the code of conduct is being followed regularly. This activity must be performed within 60 minutes. The health and safety signs are provided. The equipment, PPE, and personal hygiene materials are all in the warehouse. Clean, hot water is also available.

Self-Reflection

1. You have come to the end of the unit. You are going to do the assessment you did at the beginning of the unit again to help you do self-assessment of your knowledge, skills and attitudes.

Again, there are no right or wrong answers to this survey. It is for your own use to gauge your knowledge, skills and attitudes after the unit. Read the Knowledge, skill or attitude in the left column. Think about yourself: do you think you can do this? How well? Read the statements across the top. Put a check in column that best represents your situation

My experience **Knowledge, skills, and attitudes**	**I don't have any experience doing this.**	**I know a little about this.**	**I have some experience doing this.**	**I have a lot of experience with this.**
Make selection of tools, materials, supplies, and equipment				
Select and use PPE in workplace according to workplace requirements				
Observe cleanliness, sanitization, waste collection, and disposal services during cleaning process				
Select tools, equipment, materials, and supplies to conduct cleaning and sanitization of the work area				
Clean and sanitize a food processing work area				
Collect and dispose waste in specialized facilities				

My experience Knowledge, skills, and attitudes	I don't have any experience doing this.	I know a little about this.	I have some experience doing this.	I have a lot of experience with this.
Follow code of conduct regarding food hygiene and safety practices				
Use the proper health and safety signs in checking them regularly in food processing, and explain their role in workplace area				
Respect health and safety rules, record observations, and follow-up for corrective action				

2. Complete the table below by identifying areas from the unit where you have improved and those that you need improvement with the actions/strategies you will use to help you improve.

Areas of strength	Areas of improvement	Actions to improve
1. **2.**	**1.** **2.**	**1.** **2.**

Unit 2: Compliance with good manufacturing practices

Topics

2.1 Establishing small scale design and facilities for processing unit

2.2 Assistance with production planning

2.3 Assistance with implementation standards operations procedures

2.4 Documentation and recording information

Unit Summary:

This unit describes the knowledge, skills, and attitudes required to comply with good manufacturing practices in food processing. By the end of this unit, you will be able to establish small scale design and facilities for processing unit, assist in production planning, assist in implementing standard operating procedures, document, and record information.

Self-Assessment: Unit 2

1. Look at the illustration. What do you see? What do you think this unit will be about? What topics might be covered?

2. Fill in the self-assessment below.

There are no right or wrong ways to answer this survey. It is for your own use during this course. Think about yourself: Do you think you can do this? How well? Read the statements across the top. Put a check (√) in column that best represents your situation. At the end of this unit, we'll take this survey again.

My experience **Knowledge, skills, and attitudes**	**I don't have any experience doing this.**	**I know a little about this.**	**I have some experience doing this.**	**I have a lot of experience with this.**	**I am confident in my ability to do this.**
Categorise raw materials and design packaging materials according to food products requirements					
Select food processing staff for a production line					
Use of tools, utensils, equipment and documentation records required according to food processing program					
Categorise raw materials and design packaging materials according to food products requirements					
Select food processing staff for a production line					
Use of tools, utensils, equipment and					

My experience Knowledge, skills, and attitudes	I don't have any experience doing this.	I know a little about this.	I have some experience doing this.	I have a lot of experience with this.	I am confident in my ability to do this.
documentation records required according to food processing program					
Apply food safety and sanitation practices in reference with health and safety requirements					
Process raw materials following the protocol and procedures of food processing standards					
Demonstrate packaging methods according to food processing procedure in reference with processed products requirements					
Maintain records to provide evidence of conformity with the GMP manual					
Make the listing of records traceable according to GMP manual.					
Report records to concerned personnel according to workplace procedures					

Topic 2.1: Establishing small scale design and facilities for processing unit

Getting Started: What do we know and where are we going?

Topic 2.1 Task 1:

Key Competencies:

Knowledge	Skills	Attitudes
1. List the requirements relating to the design and layout of food processing premises	**1.** Apply all necessary requirements relating to the design and layout of food processing premises	**1.** Attentive to detail
2. Describe participation in ordering construction equipment and materials according to environmental and food processing buildings quality standards	**2.** Participate in ordering construction equipment and materials according to environmental and food processing buildings quality standards	**2.** Cooperative
3. Define steps in monitoring design and building activities	**3.** Contribute in monitoring design and building activities	**3.** Meticulous

1. Look closely at the following illustrations.

2. Discuss the following questions with a partner:

a. What is the same and what is different in each illustration?

b. Based on what you have learned already about safety and hygiene standards, which one do you think might be better for upholding such standards? Why?

c. Do you notice anything missing from these facilities?

Facility 1

Facility 2

Facility 3

Problem Solving Activity

Topic 2.1 Task 2:

1. Form three groups and read the scenario together:

Mwiza, Muyango, and Kaneza are starter entrepreneurs interested in starting a new small-scale fruit and vegetable processing unit. They want to process juice from stinging nettle leaves, moringa leaves, alfalfa leaves, as well as wine from beetroots, bananas ripe strawberries, and ginger roots. Mwiza, Muyango, and Kaneza want to do the right thing by setting up their processing unit in compliance with manufacturing standards and regulations. Give them advice on how to do this.

2. With your group, discuss and respond to the following questions:

a. How should Mwiza, Muyango, and Kaneza identify the requirements related to the site location design, and layout? Where can they go to get information?

b. What general advice can you give them regarding the location of their processing unit?

c. Explain to Mwiza, Muyango, and Kaneza possible sources of contamination that they should be aware of as they start their facility.

3. Write your group's responses on a flipchart or white/blackboard. In your groups, choose one trainee to present and share your results with the other groups. Listen carefully to other groups and make comments.

4. Compare your answers with those of other groups. Do they have similar discoveries? Pay attention to your trainer's questions to help you to become familiar with establishment of small-scale design facilities for processing units.

5. As a class, read **2.1 Key Facts** and review the answers with your trainer.

2.1 Key Facts

- **Food processing facilities:** Establishments usually engaged in manufacturing, but do not provide foods directly to a consumer. They process raw fruits, vegetables, and meat into products that can be consumed by humans. Food processing facilities also package, label, and store the processed food.

- **Rwanda Standard Bureau (RSB):** Provides food processing and agriculture standards.

- **Rwanda Food and Drug Administration (RFDA):** Also has a mandate to regulate processed foods and provide technical assistance in small scale food processing operations. They provide registration of food processing premise suitability, licensing and product registration.

- **Criteria** for identifying and selecting the appropriate food processing facilities may include:
  - An appropriate location and hygienic building that prevents the entry of pests
  - Food manufacturing or processing and packaging premises are located away from sources of pollution like open drains, garbage yards, dense vegetation, and industries that emit fumes or gases.
  - No contamination from external sources such a odours, pest infestation (birds, rodents or insects), or dust from outside.

- **Sources of contamination:** Food processing facilities should be designed to minimize all sources of contamination. There are many ways for food processing to be contaminated.

- **Common contamination sources include:**
  - Presence of harmful chemicals, microorganisms, and harmful hazards in food or in food ingredients.
  - Pest: Includes insects, rodents, birds and bats that may contaminate human food. These pests may carry food-borne pathogens, or diseases. Their presence indicates poor sanitary conditions in the facility.
  - Pathogenic agent: In biology, a pathogen is anything that can produce diseases. A pathogen may also be referred to as an infectious agent.
  - Pollution: Open drains, garbage yards, industries that emit fumes or gases, and dense vegetation.
  - Open drains: Drains of dirty polluted liquid which are not insulated.
  - Garbage yards: An area for garbage collection.
  - Pest's infestation: The presence of pest in food area or the signs of their presence such as hard waste or urine.
  - Hygienic piping: Piping recommended materials should be smooth and non-absorbent as well as Non-toxic and easily cleanable
  - Lead or mercury and cardium: Toxic heavy metals which are not acceptable in food contact. Heavy metals are metals that have a relatively high density or a relatively high atomic weight. Heavy metals can be taken up by plants.
  - Physically durable materials for processing equipment should be:
    - Unbreakable and resistant to steam and moisture

- Resistant to cold or abrasion and chipping
- Easy to maintain

- **Other considerations for choosing site location:**
  - Reliable electricity.
  - Adequate supplies of potable water.
  - Low risk of contamination of supplies.
  - Access for workers and staff. Public transport and short distance down an access road.
  - Quality of the road. Dry season only and potholes that may cause damage to glass containers.
  - Processing area should not have direct access to any residential area.
  - Access to other facilities, such as schools and medical facilities, shops and entertainment that allow staff to relax after work.
  - Distance between the processing facilities and where raw materials are grown is important. It is best to avoid too much handling of raw materials, causing bruising and spoilage during transportation.[3]

Guided Practice Activity

Topic 2.1 Task 3:

1. Separate into four groups and visit several buildings in your community with your trainer to evaluate them as potential food processing facilities. The buildings may or may not be existing food processing facilities, but the goal is to collect observations about what would be needed to bring the buildings up to safety and hygiene standards.

2. Your group will be assigned one of the observation lists below. You will use it to evaluate the strengths and weaknesses of the building from inside and out. Consult **2.2 Key Facts** for ideas on what to look for.

3. Once the field visit is over, compile your group's observations for each building.

4. Summarise your group's observations for each worksite in writing.

[3] Fellows, P. (2004). *Small-scale fruit and vegetable processing and products*. United Nations Industrial Development Organization (UNIDO). https://www.unido.org/sites/default/files/2009-05/Small_scale_fruit_and_vegetable_processing_and_products_0.pdf

5. Finally, with your trainer and the rest of the class, choose the facility that was the most promising and work together to make a list of construction steps and installations which would bring this building up to safety and hygiene standards.

List 1:

Food Preparation	
1. Storage facilities	
2. Handling utensils, washing and dishwashing facilities	
3. Personal hygiene facilities	
4. Cool supply facilities	
5. Others specific facilities	

List 2:

Waste	
1. Waste and dangerous substances	
2. Water facilities	
3. Cleaning facilities and water	
4. Personnel changing and washing facilities	

List 3:

Layout	
1. Site and location	
2. Spatial planning	
3. Flow of work	

4. The structure	

List 4:

Internal Design and Layout	
1. Windows	
2. Adequate safe working space	
3. Lighting and ventilation	
4. Facilities for monitoring food operations	

2.2 Key Facts

- **Simple layout for a food processing factory:**
  - Storage room for fresh produce
  - Processing room
  - Storage room for processed produce and equipment
  - Quality testing room
  - Reception area
  - Waste treatment area
  - Office

- **Outside the food production area:**
  - Layout and design of the food production unit should be unidirectional (one-way direction).
  - At one end, the materials are received and at the other, the final product leaves the processing facility.
  - This prevents backward flow of materials during processing, which can result in cross contamination.
  - Premises should be tarred and concrete to avoid dust contamination.
  - Entrance should be clean and visible with clearly defined walkways.

- **Floors:**
  - Floors should have adequate and proper drainage with appropriate slope.

- They should be easy to clean and disinfect.
- Drainage should flow in a direction opposite to the direction of food preparation area to avoid contamination.
- Drains should be covered to prevent insects and rodents from entering in the processing area.

- **Ceilings and walls**:
  - Made of impervious (waterproof) material and smooth.
  - Easy to clean with no flaking paint or plaster.
  - Maintained in a sound condition to minimize accumulation of dirt.
  - Minimal condensation to prevent growth of moulds.
  - No cracks, which are areas with damage that can allow bacteria and moulds to accumulate.

- **Doors**:
  - Made of smooth non-absorbent surfaces.
  - Easy to clean and disinfected.
  - Doors that can be fitted with automatic opening and closing functions are optimal.

