RWANDA POLYTECHNIC

TVET LEVEL II

AGRICULTURE

Maintain Farm Tools

TRAINEE MANUAL

RWANDA POLYTECHNIC

Approved by: Workforce Development Authority

USAID FROM THE AMERICAN PEOPLE

EDC Education Development Center

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MAINTAINING FARM TOOLS, EQUIPMENT AND FACILITIES

Unit 1: Select tools and equipment

Unit 2: Clean tools and equipment

Unit 3: Repair tools and equipment

Unit 4: Adjust and calibrate tools and equipment

Unit 5: Maintain farm facilities

Unit 1: Select tools and equipment

Topics

1.1 Inventory of tools and equipment

1.2 Selecting tools and equipment

1.3 Criteria for selection tools and equipment

Unit Summary:

In this unit you will become familiar with different topics such as creating inventories for farm tools and equipment, selecting farm tools and equipment for different tasks, and the different criterion that make different farm tools and equipment more suitable for different tasks.

Self-Assessment: Unit 1

1. Look at the illustration of unit 1. 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 rights or wrong ways to answer this assessment. It is for your own use during this unit. The trainer will read a skill that is listed 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. 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.**
Develop inventory checklist for farm tools and equipment					
Arrange tools and equipment properly according to their specification and codes					
Use specifications and codes to handle farm tools and equipment					
Find the correct tools in the community for the different farming activities					
Choose correct tools and equipment that are appropriate to specific agricultural tasks					

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.
Justify the reasons for selecting certain tools and equipment for different farming tasks					

Topic 1.1: Inventory of tools and equipment

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify checklist for tools and equipment	**1.** Develop inventory checklist for farm tools and equipment	**1.** Attentive
2. Describe ways of arranging farm tools and equipment	**2.** Arrange farm tools and equipment following specifications and codes	**2.** Detail-oriented
3. Explain farm tools and equipment specification and codes	**3.** Use specifications and codes to handle farm tools and equipment	**3.** Responsible

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

Topic 1.1 Task 1:

1. Consider a farm activity and answer the following questions:

a. What is the farm activity?

b. How you perform this farm activity and what tools do you use?

c. When you are not performing this farm activity, where do you store your tools? Is there an order to where you put them? What order do you put them in? Do you keep written track of the tools?

2. Review the Key Competencies table.

Problem Solving Activity

Topic 1.1 Task 2:

1. Consider the tools you use on your farm:

- **a.** How many tools do you think you use?
- **b.** Have you ever lost or misplaced a tool?
- **c.** Why do you think people take inventory of their tools?
- **d.** Do you arrange your tools? In what manner do you arrange your tools? How do you think the way you arrange your tools could be improved?
- **e.** Do your tools have any specifications or codes? Do you keep track of these specifications or codes?
- **f.** If your tool had an issue, how would you fix it? For example, if a specific part was broken, how could you find a new one for your specific tool?

2. Take some of your tools and consider their category or specifications. Consider how you would arrange them with respect to their category and specifications.

3. Read **1.1 Key Facts** below.

1.1 Key Facts

An **inventory** is a list of everything the farmer owns with values for each item (tools and equipment). The farm inventory is the foundation or basis for all farm records. The farmer will use it as the record to help in planning the operations of the farm business.

- An inventory requires that all items in storage be counted periodically. Inventory should be taken at least monthly to track any changes in tools and equipment. The inventory records can be kept in a spreadsheet, table or in another system reserved for that purpose.
- The inventory is used to verify the accuracy of the lasting inventory. For example, if 15 whole wheelbarrows are counted during a physical inventory, but the lasting

inventory suggests that there should be 20 wheelbarrows on hand, then a control problem exists, and you need to find the reason for the variance.[1]

Why keep an inventory:

- Provides the opportunity to measure success
- Controls expenditure
- Helps in proper planning
- Helps you to respond to customers as quickly as possible
- Helps to identify necessity to update of supplies
- Determine if tools or equipment may need to be repaired

Types of inventory

- Tools and equipment: all farm tools and equipment
- Farm machinery: tractors, vehicles etc.
- Planting material and agrochemicals: suckers, fungicides, weedicides, soil amendments, fertilizers etc.

