



TVET LEVEL II



AGRICULTURE

Food Preservation

TRAINER MANUAL











Acknowledgements

Rwanda Polytechnic (RP) would like to officially recognize all parties who contributed actively to the preparation of the Trainer and Trainee manuals of this module. We wish to extend our thanks to various organizations such as Workforce Development Authority (WDA), EDC through its USAID Huguka Dukore Akazi Kanoze (USAID - HDAK), TVET schools, Private Industries, GIZ Hanga Ahazaza Project and other individuals who greatly contributed from the initial concept towards publication of this training manual.



Under Rwanda Polytechnic (RP) supervision and involvement



Under Workforce Development Authority (WDA) guiding policies and directives



With funding provided by USAID through Huguka Dukore Akazi Kanoze (HDAK) project



And with technical support by Education Development Center (EDC) through local and international USAID HDAK experts

Production Team

Authoring and Review

Mr. Alexandre Bereti Mrs. Germaine Rwubatse Dr. Clement Bitwayiki

Conception, Adaptation, Review and Editing

Mr. Felix Ntahontuye
Mr. Jean Marie Vianney Muhire
Mrs. Elizabeth Miller Pittman
Mrs. Lauren Hakizimana

Formatting, Graphics and Infographics

Mr. Albert Ngarambe Mr. Simon Pierre Abayiringira

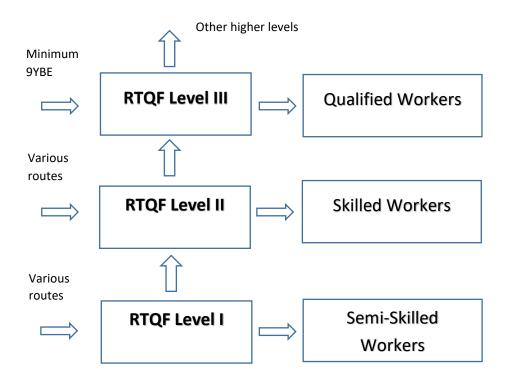
Technical Support

USAID Huguka Dukore Akazi Kanoze (HDAK) project implemented by Education Development Center (EDC)

Introduction to RTQF Level II Training Modules

Background

Rwanda Polytechnic, with support of and in collaboration with USAID Huguka Dukore Akazi Kanoze, has developed RTQF TVET Level II programs that combine basic education, soft skills and vocational skills modules. Bridging the gap between Level I and Level III programmes, Level II aims to prepare learners who have a minimum education level of Primary 6 or equivalent to continue with their education or become skilled workers in the labour force.



Following the Workforce Development Authority (WDA) curriculum development process that involved experts from Rwanda Polytechnic, Rwanda Education Board, Ministry of Agriculture, technical vocational institutions, Education Development Center, Akazi Kanoze Access and other technical experts, training modules were developed in basic education, soft skills (work readiness) and, initially, agriculture. Additional vocational areas will be added over time. Trainees will be trained in all Basic Education and Soft Skills modules listed below, as well as in 6 - 8 modules that make up their chosen technical vocational programme.

Module Requirements:

Basic Education

- English
- Kinyarwanda
- Mathematics

Soft Skills

- Basic Entrepreneurship Skills
- ICT Essentials
- Communication Skills

Vocational Skills

 Vocational programmes will have a set of 6 – 8 required technical modules.

- Integrated Science (Physics, Chemistry, Biology)
- Safety, Health and Sustainable Environment
- Personal Development and Career Guidance

E.g. Food Crop Production and Processing includes the following modules:

- 1. Food Crop Production
- 2. Small Scale Post-Harvest Operations
- 3. Growing Medium
- 4. Food Safety and Sanitation
- 5. Food Preservation and Storage
- 6. Flour Processing

Organization of the Training Manuals

For each module there is a Trainer Manual and a Trainee Manual. These manuals, based on the curricula for each subject, are divided into Learning Units, and each Learning Unit includes 3 – 5 Learning Outcomes. The learning outcomes make up the essential skills, knowledge and attitudes to be acquired by trainees. To make the Trainee Manual more user friendly, Unit and Topic are used respectively for Learning Unit and Learning Outcome. The number of hours per training module varies, ranging between 30 and 120 hours.

Teaching & Learning Methodology of RTQF Level II 2 TVET Materials

The teaching and learning methodology used in the materials is based in experiential and adult learning. Activities are designed to engage trainees, build upon what they know and learn and provide them with opportunities to build their skills in the classroom and in the workplace. More specifically, guiding principles in the development of the manuals include:

- ▶ Building on participants' knowledge, skills and experiences
- ▶ Facilitating a learning process through active engagement of participants rather than through lecturing
- Providing opportunities to practice inquiry based and hands on practice, both in the classroom and workplace
- Using simple and clear language
- Connecting to the real world: use local resources and the environment for learning
- Promoting critical thinking through properly debriefing activities and asking questions that get learners to think, analyze, relate issues and topics to their own lives and come up with solutions

- ▶ Applying social inclusion principles: Finding ways to include all types of youth (and trainers) males and females; different cultural/ethnic/religious backgrounds, people with disabilities (PWD); people with different types of health status ...
- Encouraging risk taking promote questioning and being free to explore
- Promoting habits of mind that support life-long learning: curiosity and wonder, open mindedness, creativity

These principles are reflected in the layout and flow of activities in the manuals:

- 1. Key Competencies: Table found at the beginning of each Learning Outcome that describes the main knowledge, skills and attitudes to be gained by the end of the activities.
- 2. Self-Assessment: Conducted at the beginning and end of each Learning Unit to get a sense of trainees' knowledge and skills going into it and what they have gained by the end of the Learning Unit (and steps they need to take to further their understanding and skills).
- 3. Getting Started Activity: Typically, a quick activity or questions to 1) give the trainer a sense of trainees' existing knowledge and skills; 2) spark the interest of trainees in the topic; 3) introduce the objectives and key competencies of the topic.
- 4. Problem Solving Activity: A challenging activity to get trainees engaged and to learn through discovery instead of memorization of facts. A variety of teaching and learning methodologies are used, including individual and group work such as reading real life work-based scenarios and answering accompanying questions to activities such as identifying proper tools and equipment from the school workshop to conduct a certain activity. Following the sharing of responses, the trainer guides trainees through the content and processes being introduced.
- **5. Guided Practice Activity:** Building on the concepts and skills gained in the Problem Solving Activity, the trainer guides trainees through practical examples.
- 6. Application Activity: Consolidates trainees' knowledge and skills through a reallife application of the topic in the classroom, community or workplace. Trainees are given more independence in applying what they have learned.

- **7. Key Facts boxes:** Throughout the Trainee Manual, one will find Key Facts boxes. These contain the main information or content for a given Learning Outcome. They are there for the trainees' reference and are used throughout the different types of activities.
- 8. Points to Remember: List of the top key learning points or "take-aways" from the topic.
- 9. Formative Assessment: Questions and activities to assess trainees' level of understanding of the concepts introduced.
- 10. Summative Assessment: Based on the integrated, real life situation approach used in other TVET levels, this is done at the end of every module for agricultural modules and, with some variations, at the end of each Learning Unit for Basic Education and Soft Skills modules.
- 11. Self-Reflection: Trainees re-take the Self-Assessment given at the beginning of the Learning Unit and identify their strengths, challenges and actions to improve their level of competence.

The Trainer and Trainee Manuals are meant to be used in conjunction with each other and are well coordinated through the headings and labelling of activities. The trainer will always be able to refer trainees to specific activities by the coordinated numbering system. For instance, a specific exercise might be labelled Topic 1.2 Task 2. The Topic is the number of the Learning Outcome and the task is the specific exercise to be done. The Key Facts are also numbered for easy reference. These nor the Self-Assessment tables are in the Trainer's Manual so the trainer should have a copy of both manuals.

The Trainer's Manual includes answers (or guidelines to the trainer as appropriate) to Formative and Summative Assessments as well as to problems given throughout the activities. Summative Assessments are not included in the Trainee's Manual. These are meant to be used as a guide for those who will be developing a context-appropriative Summative Assessment at the end of the Module or Learning Unit. Basic Education and Soft Skills modules include Summative Assessments at the end of every Learning Unit while the technical modules include it only at the end of the module.

Lastly, there is a section in the Trainer's Manual for additional information to the trainer that includes either specific information or references to information that can help them deepen their understanding of the particular content.

FOOD PRESERVATION AND STORAGE

Learning Units	Learning Hours	Learning Outcomes
Unit 1: Apply food preservation techniques	30	1.1 Identify preservation methods
		1.2 Apply preservation techniques
		1.3 Pack and store foods
Unit 2: Store raw materials	40	2.1 Prepare food storage facilities
		2.2 Receive and store raw materials
		2.3 Keep records regarding stored items

Learning Unit 1: Apply food preservation technique



Learning Outcomes

By the end of the Learning Unit, trainees will be able to:

- 1.1 Identify preservation methods
- **1.2** Apply preservation techniques
- **1.3** Pack and store foods

Learning Unit 1 Self-Assessment

- 1. Ask trainees to look at the Unit 1 illustration in the Trainee's Manual and discuss what they see. Ask them what topics they think this unit will include based on careful observation of the illustrations. After some brainstorming, reveal the headings of the main topics that will be covered in this unit.
- 2. Ask each trainee to fill out the **self-assessment** at the beginning of this unit. The purpose of the self-assessment is to be aware of what every trainee knows or does not know about the unit. At the end of this unit, ask each trainee to do a **self-reflection**, repeating the self-assessment of Unit 1 and recognizing strengths and areas that need improvement. The self-assessment is not a test!