- **Lighting:**
  - Should be adequate in the areas where preparation, handling, and processing occurs.
  - Good lighting is especially important when storing food products that are made of small particles such as:
    - Flour or sugar
    - Dairy-based products
    - Spices
    - Bakery ingredients
    - Dry fruits
    - Cereals and grains
    - Oilseed and refined oil

- **Equipment and tools:** Be aware of the quality of certain equipment and tools for food processing to make sure they do not negatively affect food product.
  - Scoops or spoons and cooking vessels
  - Containers or tanks and silos
  - Hoppers and pipes
  - Packaging machines and filters that come into contact with food

- **All food contact surfaces should be:**
  - Made up of non-corrosive and rust-free material. Food-grade stainless steel or galvanized iron material is preferred.
  - Smooth and free from any grooves and easy to clean or maintain.
  - Non-toxic.[4]

- **Other structural considerations:**
  - Grooves: Spaces that are not smooth on equipment or surfaces. These should be avoided because bits of food can become trapped and rot.
  - Mesh in windows: To prevent pest entry.
  - Flaking paint: Abnormalities of paint on the surface can create hazards.
  - Harbourage: The term used for large amounts of vegetation that creates a shelter for rodents or other pests. Thus, grooming the area surrounding the facility is essential.

Application Activity

Topic 2.1 Task 4:

1. Using the list you made about construction steps in the previous activity, your class will interact with an staff member from RSB or a local construction authority.

2. Ask the representative questions about the following aspects of the construction process:
   a. Prices of materials
   b. Specifications
   c. Suppliers
   d. Transporters
   e. Taxation

3. With your group, brainstorm a list of questions to ask the representative.

4. Record the information provided by the RSB staff or other representative. Using this information, estimate the price and which suppliers to use.

5. Use this opportunity to ask any other questions you may have about building regulations and codes for food processing facilities

[4] Food Safety & Standards Authority of India. (n.d.). *Training manual food safety supervisor course advance (level 2) manufacturing*. https://archive.fssai.gov.in/dam/jcr:4ad6a61c-b0c3-4210-9059-45d8b32dd222/Draft_Advanced_Manufacturing_Manual_08_11_2017.pdf

6. By the end of the activity, you should know what kinds of construction equipment and materials are needed to place an order according to environmental and food processing buildings quality standards.

Points to Remember

- Never forget the impact of appropriate location of food processing building.
- Rwanda Standard Bureau (RSB) is a national regulating body providing building standards for food processing and agriculture.
- Rwanda Food and Drug Administration (RFDA) is responsible for registration of food processing premise suitability, licensing, and product registration.

Formative Assessment

Part I: Formative Evidence

Read the following carefully and choose ONE best answer.

1. Which of these is a correct consideration for choosing a land site?
   a. The most important is the land, products, clients, and the potential to get rich in a short period of time, even if it surrounded with pollution there is no problem.
   b. The distance between the processing cite and the source of raw materials is not big deal.
   c. Appropriate site should be that prevents the entry of pests, Should be located away from sources of Pollution, be near reliable electricity, on short distance down an access road, near the good quality of the road, have access to other facilities.
   d. The cheaper site located in the countryside even if no water, no electricity, or road can be available there, that advantage is the highest requirement to consider.

2. When ordering construction equipment and materials according to environmental and food processing buildings quality standards it is important to consider which of the following:
   a. The cheapest materials should be the first priority over quality and safety.
   b. The size of space and the size and number of building needed, the start-up capital as investment conditions, collecting and considering information regarding equipment and materials

c. Consideration of reserving enough money for buying and expensive beautiful car for the CEO to avoid being overlooked by the people and defend his respect in the society.

d. Consideration of cheaper contractors who will not go into details in analysing the effects of environment to the buildings and their purpose of use, to avoid extra cost.

Determine if the following are True or False.

The following government regulatory bodies have a close relationship with food processing sector in Rwanda:

3. Rwanda Standard Board (RSB)
4. Rwanda Social Security Board (RSSB)
5. Rwanda Investigation Bureau (RIB)
6. Rwanda Food and Drug Administration (RFDA)

Part II: Performance Evidence

Bugabo has a project to establish small-scale food premises facilities and wants to implement the layout phase of the project. As a food safety and GMP technician, you are requested to contribute to his monitoring design and building activities. He also asks you to participate in setting and installing heavy and light equipment in the workplace. The space has 625 m^2 (square metres 25 m x 25 m). This task must be performed within 4 months. The experts and staff are present, the materials are in the warehouse, and the other facilities you will need are available.

Topic 2.2 Assistance with production planning

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify raw materials and design packaging materials according to food products requirements	**1.** Categorise raw materials and design packaging materials according to food products requirements	**1.** Detail-oriented
2. Describe the appropriate food processing staff for a production line	**2.** Select food processing staff for a production line	**2.** Diligent
3. Describe the tools, utensils, equipment and document records required according to food processing program	**3.** Use of tools, utensils, equipment and documentation records required according to food processing program	**3.** Methodical

Getting Started: What do we know and where are we going?

Topic 2.2 Task 1:

1. Observe the images provided.

2. With a partner, discuss the following questions:

a. What happening in each image?

b. Have you ever seen something similar to this in your community?

c. How might these illustrations be related to food processing?

d. If you had to guess which step might come first and last?

3. Review the learning outcomes and Key Competencies table together.

Figure 1

Figure 2

Figure 3

Figure 4

Problem Solving Activity

Topic 2.2 Task 2:

1. Read the following scenario with your group:

Mwiza, Muyango, and Kaneza have built their food processing facilities according to your recommendations. However, they are faced with a new problem: They do not have any workers nor raw, unprocessed food to start production with. They need your help!

2. Then, discuss the following questions with your group:

a. What problems might occur if Mwiza, Muyango, and Kaneza take in raw food, materials, or produce without procedures in place?

b. What kinds of tasks and processes need to occur on a food production line to make food products?

c. Which of these tasks could be done by one person and which might need more than one person?

d. How should Mwiza, Muyango, and Kaneza go about staffing their factory?

e. How could sanitation and hygiene be related to this situation?

3. Share and compare your responses with the rest of the class.

4. Read and discuss **2.3 Key Facts**. Use the information give to supplement your answers.

2.3 Key Facts

- **Raw materials:**
  - Ingredients
  - Processing aids
  - Packaging materials

- **Considerations for receiving and identifying raw materials**:
  - Name of the product and the supplier's item number
  - Components or composition of the material
  - Presence of regulated or customer-recognized food allergens
  - Organoleptic information
  - Microbiological information/any risks for contamination
  - Shipping and storage information—Where is the raw food coming or going?
  - Shelf life—How long the raw food can last for?
  - Handling directions[5]

- **Distinguishing between raw materials:**
  - General for commodity-type products
  - Products with a standard of identity, such as salt or granulated sugar

- **Material-specific name:** The supplier may assign the name or number when the item is a unique or proprietary material, such as with most flavours.

[5] Amsbary, R. (2013, June 12). *Raw materials: Selection, specifications, and certificate of analysis*. Quality Assurance & Food Safety. https://www.qualityassurancemag.com/article/aib0613-raw-materials-requirements/

- **Item number**: The number assigned to the purchased item in order to track materials within the buyer's system.

- **Food Allergens indication**: Written confirmation of the presence or absence of the products, which can cause allergies.

- **Information included in descriptions:**
  - **Organoleptic Information:** Characteristics that are confirmed by testing with human senses, including visual appearance, aroma, and flavour.
    Example: Red liquid (visual)

  - **Analytical Information:** Analytical characteristics that typically require testing with instruments rather than one's senses.[6]
    Example: Number calories from a calorimeter

- **Steps for receiving raw produce or materials in food processing**:
  - Check the origin
  - Evaluate the quality of the raw material
  - Pay the farmer/seller according to the quality

- **Evaluation criteria for fruits**:
  - Appearance
  - Content of ascorbic acid
  - Sugar or fungicide
  - Insecticide residue content is a special and difficult task because, in many cases, the small-scale food processing may not have appropriate devices for testing some elements mentioned above.
  - Sensory evaluation and other simple tests are needed when receiving the raw materials for processing.

- **Nature of the products**: Type of the products to be processed may include meat, milk, cereals, tubers, tea, coffee, fruits, vegetables, seeds, or spices.

- **Quality parameters of food:** Attributes of fruits and vegetables such as appearance, colour, aroma, taste drive the decision of consumers to buy a product

- **Inventory of stocks**: Record stock at every stage of the production process, from purchase and delivery to using and re-ordering.

[6] Amsbary, R. (2013, June 12). *Raw materials: Selection, specifications, and certificate of analysis*. Quality Assurance & Food Safety. https://www.qualityassurancemag.com/article/aib0613-raw-materials-requirements/

- **The field number**: The specific number to locate the supplier of raw materials.

- **Harvest crew**: Custom harvesters usually work for the same farms every harvest season.

- **Utensils**: Equipment that is used in the preparation, processing, service, storage and dispensing of food. It does not include tabletops, counter tops, or similar working surfaces.

- **Weighing equipment**: A device to measure weight or mass, such as a weighing scale or weighing balance.

- **Produce:** cultivated plants and crops; aquaculture; dairy; livestock; poultry; bee; or other farm products.

- **First in first out (FIFO) policy**: An effective food rotation system in which the first lot of product received is used up before using lots received after it on later dates.

- **Washing raw material**:
  - Water temperature range: 0-5^{o}C
  - Water pH: 4.5-5.5
  - Chlorine concentration: 50-100 ppm

Staff on a production line

- For managing raw material:
  - Receiver: Takes in unprocessed food/materials
  - Sorter/grader: Separates desirable produce from undesirable produce
  - Storekeeper: Keeps records of incoming and outgoing loads in raw storage

- For processing line:
  - General labourer: Does general work and tasks related to the production line
  - Machine operators: Runs machines to process food
  - Packagers: Packages processed food
  - Production supervisor: Oversees operation of the line to ensure it continues running without stopping or lapses in quality

- For laboratory activities:
  - Sampler: Does rudimentary tests of processed and unprocessed foods
  - Laboratory technician: Performs quality control of processed food

- Laboratory technician assistant: Prepares work for laboratory technician
- Laboratory manager: Oversees operations in the laboratory

- For storage of processed products/end products:
  - Storekeeper: Keeps records of incoming and outgoing loads in processed storage

- For transport:
  - Logistics worker: Coordinates between storage workers and drivers for loading and unloading products
  - Driver: Transports goods

- For documentation and records:
  - Record keeper: Responsible for maintaining all records

Guided Practice Activity

Topic 2.2 Task 3:

1. Review the illustrations (A-H). These images show the entire workflow of fruits being processed, from the receiving point to the finished products are out for order.

2. With a partner, identify the corresponding tasks for each image and write them in the box.

3. Then, determine the order of the tasks. Write the letters for each task in the correct sequence below. The first letter and task name have been provided as an example.

Order: H,

A

Processing task:

_____

B

Processing task:

_____

C

Processing task:

_____

D

Processing task:

_____

E

Processing task:

_____

F

Processing task:

_____

G

Processing task:

_____

H

Processing task:

Receiving produce

4. Next, your trainer will provide you with outlines of other workflows. With your group, draw out (sketch) each task in the workflow similar to the previous activity.

5. Cut the sketches out so that they can be rearranged and have another group try to put them in the correct order.

6. Review the workflows for the different products together. Then read the information in **2.4 Key Facts**.

2.4 Key Facts

- **Types of processing:**
  - **Trim:** To cut and remove selected parts of a fruit
  - **Chop**: To cut into small bits
  - **Slice:** To cut a thin, broad piece from a larger portion
  - **Shred**: To cut into small linear parts
  - **Peel:** To remove the outer covering or skin from a fruit or vegetable
  - **Dice**: To cut into very small pieces
  - **Section**: To divide by cutting
  - **Chopping board**: A board on which vegetables and other types of food are chopped
  - **Minimal handling**: Minimising contact of food materials with hands or equipment
  - **Dip**: To immerse in a solution of an acidulant/antioxidant
  - **Dry**: To remove excess water from processed products
  - **Sorting for defects**: To remove defects or damaged products

- **Good Hygienic Practices (GHP)**: The basic rules for clean and healthy practices must be incorporated at all stages of the processing work line:
  - Handling
  - Storage
  - Processing
  - Distribution
  - Final preparation of all food along the food production chain

- **Product Labelling**: Any legend, word, ticket, tag, sign or mark attached to, included in, belonging to, or accompanying any food or food package.