Conduct a farm tools and equipment inventory so you have a detailed record of each tool or equipment including:

- The source of equipment including the supplier name and location
- Descriptions of the tool or equipment including model, serial and ID numbers, model number, brand and year
- The acquisition date and unit cost
- The funding source and, if taken on a loan, the percentage paid and the percentage left to pay
- The present location, use, condition (excellent, good, fair or poor) of the equipment, and date the information was reported.
- All pertinent information on the final transfer, replacement, or disposition of the equipment
- Storage location

[1] The BC Cook Articulation Committee. (2015, September). *Chapter 10: Managing inventory control and procurement*. The Pennsylvania State University: Open Resource Publishing. https://psu.pb.unizin.org/hmd329/chapter/ch10/

Example tools and equipment inventory format

Date Acquired	Description (make and model number)	Serial Number	Supplier	Cost	Quantity	Condition (good/ fair/ poor)	Location	Remarks

Guided Practice Activity

Topic 1.1 Task 3:

1. Consider the tools and equipment you use in your farming activities. Try to consider at least three tools or pieces of equipment. It is okay if you cannot fill out all of the information. If information is missing, consider keeping track of that information the next time you purchase tools or equipment.

Date Acquired	Description (make and model number)	Serial Number	Supplier	Cost	Quantity	Condition (good/ fair/ poor)	Location	Remarks

Application Activity

Topic 1.1 Task 4:

1. Conduct the inventory with the tools and equipment located in the school's facilities with the following phases:
   a. **Requests:** Equipment requests waiting to be fulfilled (they move to 'in use' after formal acknowledgement from the employee)

   b. **In use**: Equipment currently assigned to an employee

   c. **Transfers:** Equipment that was put back in stock for any reason (no longer necessary, the employee is no longer working at the schools, etc.)

   d. **Under repair**: Damaged equipment, undergoing repairs

   e. **Obsolete:** Old, broken or lost equipment, no longer functional

2. Compare your findings with the school's inventory list. Make all updates as necessary.

Topic 1.1 Task 5:

1. Visit an actual farm and ask to see their farm tools and equipment inventory. While at the farm, answer the following questions:
   a. What differences do you observe between the example inventory form and the real farm's inventory form?

   b. How often does the farmer collect inventory?

   c. What does the farmer keep inventory of?

   d. How could the farmer's inventory be improved?

   e. How important does the farmer consider taking inventory to be? What reasons does the farmer provide?

   f. What strategies does the farmer use to arrange their tools?

2. Share and discuss your ideas with the rest of the class.

Points to Remember

- Mark each tool or each piece of equipment with a permanent identification number to make taking inventory easier.
- Schedule the dates when you will take inventory.

Formative Assessment

1. An older farmer has been running his farm for many years and while the farm has grown a little, he farms almost the same size plot each year. He hasn't thought of performing inventory and doesn't really understand why he would want to perform it.

Explain to the farmer what making an inventory involves and why it is important to make an inventory of his tools and equipment.

2. What are some of the aspects of the tools and equipment you want to keep track of when taking inventory?

Topic 1.2: Selecting farm tools and equipment

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify different farming activities and their associated tools or equipment	**1.** Choose the correct tool or equipment based on the farming activity	**1.** Attentive
2. Explain different categories or types of farming activities	**2.** Apply correct tools to different farming activities according to their purpose	**2.** Detail-oriented
3. Describe the usage of different farming tools in the community	**3.** Find the correct tools in the community for desired farming activities	**3.** Responsible

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

Topic 1.2 Task 1:

1. Fill in the following table. Pick different farm activities and mention the tool you would use to accomplish that activity.

Farm Activity	Tool or Equipment Used in Activity
Example: Watering the plants	Watering can

2. Consider a time when you used the wrong tool for a farming activity.

a. What lead you to use that specific tool for the activity?

b. Were there any negative consequences from using that tool?

c. What tool should you have used?

Problem Solving Activity

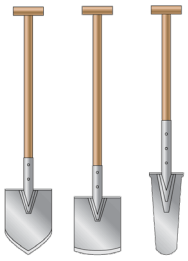
Topic 1.2 Task 2:

1. Consider more general types of farming activities. The following table provides several general types farming activities. There is space for you to add more types that you believe need to be considered. Under each general type, provide two more specific activities and the tools you would use.

General Type of Farming Activity	Specific Farming Activity	Tool Used to Perform the Activity
Land preparation	1.	
	2.	
Planting	1.	
	2.	
Crop Maintenance	1.	
	2.	
Harvesting and Product Handling	1.	
	2.	
Soil Erosion	1.	
	2.	
_____	1.	
	2.	
_____	1.	
	2.	