Learning Outcome 1.1: Identify preservation methods



Objectives: By the end of the learning outcome, trainees will be able to:

- a. Identify preservation equipment used for different products
- **b.** Classify preservation techniques
- **c.** Describe preservation methods for different food products



Time Required: 10 hours



Learning Methodology: brainstorming, group work and discussion, field visit

Materials Needed:



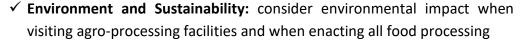
- Standard training materials flip chart, markers, tape, paper, pens
- Equipment -- thermometer, hydrometer, PPE, cleaning materials
- Food preservation machines sterilizer, pasteurizer, vacuum sealer, fridge

Preparation:



- Contact the company to organize the field visit
- ☐ Collect video images of equipment for preservation methods
- ☐ Prepare questions to assess the trainees

Cross Cutting Issues:





- ✓ **Peace and Values Education:** ensure trainees work well together in groups
- ✓ **Inclusive Education:** allocate tasks during learning processes so all are included, contributing members that are valued by the group
- ✓ Gender Balance: in forming working groups and in trainer practice

Prerequisites: Trainees will have previous working knowledge of:



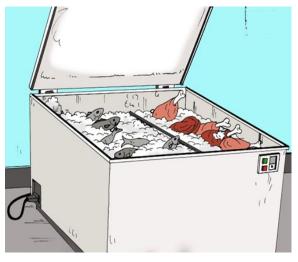
- ▶ Food hygiene and safety practices
- ▶ SHE procedures
- ▶ Basic science for food and for the workplace

Key Competencies:

Knowledge	Skills	Attitudes	
1. Describe preservation	 Select and manipulate 	1. Safety Conscious	
equipment	preservation equipment		
2. Classify preservation	2. Apply preservation	2. Methodical	
techniques	techniques		
3. Explain how to check	3. Check raw material for	3. Attentive	
raw material for correct	product preservation and		
preservation	storage		

ትታ C Steps:

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





- **1.** Ask trainees to form into pairs. Each pair will work together to gather as many relevant answers as possible for each question in **Topic 1.1 Task 1**.
 - **a.** What do you see in these two pictures?
 - **b.** What do the two pictures have in common?
 - **c.** Discuss the activity of this picture and share personal experiences.

Answer:

- **a.** One picture shows fish and meat in a freezer, the other shows people drying coffee beans or rice or millet.
- **b.** both pictures show ways to preserve food—by freezing it, or by drying it in the sun.
- **c.** answers will vary.
- **2.** Take two pairs randomly and ask them to share their response with the class.

3. After a discussion, ask trainees what topic they think these activities relate to. Introduce the learning outcome and have trainees review the table of knowledge, skills and attitudes for this outcome. Explain that this learning outcome will focus on identification of preservation methods which trainees may already have some good experience with from their daily lives, but that they will also learn new things.

Problem Solving Activity

- 1. Form trainees into groups (3 trainees in each group). Have trainees turn to Topic 1.1 Task 2 in their trainee manuals. Each group will take one of the following topics and will write a list of all they know about storing foods from these groups. Each group will share their list (based on their experiences) with the class and will gather other relevant experiences from other trainees so all have good understanding of the local practices that are involved in storage of each of these common food groups.
- **2.** Each group will consider one of the following food categories:
 - a. Fruits and vegetables
 - **b.** Milk and dairy products
 - **c.** Grains and beans
 - **d.** Meat and fish
- **3.** If there are more than 4 groups, then let some groups work on the same food groups and they can report out together—but they should still work in groups of just 3 to ensure that all trainees are participating actively and contributing to the thinking and the work.
- **4.** Trainees will consider and discuss the following questions in order to produce good answers.
 - **a.** Does your family store this sort of food? Under what conditions is this sort of food stored? What is done to the food prior to storage that helps the food last longer without spoiling? How long can this sort of food last when it is stored?
 - **b.** What equipment (if any) is needed to store this sort of food safely? What processes must be done before the food is stored?
 - **c.** How can you tell if this food is well preserved and safe to eat? How can you tell if this food has spoiled during storage times?
 - **Answer:** (will vary depending on context but in general must include the following details)
 - **d.** Fruit: can be dried, some (apples, squash, potatoes) can be stored in cool places
- **5.** After the small group discussions where experiences and local knowledge are gathered into a single list, each group should share their answers with the class.

- **6.** As groups present their work, encourage other trainees to ask questions and add any other ideas so everyone is aware of all the ideas that are relevant to the local context.
- **7.** After all groups have presented, refer trainees to **1.1 Key Facts**. Ask all trainees to read the Key Facts individually and to write any questions that they may have in their copybooks.
- **8.** When all trainees have finished reading and writing questions, respond to all the questions posed by trainees so all trainees have sound knowledge of the given facts.



Guided Practice Activity

NOTE: trainer will bring examples of food preservation equipment to class or take the class to the school kitchen. This equipment may include a sterilizer, a pasteurization machine, a vacuum sealer, a freezer and a refrigerator, along with a thermometer, hygrometer, PPE and cleaning supplies. Trainer will also prepare some examples of foods to be preserved, meat, milk, fruit, etc....

- **1.** This is a demonstration activity—after which, the trainees will have time to work with the given machines on their own, while under the supervision of the trainer.
- 2. Trainer will explain what each of the pieces of equipment are—and how they work. Then the trainer will demonstrate the use of the machine using some of the samples of food that trainer has brought to class. For example: the trainer will pasteurize some milk, the trainer will sterilize jars for canning jelly made from mangoes, etc.
- 3. Between each of the demonstrations of the different machines, trainer will carefully and completely demonstrate the sanitation and hygiene techniques needed to reduce the chance of cross contamination. Trainer will also explain the value (and demonstrate the use of) PPE including hair cover, apron, gloves, mouth and nose coverings, and safe shoes (not slippers).
- **4.** While the trainer is doing the different demonstrations, the trainees will each be taking notes into their trainee manuals in the **Topic 1.1 Task 3** section in order to record their learning.
 - **a.** Sterilizer:
 - **b.** Pasteurization machine:
 - c. Vacuum sealer:
 - **d.** Freezer and a refrigerator:

- **e.** Thermometer:
- **f.** Hygrometer:
- **g.** Cleaning supplies:
- **h.** Other equipment:
- i. REMEMBER it is always important to wear the appropriate Personal Protective Equipment. List out all the PPE used by your trainer during this demonstration. PPE:

Answer: All answers will vary depending on the equipment that the trainer brings to class.



- 1. Explain to the trainees that they will be doing homework in pairs for this next task. They will choose a partner that lives in their same community so the two can work together on **Topic 1.1 Task 4**.
- 2. Each pair will be expected to visit a community store. In the store they will observe all the many ways that they see food being preserved as it is waiting to be sold. Trainees will each complete the task, by copying the table into their notebooks and filling it in. At the beginning of the next class period, the trainees will submit their homework to the trainer.
- **3.** Trainer will read, verify and correct as well as comment on the homework from every student prior to the Formative Assessment so the trainees will have individual feedback on their level of understanding of the topics in this LO.

Answer: Answers will vary but will contain some of the following:

Store Name:	Location of Store:	
Foods that are preserved in cans:	Foods that are preserved by being dried:	
Corn, soup, milk, Nescafe, sardines	Tea leaves, raisins, beans, flour, nuts	
Foods that are preserved by being kept cold	Foods that are preserved by being kept cold	
in refrigerator:	in freezer:	
Soft drinks, milk, fresh meat, cheeses, butter	Ice cream, meat, fish	
Foods that are kept in a cool place:	Foods that have been preserved by pickling:	
Apples, eggs	Olives, pickles	
Foods that have been preserved by being	Foods that are preserved by fermentation:	
sealed into closed packages:	Yogurt, fermented milk drinks, cheeses,	
Chips, cake, bread, flour		

Foods that are NOT being well preserved:	Foods that are preserved by other methods:		
Fresh avocado, fresh tomato, banana			



- Workplace cleanliness and sanitation can reduce food spoilage
- Wear personal protective equipment and wash hands before processing or preservation
- Selection preservation equipment according to the needs of the product being preserved



Formative Assessment

- 1. Ask trainees to write out answers to the following questions:
 - **a.** List four ways to delay the action of micro-organisms that can spoil food.
 - **b.** Define preservation.
 - c. Define cross-contamination.
 - **d.** Explain how do to prevent cross contamination in food storage.
 - e. Which of the following will NOT help stop the action of micro-organisms spoiling tomatoes?
 - i. Put them in boiling water
 - ii. Put them in a freezer
 - iii. Leave them on the shelf
 - **f.** Which of the following methods can be used for preserving meat:
 - i. Canning
 - ii. Smoking
 - iii. Freezing
 - iv. Drying in the sun
 - v. All of the above

Answers:

- **a.** Freezing, drying, smoking, boiling, refrigerating, etc.
- **b.** Preservation is a process that keeps organic things (like food) from decomposing
- **c.** Cross contamination is the process by which bacteria or other microorganisms are unintentionally transferred from one substance or object to another.
- **d.** Cross contamination is prevented by using strict sanitation and hygiene measures, so with food storage, clean containers well, wash hands carefully, wear sanitized PPE, etc.
- e. Leaving tomatoes on a shelf will not help microorganisms from making them spoil.
- **f.** All of the above can preserve meat.