- **Batch Number or Lot Number**:
  - A distinct identification code for each product or batch
  - Alpha-numeric: A distinctive combination of letters and numbers
  - Assigned to a specific identifiable batch/lot of production for traceability
  - Usually on each individual container

- **Record:** Documented evidence that a specific action or procedure has been performed. The information that results from documenting an action or procedure.

- **Record Keeping:** A process of filling in forms to provide proof that policies are being followed or activities are being performed. It demonstrates that processes and procedures are being conducted properly.

- **Records and documents required**:
  - Major equipment
  - Tools
  - Materials
  - Utensils
  - Use records
  - Production instructions records
  - Production formulations and control records

- **Consideration for packaging materials:**
  - Technical requirements of the products
  - Protection of food products from outside influences containing the food
  - Ingredients and nutritional information
  - Traceability
  - Design for promotional and marketing
  - Relative cost

- Availability

- **Materials used in food packaging:**
  - Glass
  - Metals
  - Paper
  - Plastics (see RSB standards)

Application Activity

Topic 2.2 Task 4:

1. You will now do a field visit to a small-scale soy and tofu processing facility. You will have the opportunity to work with an experienced team at the processing unit.

2. With your assigned group, make an observation checklist and complete the following tasks:

a. List the equipment, tools, utensils, supplies, and raw materials used.

b. Explain how the staff identifies, sorts, stores, and grades the incoming raw food or materials.

c. List each staff member and briefly describe their tasks. If there are more than 20 staff in the company, then focus on the staff working on the production line.

d. Take notes on the design of the packaging materials. What information is included? Be sure to ask why!

e. Observe how documents are recorded and kept for food processing program.

f. Be prepared to share your answers.

3. After the field visit, share your responses and discuss your experiences.

Points to Remember

- First in First Out (FIFO) is an effective food rotation system in which the first lot of product received is used up before using those received at later dates.

- The basic rules for clean and healthy practices, known as Good Hygiene Practices (GHP), must be incorporated at all stages of the processing work line.

Formative Assessment

Part I: Formative Evidence

Read the questions closely and select the correct answer.

1. Which of the following statements indicates the specification conditions needed to identify the raw materials for food processing?
   a. Your product idea, market research, business planning, business insurance, and regulations food safety.
   b. Applicable workplace cleaning plan and the type of raw materials to remove during cleaning, and the type of products to be processed after cleaning.
   c. The name of the product and the supplier's item number, the composition of the material, the presence of regulated or customer-recognized food allergens, and organoleptic information.
   d. Consideration of tourists and expatriates, restaurants and snack bars, other food processing companies, and people living in rural areas with low-to-average incomes.

2. Which of the following statements shows the proper practices for food processing employees?
   a. Employees should wear personal belongings and eat anything during the production process.
   b. Employees should wear a coverall suit, white boots, sodium hypochlorite, and hydrochloride. They should receive phone calls during production operations.
   c. Employees should wear appropriate gloves and protective clothing, including aprons and hair nets.
   d. Employees should not change gloves when they touch their bodies nor wash their hands after visiting the toilet. They should not report minor illnesses like a common cold or skin boils.

Determine if the following statements are appropriate for a food processing area according to standard operating procedures. Write **True** if they are appropriate and **False** if they are not appropriate.

3. Production planning has no connection to a food safety plan.

4. Identification of raw materials should be done according to standard specifications.

5. Records are useless operations in the food processing workflow.

Part II: Performance Evidence

Bana is a young entrepreneur in Ruhango District. He has been selected by the district's Youth Empowerment Community as the best innovative young entrepreneur and received financial support for setting up a small-scale potato processing operation. He wants his business to comply with food safety guidelines.

As a food safety technician, Bana needs your support in production planning, especially in the identification, selection, and use of tools and equipment in the production line. This task must be performed in a small food processing area of 49 m^2 with eight processing points. This task should be performed within 2 hours according to proper food processing procedures.

Topic 2.3: Assistance with implementation of standard operation procedures

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify the application of food safety and sanitation practices in reference with health and safety requirements	**1.** Apply food safety and sanitation practices in reference with health and safety requirements	**1.** Attention to detail
2. Describe, the processing of raw materials following protocol and procedures	**2.** Process raw materials following the protocol and procedures of food processing standards	**2.** Confident
3. Define the packaging methods according to food processing procedure in reference with processed products requirements	**3.** Demonstrate packaging methods according to food processing procedure in reference with processed products requirements	**3.** Detail-oriented

Getting Started: What do we know and where are we going?

Topic 2.3 Task 1:

1. Briefly review the previous topic with the trainer. Then, review and discuss the statement provided. Try to apply your prior knowledge and experience.

Knowledge with skills is like refined silver, but when connected to the law, rules, and standards, they yield a pure shining gold mixed with diamond.

2. Describe what the statement means to you. Can you relate or give an example of this situation from your own life?

3. Volunteer to share your answers and discuss them as a class. How do you think this situation could link to your professional life and this unit?

4. Review the learning outcomes and the Key Competencies table for this topic.

Problem Solving Activity

Topic 2.3 Task 2:

1. Read the following scenario:

Mwiza, Muyango, and Kaneza have staffed their entire production line, but realised that some of them have never had any experience processing raw food. They need to create a training program for their workers to avoid contamination and prevent future customers from becoming sick due to poor quality products.

2. Think back to the last scenario with Mwiza, Muyango, and Kaneza when you helped identify the steps of food safety and sanitation practices and apply it to their production line. This time, give them advice by answering the following questions:

a. What should they consider before the processing of raw materials in order to follow hygiene and safety protocols and procedures?

b. What packaging methods would be appropriate to use?

c. How should they properly store and organise their finished products according to the product's requirements?

3. After discussing, write your group's responses on the flipchart/board. Choose a presenter to share your findings with the rest of the class. Listen carefully and provide comments after each presentation.

4. After all groups have presented, compare your answers. Do you have similar responses and ideas?

5. Finally, review the correct answers together by reading **2.5 Key Facts**.

2.5 Key Facts

- **Standard Operating Procedures (SOPs)**
  - Procedures/specifications for controlling a food operation and ensuring a safe and high-quality food product.
  - Should already be in place as a prerequisite before an HACCP plan is implemented
  - For example, an SOP might describe how to safely process milk and milk products, or meat, or fruit products

- Should provide all appropriate information so that an employee with some knowledge of the area, equipment, and tools can read and perform the tasks both safely and effectively.

- **SOP Format**:
  1. **Title Page:** Identifies the procedure name number, date of issue and/or revision and the name of the applicable plant, division and department to which the SOP applies.
  2. **Table of Contents:** Helpful for quick reference and location of specific information, changes, or updates.
  3. **Purpose**: Describes the intention or reason for the SOP.
  4. **Definitions**: Includes a list of terms, phrases, words, or acronyms and their applicable meanings.
  5. **Materials:** List the materials, equipment, checklists, and supporting documents required to complete the task.
  6. **Safety Warning**: List any personal injury warnings, such as working in a confined space.
  7. **Procedures**: Each process, task, or step to be taken in sequence will be listed in this section. One SOP document may contain several procedures for multiple processes or sub processes.
  8. **Training**: List the training requirements for the SOP as well as the frequency of training.
  9. **Documentation**: Identify the forms to be used and reports to be written, as well as the data and record storage location and duration.

- **Food Safety and Sanitation Practices**
  - **Cleaning procedures and schedules:** A written schedule or process used to describe all items which must be cleaned and freed of soil, food residues, dirt, grease and other undesirable debris.
  - **Routine equipment maintenance:** Daily maintenance of equipment (more details will be discussed in Unit 3).
  - **Personal hygiene practices:** Personal hygiene is critical to food safety. The behaviour that food handlers need to practice ensure that they do not contaminate the food or cause an outbreak of food poisoning.
  - **Handwashing:** A mandatory practice to prevent food contamination in food processing area.
  - **Garbage and pest control**: Managing disposed waste to prevent pest infestation, invasion, or infiltration.
  - **Hazard Analysis Critical Control Point (HACCP):** A system which identifies, evaluates, and controls hazards that are significant for food safety.

Guided Practice Activity

Topic 2.3 Task 3:

1. With a small group, write a Standard Operating Procedure (SOP) for one of the food products that you have observed so far in this module.

2. You may pick any food product. First, agree on the product and specific processing task.

3. Then, think back in greater detail to your experiences during field visits and brainstorm all the relevant information that should be included.

4. Follow the format provided to ensure that the SOP is easily readable and that you do not forget any important steps. You will need to write the SOP on a separate piece of paper.

Title:
Table of Contents:
Purpose:
Definitions:
Staff Responsibilities
Materials:
Safety Warnings:
Procedures:
Training:
Documentation:

5. Refer to **2.5** and **2.6 Key Facts** for useful guidance and information. Be prepared to share your answers.

6. After all groups have completed the activity, share your SOP and listen closely to other groups while they present.

2.6 Key Facts

- **Steps and conditions for processing of raw materials:**
  - **Compliance**: Standard Operating Procedure (SOP) and Good Manufacturing Practice (GMP)
  - **Personal hygiene**: A recommended practice in food processing to comply with SOP or food safety and GMP as discussed in the previous topics.

- **Product preparation for processing**: A key practice in food processing to comply with good manufacturing practices for safety and quality products.
- **Processing flowchart or diagram**: A graphical illustration detailing the sequence of operations or steps involved with a particular food product or process, usually in the form of a receipt of raw materials for preparation, processing packaging, labelling, storing, and shipping to the final consumers.

- **Storage conditions:**
  - Prepare storage area for processed food products
  - Identify types of storage methods for processed products
  - Consider storage methods criteria for storing processed food products
  - Arrange food products in store according to processed food nature and storing conditions

- **Storage record keeping protocol:**
  - Document the types of the stored products
  - Record stored food temperature
  - Record dates of entry for store management
  - Record damaged products
  - Record stock rotation

Application Activity

Topic 2.3 Task 4:

1. You will now go on a field visit to a local business where a small-scale entrepreneur processes sugar cane into gur (jiggery) and brown sugar.

2. In small groups, your task is to engage with food processing procedures. Your group should perform the following:

a. Identify the food safety and sanitation practices in accordance with health and safety requirements.

b. Classify the conditions to consider before the processing raw materials.

c. Demonstrate how to process raw materials according to food processing protocols.

d. Illustrate the packaging methods used.

e. Indicate the proper storage methods used.

3. Record any difficulties or challenges your group encountered.

4. At end of the activity, share and discuss your answers with the class. Compare your observations with the information in **2.5 and 2.6 Key Facts.**

Points to Remember

- Remember to establish and enforce basic Standard Operating Procedures (SOPs).
- Remember to follow the specific food packaging protocol while packaging the processed food products.

Formative Assessment

Part I: Formative Evidence

Determine if the following statements refer to correct food safety and sanitation practices considering health and safety requirements. Write True **if the statements are correct and** False **if they are incorrect.**

1. Cleaning procedures and schedules are not a must for applying food safety**.**

2. Appropriate use of tools and multi service utensils cleaning and sanitizing. procedures.

3. Routine equipment maintenance and personal hygiene are not applicable practices in small scale food processing.

4. Hand washing program, garbage and pest control are not important to prevent cross contamination and food hazards in food processing.

Circle ONE correct answer for each question.

5. Which of the following is NOT included in the packaging procedures for processed food products?
   - **a.** Selection of packaging materials is mandatory
   - **b.** Package any way depending on the products processed
   - **c.** Preparation of packaging materials is recommended
   - **d.** Package the processed products according to processed products packaging procedures

6. Which of the following statements does NOT indicate an example of proper storage record keeping?

a. Records of stored food temperature condition.
b. Records of dates of entry for store management.
c. Records of damaged vehicles for products transport to the farm.
d. Records of stock rotation.

Part II: Performance Evidence

Mageza is a young entrepreneur who has started small-scale fresh banana processing unit in Ngoma District. He wants to implement food safety and basic Standard Operating Procedures at his processing unit.

As a basic food safety and basic GMP technician, you are requested to contribute to the basic standard operating procedures for processing dry banana products (bread) in a food processing area of 64 m^2 (8 x 8 m). This activity must be performed within 1 hour. The staff, equipment, materials, and other facilities you will need are available.