Topic 1.2 Task 3:

1. Write down the name of the following types of tools and equipment and their special use.

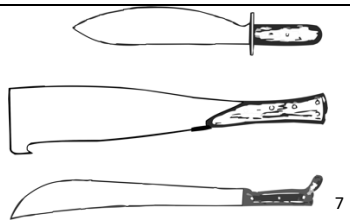
No	Picture	Name of Tools/ Equipment	Special Use
1	 [2]		
2	 [3]		
3	 [4]		
4	 [5]		

[2] User: KoS. (2006, August 18). *Secateur ouvert* [Photograph]. Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Secateur_ouvert.jpg

[3] Pandanna Imagen. (n.d.). *Hammer* [Illustration]. Pixabay. https://pixabay.com/vectors/hammer-tool-tools-work-carpenter-4772131/

[4] International Institute of Tropical Agriculture (IITA). (2012, February 17). *Spraying maize with chemicals* [Photograph]. Flickr. https://www.flickr.com/photos/iita-media-library/6891413527
License: https://creativecommons.org/licenses/by-nc/2.0/legalcode

[5] User:Arz. (2007, May 17). *Shovels* [Graphic]. Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Shovels.png
License: https://creativecommons.org/licenses/by-sa/3.0/legalcode

5	 6		
6	 7		
7	 8		

Topic 1.2 Task 4:

1. Consider the following questions regarding selecting farm tools and equipment for farm activities:
   a. Why do you think it is important to choose the appropriate tools for different farming activities? Choose at least three reasons and explain.

   b. While it may cost money to buy farm tools, why might it be a smart business decision?

2. Read **1.2 Key Facts** below.

1.2 Key Facts

The **types of tasks** on a farm that might require you to use tools and equipment are the following:

- Soil preparation
- Planting
- Weeding

[6] User:OpenClipart-Vectors. (n.d.). *Gardening hoe*. Pixabay. https://pixabay.com/vectors/garden-gardening-hoe-tool-2024534/

[7] User: Ehrenburg. (2005, August 18). *Machete* [Drawing]. Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Machete.png

[8] Dorn, C. (n.d.). *Wheelbarrow cart work garden* [Illustration]. Pixabay. https://pixabay.com/illustrations/wheelbarrow-cart-work-garden-1988038/

- Fertilizers and applying agro-chemical pesticides and herbicides
- Building fences
- Plant and crop maintenance
- Harvesting
- Soil erosion control
- Maintaining structures and irrigation
- Transporting

During **soil preparation** and **planting** we might use the following tools and equipment:

- Pickaxe: breaking up the soil
- Wheelbarrow: transporting soil, seeds, and materials
- Spade: slicing through roots and soil, moving soil
- Rake: even out and till the soil
- Shovel: digging, breaking up, turning soil
- Hoe: shaping the soil

During **weeding** we might use the following tools

- Hoe: slicing and pulling up the weeds, cutting roots
- Rake: useful in raking overtop plants, does not pull up seedlings
- Spade/shovel: loosen soil to make easier to pull the weeds
- Garden fork: tool with prongs to comb out many weeds at once
- Machete/panga: chopping the weeds especially difficult to break roots

During **fertilization** and **application of pesticides** we might use the following tools and equipment

- Agro-chemical backpack or knapsack sprayer: holds chemicals and solutions and sprays them onto crops
- Balance/scale: measure the quantities of fertilizer or pesticides to mix

During **crop maintenance** we might use the following tools and equipment

- Saw: clearing obstacles for plants, pruning
- Secateurs: pruning the plants
- Tape measure: measuring crop growth
- Binding tape: providing support to plants to stand
- Stake: tie a plant to a stake to provide support

During the **erection of fences** and **trellis system** we might use the following tools and equipment

- Spirit-level: placed on the side of the posts to ensure they are perpendicular to the earth, placed on horizontal slats to ensure they are parallel to the earth

- Pickaxes: breaking the ground to dig post holes
- Wire cutters: trimming/cutting the metal material
- Hammers: tapping in nails
- Tape measure: ensuring the dimensions are equal or as desired
- Saw: cutting pieces of wood for the fence or trellis

To **maintain soil erosion structures** such as contour/stone bunds, we might use:

- Hammers: breaking apart rocks
- Binding wire: bind the rocks together

During **harvesting** and **product handling** we might use the following tools and equipment:

- Harvesting snips: trimming off harvest of fruits and vegetables
- Harvest knives: truncating fruits and vegetables
- Secateurs: clean up the crop and remove unwanted pieces
- Picking crates: space to hold the harvest
- Picking baskets: portable place to carry harvest
- Balance: measuring amount of the harvest
- Hoe: harvesting root vegetables such as potatoes and taro.