① Further Information for the Trainer

- **1.** Desrosier, N.W. and J.N. Desrosier (1977). The Technology of Food Preservation. AVI Publishing Co., Inc., Westport, Connecticut, USA.
- 2. www.iiste.org ISSN 2224-6088 (Paper) ISSN 2225-0557 (Online)
- **3.** Nummer, Brian; Andress, Elizabeth (June 2015). "Curing and Smoking Meats for Home Food Preservation". National Center for Home Food Preservation
- **4.** Mack, L. 2001. Food Preservation in the Roman Empire. Chapel Hill, NC. University of North Carolina.

Learning Outcome 1.2: Apply preservation techniques



Objectives: By the end of the learning outcome, trainees will be able to:

- a. Describe different preservation techniques
- **b.** Determine which heat treatment is correct for raw materials
- c. Describe rules for using food additives to preserve various food products



Time Required: 10 hours



Learning Methodology: brainstorming, practical exercises, field visit, demonstration

Materials Needed:



• **Preservation supplies:** Pasteurizer, Knife, Fridge, Cooker, Fear, First aid, PPE, saucepans, oven, thermometer, canning equipment, cleaning and sanitizing equipment,

Preparation:



- ☐ Ensure research documents and material (pictures, books, journals, etc.) and equipment are in classroom.
- ☐ Contact training center management to provide materials for class demonstration to perform preservation methods
- ☐ Contact owners of food processing plant to be visited with trainees

Cross Cutting Issues:

✓ Food Safety: in food processing chemicals, and preservatives are cared for in order to maintain foods products safely while carrying out the practical session;



- ✓ Environment and Sustainability: consider environmental impact when visiting food processing facilities and when enacting all food processing
- ✓ Peace and Values Education: ensure trainees work well together in groups
- ✓ Inclusive Education: allocate tasks during learning processes so all are included, contributing members that are valued by the group
- ✓ Gender Balance: in forming working groups and in trainer practice

Prerequisites: Trainees will have previous working knowledge of:



- ▶ Food hygiene and safety practices
- ▶ SHE procedures
- Basic science for food and for the workplace

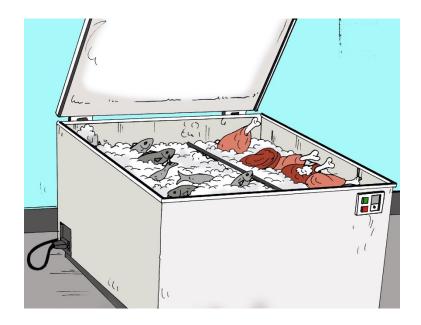
Key Competencies:

Knowledge	Skills	Attitudes	
1. Explain reasons for	1. Apply heat treatment to	1. Attentive	
heat treatment	preserve food		
2. Describe food	2. Use food preservation	2. Precise	
additives rules	methods at home		
3. Describe different	3. Explain reasons for	3. Accurate	
processing techniques	processing food		
	products		



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

NOTE: prior to the class, post the illustrations from the first unit on the board for all trainees to see so they will be reminded of the first topic covered. The two pictures are the following:





NOTE: Also make a copy of the following two pictures, but let trainees work for a few minutes on the first set before you post the second set of pictures.

The second set should include the following two illustrations:





- Welcome trainees and ask trainees to respond the following questions, part of Topic 1.2
 Task 1, in pairs:
 - **a.** What did we learn in the last lessons topic?
 - **b.** Describe the pictures from the last topic which are posted on the blackboard.
 - **c.** Now think about what you have learned already and make a guess about what is happening in the next set of pictures that your trainer posts.

Answer:

- a. The last topic was about food preservation methods and machines.
- **b.** the pictures show two ways of preserving food: freezing it or drying it.
- **c.** the second set of pictures shows food being treated to preserve it, first in a sterilizing machine, second by salting the pieces of meat.
- 2. Introduce the learning outcome and have trainees turn to the table of knowledge, skills and attitudes in their trainee manual. they will gain from the learning the outcome and review the key competencies together. Explain that this learning outcome will focus on application of preservation techniques.

Problem Solving Activity

1. Create seven small groups (so each group has one topic). In these groups they will read, discuss and respond to the scenario in **Topic 1.2 Task 2**.

- 2. Trainees will have approximately 10 minutes to do research so each group member should search for answers in different sources for about 5 minutes then the last 5 minutes the groups can put all their information together for a quick presentation.
- **3.** The research topics are:
 - a. Sterilization
 - **b.** Pasteurisation
 - c. Canning
 - **d.** Pickling
 - e. Fermentation
 - f. Brining
 - **g.** Drying

Answer: answers vary depending on the source, but reference **1.2 Key Facts** for overview.

- **4.** Let each trainee group present their information and respond to questions from the class.
- **5.** As groups present their work, encourage other trainees to ask questions and add anything they have.
- **6.** Note aloud that the class already has good experience preserving foods in some of these ways at home, but others tend to be done more in industrial settings.
- **7.** After all groups have presented, refer trainees to **1.2 Key Facts**. Trainees should pair up and read **1.2 Key Facts** together. If they have any questions, trainer will provide detail and examples to clarify.

Guided Practice Activity

- **1.** Ask trainees to turn to **Topic 1.2 Task 3** in their trainee manual.
- 2. Trainees will read the scenario and respond to the questions.

Inyange is one of the biggest food industries in Rwanda. They process different products such as juice and fresh milk, but they have problem of shelf-life for those products which is caused by poor application of preservation techniques. The workers notice that the drinks have become odd colors, this is how they know there is a preservation problem.

a. Can you think of other ways to identify that the food prepared by Inyange has spoiled?

Answer:

- **a.** The product may be in a damaged container, the container may be puffed out, the food may spray out when opened, odd smell or taste, color of food, un-natural texture or odd separation of food inside the container (may be other answers too)
- **3.** Ask trainees to share their answers with the class. Write answers on the board. Discuss how everyone now has some ideas how to identify spoiled foods, and we have already discussed some preservation methods.
- **4.** Together review the part of **1.2 Key Facts** that discusses chemical additives for food preservation.
- 5. Trainer will now do a short demonstration by displaying several different chemical food additives that are available on the local market AND will also display some packages of processed foods to show trainees that the chemical additives can be found by reading the section of packaging that lists the ingredients. Let trainees touch and taste the different food additive chemicals—if appropriate—and show them recipes that use the displayed ingredients for preservation of a food product.

Application Activity

Note: Trainer must communicate with a local food processing factory and set up a site visit for the class. Inform the factory manager that trainees are learning about food preservation which is the focus of this tour. Ask the company representative to show trainees how the food is processed in the factory and thus preserved prior to selling and eating. Alert the manager that trainees will focus on machinery, processes, additives (if any) and also cleanliness, sanitation and hygiene practices.

Explain to trainees that they will be visiting a local food processing factory. They will focus on food preservation techniques—and will be expected to complete **Topic 1.2 Task 4** individually during the visit by taking notes in response to the given questions—as well as writing any additional observations they may have.

- **1.** The questions are as follows:
 - **a.** What are the primary food products being produced at this factory?
 - **b.** What PPE are workers wearing? Why do they need these particular pieces of gear?
 - **c.** What machine or equipment is being used to process the food?
 - **d.** What additives (or other ingredients) are part of the food preservation process?
 - **e.** Describe the containers where the food is put after it has been processed. Explain why this sort of packaging is being used.

- f. Explain the steps to processing the food.
- **g.** How long is the shelf-life of this food after it has been processed? AND how long is the shelf life of the food if it had been left in the raw/natural state?
- **h.** are there other ways to preserve this food or is the factory doing the only method possible?

Answer: Answers will vary but must be verified by the trainer while checking each report

2. Upon returning to the class (the following class session) Ask volunteers to share their observations and things that they learned from the site visit.

Points to Remember

- Certain methods of processing food can preserve the food, prolong the shelf-life.
- Traditional methods are equally good as industrial methods when carried out in clean conditions.



Have trainees write answers to the following questions:

- 1. Why does heat treatment preserve food?
- 2. Describe how to do pasteurization and sterilization for food preservation.
- 3. Explain the advantage of pasteurization and the disadvantage compared with sterilization.
- **4.** Describe two ways to preserve food other than using heat.
- **5.** Explain why drying helps to preserve food.
- **6.** Give two rules that should always be followed if using chemical additives to preserve food.