Topic 2.4: Documentation and recording of information

Key Competencies:

Knowledge	Skills	Attitudes
1. Define the maintenance of all records to provide evidence of conformity in accordance with GMP manual	**1.** Maintain records to provide evidence of conformity with the GMP manual	**1.** Attention to detail
2. Describe the listing of records traceability according to GMP manual	**2.** Make the listing of records traceable according to GMP manual	**2.** Confident
3. Identify reporting records to concerning personnel according to workplace procedures	**3.** Report records to concerned personnel according to workplace procedures	**3.** Detail-oriented

Getting Started: What do we know and where are we going?

Topic 2.4 Task 1:

1. Briefly review the last topic. Then, read this Latin proverb translated to English.

"Spoken words fly away, written words remain."

2. Describe what the proverb means to you.

a. What is the content of the proverb?

b. How does it apply to your own life?

c. Have you ever experienced or heard of a similar situation reflected by the proverb?

3. Volunteer to share your ideas. Discuss them as a class.

4. Review the learning outcome and the Key Competencies table for this learning outcome.

Problem Solving Activity

Topic 2.4 Task 2:

1. With a partner, read the following scenario:

Mwiza, Muyango, and Kaneza have started processing activities with good results and high consumer satisfaction. However, now they have a serious problem of unexplained loss of money and raw food. Kaneza suspects it is due to lack of appropriate documentation, record keeping, and reporting. They want to correct this problem to stop their processing unit from operating at a loss.

2. With your partner, discuss the questions. Write your answers on a common flipchart or white/blackboard, if available, at the front of the class.

a. How should they begin maintaining records to enforce conformity in accordance with GMP?

b. What should the keep records of?

c. How should they list records so that traceability can happen?

d. How should they report records to relevant personnel according to workplace procedures?

3. Share and compare your answers. How are they similar? How are they different? Follow the trainer's guidance to become familiar with the documentation of information records.

2.7 Key Facts

- **Records:** Evidence, written in books or other forms, used to provide information about a working food safety program or HACCP system and its prerequisites. Record keeping in food processing is a recommended practice critical to monitoring and maintaining an effective food safety program.

  Examples:
  - Respect of some food recommended processing temperatures
  - Raw materials delivery conditions
  - Food processing area cleaning records

- **Records should include**:
  - Evidence that the organization program has been implemented effectively.
  - Evidence that the facility is following the program.
  - Evidence that employees have been trained properly.
  - Evidence that management is committed to food safety.
  - Ability to identify trends and opportunities for improvement.

- **Records Inventory**: System to check that all records are in their appropriate place

- **Organization electronic records:** Records kept in electronic devices, such as CDs, hard discs, DVDs, and others.

- **Records disposal**: Keep expired records in the appropriate area.

- **Secure document storage**: Keep documents in the storage with assurance that they cannot be easily damaged or stolen.

- **Traceability records**: A procedure describing the mandatory documents and records a food processing must have in order to prove that they comply with good manufacturing practices.
  Include:
  - Company/business documents (quality manual)
  - Policies documents
  - Standard operating procedures documents
  - Batch records
  - Test methods records

- **Records vs. Documents:**
  - **Document:**
    - A set of procedures
    - Permanent
    - Describe facility policies and work instructions
    - Define systems or processes and procedures

  - **Record:**
    - Proof of completed actions
    - Filled in as activity occurs.
    - Provide proof that policies were followed, or activities performed.
    - Demonstrate processes and procedures are being conducted as required.

- **How to complete documents**
  - **Keep it short and simple:** Use bullet points and flow diagrams instead of long sentences and lengthy paragraphs.
  - **Clear content:** Step-by-step instructions are easily understood.
  - **Use a standardised, consistent format:** Even if different programs may need different documents and records, using a related method helps staff learn quickly

Guided Practice Activity

Topic 2.4 Task 3:

1. Separate into groups of three.

2. Carefully read through the examples of various record keeping forms.

3. With your group, you must evaluate the forms according to the following points:
   a. Do they include organization and reporting records?

   b. Are they standard operating procedure documents?

   c. Do they serve to provide evidence of conformity in accordance with the GMP manual?

   d. Do they allow for traceability according to GMP manual?

   e. Do they record reporting to concerned personnel according to workplace procedures?

4. Review **2.8 Key Facts** together and use the information to help you answer the questions above.

2.8 Key Facts

- **Traceability:** The ability to track any food through all stages of production, processing, and distribution.
  - Movement of products can be traced or followed one step backwards and one step forward in the supply chain.
    - One step backwards example: What came to the processing unit from other sources, such as raw materials from farmers

    - One step forward example: What went from the processing unit to other destinations like processed finished products to clients.[7]
  - Examples:
    - Supply records
    - Material records
    - Products records

- **Specification Records:**
  - Ingredient lists
  - Organic certifications for ingredients
  - Chemical formulas used
  - Details of temperature settings used for heating and cooling

- **Logbooks**:
  - Mandatory records expected to be in food processing to provide information about the following:
    - Operating: Records taken by operators during food processing activities.
    - Maintenance: Records providing all types of maintenance done on equipment.
    - Calibration: Records stating equipment and tools calibration history for accuracy.

- **Reporting records to concerned personnel:**
  - Mandatory practice for food processing to comply with good manufacturing practices.
  - Procedure:
    - Identify the roles and responsibilities of all personnel working in the organization.
    - Verbally report to a supervisor
    - Complete a report form
    - Raise the issue at a staff meeting

[7] Food Standards Australia & New Zealand. (2017, January). *Food traceability*. https://www.foodstandards.gov.au/industry/safetystandards/traceability/pages/default.aspx

Application Activity

Topic 2.4 Task 4:

1. Form small groups and get ready for fieldwork at a local business where an entrepreneur has a small-scale cheese processing unit.

2. Visit the cheese processing unit as a class.

3. With your group, perform the following tasks:
   a. Identify all records kept as evidence of conformity in accordance with the GMP manual.

   b. Carefully note how the records are kept and tracked in live time, such as during food processing.

   c. Grade records of traceability according to the GMP manual.

   d. Write a brief report of records according to workplace procedures to share with your trainer

4. At the end of the practical activity, share your group's answers with the rest of the class.

5. Listen closely while the trainer clarifies any questions and misunderstandings while highlighting important insights that arise in the share session.

Points to Remember

- Maintaining records as evidence for conformity to standards is mandatory in every food processing area.

- Records of materials, supplies, and products specifications are examples of traceability records to be maintained.

- The procedure of reporting records to concerned personnel should always be followed in food processing area.

Formative Assessment

Part I: Formative Evidence

Read the following questions carefully and circle the best answer for each one.

1. What is an appropriate way of securing and deposting of recorded documents?
   a. Organization program with filing of records.
   b. Review of record's inventory of cars in the parking of food processing premises.
   c. Organization's electronic records of food eaten by staff in a year at their homes

2. Which of the following elements should be included in logbooks of the production area to allow for tractability?

   a. Supply of equipment spare parts records
   b. Operating records
   c. Walls of the production area maintenance records.
   d. Calibration records of food processing 's fuel equipment.

3. Which of the following does SOP stand for?
   a. Society of Paints for food processing equipment
   b. Standard Operating Procedures
   c. Standard Outcomes Papers

4. Which of the following does GMP stand for?
   a. Good Manufacturing Planning
   b. Good Manufacturing Practices
   c. Guidance for Manufacturing Personnel

Part II: Performance Evidence

Munezero is a young entrepreneur in Nyamasheke District in Nyabitekeri Sector. He has a small-scale fish processing unit and wants to comply with good manufacturing practices in his unit. You are requested to assist him with documenting and recording all information recommended to be maintained in order to comply with good manufacturing practices. This activity must be performed within 45 minutes.

Self-Reflection

1. You have come to the end of the unit. You are going to do the survey you did at the beginning of the unit again to help you do self-assessment of your knowledge, skills and attitudes.

Again, there are no right or wrong answers to this survey. It is for your own use to gauge your knowledge, skills and attitudes after the unit. Read the Knowledge, skill or attitude in the left column. Think about yourself: do you think you can do this? How well? Read the statements across the top. Put a check in column that best represents your situation

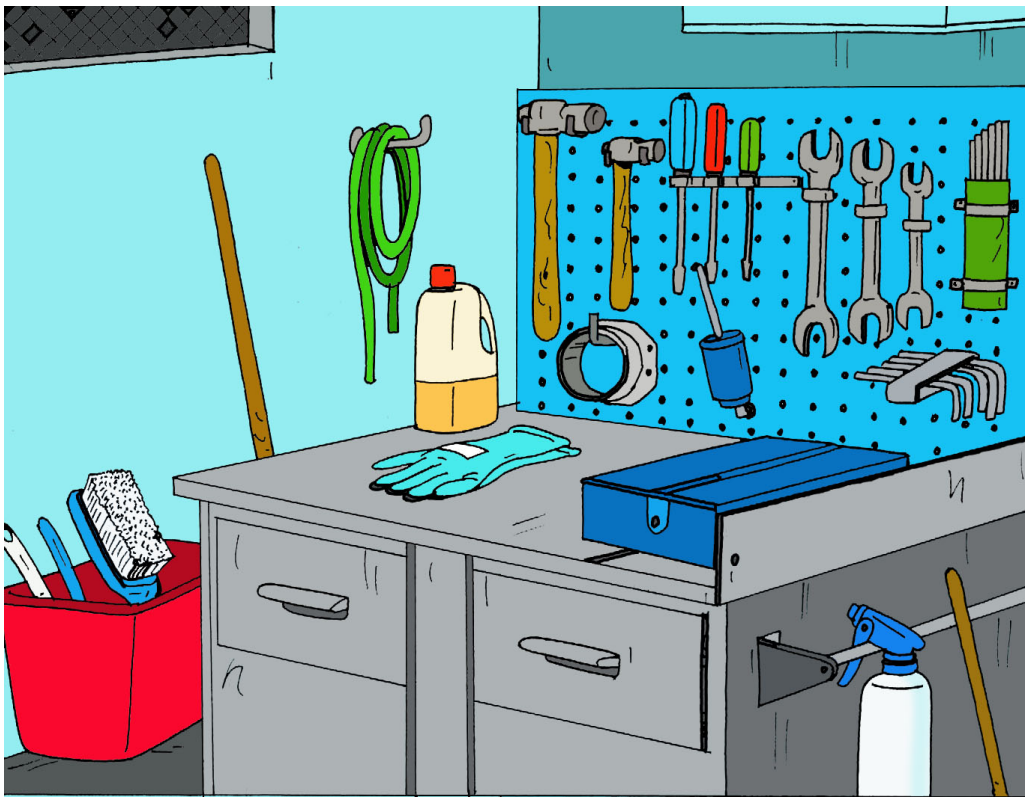
My experience **Knowledge, skills, and attitudes**	**I don't have any experience doing this.**	**I know a little about this.**	**I have some experience doing this.**	**I have a lot of experience with this.**	**I am confident in my ability to do this.**
Categorise raw materials and design packaging materials according to food products requirements					
Select food processing staff for a production line					
Use of tools, utensils, equipment and documentation records required according to food processing program					
Categorise raw materials and design packaging materials according to food products requirements					
Select food processing staff for a production line					