Guided Practice Activity

Topic 1.2 Task 5:

1. Read the following and answer the questions:

Kagabo, a farmer of Gasaka sector in Nyamagabe District, has 2 hectares of land. Using this piece of land, Kagabo want to grow vegetables especially carrots, cabbage and tomatoes. As an agronomist in the Gasaka sector, you are requested to advise Mr Kagabo on the types of tools and equipment that might be useful in growing these specific vegetables.

a. List the types of activities associated with growing the different crops.

b. Copy identified activities (a) and list the name of tools and equipment used for each mentioning field operations. Use the table to record your responses.

Activity	Tool or Equipment
1.	
2.	
3.	
4.	

Topic 1.2 Task 6:

1. Consider each tool or piece of equipment and write down its usage/function.

No	Tools and equipment	Functions/use
1	Secateurs	
2	Saws	
3	Hoe	
4	Measuring tape	
5	Pickaxe	
6	Sprayer pump	
7	Axes	

Application Activity

Topic 1.2 Task 7:

1. Write the following scenario and direct the trainees to complete the tasks that follow.

Scenario: REMA (Rwanda Environment Management Authority) a government institution wants to cover the mountains of Rutsiro district with forest in order to prevent the land degradation in this area. Additionally, to increase soil water and nutrients, REMA wants to create some contour/stone bunds to prevent soil erosion.

a. Select appropriate tools and equipment needed to install the tree nursery.

b. Select appropriate tools and equipment require for maintaining seedlings in nursery.

c. Select the appropriate tools and equipment to build the stone/contour bunds.

Topic 1.2 Task 8:

1. Find a farmer that performs farming activities similar to the activities you want to perform one day. Ask them to help you create a list of their farming activities and the tools they use for each of those respective activities. You can use the table below.

Farming Activity	Tool Used to Perform the Activity	Notes or Comments

Points to Remember

- Before you select a tool, think about the job you will be doing. Tools are designed for specific purposes. Using a tool for something other than its intended purpose often damages the tool and could cause you pain, discomfort, or injury. You reduce your chances of being injured when you select a tool that fits the job you will be doing.

- Select a tool that can be used within the space available. Uncomfortable postures may cause you to use more force.

Formative Assessment

1. Consider the following activities and choose the appropriate tool for each activity.

a. Transporting soil when preparing beds for seeds: _____

b. Pruning plants: _____

c. Harvesting root vegetables such as potatoes: _____

d. Spraying pesticides: _____

e. Holding harvest while picking: _____

2. Consider the following scenario and provide Mike with some advice so that he can improve his farming.

Scenario**:** Mike is growing potatoes. He uses a hammer to arrange the dirt to plant the potato spuds. Then for weeding, he uses a panga to chop small plants that pop up. Finally, when he harvests, he uses a pickaxe to break through the ground and pull up the potatoes with his hands.

What tools could Mike purchase and how should he use them?

Topic 1.3: Criteria for selection of tools and equipment

Key Competencies:

Knowledge	Skills	Attitudes
1. Describe different criteria that influence selecting farm tools and equipment	**1.** Choose farm tools and equipment based on certain criteria	**1.** Decisive
2. Explain the different aspects of land and agrobusiness	**2.** Apply different aspects of land and agrobusiness to one's own community and choose farming tools and equipment based on these aspects	**2.** Realistic
3. Explain the reasons behind choosing different equipment and tools based on different criteria	**3.** After selecting tools and equipment for a real plot of land, justify the reasons for selecting those tools and equipment	**3.** Purpose-driven

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

Topic 1.3 Task 1:

1. From these pictures, which farmer is completing the task of chopping down the tree more quickly? The farmer with the machete or the farmer with the axe?

2. While both tools are used for cutting and chopping, what criteria defines which tool to use? How do you decide whether to use a machete versus an axe?