Answers:

- 1. The heat will kill (or reduce) microbial activity.
- **2.** Sterilization is high temperature for a longer time to kill ALL microbes. Pasteurization is high temperature but only for a short time—not all microbes are killed.
- **3.** Pasteurization maintains the quality of the food better (advantage) but pasteurized products have a shorter shelf life and usually need to be chilled to maintain quality.
- **4.** You can preserve food with chemical additives, by drying, brining, pickling, etc.
- **5.** Drying helps preserve foods because microbes need water to thrive—and without microbes the food will not spoil as quickly.
- **6.** Two of the following must be mentioned:
 - Chemical food preservatives must be used only at a low dose level

- Must be strictly limited to chemicals which are not harmful to human health
- Consider chemical composition and concentration of chemical before adding to food
- Microbe level in a product determines efficiency of chemical additives for preservation



Further Information for the Trainer

- 1. http://www.nios.ac.in/media/documents/SecHmscicour/english/Home%20Science%20% 28Eng%29%20Ch-5.pdf
- 2. "Food Preservation." <u>UXL Encyclopedia of Science</u>. *Encyclopedia.com*. (June 9, 2019). https://www.encyclopedia.com/science/encyclopedias-almanacs-transcripts-and-maps/food-preservation-2, "Food Preservation." <u>UXL Encyclopedia of Science</u>. Retrieved June 09, 2019 from Encyclopedia.com:

Learning Outcome 1.3: Pack and store foods

Objectives: By the end of the learning outcome, trainees will be able to:



- a. Select appropriate packaging materials for various foods
- **b.** Describe product labeling norms
- c. Describe storage options
- d. State the factors to consider during storage of labeling of food



Time Required: 10 hours



Learning Methodology: group discussion, problem solving, brainstorming, individual and group work, field visit



Materials Needed:

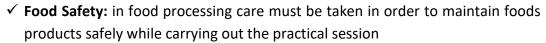
- LEARNING CORNER materials (samples of food and question cards)
- Some chocolate milk as prize for problem solving winning group

Preparation:



- ☐ Contact the company to organize the field visit
- ☐ Gather all requirements for LEARNING CORNERS
- ☐ Print the question for LEARNING CORNERS

Cross Cutting Issues:





- ✓ Environment and Sustainability: consider environmental impact when visiting agro-processing facilities and when enacting all food processing
- ✓ Peace and Values Education: ensure trainees work well together in groups
- ✓ **Inclusive Education:** allocate tasks during learning processes so all are included, contributing members that are valued by the group
- ✓ **Gender Balance:** in forming working groups and in trainer practice

Prerequisites: Trainees will have previous working knowledge of:



- ▶ Food hygiene and safety practices
- ▶ SHE procedures
- ▶ Basic science for food and for the workplace

Key Competencies:

	Knowledge		Skills		Attitudes
1.	Identify packaging	1.	Diagnose reactions	1.	Conscientious
	material for various		between food and		
	product specifications		packaging materials		
2.	Describe packing and	2.	Apply packing and	2.	Attentive
	labeling requirements		labeling correctly		
3.	Identify storage	3.	Choose storage spaces	3.	Prudent
	requirements for		for preserved food		
	preserved food				



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

1. Organize trainees to work in small groups to complete **Topic 1.3 Task 1.**



- **2.** Ask trainees to answer the questions that follow the image.
 - a. Describe what you see in this picture in detail.
 - **b.** What do you see the woman on the right side doing?
 - c. What information do you think should be put on the outside of the box?

Answer:

- **a.** There are two people working in a factory that is filling bottles by a machine.
- **b.** Caps are then put on the bottles and the bottles are packed into cardboard boxes.
- **c.** The woman on the right is organizing the bottles into the boxes
- **d.** The boxes should be labeled with information on the content of the bottles, the number of bottles inside the box, the date, and the name and address of the factory...as well as other possible information like where the box should be delivered, etc.
- 3. When groups have completed the task, discuss the answers with the trainees.

Note: that the illustration shows two kinds of packaging. Some liquid is being packaged into the bottles and the bottles are being packaged into the boxes...both packaging is important: the bottle is to preserve the food; the box is to ensure that the bottles are kept carefully. This provides a clue to the content of this learning outcome...packaging!

4. Introduce the learning outcome. Ask trainees to read the table of knowledge, skills and attitudes in their trainee manual then review it together. Explain that this learning outcome will focus on packaging and storing food items.

Problem Solving Activity

- 1. Organise trainees into small groups (aim to have three trainees in each group). This is a competition where trainee groups will design a food label then each group will present their label to the class. At the end the class will vote for the best design.
- **2.** The instructions for the trainees are as follows
 - **a.** You and your group have been hired to help a factor market a new kind of chocolate milk. This milk is tasty with chocolate flavor but also has 9 kinds of vitamins and calcium for strong teeth AND it is sweetened by natural honey from the Nyungwe Forest so it is more natural and more healthful than regular chocolate milk. It will be sold in two sizes: 250ml boxes and 1liter boxes.
 - **b.** Your job is to design a label to promote this product and enhances sales so make it attractive!
 - **c.** The label must also include all the important information (for eating and for storage as well as all other important information—your group must decide what is needed)

d. When you have completed your sample label (front and back sides) you will present your idea to the class and the class will vote on which design is the best...and that group will get a prize!

Answer: answers vary but should be verified to include all needed information (1.3 key facts)

- **3.** After all groups have presented, let the trainees vote on which is the most attractive and most informative...the group that wins should get a small price (inyange chocolate milk would be ideal)
- **4.** Refer trainees to **1.3 Key Facts** to learn more about Packaging and Storing food products. Let a volunteer read the key facts aloud and let trainees ask questions or provide examples of the given facts as they read together.



1. Form four groups of trainees. In this activity, the trainees will move as a group from one corner of the classroom to the next until they have visited all 4 "learning corners." In each corner the groups will work together to explore and learn about an aspect of food packaging or food storage. They can find the questions to aawer for each category in **Topic 1.3 Task 3** in their trainee manual.

NOTE: Prior to the class the trainer should organize the following four "learning corner" topics and each corner should have a box with the items inside and the questions beside the box, note that each corner will have 3 items and one list of questions.

- **2. Topic A:** This is a packaging exploration.
 - **a. Gather the following real-life samples:** one bottle of soda (like coke or 7-up), One tin of sardines, and one bag of Winnaz chips. All be un-opened and in good condition.
 - **b. Print on a piece of paper** the following questions for the group of trainees to consider.
 - c. Describe how the design of the packaging is good as publicity for each different item
 - **d.** Find where ingredients are listed on the labels and tell the two most common ingredients in each of the items and also find if there is a production and expiry date.
 - **e.** Explain what happens to this packaging when the food inside is used up.
- **3. Topic B:** This is a storage exploration.
 - **a. Gather the following real-life samples:** one package of milk, one 250cl box of milk and one-liter box of milk, all un-opened and in good condition.
 - **b. Print on a piece of paper** the following questions for the group of trainees to consider.

- **c.** Describe where you would find these items in a store, and explain why they are stored in that place
- **d.** Once you buy these items and bring them home, where are they stored? Where are they stored if you eat only half the amount inside the package.
- e. Explain how you know if these items have not been stored carefully.
- **4. Topic C:** This is a packaging exploration.
 - **a. Gather the following real-life samples:** one box of tea, One container of yogurt, and one bag of OMO soap. All be un-opened and in good condition.
 - **b. Print on a piece of paper** the following questions for the group of trainees to consider.
 - c. Describe how the design of the packaging is good as publicity for each different item
 - **d.** Find where ingredients are listed on the labels and tell the two most common ingredients in each of the items and also find if there is a production and expiry date.
 - **e.** Explain what happens to this packaging when the food inside is used up.
- **5. Topic D:** This is a storage exploration.
 - **a. Gather the following real-life samples:** one fresh avocado, one can of tomato paste, one bag of dried beans, all in un-opened packages and in good condition
 - **b. Print on a piece of paper** the following questions for the group of trainees to consider.
 - **c.** Describe where you would find these items in a store and explain why they are stored in that place.
 - **d.** Once you buy these items and bring them home, where are they stored? Where are they stored if you eat only half the amount inside the package.
 - **e.** Explain how you know if these items have not been stored carefully.

Answer: answers will vary depending on the food items chosen by the trainer.

- **6.** Trainer should attend to groups as they carry out the tasks in each of the corners and provide assistance where needed.
- **7.** After all groups have finished the activities in each learning corner, ask a few volunteers to share experience they have gained throughout the session

Application Activity

1. In this activity, the class will return to the factory where they did a site visit during the previous learning outcome.

NOTE: trainer will prepare this visit in advance so the trainees can review as many labelling and storing processes as possible.

- **2.** During the visit, trainees will use the following questions to guide observations:
 - **a.** What kind of packaging materials are used? Why?
 - b. How are the packaged goods packed for distribution? How far away are they distributed?
 - c. Are the packing materials re-useable? Recyclable?
 - **d.** Describe the labels that are used on the food packages?
 - e. What information is included? Can you think of any information that is missing?
 - **f.** Can you think of any packaging or labeling that this company could or should do better?
- 3. After your visit, trainees will review their notes and write a one-page summary to submit at the start of the next class session.