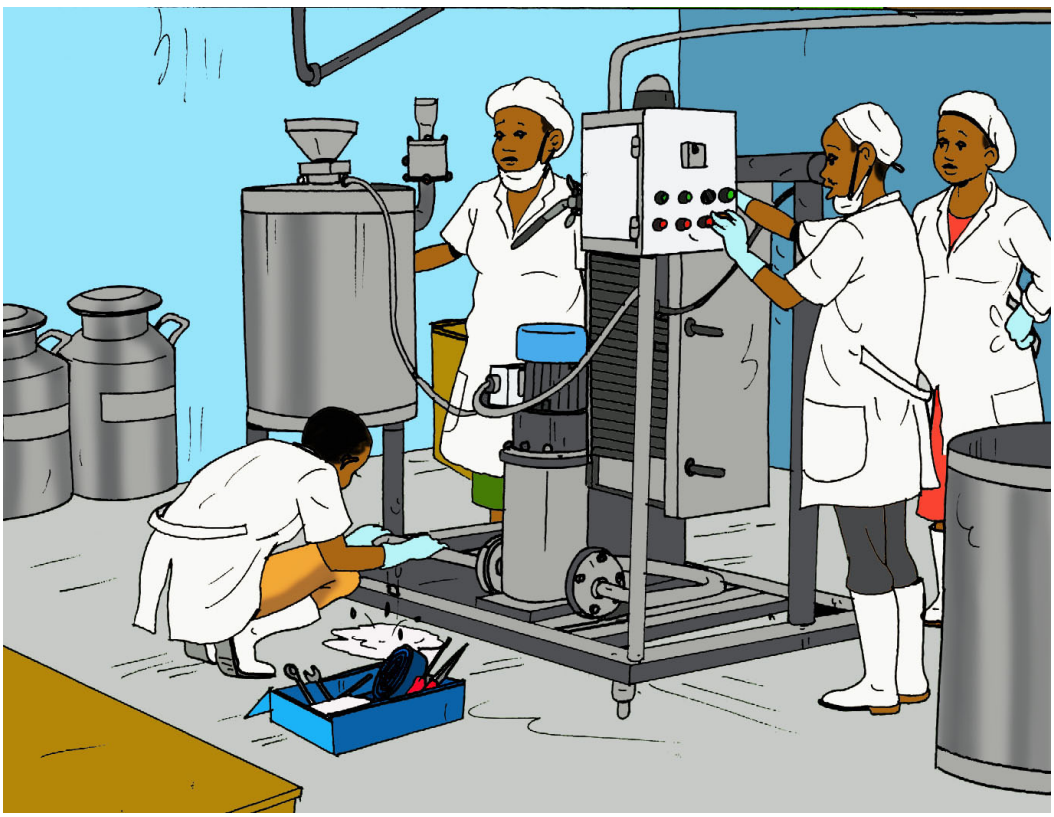
My experience Knowledge, skills, and attitudes	I don't have any experience doing this.	I know a little about this.	I have some experience doing this.	I have a lot of experience with this.	I am confident in my ability to do this.
Use of tools, utensils, equipment and documentation records required according to food processing program					
Apply food safety and sanitation practices in reference with health and safety requirements					
Process raw materials following the protocol and procedures of food processing standards					
Demonstrate packaging methods according to food processing procedure in reference with processed products requirements					
Maintain records to provide evidence of conformity with the GMP manual					
Make the listing of records traceable according to GMP manual.					
Report records to concerned personnel according to workplace procedures					

Areas of strength	Areas for improvement	Actions to be taken to improve
1. **2.**	**1.** **2.**	**1.** **2.**

Note: If you still have challenges regarding the learning unit, you should contact your trainers for more assistance.

Unit 3: Conducting routine maintenance





Topics

3.1 Conducting routine inspection of processing plant and equipment

3.2 Preparation for conducting routine maintenance

3.3 Carrying out routine maintenance

3.4 Completion of maintenance tasks

Unit Summary:

This unit describes the knowledge, skills, and attitudes required to conduct routine maintenance in food processing. By the end of this unit, you will be able to conduct routine inspection of processing plant and equipment, prepare and conduct routine maintenance, and complete maintenance tasks.

Self-Assessment: Unit 3

1. Look at the illustration. What do you observe? What do you think this unit will be about? What topics might be covered?

2. Fill in the self-assessment below.

There are no right or wrong ways to answer this survey. It is for your own use during this course. Think about yourself: Do you think you can do this? How well? Read the statements across the top. Put a check in column that best represents your situation. At the end of this unit, we'll take this survey again.

My experience **Knowledge, skills, and attitudes**	**I don't have any experience doing this.**	**I know a little about this.**	**I have some experience doing this.**	**I have a lot of experience with this.**	**I am confident in my ability to do this.**
Inspect food processing equipment to identify signs of wear					
Perform assessment of maintenance nature					
Follows preventive maintenance schedules for food processing equipment					
Assist in assessment of maintenance tasks to determine tools and services required according to maintenance procedures					
Prepare maintenance equipment and select tools according to task requirements					

My experience Knowledge, skills, and attitudes	I don't have any experience doing this.	I know a little about this.	I have some experience doing this.	I have a lot of experience with this.	I am confident in my ability to do this.
Check and report condition of tools before use and planning, schedule maintenance in consultation with work areas production management					
Identify types of routine maintenance to carry out on equipment according maintenance work rea procedures					
Select and use tools and materials for carrying out routine maintenance					
Assist in report of maintenance activities according to workplace reporting requirements					
Return equipment to operating order					
Store tools and materials according to workplace procedures					
Notify relevant personnel of maintenance completion					

Topic 3.1: Conducting routine inspection of processing plant and equipment

Key Competencies:

Knowledge	Skills	Attitudes
1. Describe inspection of food processing equipment to identify signs of wear	**1.** Inspect food processing equipment to identify signs of wear	**1.** Accurate
2. Define assessment of maintenance nature	**2.** Perform assessment of maintenance nature	**2.** Attentive
3. Identify inspection schedules, used for preventive maintenance of food processing equipment	**3.** Follows preventive maintenance schedules for food processing equipment	**3.** Methodical

Getting Started: What do we know and where are we going?

Topic 3.1 Task 1:

1. Observe the illustrations provided.

2. Describe what you see to a partner using the following questions:
   a. What is the setting of the illustrations?

   b. What is the link between the two situations in the pictures?

   c. Have you ever visited local food processing units and observed a similar situation?

3. Share your ideas and discuss as a class.

4. The illustrations show a food processing environment. Discuss the possible problems that can happen to the food processed in each setting shown.

5. Review the learning outcomes and Key Competencies table.

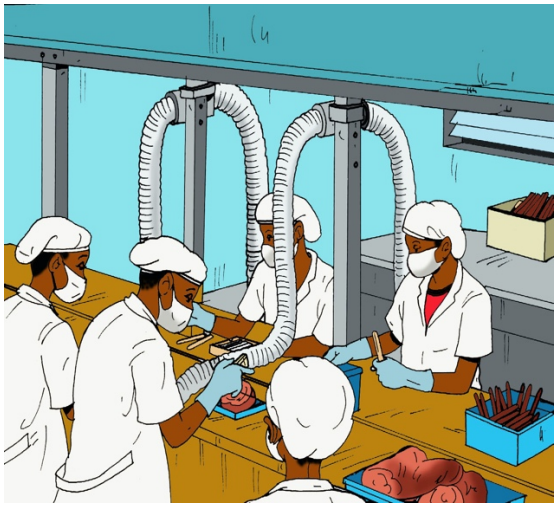


Illustration 1

Illustration 2

Problem Solving Activity

Topic 3.1 Task 2:

1. Form two groups. With your group, read the following scenario:

   Bwiza and Bingo are emerging entrepreneurs interested in starting a new small-scale food processing unit. They want to process brown sugar from sugar cane juice mixed with ginger and lemon juice. Bwiza and Bingo want to comply with the appropriate sanitation standards by setting up a routine maintenance program at their processing unit.

2. Discuss the following questions. Write your answers down and choose one person to present.
   a. What signs of wear should Bwiza and Bingo look for while inspecting the equipment?

   b. What factors should they consider when deciding to perform maintenance?

   c. How should they determine inspection schedules?

   d. How should they keep an inspection record?

3. Present your ideas to the rest of the class and listen closely while other the other group presents.

4. Review the answers together.

5. Then, turn to **3.1 Key Facts** and read the information together, correcting any errors or misunderstandings from the activity.

3.1 Key Facts

- **Maintenance:**
  - Replacements, adjustments, and repairs intended to retain or restore equipment.
  - Functional checks are conducted to evaluate the compliance of a system or component with specified functional requirements.

- **Routine inspection**: A fundamental process that needs to be carried out on all plant equipment.
  - **Inspection:** May involve examination, check, survey, look-over, exploration, observation, investigation, assessment, and/or evaluation.
  - **Maintenance:** Any activity, such as tests, measurements, replacements, adjustments, and repairs. Inspections, testing, servicing, classification as to serviceability, rebuilding, and renovation. It is intended to retain or restore a functional unit.[8]
  - **Procedure:** Equipment should be inspected if a risk assessment identifies any significant risk (for example, of major injury) to operators and others from the equipment's installation or use.
  - **Purpose:** To identify whether work equipment can be operated, adjusted, and maintained safely.

- **Signs of wear:**
  - Cracks or cuts
  - Stretch or frayed material
  - Broken fibres or frayed stitches
  - Change in colour
  - Seemingly reduced strength of machinery

- **Maintenance considerations:**
  - Information in the manufacturer's instructions
  - Intensity of equipment use
  - Operating situation (temperature, corrosion, weathering)
  - User knowledge and experience

[8] Wikipedia. (n.d.). *Maintenance (technical)*. Retrieved 2020, from https://en.wikipedia.org/wiki/Maintenance_(technical)

- Risk to health and safety from any probable failure or malfunction

- **Facility considerations**:
  - Facility age and size
  - Equipment age and size
  - Number and types of signs of wear and tear (damage or abnormalities)
  - Preventive maintenance program
  - Working frequency
  - Daily functional duration time

- **Places to inspect:**
  - Receiving activities
  - Storage areas
  - Production area
  - Finished product/shipping areas
  - Backing areas
  - Outside grounds and roof

- **Preventive maintenance:** A strategy regularly arranged to do inspections, tests, servicing, replacements, repairs and other tasks intended to help reduce the impact and frequency of equipment failures.
  - Inspection of activities
  - Scheduled preventive maintenance
  - Predictive maintenance

- **Risk assessment**: A systematic process of evaluating the potential risks or danger that may be involved in a planned activity or task.

- **Manufacturer's recommendations:** Should always be followed. These are written guidelines established by a manufacturer and approved by the U.S. Food and Drug Administration or other appropriate regulating bodies for the installation and operation of the manufacturer's equipment.

- **Probable failure:** Risk of equipment to stop working properly.

- **Self-inspection program:** A program involving everyone from top management to front-line employees. All workers collaborate to inspect the entire processing unit for signs of wear and needed maintenance. It allows time to detect and correct unsafe conditions before someone is injured.

Guided Practice Activity

Topic 3.1 Task 3:

1. Separate into two groups. Each group should have an equal number of trainees. Your group must pretend to be staff in a food processing unit, and you are going to conduct routine inspection of processing plant and equipment.

2. Familiarise yourselves with the equipment presented to you by your trainer and take an inventory by filling out the Inspection Master List provided.

Inspection Master List:

Equipment Name			
Serial Number			
Description			
Location			
Frequency/ Maintenance schedule			
Method/Procedure			
Person Responsible			
Other Comments			

3. Discuss your data collection and observations together and share with the rest of the class.

4. The next part of this activity involves visiting a food processing unit. Upon arrival, you will be asked to inspect equipment and identify the appropriate inspection schedules for preventive maintenance.

5. Use the following questions to guide your observations. Refer to **3.2 Key Facts** as necessary.

a. Logbook entries containing records on inspection of performance

b. Scheduled inspection combined with scheduled servicing

c. Scheduled inspection of non-standard items

d. Inspection schedule's record keeping

6. After the visit, share your responses and discuss as a class.

7. Refer to **3.2 Key Facts** and read the information together. Try to connect the information given to the previous activity.

3.2 Key Facts

There are three types of inspection procedures.

1. **Logbooks:**
   - Designed to keep records of the daily processing runs and the record of the equipment performance.
   - Contains instructions to processing equipment operators and instruction from the operators to specialized personnel.
   - May include to and from the operator(s)

   - **Specialized maintenance personnel:** May include a processing group and an engineering group.

   - **Simplified sectional flow chart/diagram**:
     - Often included in logbooks.
     - Shows the process concerned with all "check spots" or potential problem areas.
     - Clearly shown and marked in the same order as they are on the recording pages of the logbook.
     - Helps to easily trace root causes of any malfunction along the processing line.

2. **Inspection-cum-servicing schedules**: The second type of inspection program combined with servicing or simple replacement of equipment, such as oil, rings, or blades.
   - Most crucial task for the specialised team responsible for preventive maintenance.
   - Sources: Manufacturers' manuals, equipment records, plant experience.