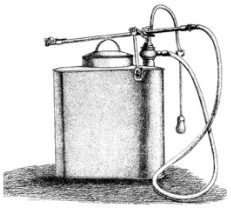
3. Read the Key Competencies table together.

Problem Solving Activity

Topic 1.3 Task 2:

1. Consider the previous topic. While some tools have similar purposes, how do you choose one versus the other?

   Fill out a comparison chart between similar tools and explain the different ways in which they would use one tool versus another. You can use the first comparison as an example. The benefits you attribute to each tool are the criteria that define which tool provides an advantage for different tasks.

Example: Shovel versus spade		Rake versus garden fork	
Shovel	Spade	Rake	Garden fork
 [9]	 [10]	 [11]	 [12]
- Better for softer soil - Better for mixing soil	- Better for harder soil - Better for chopping roots		
Pickaxe versus hoe		**Watering can versus sprayer**	
Pickaxe	Hoe	Watering can	Sprayer
 [13]	 [14]	 [15]	 [16]

[9] User:JohannPoufPouf. (2014, September 9). *PPShovel01* [Illustration]. Wikimedia Commons. https://commons.wikimedia.org/wiki/File:PPShovel01.svg

[10] User:Clker-Free-Vector-Images. (n.d.). *Spade shovel dig farming planting* [Illustration]. Pixabay. https://pixabay.com/vectors/spade-shovel-dig-farming-planting-29876/

[11] *Rake tool* [Illustration]. (2016, March 17). Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Rake_tool.svg

[12] Buckley, B. (n.d.). *Garden fork old rusty tools* [Photograph]. Pixabay. https://pixabay.com/illustrations/garden-fork-old-rusty-tool-4929470/

[13] User:JohannPoufPouf. (2014, September 9). *PPPickaxe01* [Illustration]. Wikimedia Commons. https://commons.wikimedia.org/wiki/File:PPPickaxe01.svg

[14] User:OpenClipart-Vectors. (n.d.). *Gardening hoe*. Pixabay. https://pixabay.com/vectors/garden-gardening-hoe-tool-2024534/

[15] Ray, F. (n.d.). *Watering can garden gardener* [Illustration]. Pixabay. https://pixabay.com/illustrations/watering-can-garden-gardener-3340478/

[16] Galloway, B. T. (1980, September 10). *Description of a New Knapsack Sprayer (1890)* [Sketch]. Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Description_of_a_New_Knapsack_Sprayer_(1890)_fig._2.jpg

Topic 1.3 Task 3:

1. Consider the different environments where one might practice agriculture. Depending on the environment and situation, choose the proper tool for each of the following farming activities. Provide an explanation based on the provided situation by explaining the criteria that makes this tool especially effective.

   a. Preparing/tilling the soil in steep, hilly terrain:
   Tool and Explanation:

   b. Loosening soil on a small plot to harvest onions:
   Tool and Explanation:

   c. Removing small weeds from a row of tomatoes:
   Tool and Explanation:

   d. Tilling and breaking very hard, difficult to break soil:
   Tool and Explanation:

2. Read **1.3 Key Facts** below.

1.3 Key Facts

When selecting tools and equipment for farming operations, they will depend on many different criteria such as:

- the scale of the farming operations envisaged and on the local farming conditions
- the type of task i.e. type of farming activity,
- soil types e.g. clay, sandy or silty,
- crops to be grown e.g. root vegetables, fruit trees, or vines,
- weed species e.g. thick or easily removable, and
- agroecological conditions e.g. desert, rainforest, or grasslands

Guided Practice Activity

Topic 1.3 Task 4:

Consider the two given scenarios and complete the tasks that follow.

1. Scenario 1:

Kamugisha is a farmer located in Rilima sector, Bugesera District, he has two hectares of field on hilly, steep where he wants to grow maize. He asks you for advice on the type of tools and equipment he should buy.

a. Write down the criteria to consider when selecting these tools.

b. Provide Kamugisha with some advice on tools to purchase. Consider the whole process from planting seeds to harvesting and selling.

2. Scenario 2:

Gashumba, a farmer of Busogo Sector in Musanze District is facing a problem of low production of vegetables. His plot is on tough, clayey, flat land. He is having a problem with strong, large weeds with deep root systems. Also, he is trying to farm during the dry season. He needs to transport water but doesn't have the equipment.

a. Write down the criteria to consider when selecting the required tools.

b. Provide Gashumba with some advice on the tools to purchase. Consider the whole process from planting seeds to harvesting and selling.