Answer: answers will vary but must be verified by trainer upon submission of reports.



Points to Remember

- Packaging material must be clean and sanitized to avoid contamination
- Choose packaging based on both the food and the packing requirements
- Label any package carefully and completely



Formative Assessment

- 1. Respond to the following questions:
 - **a.** Describe five functions of food packaging.
 - **b.** List four things that should be included on a food label.
 - **c.** Give three marketing considerations for packaging.
 - **d.** List two things to consider when choosing a packaging material.

Answers:

- a. The functions of a package include the following:
 - Keeps the contents in a secure space (containment)
 - Protects the contents from the environment or other hazards (protection)
 - Identifies the contents through labelling (communication)
 - Enables factory processes like filling or heating (mechanization)
 - Facilitates production, storage, distribution, and use (convenience)
- b. Labels require the following:
 - Name of the product

- Name and physical and postal address of manufacturer
- List of ingredients
- Net content weights or volumes
- Date of manufacture and expiry date
- Storage instructions

c. Marketing considerations for packaging include:

- The brand image and style
- Compatibility with handling and distribution needs, and size variation
- Requirements of retailers

d. Choose a packing material based on:

- Technical properties of the material (strength, flexible or rigid, weight, etc.)
- Purpose of the packaging (moisture barrier, cushioning, branding, etc.)
- Availability and cost (locally made or imported? Etc.)
- Environmental impacts (such as recycling) and legal requirements

• Further Information for the Trainer

- **1.** Appendini P, Hotchkiss JH. 1997, Packaging: coming to a store near you. Food Engineering& Ingredients. 32:2023 3.
- 2. http://www.oakpackaging.com/include/assets/Materials.pdf
- 3. Frank A. Paine, H.Y. Paine, 2005: A Handbook of food packaging
- 4. Food Packaging Principles and Practice, Second Edition by Gorden L. Robertson, 1987.

Self-Reflection

- 1. Ask trainees to re-take the self-assessment at the beginning of the unit. They should then fill in the table in their Trainee Manual to identify their areas of strength, areas for improvement, and actions to take so they learn better.
- 2. Discuss trainees' results with them. Identify any areas that are giving many trainees difficulties and plan to give additional support as needed (ex. use class time before you begin the next learning outcome to go through commonly identified difficult concepts).

Learning Unit 2: Store raw materials



Learning Outcomes

By the end of the Learning Unit, trainees will be able to:

- **2.1** Prepare food storage facilities
- 2.2 Receive and store raw materials
- 2.3 Keep records regarding stored food

Learning Unit 2 Self-Assessment

- 1. Ask trainees to look at the illustration above (in their Trainee Manuals) and discuss what they see. What topics do they think this unit will include based on the picture? After some brainstorming, share the main topics.
- 2. Ask trainees to fill out the self-assessment at the beginning of the unit in their Trainee Manuals. Explain that the purpose of the self-assessment is to become familiar with the topics in the unit and for them to see what they know or do not know at the beginning. At the end of the unit, they will do a self-reflection, which includes re-taking the self-assessment and identifying their strengths, areas that need improvement and actions to take. The self-assessment is not a test.

Learning Outcome 2.1: Prepare food storage facilities



Objectives: By the end of the learning outcome, trainees will be able to:

- **a.** Describe, prepare, and verify the storage facilities
- b. Check the food storage capacity and arrangement of goods
- c. check storage condition against product specifications



Time Required: 15 hours



Learning Methodology: brainstorming, group discussion and group work, practical exercises, site visits and



Materials Needed:

• **Standard training materials:** along with tape measures or meter sticks and rulers



Preparation:

- ☐ Contact the supermarket and school manager to organize the field visits
- prepare the question for assess of the trainees

Cross Cutting Issues:



- ✓ **Environment and Sustainability:** consider environmental impact when visiting food processing facilities and when enacting all food processing
- ✓ **Peace and Values Education:** ensure trainees work well together in groups
- ✓ **Inclusive Education:** allocate tasks during learning processes so all are included, contributing members that are valued by the group
- ✓ Gender Balance: in forming working groups and in trainer practice

Prerequisites: prior to this objective, trainees will have a working knowledge of:



- ▶ Food safety and sanitation
- ▶ SHE procedure
- Basic math skills

Key Competencies:

	Knowledge		Skills		Attitudes
1.	Describe storage	1.	Clean and organize	1.	Attentive
	facilities		storage facilities for		
			various products		
2.	Describe best storage	2.	Calculate and check	2.	Careful
	arrangement for various		storage capacity		
	products				



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

- **1.** Using brainstorm, inform trainees that they are going to discuss about activities they do at home or school. Trainer will write all answers from trainees on the board.
 - **a.** Where does your family store soybeans at home?
 - **b.** What do you do if you have new soybeans to store?
 - c. Where are books stored in school?
 - **d.** How does the school add new books to the library?
 - e. How is a place to store soybeans different from where books are stored?

Answers:

- **a.** Answers will vary but soybeans are stored dry and away from bugs and other animals, not near anything poisonous or dirty, etc. only need to access the top few to scoop some out.
- **b.** If new soybeans are added they need to be put behind the old so the old are used first
- **c.** Books are stored in a library which is dry, but in a place where all can be seen and accessed.
- **d.** Books are organized by subject, title, or author.
- **e.** Both need dry places, but food also needs to be protected from animals and bugs as well as poisons. Note that different things are stored in different ways and in different places.
- 2. Ask trainees what topic they think this activity related to. Then introduce the learning outcome and have trainees turn to the table of knowledge, skills and attitudes in their trainee manual they will gain from the learning the outcome and review it together. Explain that this learning outcome will focus on food storage facilities.



1. Ask trainees to consider **Topic 2.1 Task 2** in small groups. Give groups approximately 5 minutes to complete the observations and to respond in writing to the questions.



- **a.** List all the details that you see which make this warehouse a very fine place to store food products.
- **b.** Describe at least two activities (more if possible) that should be completed before food is stored in this warehouse.

Answer:

- a. The walls look solid. There are windows for air flow to keep temp and humidity moderate. There are pallets on the floor to enable air flow under and around the food once it is stacked. There is good lighting. There are bars on the windows for security, etc.
- **b.** The area inside the warehouse should be well cleaned prior to storing foods, the area should also be fumigated if needed. The area outside the warehouse should be tidied, all animals should be kept away from the warehouse, and good records should be kept.
- 2. After the group work time, have each group share their works / answers with the class. As groups present their work, encourage other trainees to ask questions and add anything new. Conclude this activity by noting that this warehouse is only one way to store food, and that we will be learning about, and observing others as well.

3. After all groups have presented, ask trainees to read **2.1 Key Facts**.



Guided Practice Activity

- 1. During this activity, trainer and trainees will visit at least three different storage facilities within the school campus. (may include office supply storage areas, canteen food storage areas, equipment and material storage areas, cleaning materials and supply areas, etc.)
- 2. Trainer will bring measuring tapes (or meter sticks and rulers) with so trainees can measure the storage area and calculate the capacity of each storage area.
- 3. To start this activity, remind trainees that when we consider storage, we are considering volume—that is, the size of the storage area, as well as the volume of the product.
 - a. Ask who remembers how to calculate volume? (answer: length x width x height = volume)
 - **b.** Ask a couple trainees to volunteer to calculate the volume of the classroom using the given meter sticks or tape measure. Let other trainees provide guidance and support as they find the three needed inputs (Length, width, and height) and then as they calculate the total volume of the classroom. (answers will vary per classroom size, but trainer will verify)
 - c. Now that you have the volume of the class, ask trainees to estimate the size of a sack of fresh carrots. (answer: approximately a quarter of a meter squared (length .5m, width .5m height 1m thus .5 x .5 x 1=.25 meters cubed.
 - **d.** Given that estimate, now estimate how many sacks of carrots could be stored inside the classroom. (again, answers will vary)
 - **e.** Ask trainees to think if it makes sense to fill the entire storage area with the given product (in this case with sacks of carrots), and ask them to explain their answer.

Answer: NO, the entire area should not be completely filled. The sacks should be on pallets or shelves so they are not on the ground which may have insects or may be moist. Also, the sacks should have room for air to pass between them so the temperature and moisture can remain constant. AND there should be paths and places for people to walk so they can check the stock as well as load and unload the stocks.

4. Tell trainees to keep these last few classroom activities in mind as the class visits three or four storage areas around the school where trainees can calculate the volume of the storage area and can estimate the amount of product that could be stored in each location. Trainees will each complete the Topic 2.1 Task 3 during this activity outing, using the following table.

Name	Length	Width	Height	Volume	Number of carrot	Notes:
of	(in	(in	(in	In m ³	sacks that could fit	
Area	meters)	meters)	meters)			

Answer: vary depending on sites visited.

5. Upon return to your classroom, invite pairs of trainees to share calculations and defend their estimates for numbers of sacks of carrots. Allow trainees to challenge one another with ideas of why their estimated number of carrot sacks is better than the number estimated by their peers. In the end, the numbers will be validated by the trainer.