- **Manufacturer's manuals guide users on:**
  - How to install and perform service
  - How often to inspect
  - What to replace and when

- **Equipment records**:
  - Information written in separate log
  - Referred to during inspection to show history of a particular piece of equipment
  - Contains the most essential information, originated from the manufacturers' manual
  - Contains a record of the history of the machine during its use in the processing unit such as:
    - Records showing the age of the machine
    - Major repairs it has undergone
    - A detailed overview of its working condition and strength, as well as and its ability to continue performing safely
    - Changes in inspection and servicing schedules concerning any particular part of the equipment

- **Plant experience:**
  - Experience gathered in the plant by the operators and the engineering staff.
  - Provides a valuable source of information around which the inspection and servicing schedules can be designed
  - Provides specific information for even the most common machines, which are all exposed to different working conditions

3. **Civil structures**:
   - Ducts and pipelines
   - Buildings and underground structures
   - Drains, water storage tanks, wells
   - Many other parts of the plant not described in manufacturers' manuals.
   - Even unit sanitation and anything from painting to insect and rodent control

Benefits of keeping a maintenance record:

- Keeps equipment at optimum working condition
- Minimises the risk of having unscheduled stoppage[9]

[9] Hall, H. S., & Tuszynski, W. B. (1984). *Maintenance systems for the dairy plant: Preventative Maintenance*. Food and Agriculture Organization of the United Nations. https://www.fao.org/3/x6548e/X6548E01.htm

Application Activity

Topic 3.1 Task 4:

1. Form small groups of about four people per group. You will be doing a fieldwork assignment. For this activity, each group has a choice of which local business they want to visit.

2. Your group can visit either a local business where an entrepreneur has a small scale-milk processing unit or another food processing unit.

3. Each group must accomplish the following tasks with the help of the food processing unit staff.
   a. Execute a correct inspection of equipment to identify signs of wear.

   b. Assess the nature of the maintenance needed.

   c. Establish inspection schedules for preventive maintenance.

   d. Create a possible inspection record template.

4. Once all groups have concluded their fieldwork assignment, answer and discuss the following questions as a class:
   a. What are guiding criteria for equipment inspection to identify signs of wear?

   b. How does one determine the nature of the maintenance needed?

   c. What are inspection schedules and why are the important?

5. Once each trainee has had the chance to discuss and respond, conclude the lesson by highlighting the **Points to Remember**.

Points to Remember

- The correct inspection of equipment to identify signs of wear should always be executed for equipment maintenance.
- The purpose of an inspection is to identify whether the equipment can be operated, adjusted, and maintained safely.
- It is important to keep records that align with the inspection schedule.

Formative Assessment

Part I: Formative Evidence

Determine if the following statements are True **or** False**.**

1. Inspection of equipment is planned because of visitors.

2. Identification of signs of wear should be done using inspection methods or procedures.

3. It is important to make equipment inspection procedures and schedules.

4. Inspection is a waste of time when the company has a big demand of products from clients.

5. When the processing equipment is very old, inspection is done only when breakdowns happen.

Circle ONE correct answer.

6. What are items covered in a scheduled inspection of non-standard equipment?
   a. The food processing equipment and their accessories.
   b. The Inspection of civil structures and Inspection of the sanitation of the whole plant
   c. The inspection of the garden and the street near the factory

Circle ALL answers that are correct.

7. Which of the following statements are true about proper inspection and maintenance records?

- **a.** Minimises the number of expensive repairs.
- **b.** The staff get more time to relax during the production.
- **c.** The salary decreases due to a lot of projects in the factory.
- **d.** Increase operator safety.
- **e.** Positively impact on resale value.
- **f.** Identify inventory trends.
- **g.** The staff on the night shift get time to sleep while automated equipment is working.
- **h.** Enhance the visibility of every equipment's health.

Part II: Performance Evidence

Nyabunyana has a small-scale mushroom and stinging nettle processing unit and wants to establish an equipment inspection program at her processing unit. As a food safety and maintenance inspection technician, you are requested to help her to identify inspection schedules and record keeping measures according to maintenance requirements. The processing area 25 m^2. This activity must be performed within 45minutes. All materials needed to perform this task are available.

Topic 3.2: Preparation for conducting routine maintenance

Key Competencies:

Knowledge	Skills	Attitudes
1. Describe how to assess maintenance tasks to determine tools and services required	**1.** Assist in assessment of maintenance tasks to determine tools and services required according to maintenance procedures	**1.** Detail-oriented
2. Plan preparation of maintenance equipment	**2.** Prepare maintenance equipment	**2.** Diligent
3. Explain how to check and report tools' condition before use and schedule maintenance appropriately	**3.** Check and report condition of tools before use and schedule maintenance	**3.** Attentive

Getting Started: What do we know and where are we going?

Topic 3.2 Task 1:

1. In this topic, you will learn more about food processing equipment routine maintenance at school and in your community.

2. Ask questions you have about the previous topic and the trainer will address them. Respond to a few review questions on routine inspection of processing plant and equipment. Be sure to participate and share your knowledge.

3. After the brief review session, take five minutes to discuss the following proverb:

When all you have is a hammer, everything looks like a nail.

4. Consider the following questions about the proverb:

a. What does this proverb mean to you?

b. How does the proverb relate to real life?

c. How could the proverb relate to food process maintenance?

5. Share and compare your answers with your peers.

6. The trainer will clarify as needed.

Problem Solving Activity

Topic 3.2 Task 2:

1. Separate into small groups.

2. Read and discuss the following scenario:

Bwiza and Bingo have now trained some of their mechanics to conduct routine and preventative maintenance inspections. Today, the mixer in the processing line showed signs of wear. The mechanics want to fix the machine right now, however there is a large order going through that must be finished by today! Furthermore, the mechanics report that some of the tools they need are missing, while others are simply broken.

3. With your group, discuss the following questions:

a. Thinking back to the previous field visit, how might the mechanics determine the tools and services required?

b. What might they need to prepare for maintaining the equipment?

c. Describe the factors to consider when selecting tools according to task requirements.

d. Can you think of any procedures for checking tools before use and reporting unsafe/faulty items?

e. What is the process for scheduling maintenance?

4. Select one person from your group to write your ideas on the flipchart. After all groups have written their responses, discuss the different ideas presented.

a. How are the responses similar?

b. How are they different?

c. What evidence—from previous experience or knowledge—is there to support your responses?

5. After the discussion, turn to **3.3 Key Facts** and read the information together. Revise your responses to the previous questions according to this information.

3.3 Key Facts

- **Procedure to assess maintenance tasks to determine tools and services required:**
  - Routine maintenance
  - Simple repairs
  - Painting and redecorating
  - Adjustments to equipment

- **General requirements for equipment maintenance:**
  - Obtain a copy of the maintenance schedule recommended by the manufacturer.
  - Ensure that maintenance is performed as required.
  - Ensure that the person(s) performing the maintenance are competent (e.g. a trained mechanic). Only simple spare parts should be replaced by operators.
  - Retain records of maintenance/service conducted.
  - Specify who is responsible for controlling equipment maintenance and where the records are kept.
  - Set up a system for removal and labelling of damaged or broken tools and equipment.[10]

- **Considerations when preparing for equipment maintenance**:
  - Description of the major steps to be accomplished
  - Safety requirements
  - Availability of spare parts
  - Availability of special tools
  - Prepare physical layout of the location where maintenance is to be performed
  - Provide adequate time to do the task
  - Availability maintenance task description

- **Factors to consider when selecting tools according to task requirements**
  - Lifespan of equipment

[10] Infrastructure Health & Safety Association (IHSA). (2020, March 23). *Tool and equipment maintenance*. https://www.ihsa.ca/Resources/Tool_Equip_Maintenance.aspx

- The cost of repairs or maintenance downtime safety
- Efficiency of equipment operating capacity
- Equipment types
- Location
- Maintenance task description

- **Preventive maintenance**: The systematic care and protection of tools, equipment, and machines in order to keep them in safe, usable condition, limit downtime, and extend productivity.

- **Lifespan of equipment**: The predicted time set by the manufacturer that the equipment can be used safely.

- **Maintenance downtime**:
  - A period of time when a system fails to provide or perform its primary function.
  - Usually a result of the system failing to function because of an unplanned event or because of routine maintenance (a planned event).
  - Can result in unexpected negative consequences such as losses of profit or raw unprocessed materials.[11]

- **Task description**: Step by step explanation/guide on how to perform the maintenance task.

- **Safety requirements**: Any quality requirement that specifies a minimum required amount of safety.

- **Spare parts**: Interchangeable parts that are kept in an inventory and used for the repair or replacement of failed equipment in the unit.

- **Special tools**: Tools designed to perform a specific task.
  - Specific end item or a specific component of an end item
  - Not available in the common tool load that supports that end item or unit.

[11] Wikipedia. (n.d.). *Downtime*. Retrieved 2019, from https://en.wikipedia.org/wiki/Downtime

Guided Practice Activity

Topic 3.2 Task 3:

1. In this activity, you will simulate working in a food processing plant. First, practice selecting PPE to perform maintenance tasks.

2. Separate into groups of three.

3. With your group, go to each station, read the scenario and maintenance task description, and draft a maintenance plan.

4. Your maintenance plans should include the following:
   a. An assessment of which tools are required.

   b. A logbook to report the tools used for the equipment before beginning maintenance.

   c. A scheduled time for when the line will need to be shut down for maintenance downtime.

   d. A report to the line manager and labourers.

5. Ask the trainer for help and guidance as needed.

6. Share your plans while the other groups listen. Listen closely to other groups and feedback from the trainer.

7. Finally, review **3.4 Key Facts** together as a class.

3.4 Key Facts

- **Checking and reporting unsafe/faulty tools:**
  - Identify requirements for tools and equipment.
  - File checklists for tools and equipment before use.
  - Refer to reports for tools and equipment.
  - Describe the location and type of problem/faults.

- **Tool reporting:**
  - Ongoing report: Report given during operation.

- Pre-operation report: Report given before starting operation.
- Periodic report: Report given in planned time.

- **Activities to include in the maintenance plan:**
  - A method of communicating maintenance requirements.
  - Planning and scheduling according to historical data.
  - Record of maintenance management information.

- **Maintenance requirements may include:**
  - Inspection of tools or machines and equipment before use.
  - Preventive maintenance such as a systematic care and protection of tools or equipment in order to keep them in a safe, usable condition, limit downtime, and extend productivity.[12]

- **Methods to consider for making maintenance plan**:
  - Organisation of resources and maintenance methods.
  - Detect a smaller disruption before an actual interruption(breakdown) occurs
  - Create and implement a preventative maintenance plan.

- **Scheduling specific maintenance tasks:**
  - Individual tasks or maintenance events within work schedules are associated with "trigger" or a cue that ensures the action occurs.
  - These triggers are either date-based and or operating statistics-based.
  - The triggers ensure that the events are highlighted when the maintenance activity is due to be done.

Application Activity

Topic 3.2 Task 4:

1. Form groups of six people and get ready for field work at a small-scale meat processing unit.

2. With your group, perform five different tasks in cooperation with the help of experienced staff:
   a. Assist the staff with assessing maintenance tasks to determine tools and services required according to maintenance procedures.

[12] Infrastructure Health & Safety Association (IHSA). (2020, March 23). *Tool and equipment maintenance*. https://www.ihsa.ca/Resources/Tool_Equip_Maintenance.aspx

b. Consider how to prepare the maintenance equipment.

c. Consider the factors for selecting tools according to task requirements.

d. Follow the procedure of checking and reporting unsafe/faulty tools before using them.

e. Follow the process to plan and schedule maintenance in consultation with workers, and production management.

3. At the end of the practical activity, answer the following questions based on your experience:

a. What is the procedure to assess maintenance tasks to determine the tools and services required?

b. What are the considerations for preparation of maintenance equipment?

c. What are the factors to consider when selecting tools according to task requirements?

4. Discuss and compare your experiences as a class.

Points to Remember

- Routine maintenance involves simple repairs, like painting or adjustments to equipment.
- Successful maintenance is well-organised, scheduled, and controls hazards.
- Equipment maintenance and food safety should work together when in the food processing unit.

Formative Assessment

Part I: Formative Evidence

Circle ALL of the correct responses for the following questions.