Application Activity

Topic 1.3 Task 5:

Consider the environment in your community. If you already have land, consider your own land for the following questions.

1. What are some of the criteria to consider for this land?
   a. Type of soil: _____

b. Scale of your desired farming operations: _____

c. Desired crops to produce/farming activities:

_____

d. Potential invasive species, weeds: _____

e. Type of environment, agroecological conditions: _____

2. Based on your responses, what tools might you select based on the criteria you provided?

Points to Remember

- Choosing the right tools for your farming activities will save lots of time and money in the long run.
- There are many different criteria to consider when choosing farm tools and equipment, not just the price! If you choose a tool that is not suitable for the soil, it may not last and you will have to buy a different one eventually.
- The most important tool to consider in farming is your own body. Remember to buy tools that are suitable for your body and do not require excessive force or stress.

Formative Assessment

1. What criteria should one consider when selecting tools?

2. For each of the following activities, name a tool or tools that would be suitable for the activity.

a. Digging a hole in sandy ground:

b. Cutting the branch from a large fruit tree:

c. Pruning small pepper plants:

d. Harvesting bananas:

e. Carrying a large quantity of dirt across a garden:

Self-Reflection

1. You have come to the end of the unit. You will repeat the survey you did at the beginning of the unit to help you self-assess 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.**
Develop inventory checklist for farm tools and equipment					
Arrange tools and equipment properly according to their specification and codes					
Use specifications and codes to handle farm tools and equipment					
Find the correct tools in the community for the different farming activities					
Choose correct tools and equipment that are appropriate to specific agricultural tasks					
Justify the reasons for selecting certain tools and equipment for different farming tasks					

2. Complete the table below by identifying areas from the unit where you have improved and where you need improvement with the actions/strategies you will use to help you improve when receiving and interpreting information at the workplace.

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

Unit 2: Clean tools and equipment

Topics

2.1 Selection of materials for cleaning tools and equipment

2.2 Identification of cleaning techniques

2.3 Cleaning tools and equipment

Unit Summary:

A selection of quality tools can be quite a good investment and if you take care of and store them properly, they will last a lifetime. Not only will regularly maintaining and cleaning your tools keep them in good shape, but it will also save you time and money.

This unit concerns cleaning your farming tools and equipment. You will learn the different techniques, materials and terminology to use when cleaning your farming tools and equipment.

Self-Assessment: Unit 2

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

2. Fill in the self -assessment below.

There are no rights or wrong ways to answer this survey. It is for your own use during Unit 2. The trainer will read a skill that is listed 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. 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.**
Choose relevant cleaning materials for cleaning tools and equipment					
Demonstrate the selection criteria of cleaning materials for cleaning tools and equipment					
Choose appropriate disinfectant used in cleaning process					
Demonstrate cleaning techniques of farm tools and equipment					
Discover the criteria to consider when selecting cleaning techniques					
Demonstrate the objectives of cleaning					

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.
farm tools and equipment					
Illustrate tools and equipment cleaning procedures					
Employ the cleaning tools and equipment procedures					

Topic 2.1: Selection of materials for cleaning tools and equipment

Key Competencies:

Knowledge	Skills	Attitudes
1. Select cleaning materials	**1.** Choose relevant cleaning materials	**1.** Attentive
2. Describe the criteria for cleaning materials selection	**2.** Demonstrate the selection criteria of cleaning materials	**2.** Willing to seek clarification
3. Select appropriate disinfectants	**3.** Choose appropriate disinfectants	**3.** Decisive

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

Topic 2.1 Task 1:

1. For three minutes, write down all the cleaning materials you would use on a farm.

2. Ask another person if they can think of any materials you forgot to list.

3. Read the Key Competencies table together.

Problem Solving Activity

Topic 2.1 Task 2:

1. Attempt to answer the follow questions:
   a. Why do you think cleaning materials are important?

   b. What do we consider when selecting cleaning tools and materials?

   c. Consider the hoe, rake, pruning shears.
      i. What do these tools have in common?

      ii. List all kinds of cleaning materials you normally use for cleaning the hoe, rakes, pruning shears.

   d. Identify the cleaning materials used for cleaning handheld farm tools and equipment such as hammers, screw drivers, saws, and wrenches.

   e. What is the meaning of disinfectants? Can you give some examples? If yes, give at least two examples.