Application Activity

Note: prior to the class find a supermarket near the training center that has different ways of storing of different goods and foods products. Visit the supermarket and discuss a field visit with the manager. Explain that the main purpose of visiting this supermarket is to observe the different way of storing food, conditions of the stored foods, records, and any other observations or guidance regarding the storage areas for food.

- **1.** Ask group trainees to work in pairs during this site visit. They will be trying to find as many good answers as possible so the more details they can notice the better!
- **2.** Take class to visit a nearby supermarket (where trainer has already organized the visit) and ask trainees to complete **Topic 2.1 Task 4**.
- **3.** Questions to guide observations are as follows:
 - a. Look for dry storage and describe foods stored in these areas
 - **b.** Look for refrigeration storage and describe foods stored in these areas
 - **c.** Look for freezer storage and describe foods stored in these areas
 - **d.** What are the advantages of dry storage over the other kinds of storage?
 - **e.** When is freezer storage the best option?

f. What products are stored in refrigeration? Why?

Answer: Answers will vary depending on the site visited.

4. Trainees will write a short, one-page report to present to the class. Ask several trainees to share their observations with the class for comment and discussion.



- Clean any storage area prior to use
- Monitor temperature and moisture of any storage area
- Carefully label each stored container and keep detailed records of stock



Formative Assessment

- **1.** Answer the following questions:
 - **a.** List and describe the three primary ways to store food.
 - **b.** Give three tasks that will help prepare a warehouse prior to storing food there.
 - **c.** Give three best practice tips that will help ensure better cold storage conditions.
 - **d.** Explain why humidity should be kept low and temperatures moderate in a warehouse.

Answers:

- **a.** Primary ways to store food:
 - Dry Storage: should be dark, low humidity, and moderate temperatures (not hot or
 - Refrigeration: should have stable temperature (1-5°C)
 - Freezer: should have stable temperature (0 °C or colder)
- **b.** Hygiene practice in storage areas: keep everything as clean as is practically possible!
 - Clean and fumigate storage areas prior to storing food.
 - Warehouse surroundings should be tidy: vegetation and rubbish can hinder inspections and can provide breeding grounds for insects and rodents.
 - Livestock must be kept away from the store; clean up droppings which attract rodents.
 - Clean storage containers whenever they are empty.
 - Dip old sacks in boiling water to kill insects and then dried in the sun.
 - Remove food residues with a thorough brushing as well as cleaning with soap.
 - Holes should be stitched/patched/repaired.
 - Burn grass inside solid-walled bins or mud-plastered baskets to kill insects and mold.

- Old grain must be stored separately from new grain, and old grain must be used first
- **c.** Best practice for fridge and freezer:
 - Do not overload because this will limit airflow which is needed for stable temps.
 - Wait for food to be cooled to room temp before loaded into fridge or freezer.
 - Keep door closed as much as possible so cold air does not escape.
 - Clean frequently and ensure all food is well wrapped and labelled.
- **d.** Humidity should be kept low and temperatures moderate in a warehouse so the food does not spoil—that is the conditions are not those where microbes can thrive, so food does not decompose as quickly

Learning Outcome 2.2: Receive and store raw materials



Objectives: By the end of the learning outcome, trainees will be able to:

- a. Describe ordering and receipt documents
- **b.** Discuss LIFO & FIFO protocols (foods stock protocols)
- c. Monitor storage conditions and records for storage places



Time Required: 15 hours



Learning Methodology: Brainstorming, group discussion, presentations, practical exercises, field visit, written activities



Materials Needed:

- Documents or forms for the stock records, reporting form, Recording form
- Balance, PH meter, Flipchart, Marker pen, Foods items,





- ☐ Make a clear plan of field visit well in advance, contact owners of food processing plant to book your trainee's visit
- ☐ Gather at least 20 storage documents for class exploration activity

Cross Cutting Issues:

✓ **Environment and Sustainability:** consider environmental impact when visiting food processing facilities and when enacting all food processing



- ✓ **Peace and Values Education:** ensure trainees work well together in groups
- ✓ **Inclusive Education:** allocate tasks during learning processes so all are included, contributing members that are valued by the group
- ✓ **Gender Balance:** in forming working groups and in trainer practice. Financial education

Prerequisites: Trainees should have some prior knowledge of:



- ▶ Food storage
- Hygiene and food safety
- SHE practices

Key Competencies:

	Knowledge		Skills		Attitudes	
1.	Identify documents for	1.	Correctly fill and verity	1.	Attentive	
	ordering, delivering and		food stock records			
	receiving raw materials					
2.	Describe order and	2.	Complete receipt	2.	Self-confident	
	receipt document details		documents with weight			
			of raw materials			
3.	Explain LIFO and FIFO	3.	Arrange raw materials	3.	Persistent	
	methods (food stock		using LIFO and FIFO			
	protocols)		methods and monitor			
			storage conditions			



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

1. Create small groups of trainees (everyone in each group should participate so groups should have no more than 4 trainees).



- **2.** Ask trainee to complete the **Topic 2.2 Task 1**, by observing the picture, discussing their thinking, and then answering the related questions.
 - **a.** Give specific detail to explain what both people in this illustration are doing.

- **b.** Who do you think is the seller and who is the buyer? Why do you think that?
- **c.** Guess what will happen next.
- **d.** Where will bananas be placed?
- e. What will the woman be given? What will the man be given?
- **f.** What document is the man filling out? What detail is on that document? Who keeps a copy of that document?

Answers:

- **a.** The woman is selling bananas to a man who is weighing and writing things down.
- **b.** The woman is the seller and the man are the buyer because he is taking notes.
- c. The man will pay the woman and then store the bananas in the warehouse behind
- **d.** Into the warehouse behind the lady
- e. The woman will be paid cash—the man will get bananas.
- **f.** The man is documenting the weight and filling out a receipt. The receipt will show the weight, the price paid and the date as well as names of seller and buyer. Both seller and buyer should keep a copy of the receipt.
- **3.** Write on the blackboard / flipchart all responses / answers proposed by each group. Discuss and verify the best answers.
- **4.** Ask trainees what topic they think this activity related to. Introduce the learning outcome and have trainees turn to the table of knowledge, skills and attitudes in their trainee manual to see what they will gain from this learning outcome.

Problem Solving Activity

- 1. Ask the trainees to stay in the same groups that they formed for the warm-up.
- **2.** Ask trainees to discuss the next illustration as they respond together to **Topic 2.2 Task 2** questions.



- **a.** Describe the conditions in the warehouse.
- **b.** Describe the stock that you see stored in this warehouse.
- **c.** Why would a chair and table be placed inside a warehouse?
- **d.** Give at least two ideas for why there are some boxes that are near the table, rather than carefully stacked with the other boxes.
- e. What sort of document do you think the man might be filling out?

Answer:

- **a.** The warehouse is clean, well-lit with a light fixture, the windows have screens so air can pass through, but the place remains secure. The floor looks neat and organized. The stock is piled neatly and is placed on pallets, so it is not on the floor.
- **b.** There are two kinds of stock. The boxes with green labels are stored on pallets stacked up to a maximum of 4 boxes high. The sacks, each with a blue stripe, are in stacks of 10 sacks. There are many more sacks than boxes (which we can see). A few boxes are near the man's desk.
- **c.** The chair and desk/table are inside the warehouse so the man can sit there and control the stock carefully, either if stock is leaving or if new stock is coming in.
- **d.** The boxes near the desk may be newly delivered and the man is putting them into the warehouse log, or they may be ready to be shipped out and the man is making a waybill or invoice, or maybe those boxes were damaged and the man is making a damage report.
- **e.** The man could be completing a stock record or an invoice or a receipt or an inspection report or a damage report, or he may be ordering more stock for the warehouse, or he may be writing a letter to his mother to tell her that all is fine.

- 3. After groups have completed their work, share out some responses and trainer will verify the correct answers.
- 4. After all groups have presented, refer trainees to 2.2 Key Facts. Ask a volunteer to read the Key Facts aloud and respond to any questions that trainees may have.



Guided Practice Activity

NOTE: prior to this class the trainer will gather examples of reports and documents that are used when storing and stocking raw materials. Gather as many examples as possible. It is strongly suggested that you gather not less than 20 samples, but there should be at least one document per trainee so big classes may need more documents. Include at least one example of the following: Contracts, Waybills, Transport documents, Import / export documents, Goods Received Records / Receipts / Delivery Notes / Loss-damage Forms, Inventory Forms and Inspection Reports.

- 1. Prior to class, gather the documents that you have brought to class and divide them equally into 4 piles of documents.
- 2. Organize the class so desks are put together so there are 4 larger tables that groups of trainees can gather around. Put one pile of documents on each of the tables.
- 3. Explain that Topic 2.2 Task 3 will be a sort of classroom exploration done in groups. Divide the trainees into 4 groups. Each group will have approximately 5 minutes at each of the 4 tables (so encourage the trainees to work efficiently) and at each of the tables they will review and discuss each of the sample documents, then respond to the questions below.
 - a. Which of the documents in your pile of documents are used for ordering raw materials?
 - **b.** Which are used during the delivery process for those raw materials?
 - **c.** Describe receipt document and list out all the required pieces of information you see. Is any information missing on this receipt?
 - **d.** Identify the documents that are used within the storage facility to keep track of stock that is coming in and stock that is going out. Are there any documents that relate to stock rotation—or stocking protocols like FIFO or LIFO?
 - e. Describe raw materials presented in the documents –give as much detail about those materials as you can. (weight, packaging sizes, seller, transporter, etc.) Describe raw materials presented in the documents –give as much detail about those materials as you can. (weight, packaging sizes, seller, transporter, etc.)