1. Which of the following tasks help determine tools and services required for maintenance?
   a. Routine maintenance.
   b. Repairing cars and motorcycles.
   c. Simple repairs of equipment.
   d. Painting equipment.
   e. Boat equipment maintenance.
   f. Adjustments to equipment.

2. Checking and reporting unsafe/faulty tools involves which of the following steps?
   a. Identification of tools and equipment checking requirements.
   b. Filling tools and equipment checklists before use.
   c. Reporting equipment faults to executive secretary of your sector.
   d. There are three types of equipment reports: periodic reporting, pre-operational reporting and ongoing reporting.
   e. Providing written and verbal reports.
   f. Checking and reporting the received raw materials for processing.
   g. Describing the location and type of problem faults.

Circle ONE correct answer for the following questions.

3. Which of the following is true about well-maintained equipment?
   a. Breaks down often.
   b. Works well during the manufacturing and processing of raw materials.
   c. Compromises the integrity of the equipment.
   d. Will not frequently interrupt the production process.
   e. Presents physical hazards to the food being produced.

4. A successful maintenance program is characterised by which of the following?
   a. Controls hazards outside of the food processing area.
   b. Defines operational procedures and trained personnel for each task
   c. Is scheduled at the last minute.

Part II: Performance Evidence

Kanziga, Nyirabukara, and Mizero have a small-scale moringa and turkey berries (intagarasoryo) processing unit. They want to ensure food safety and appropriate preparation by conducting routine maintenance at their processing unit. As a food safety and maintenance preparation technician, you are requested to help them to identify maintenance schedules and assist in establishing the preventive maintenance of food processing equipment. The processing area is 25 m^2. This activity must be performed within 45 minutes. All tools, materials, and equipment needed to perform this task are all available.

Topic 3.3: Carrying out routine maintenance

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify types of routine maintenance to carry out according to maintenance work area procedures	**1.** Carry out routine maintenance on equipment according maintenance work area procedures	**1.** Attention to detail
2. Explain how to select and use tools and materials for carrying out routine maintenance	**2.** Select and use tools and materials for routine maintenance	**2.** Confident
3. Describe procedures for reporting maintenance activities according to workplace reporting requirements	**3.** Assist with reporting maintenance activities according to workplace reporting requirements	**3.** Detail-oriented

Getting Started: What do we know and where are we going?

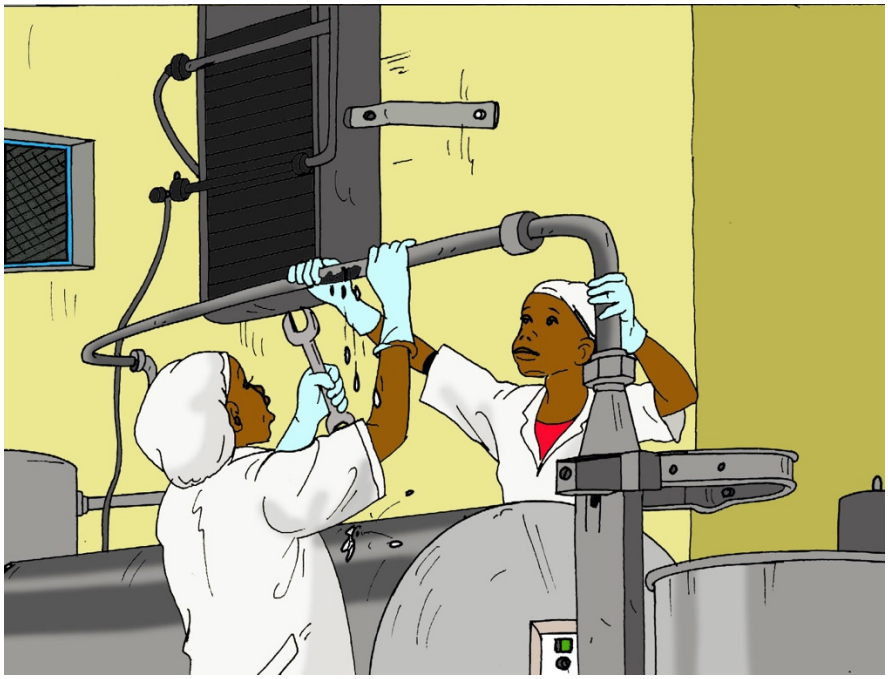
Topic 3.3 Task 1:

1. Briefly review the previous topic with your trainer.

2. Then, observe the picture and describe what you see. Discuss:
   a. What is the meaning of the situation presented in the picture?

   b. Have you ever seen or heard of a similar situation? Explain.

3. Review the learning outcomes and the Key Competencies table for this topic.



Problem Solving Activity

Topic 3.3. Task 2:

1. Read the scenario with a partner:

Musafiri wants to teach his daughter about the importance of maintenance and taking care of her things. He buys her a bicycle and tells her that she must be responsible for it. It has been six months and she has enjoyed riding the bicycle to and from school but now the bicycle doesn't work. Her father notices that the back tire is worn out, the wheels are out of alignment, the seat has been damaged by the rain, and the chain is rusted and will not move. Musafiri knows that his daughter is an excellent student and well-organised you person. He wonders what could have caused so much damage so quickly.

2. Discuss the scenario with your partner using the following questions:

a. What do you think the problem is? How did the bicycle become so damaged?

b. How might this story relate to performing routine equipment maintenance?

c. What tools and materials are needed to fix Musafiri's daughter's bike?

3. After some discussion, share and compare your answers with the pair sitting next to you.

4. Then, participate in a class discussion in which everyone gets a chance to give their inputs.

5. Conclude by reviewing **3.5 Key Facts** together.

3.5 Key Facts

- **Corrective maintenance:** A set of tasks designed to correct the imperfections found in the different equipment and communicate the problems to the maintenance department.

- **Preventive maintenance:** Regular and routine action taken on equipment in order to prevent its breakdown. Involves systematic inspection or detection and correction of emerging failures either before they occur or before they develop into major defects.[13]

- **Maintenance program:** A plan developed to schedule routine maintenance, such as:
  - Cleaning and inspection
  - Servicing and lubrication
  - Repairs in the case of equipment break-down during regular operations
  - Scheduled and planned preventive maintenance

- **Maintenance "master" schedule**: An internal program responsible for taking a maintenance plan and bringing together all the resources needed to complete it. It involves assembling and coordinating the information with people and materials or equipment, along with all the other necessary resources to get the job done.

- **Predictive maintenance:** Techniques designed to help determine the condition of in-service equipment in order to estimate when maintenance should be performed. Saves money in the long-term because personnel know exactly when to perform tasks.[14]

- **Zero hours maintenance:** Review of the equipment at scheduled intervals before any failures appear. This review is based on leaving the equipment to zero hours of

[13] Stiles Machinery Inc. (n.d.). *Corrective versus preventive maintenance: What is the difference and where is the value?*. https://www.stilesmachinery.com/articles/corrective-versus-preventive-maintenance-what-is-the-difference-and-where-is-the-value

[14] Wikipedia. (n.d.). *Predictive maintenance*. Retrieved 2020, from https://en.wikipedia.org/wiki/Predictive_maintenance

operation, meaning to treat the equipment as if it were new. These reviews will replace or repair all items subject to wear.

- **Periodic maintenance** (Time-Based Maintenance or TBM): The basic maintenance of equipment performed by users. It consists of a series of basic tasks, data collection, and visual inspections performed at regularly scheduled times.[15]

- **How to determine the type of maintenance:**
  - Workplace practices
  - Manufacturer's guide/instructions
  - Break down equipment use and maintenance into daily, weekly, monthly, and annual categories.
  - Collect information in order to organise a "master" schedule to track maintenance dates
  - Consider how maintenance best fits into the operational schedule. Decide if it is possible to shut down production early one day and take care of all the maintenance at once or if it is better to work on a rotational schedule.
  - Every equipment will need different types of maintenance and a particular mix of tasks, so maintenance models will need to be planned according to the existing equipment.

- **Guidelines for using tools when carrying out maintenance:**
  - Keep tools on a rack, with a specific spot for each tool
  - Never leave tools on the floor near equipment
  - Keep tools in a locked cabinet on the walls of the production area and painted in distinct colour, but do not pay attention to other considerations
  - Small tools can be kept in a portable clean metal toolbox

[15] García Garrido, S. (n.d.). *Types of maintenance*. Renove Tecnología. https://www.mantenimientopetroquimica.com/en/typesofmaintenance.html

Guided Practice Activity

Topic 3.3 Task 3:

1. Form groups of four people.

2. Your task is to carry out routine maintenance at your training centre as if you are staff in the food processing plant.

3. Select and put on PPE.

4. Create a checklist for making inspections, identifying tools, and following pre-maintenance procedures. You can also use the checklist included in **3.4 Key Facts**.

5. Then, under the trainer's guidance, perform the following:
   a. Assist in carrying out the appropriate service inspection, part replacement, and lubrication of food processing equipment at your training centre. First, observe the trainer's demonstration of how to perform this task.

   b. Preform minor repairs to other equipment or aspects of the facilities including doors, windows, light fixtures, flooring, bathrooms, and painting.

   c. Report maintenance activities according to workplace reporting requirements.

6. Following the activity, share your group's experience and discuss as a class.

7. Refer to **3.6 Key Facts** and review the information together.

3.6 Key Facts

- **Equipment maintenance diagnostic:**[16]

Milk Processing Equipment		
Equip.	**Problem**	**Solution/Checklist**
Vat milk	Below 4°C	Check/adjust settings on vat control unit
Agitator	Not running	• Check power supply and settings of vat. • Check controller and control switch panel. • Check fuses. • If still no action, call maintenance firm/engineer.
Milk pump	Not running, excess noise/heat, milk leakage	• Check power supply. • Check starter. • Re-set button on panel. • Check fuses. • Check cover "O" ring; tighten nuts or replace "O" ring. • If leaking from adaptor housing, call maintenance firm/engineer to replace carbon seal unit. • If no results, call maintenance firm/engineer.

- **Milk Processing Equipment Terms**
  - **Vat milk:** Milk processing equipment used for the production of dairy products to pasteurise milk.
  - **Agitator:** Electrical rotating equipment used in liquid food processing for mixing to promote uniformity, dissolution, heat, and more.
  - **Milk pump:** Equipment to power milk from one area to another in the milk processing unit, such as through pipes to the tank.

- **Lubricants:** In many cases, equipment failures may be traced directly to improper lubrication responsibility and to the handling of lubricants.

- **Centralised lubrication responsibility**: Lubrication responsibility should be given to a trained specialist who is fully familiar with the exact lubricating requirements of the equipment.

- **Planned lubrication schedules**: Schedules outlining the type of lubricant to be used and lubrication frequency should be established and followed closely.

[16] FAO/TCP/KEN/6611 Project. (n.d.). *Dairy equipment maintenance*. Dairy Asia. https://dairyasia.org/file/Information/Dairy%20Equipment%20Maintenance.pdf

- **Lubricant identification**: Frequently the product loses its identity after being received by the used and becomes just another barrel of grease. Good housekeeping will assure clean and well-marked containers.

- **Lubricating Devices**: Adequate lubricating devices should be supplied for proper lubrication. Proper lubricating devices make it easier for personnel to maintain a lubricating schedule. The use of Teflon for bearing has increased greatly. It is a self-lubricating plastic material. Lubrication devices should be placed in accessible locations to ensure safety of the operators and to encourage attention to lubrication.[17]

- **Abnormal noises that indicate anti-friction equipment has problems:**
  - A scraping noise indicates the presence of foreign bodies.
  - A regular grinding noise indicates cracked or jammed belts.
  - A jotting noisy indicates surface crumbling.
  - A strong and weak rattling indicates a loose ball or roll.
  - A regular vibrating sound indicates that equipment is in normal operation.

- **Clean and sanitary maintenance:** Maintenance of food processing equipment cannot be complete without due attention to its cleaning and sanitation
  - This is necessary not only from the hygienic point of view but also in the prevention of mechanical damage (e.g. corrosion) to plant and equipment.
  - Requires the right type of detergent and its proper use
  - Likewise. the temperature of water and concentration of detergent is important.