2. Read **2.1 Key Facts** together.

2.1 Key Facts

For cleaning tools and equipment like **shovels, hoes, rakes and pruning shears** you will need the following:

- Hose with nozzle
- Putty knife
- Old towels
- Working gloves (optional)
- Steel wool
- Old, soft rag
- Sponge
- Lubricating oil such as boiled linseed oil, tung oil, motor oil (can be used), lamp oil or cooking oil
- Scrub brush
- Wire brush
- Water

- Soap

For cleaning **handheld farm tools and equipment**, you may use:

- Wire scrub brush
- Large bucket
- Hot water
- Several old towels
- Heavy duty rubber gloves
- Steel wool
- Household oil
- Soft rag
- Toothbrush

Guided Practice Activity

Topic 2.1 Task 3:

1. Consider each of the cleaning tools/materials and write its function next to it.

Cleaning tool/material	Function
Stick or stiff brush	
Sandpaper, sanding blocks	
Penetrating oil	
Lubricating oil or grease	
Boiled linseed oil	
Files	
Whetstones	
Water	
Small hand shovel or putty knives	
Steel wools or metal bristle brush	
Hose with nozzle	
Old towels	
Bucket	
Working gloves	

2. Brainstorm some of the criteria for selecting cleaning materials. Which criteria define the cleaning material you will use for different tools?

3. Ask the trainees what types of disinfectants they have used in the past. What factors pushed them to choose these disinfectants?

4. Read the following **2.2 Key Facts**.

2.2 Key Facts

Functions of some materials needed to keep tools and equipment clean:

- Stick or stiff brush: removes caked soil or debris
- Sandpaper, sanding blocks: clean debris and some rust from metal parts; Wood parts that are dry
- Penetrating oil: spray all metal parts with penetrating oil after cleaning debris that will prevent rust
- Lubricating oil or grease: keeps parts moving freely
- Boiled linseed oil: once year, wipe wood parts with linseed oil to condition wood and prevent it from drying out and cracking
- Files: remove metal more quickly than whetstones
- Whetstones: used to hone fine edges or metal that is too hard for files particularly on knives, shears and axes
- Water: washing off the dirt, clay and weeds
- Small hand shovel or putty knives: remove the caked-on mud from the last wet day
- Steel wools or metal bristle brush: used for smoothing any pits on metal parts
- Hose with nozzle: set on tools and equipment most powerful stream water
- Old towels: wipe the tools and equipment
- Bucket: measure amount of water or cleaning solution
- Working gloves: protect your hands especially when using disinfectants that may damage skin

Consider the following criteria in selecting cleaning materials:

- Look for efficiency and effectiveness of materials
- Ease of use
- Durability: look at the manufactures warranty to ensure that, if your product does break, it can be repaired or replaced without additional cost
- Value: use materials that are not excessively expensive but get the job done
- Availability: it might not be economical to travel to Kigali or a large city to purchase the cleaning materials each time. See what is easily attainable in your community.
- Type of tools and equipment to be cleaned
- Working conditions of tools and equipment
- Application methods

- Environment: consider whether the cleaning materials are harmful to the environment. If they are harmful, consider an alternative or make sure you dispose of them properly.

Most common disinfectants for farm tools and equipment:

- Chlorine Bleach: mixed at a ratio of one part bleach to nine parts water. Very inexpensive and powerful. However, it is harmful to skin and the environment.
- Isopropyl alcohol (rubbing alcohol): It is also inexpensive to use 70-100% isopropyl alcohol to disinfectant
- Pine oil is noncorrosive and not expensive
- Hydrogen peroxide (3%) works well as a degreaser and disinfectant. It is an environmentally safe alternative to chlorine bleach.

Choice of disinfectant will depend on the following:

- Cost
- Types of tools and equipment to be cleaned
- Amount of contamination by organics matter such as soil, droppings, and manure left in the farm tools and equipment

Application Activity

Topic 2.1 Task 4:

1. Make a list of the current tools you have or will need in your desired farming activities and the materials you need to clean them. Next write down the disinfectants you can use to clean the tools.

Tool	Necessary Cleaning Materials
Tool	**Necessary Disinfectants**

Points to Remember

- With both the cleaning solutions and tools, always check the manufacturer's instructions on the label to ensure the product will not cause damage or injury.
- When handling cleaning materials and chemicals, make sure you wear the right clothes and Personal protective equipment (PPE).
- Keep all cleaning chemicals in their original containers.