Answers: (will vary based on the actual documents that the trainer brings to the class)

- **a.** Answers will vary (may be invoice or contracts may be waybills, transportation documents, good received documents, etc.
- **b.** Answers will vary
- c. A receipt should be dated, list both the seller and the buyer's names (and possibly addresses) should describe the goods that have been sold/bought and the exact quantities of each, the exact cost/price for each item (unit cost and total costs) should be listed for each raw material, should be signed and stamped by both seller and receiver...
- d. Will vary depending on what trainer has brought to class.
- **e.** Will vary per above
- **4.** Attend to each of the groups as they carry out the tasks and provide assistance and guidance where needed.
- **5.** After all groups have finished activities, each trainee will present one of the documents to the entire class. Be sure that each trainee provides detail on their document.
- **6.** Invite trainees to share experience they have gained through this guided activity.



NOTE: Contact the owner of a local bakery to ask them if your trainees might visit to observe the operation, especially as it relates to stocking and using raw materials and the records that are kept to be sure that the stocks do not run low or become spoiled.

- 1. Tell trainees that today the class will be doing field work in a local bakery.
- 2. Together you will all visit the bakery while it is working properly. The owner will show you the operation and then will show you all the paperwork that the bakery keeps in order to monitor their ordering, delivery, storage, and use of raw materials. Trainees will observe and review all the paperwork. Each trainee should refer to Topic 2.2 Task 4 for guidance during the visit, and answer the following questions:
 - **a.** Describe how raw materials are weighed both when they are delivered and again when they are used to bake things.
 - **b.** Are the raw materials stored well? Do you have any suggestions for improvement?
 - **c.** What documents do you see in use?
 - **d.** Are there documents that you think are missing and that would be helpful?
 - e. Ask the bakery manager if they organize raw material using LIFO or FIFO methods.

- **f.** List three other interesting observations with regard to storing raw materials. **Answer:** Varies according to the bakery
- **3.** Ask a few trainees to present their reports in the class for sharing purposes. Allow any trainees to ask questions, request clarification, or to add more detail. Trainer will verify all responses.



- Stocking raw materials is critical to smooth running of a business.
- Careful record keeping enables good management of stock levels.
- FIFO is the main protocol used with food and food storage to minimize spoilage.



- 1. List out the five steps to receiving raw materials into a warehouse.
- **2.** Give examples of 5 different documents that may be used to monitor stock in a warehouse.
- 3. Explain FIFO and LIFO then explain which protocol is better for food inventory—and why.

Answers:

- 1. Receiving raw materials, store person should:
 - unload the materials in staging area,
 - verify quantities,
 - clean the materials' containers/ packaging
 - transfer raw materials to the storage area
 - record all observations / details in a written record.
- 2. May include: Contracts, Waybills (transport documents including Import / export documents) Goods Received Records / Receipts / Delivery Notes / Loss-damage Forms/ Inventory Forms and Inspection Reports.
- **3. FIFO:** First In, First Out the earliest goods purchased are sold before selling the goods purchased more recently. **LIFO:** Last in First Out the latest delivery of goods are sold first. FIFO is best for food items, so no items stay too long in storage and become spoiled.

Learning Outcome 2.3: Keep Records on Stored Food



Objectives: By the end of the learning outcome, trainees will be able to:

- a. Record food storage conditions for various types of stock
- **b.** Describe and organize inventory records
- c. Record periodic inspections and monitoring visits efficiently and precisely



Time Required: 10 hours



Learning Methodology: brainstorming, presentation, problem solving activities, practical exercise, field visit, group discussion



Materials Needed:

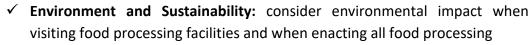
• **Standard training materials:** Pen and notebooks, Reference books, stock records and documents, Flipchart, Markers, Foods items, Internets,



Preparation:

- ☐ Make sure that all primary teaching materials are in place
- ☐ Check, plan, confirm the field visits both off site & at training center

Cross Cutting Issues:





- ✓ Peace and Values Education: ensure trainees work well together in groups
- ✓ **Inclusive Education:** allocate tasks during learning processes so all are included, contributing members that are valued by the group
- ✓ **Gender Balance:** in forming working groups and in trainer practice
- ✓ Financial education: keeping records



Prerequisites: Trainees will have prior knowledge of:

- Food storage
- Basic mathematics

Key Competencies:

	Knowledge		Skills		Attitudes
1.	Identify recording of	1.	Conduct recording of	1.	Detail-oriented
	food storage condition		food storage condition		
	in relation of type stock				
2.	Classify inventory	2.	Assist the inventory	2.	Motivated
	records according to		records according to raw		
	raw materials		materials stored		
3.	Identify of recoding	3.	Perform and assist	3.	Carefully
	calibration based on		recording of calibration		
	storage condition and		based on storage		
	specification		conditions and		
			specification		
4.	Choose records	4.	Collect and report	4.	Innovative
	according to type of		records according to		
	records		type of records		



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

1. Create a group of trainees to discuss about the represented picture (everyone in each group should participate).



- **a.** Ask the trainees to describe and present all information on what they observe during the presentation of this picture.
- **b.** What topic they think this activity related to.
- 2. Allow time for groups to discuss about the picture then discuss as a class.
- **3.** Introduce the learning outcome and have trainees turn to the table of knowledge, skills and attitudes in their trainee manual they will gain from the learning the outcome and review it together.

Problem Solving Activity

NOTE: The trainer will bring 4 different tools/machines (from the stock at the training center) that the trainees can calibrate during class. Groups will try to calibrate the given machines quickly in their groups—then the trainer will demonstrate correct calibration techniques and records to be kept on maintenance and calibration for each machine. Each station will have one tool/machine as well as the things needed to correctly calibrate the given tool / machine. After trainees try to calibrate, the trainer will demonstrate correct calibration procedures.

- 1. Ask trainees to form four groups with equal number of trainees in each.
- **2.** Groups will have approximately 3 minutes at each of the stations and their goal will be to calibrate the given machine in that time—then move on to the next, and the next, per **Topic 2.3 Task 1** explained below.

Answer: practical exercise—processes vary according to tools/machines chosen by trainer

- **3.** After all groups have tried to calibrate each machine/tool, the trainer will go to each machine and as trainees gather around to watch, the trainer will demonstrate how to do the calibration—and how to record the calibration.
- **4.** Refer trainees to **2.3 Key Facts**. Read aloud and take any questions —or provide additional examples as needed.



NOTE: Prior to this lesson trainer will work with the training center manager to gather copies of all the stock storage records that are used in the school storage areas. This should include records for food items as well as non-food items like cleaning supplies and stationery.

- 1. Trainer should also take some blank copies of the storage records and fill them out PURPOSEFULLY ADDING IN MISTAKES that the trainees will try to identify and correct.
- **2.** Trainer should have not less than 20 documents and should have at least one document for every trainee prepared prior to the class.
- **3.** Divide the documents into 4 envelopes (each envelope will have 5 or more documents inside) Label the envelopes A, B, C and D so they can be identified.
- **4.** Ask trainees to group into four teams. Each team will have at least two females and at least two males. Let the four teams gather around one table so they can work together and complete the Topic **2.3 Task 2** together. For each topic they will fill out a table like the one below:

Envelope Letter	Type of document	The good things about this document (what is correct?)	What should be changed with this document (what is NOT correct?)
		(trainees will add more rows)	
		Towsy	
Example:			
Envelope K	Purchase receipt	It shows the date, price, seller, buyer and describes goods	Missing: weight of the goods purchased and buyer signature

- **5.** When your group has completed the table for all the documents in all 4 envelopes, the Trainer will ask each person to take one document.
- **6.** Together as a class you will discuss how the different documents should be classified—and grouped together with other like documents.
- **7.** Think about how these documents should all be filed together in a way that is organized and so you can find them, and they are useful when needed.

Answer: vary according to the documents that the trainer provides to the class.

8. Ask one team representative to share thoughts and experience gained through this activity.



- 1. For this activity each trainee will go out into their own community (preferably with a partner that lives in their same zone) and visit a store or a small business. The trainee will discuss and observe the documents that are used by the business owner then consider some ways that the record keeping might be improved.
- **2.** Tell trainees that this next activity will be homework that they will do in pairs if they live nearby another trainee. Ask trainees to determine who may be a good partner based on proximity of their homes and then ask trainees to read **Topic 2.3 Task 3** together.
- **3.** Before trainees leave the classroom, explain the task aloud carefully (so even the slower readers have clear understandings) and take any and all trainee questions.
 - **a.** After the visit, trainees will review notes with a partner. In particular respond to the following questions
 - **b.** Were the documents used accurate and complete? Were certain records missing? Which ones? Give suggestions for better processes that the owner could use for documentation and records.
 - **c.** How were the records for the business stored? Give suggestions for better processes that the owner could use to store the documentation and records for the business.
 - **d.** Explain how each machine in the business is maintained and calibrated. Were the records clear and helpful? Give suggestions for better maintenance or records
 - **e.** What else did you observe that was an area that you felt the owner might benefit from a different process or better records or record keeping?