- **Appropriate cleaning procedures should consider two types of equipment:**
  - Those which can be cleaned in place (CIP). But even for those which use CIP methods, occasionally opening up connecting ends and seals for mechanical brushing is necessary.
  - Those that require manual cleaning.[18]

- **Maintenance reports should describe:**
  - Location and type of problem faults
  - Unusual wear
  - Written and verbal reports

[17] FAO/TCP/KEN/6611 Project. (n.d.). *Dairy equipment maintenance*. Dairy Asia. https://dairyasia.org/file/Information/Dairy%20Equipment%20Maintenance.pdf
[18] FAO/TCP/KEN/6611 Project. (n.d.). *Dairy equipment maintenance*. Dairy Asia. https://dairyasia.org/file/Information/Dairy%20Equipment%20Maintenance.pdf

Application Activity

Topic 3.3 Task 4:

1. You will now go on a field visit to a local business where an entrepreneur has a small-scale fish processing or meat processing unit.

2. Separate into groups. Your group has been asked to prepare for caring out routine maintenance, cleaning, and sanitising of the fish processing area.

3. Your group has three different tasks perform:
   a. Carry out routine maintenance according to maintenance work area procedures.

   b. Select and use tools and materials for carrying out routine maintenance.

   c. Assist with reporting maintenance activities according to workplace reporting requirements.

4. By the end of the practical activity in the field, you should be able to answer the following questions about your experience:
   a. What were the types of routine maintenance carried out according to maintenance work area procedures?

   b. What tools and materials were selected and used?

   c. What maintenance activities were reported?

5. Discuss these questions with the class. The trainer will clarify anything that remains unclear while highlighting well-articulated points.

Points to Remember

- Machine operators play an important role in equipment maintenance.
- A well-maintained machine is a top-performing machine. With fresh lubricant, better calibration, and cleaner systems, your equipment will keep your plant running smoothly.
- Always consider the documentation and traceability during equipment maintenance.

Formative Assessment

Part I: Formative Evidence

Circle the ONE correct answer for the following question.

1. How should tools and equipment be kept in the workplace?
   a. On a rack and on the floor near equipment.
   b. Kept in a locked cabinet on the walls of the production area and painted in distinct colour, without other considerations.
   c. Small tools can be kept in a portable, clean metal toolbox.

2. Which of the statements below describe equipment in a normal operation?
   a. A scraping noise of equipment or a motor of a food processing equipment.
   b. An irregular grinding noise or high vibrating sounds.
   c. A consistently smooth humming sound.

Part II: Performance Evidence

Kabera has a small-scale fish processing unit and wants to practice standard routine maintenance in his unit. As a food safety and equipment maintenance technician, you are requested to conduct routine maintenance on the equipment installed. The processing area is 36 m^2. This activity must be performed within 30 minutes. All tools and materials needed are available.

Topic 3.4: Completion of maintenance tasks

Key Competencies:

Knowledge	Skills	Attitudes
1. Describe how to return equipment to operating order	**1.** Return equipment to operating order	**1.** Accurate
2. Identifies best storage practices of tools and materials	**2.** Store tools and materials according to workplace procedures	**2.** Confident
3. Explains how to notify completion of maintenance to relevant personnel	**3.** Notify relevant personnel of maintenance completion	**3.** Diligent

Getting Started: What do we know and where are we going?

Topic 3.4 Task 1:

1. Briefly review the previous topic. Be sure to ask any questions you have and the trainer will clarify the information and/or direct you to additional resources for more information.

2. Observe the illustration provided in this topic and discuss:

a. What do you see?

b. What is the scenario presented in the picture?

c. Have you ever seen or heard of a similar situation? Explain.

3. Share your answers and compare your ideas.

4. Note that just like there are food safety rules follow during other activities in food processing area, there are safety procedures to follow in the workplace during and after maintenance.

5. Review the learning outcomes and the Key Competencies table for this topic.

Problem Solving Activity

Topic 3.4 Task 2:

1. Read the scenario with a partner:

The maintenance staff at Bwiza and Bingo's food processing facility are performing regular inspections as well as preventative and corrective maintenance to a high standard.

However, they noticed that the tools they use are constantly going missing. Sometimes labourers find a wrench left behind in the processing area. One time, when the line manager reported that an oil can had been left near a mixing vat, the head of maintenance could not identify who was responsible since no one had reported the maintenance task. Today, a worker slipped on some oil spilled in the product storage area and hurt themselves badly.

Bwiza and Bingo want to correct this problem by implementing proper tools and materials housekeeping in their processing unit.

2. Provide them with advice by answering the following questions with a partner:

a. How should the staff return equipment to operating order according to maintenance procedures?

b. How should they store tools and materials according to workplace procedures?

c. How should they assist with notifying maintenance completion to relevant personnel?

d. How should they maintain good housekeeping standards?

3. If needed, refer to **3.7 Key Facts** for guidance.

4. After discussing, ask the trainees to share their answers.

5. Finally, read **3.7 Key Facts** together and ask any questions you have.

3.7 Key Facts

- **Returning the maintained equipment to its normal operating order**:
  Different factors include:
  - The type of repairs done on the equipment. For example, a filter or an O-ring replaced needs post-maintenance inspection and trials to make sure that the equipment is operating properly and there is not a risk of breakdown during production.
  - Appropriate post-maintenance cleaning and sanitation methods need to be applied.
  - Documentation review and verification to ensure all records of maintenance task are documented without skipping one single detail of what was done before, during, and after maintenance. This helps with the evaluating the cost of maintenance.
  - Considerations connected to environment, such as waste created from maintenance.

- **Waste created as a result of maintenance may include**:
  - Oil residues, paint, or grease
  - Small metal fragments which may mix with in drained water after cleaning and become toxic
  - Environmental contaminants
  - Size of location and work area and drainage system of dirty water can affect the surrounding environment through lack of space for wastewater management and recycling. This is especially relevant in small-scale operations with limited financial capacity.

- **Steps for storing tools and materials after maintenance:**
  1. Wash and dry the tools before storing
  2. Label the storage place correctly

3. Store them near the point of use
4. Put frequently used items in an accessible location
5. Gather and secure electrical cords
6. Clean and dry storage areas
7. Arrange all items properly[19]

Guided Practice Activity

Topic 3.4 Task 3:

1. Separate into groups of four.

2. Complete the following tasks with your group and summarise your findings in a brief report:

a. Make a list of observations on which maintenance operations should have been completed.

b. Identify who the relevant personal would be in a real food processing facility.

c. Assess what has been left behind after the maintenance operation by looking for items which do not belong, uncleaned areas, or situations that present a hazard for workers and food products.

d. Conduct general housekeeping by cleaning up, sweeping, and removing hazardous waste in an environmentally conscious way.

3. Share your group's report and listen while other groups present. Discuss the difficulties you faced, and lessons learned.

4. Conclude by reading **3.8 Key Facts** together.

[19] Mr. Se Grade 8 TLE. (2019, July 25). *Proper storage of tools and equipment*. Facebook. https://www.facebook.com/permalink.php?id=478424296051998&story_fbid=479078152653279

3.8 Key Facts

- **Procedure for notifying maintenance completion:** All relevant personnel should be aware of maintenance activities to avoid violating the food processing regulations.
  1. Inspect the work area
  2. Confirmation of safety
  3. Verification of equipment condition
  4. Notifying the task completion

- **Identification of responsible person to notify maintenance completion**:
  - Depends on the nature of task accomplished, the area where the activities took place, the staff responsible for those specific areas, and the personnel who exercised the task.
  - So, one or both can be identified as responsible to notify maintenance completion.

- **Maintenance is deemed complete when:**
  - The workplace has been inspected to make sure all tools and items have been removed.
  - It is confirmed that all parts of the work area are safe.
  - It is verified that the controls systems (switch buttons) of equipment are in a neutral position.
  - Relevant personnel/staff are notified that equipment servicing is completed successfully.[20]

- **Conditions in a housekeeping program include:**
  - A culture of cleaning up the store area and related areas.
  - Day to day clean-up not does not allow any accumulation of dirt in that area.
  - Waste disposal is strategic to avoid cross-contamination.
  - Unused material is removed unused materials to protect the area from contamination.

- **Considerations for facilities for conducting work tasks**:
  - Nature of work
  - Workplace size and location
  - Type of workplace
  - Access to facilities appropriate for maintenance

[20] Canadian Centre for Occupational Health & Safety. (n.d.). *Lockout/Tag out*. https://www.ccohs.ca/oshanswers/hsprograms/lockout.html

Application Activity

Topic 3.4 Task 4:

1. Form small groups and get ready for fieldwork at a local business where an entrepreneur has a small-scale fish or meat processing unit.

2. Visit the fish processing unit or meat processing unit as a class.

3. Your group must perform the following four different tasks at the unit:
   a. Explain how to return equipment to operating order.

   b. Classify the storing methods for tools and materials.

   c. Describe the process for notifying maintenance completion to the relevant personnel.

   d. Describe how to maintain housekeeping standards.

4. At the end of the practical activity, share your group's experience. The trainer will answer any other questions you might have and make clarifications as needed.

Points to Remember

- Always follow workplace procedures when storing maintenance tools and materials.
- Always notify maintenance completion to relevant personnel according to maintenance regulations.

Formative Assessment

Part I: Formative Evidence

Circle ALL of the correct answers for the following questions.

1. Which of the following must be considering when returning equipment to operating order?
   - **a.** The type of maintenance or repairs.
   - **b.** Proper use of PPE and restricted entrance to the bathroom.
   - **c.** Minimising contact with food.
   - **d.** Post-inspection sanitation.
   - **e.** Document review and verification to ensure all sections are documented completely and accurately.

2. What are the qualities of a proper facility during maintenance tasks?
   - **a.** Safety and/or health sign.
   - **b.** Nature of work performed.
   - **c.** Size and location of the work area.
   - **d.** Fire safety sign.
   - **e.** Acoustic signal facility.
   - **f.** Type of workplace.
   - **g.** Access to the facilities appropriate for maintenance.
   - **h.** Preventive maintenance, also known as PM.

Part II: Performance Evidence

Rugwiro has a small-scale Vernonia amygdalina (bitter leaves) processing unit for export to Nigeria and wants to comply with food safety standards. As a food safety and basic maintenance technician, you are requested to participate in returning equipment to operating order according to maintenance procedures. His workplace has an area of 81 m^2. This activity must be performed within 60 minutes. PPE, personal hygiene materials, and other items are all available.

Self-Reflection

1. You have come to the end of the unit. You are going to do the survey you did at the beginning of the unit again to help you do self-assessment of your knowledge, skills and attitudes.

Again, there are no right or wrong answers to this survey. It is for your own use to gauge your knowledge, skills and attitudes after the unit. Read the Knowledge, skill or attitude in the left column. Think about yourself: do you think you can do this? How well? Read the statements across the top. Put a check in column that best represents your situation

My experience **Knowledge, skills, and attitudes**	**I don't have any experience doing this.**	**I know a little about this.**	**I have some experience doing this.**	**I have a lot of experience with this.**	**I am confident in my ability to do this.**
Inspect food processing equipment to identify signs of wear					
Perform assessment of maintenance nature					
Follows preventive maintenance schedules for food processing equipment					
Assist in assessment of maintenance tasks to determine tools and services required according to maintenance procedures					
Prepare maintenance equipment and select tools according to task requirements					

My experience Knowledge, skills, and attitudes	I don't have any experience doing this.	I know a little about this.	I have some experience doing this.	I have a lot of experience with this.	I am confident in my ability to do this.
Check and report condition of tools before use and planning, schedule maintenance in consultation with work areas production management					
Identify types of routine maintenance to carry out on equipment according maintenance work rea procedures					
Select and use tools and materials for carrying out routine maintenance					
Assist in report of maintenance activities according to workplace reporting requirements					
Return equipment to operating order					
Store tools and materials according to workplace procedures					
Notify relevant personnel of maintenance completion					

2. Complete the table below by identifying areas from the unit where you have improved and those that you need improvement with the actions/strategies you will use to help you improve.

Areas of strength	Areas for improvement	Actions to be taken to improve
1.	**1.**	**1.**
2.	**2.**	**2.**

Note: If you still have challenges regarding the learning unit, you can contact your trainers for more assistance.

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