Answer: vary depending on visits chosen by each trainee

4. When trainees return to class, ask for volunteers to share their experiences and insights. Trainer will verify the trainees' suggestions for improvement.



- A good system of record storage should be functional, accurate, reliable, and user-friendly.
- Records may be kept in paper copies in files or in e-copies on a computer or laptop.
- Calibration is the process of testing accuracy and quality of a measurement tool.



Answer the following questions:

- 1. How should records be classified and stored? Give 4 tips.
- 2. Choose two of the following words to fill the blanks in the sentence below:

The good system of record keeping should be functional, _____, ____, and user-friendly.

Options: calibrated, accurate, materials, storage, reliable, factory

- 3. Explain what it means to calibrate an instrument.
- 4. List five examples of documents that a factory would be likely to keep

Answers:

- 1. Records should be classified and stored based on:
 - Purpose (how will this record be used?)
 - Type (similar records should be stored together by date)
 - Date (how long must this type of record be kept?)
 - Access (who will review or check this record?)
- 2. Accurate and reliable
- **3.** Calibration is process of testing the accuracy and quality of a measurement or measurement tool
- **4.** May be any of the following:
 - Cleaning and pest control schedule records
 - Equipment maintenance and calibration records
 - Storage temperature monitoring records
 - Supply / inventory files
 - Purchase orders/delivery records/invoices/receipts/waybills



- 1. Ask trainees to re-take the self-assessment at the beginning of the unit. They should then fill in the table in the Trainee Manual to identify their areas of strength, areas for improvement, and actions to take to improve.
- 2. Discuss trainees' results with them individually. Identify any areas that are giving many trainees difficulties and plan to give additional support as needed (ex. use class time before you begin the next learning outcome to go through commonly identified difficult concepts).

• Further Information for the Trainer

- **1.** http://www.inspection.gc.ca/food/requirements/preventive-control-plans/record-keeping-procedures/eng/1513697123711/1513697124167
- **2.** https://www1.agric.gov.ab.ca/\$Department/deptdocs.nsf/all/afs12301/\$FILE/chapter_03 documentation.pdf
- **3.** https://www.commerce.wa.gov.au/books/inc-guide-incorporated-associations-western-australia/record-keeping-systems

Summative Assessment

MUTWARE is one of the biggest food processors in Rulindo District, Ngoma Sector. This factory processes fruits and vegetables, specifically apples, tomatoes, mangoes, pumpkins, onions, and squash. Unfortunately, after storing their products, they see that the fruits and vegetables are too old, smell bad, and look rotten.

They would like to improve the process of treating and handling fresh fruits and vegetables to stop or slow down spoilage and allow for a longer shelf-life. However, they have limited skills and knowledge in food preservation and storage techniques.

As a skilled food preservation worker in above sector, Mutware calls you to assist him with preserving the following fresh products:

- 100kg of fresh tomatoes
- 50 kg of apples
- 100 kg of mangoes

The needed products should fulfil the following conditions:

- The fresh preserved fruits and vegetables should be packaged in appropriate packaging material
- The products should be stored in optimum storage conditions

The above quantities should be processed within 4 hours.

Raw materials:

Apples, tomatoes, mangoes, pumpkins, onions and squash, NaOH, Liquid soaps, Nitrite acid, Boiled water, Hydrogen peroxide, Alcohol, Chlorine, HCl

Materials and equipment:

Brushes, buckets, serviettes, mops, basins, P.P.E (Personal Protective Equipment), Thermometer, titratable Balance, pasteurizer, homogenizer, lactoscan, autoclave, water-bath, glassware, Bunsen burner, pH meters, lactometers, phosphatase test kit, Operational manual, Clock, packaging materials, labels, atandard manuals, packaging machine, cooling van, jar lifter, canning funnel, jars, pressure canner, knives, spoons, tongs, box grater, water proof pens, markers, corer, potato masher, pots, mixing bowls

Assessment Criterion 1: Quality of process

Observation Checklist

Flowerts to Verify	Assessment	Re-asse	ssment					
Elements to Verify	Date:	Date:	Date:					
Indicator 1: Appropriate preservation methods are i	Indicator 1: Appropriate preservation methods are identified based on products specification							
Equipment are selected in relation with product	Yes□	Yes□	Yes□					
	No □	No □	No □					
Preservation techniques are classified according to	Yes□	Yes□	Yes□					
functions	No □	No □	No □					
Raw materials are prepared and checked in	Yes□	Yes□	Yes□					
accordance with product and requirements	No □	No □	No □					
Indicator 2: Effective preservation techniques are ap	plied accordin	g to raw mater	ials					
specification								
Heat treatment are applied according to raw	Yes□	Yes□	Yes□					
materials	No □	No □	No □					
Correct Food additives are applied in relation with	Yes□	Yes□	Yes□					
food product	No □	No □	No □					
Right bio-preservatives are applied according to	Yes□	Yes□	Yes□					
product	No □	No □	No □					
Minimal processing is applied according to product	Yes□	Yes□	Yes□					
	No □	No □	No □					
Indicator 3: Preserved product is packaged and stored according to standards and product								
specifications								
Packaging materials are identified according to	Yes□	Yes□	Yes□					
standards and product specification	No □	No □	No □					
Preserved product is packaged and labeled	Yes□	Yes□	Yes□					
according to the products	No □	No □	No □					
Preserved product is stored in reference with	Yes□	Yes□	Yes□					
product storage conditions	No □	No □	No □					
Indicator 4: Storage facilities are prepared properly	according to re	quirements						
Storages facilities are prepared properly	Yes□	Yes□	Yes□					
	No □	No □	No □					
Storage capacity are checked and arranged	Yes□	Yes□	Yes□					
adequately according to parameters and standards	No □	No □	No □					
Storage conditions are checked in reference with	Yes□	Yes□	Yes□					
parameter and product specification	No □	No □	No □					
Indicator 5: Raw materials are received and stored a	ppropriately a	ccording to rec	uirements					
Ordering documents are checked properly	Yes□	Yes□	Yes□					
according to requirements	No □	No □	No □					

Raw materials are tested and weighed according to	Yes□	Yes□	Yes□				
specification	No □	No □	No □				
Receipts documents of raw materials are completed	Yes□	Yes□	Yes□				
according to requirements	No □	No □	No □				
Raw materials are arranged, and respected FIFO	Yes□	Yes□	Yes□				
based on parameters	No □	No □	No □				
Storage conditions are monitored in reference with	Yes□	Yes□	Yes□				
requirements	No □	No □	No □				
Indicator 6: Records are kept in relation with types of stocks							
Storage conditions are recorded in relation with	Yes□	Yes□	Yes□				
types of stocks	No □	No □	No □				
Periodic inspection and monitoring storage are	Yes□	Yes□	Yes□				
recorded based on procedures	No □	No □	No □				
Inventory records are assisted correctly according	Yes□	Yes□	Yes□				
to raw materials	No □	No □	No □				
Calibration records are assisted according to	Yes□	Yes□	Yes□				
storage conditions and specification	No □	No □	No □				
Records are reported according to types of records	Yes□	Yes□	Yes□				
	No □	No □	No □				

REFERENCES

- 17.5C: Food preservation. (2019, September 25). Biology

 LibreTexts. <a href="https://bio.libretexts.org/Bookshelves/Microbiology/Book%3A_Microbiology_(Boundless)/17%3A_Industrial_Microbiology/17.5%3A_Food_Preservation/17.5C%3A_Food_Pres
- Boulder County Food Safety Program. (n.d.). *Cross*contamination. https://www.bouldercounty.org/families/food/cross-contamination/
- Choudhary, A. (n.d.). SOP for handling and storage of raw & packing material. Pharmaceutical Guidelines. https://www.pharmaguideline.com/2010/03/sop-for-handling-and-storage-of-raw.html#gsc.tab=0
- Dauthy, M. E. (1995). Fruit and vegetable processing: General procedures for fruit and vegetable preservation. Food and Agriculture Organization of the United

 Nations. https://www.fao.org/3/v5030e/v5030e0d.htm
- Government of Western Australia. (n.d.). *Record keeping*systems. https://www.commerce.wa.gov.au/book/export/html/5442
- Shiksha, K. (2012, March 6). *Principles of food preservation*. E-Courses

 Online. https://ecoursesonline.iasri.res.in/mod/page/view.php?id=17055
- United Nations Industrial Development Organization (UNIDO). (n.d.). Framer's training manual on post harvest management of sorghum, groundnut and rice. European

 Union. https://europa.eu/capacity4dev/file/31677/download?token=HHL_plQp