Formative Assessment

Consider the following scenario:

You oversee an association of farmers who cultivate a large wetland around Nyabarongo river mainly for fruits and vegetables crops. Following the land preparation, the tools and equipment are caked with soils, manure and other substances.

Answer the following questions:

1. Give reasons for the use of the following cleaning tool/material for removal of cakes of soil from hoes, shovels, wheelbarrow, pick and spade? Use the table below to help.

Cleaning Tool/Material	Reason
Stick or stiff brush	
Grease	
Water	
Whetstones	
Putty knives	
Hose with nozzle	
Old towel	
Working gloves	
Bucket	
Penetrating oil	
Boiled linseed oil	

2. Among the different cleaning disinfectants, which disinfectants might be useful in this case?

Topic 2.2: Identification of cleaning techniques

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify cleaning techniques of farm tools and equipment	**1.** Choose appropriate cleaning techniques of farm tools and equipment	**1.** Forward thinking
2. Describe cleaning techniques of farm tools and equipment	**2.** Demonstrate cleaning techniques of farm tools and equipment	**2.** Detail oriented
3. Identify the criteria to consider when selecting cleaning techniques	**3.** Discover the criteria to consider when selecting cleaning techniques	**3.** Respectful

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

Topic 2.2 Task 1:

1. Consider the different types of tools such as garden, hand, and power tools.
   a. How might you clean each of these differently?

   b. What are some techniques you would use to clean these different types of tools?

   c. What different types of techniques are there for cleaning machinery?

2. What different types of substances might one need to remove from tools and equipment?

3. Read the Key Competencies table together.

Problem Solving Activity

Topic 2.2 Task 2:

1. Read carefully the following short text about the regular maintenance of farm tools and equipment:

   By the end of the garden season, some of us simply put garden tools, such as hoes, shovels, trowels, and pruning shears, away for the season without even looking at them. The next season, when we are in a hurry to get started with yard and garden work, we find them dull and crusted with soil, which makes pruning and digging more difficult.

   a. What do you need to clean tools and equipment at the home?

   b. Which cleaning techniques should you use?

2. Read **2.3 Key Facts** together.

2.3 Key Facts

Benefits of regularly cleaning tools: Farm tools and equipment should be cleaned after each use. Consider the following benefits of regularly cleaning tools:

- Doing so keeps diseases, fungi, insect eggs, and weed seeds from being unwittingly spread around the garden.
- Cleaning also extends the life of a tool by removing moisture-laden, rust enhancing soil from steel surfaces.
- For tools with a keen edge, a good cleaning keeps rust from eating the edge away.

Techniques to keep tools and equipment clean: Use the following techniques to keep tools and equipment clean so that they will last and be in good shape for any task you have in mind:

- **Hand tools**: You can clean most hand tools by simply wiping them down with a rag. If they're dirty, don't be afraid to give them a good wash with soap and water. Just dry them well afterward. Spritz metal with a light coat of oil and wipe with a clean rag

(leave a light film on them to help keep the rust away). Wipe wooden handles with a rag dampened with a little linseed oil.[17]

- **Garden tools**: You can clean garden tools in much the same way as hand tools. Wash them if necessary, dry, and oil them up. For a quick way to clean, some people like to keep a bucket of sand mixed with a bit of oil. Put the tools into the bucket a few times to clean and oil them at the same time. Some people use motor oil in their sand, but even the little bit of motor oil left on the tools can harm your soil, so for garden tools, use linseed oil. Also, rub down wooden handles with a bit of linseed oil.

- **In summary, here are the essential cleaning techniques:**
  - ✓ Remove soil from tools and equipment by scrapping
  - ✓ Loosening the soil may require soaking for a period (transfer tools or equipment to tank which contains a suitable solution of water and detergent)
  - ✓ Scrubbing with water/detergent
  - ✓ Rinsing with clean water
  - ✓ Disinfection to prevent bacteria, fungus, and other soil-borne disease organisms from infecting the plants
  - ✓ Apply oil to preserve the metal or wood

Guided Practice Activity

Topic 2.2 Task 3:

1. Select the most appropriate cleaning techniques for the following tools and equipment:

Types of Tool/Equipment	Cleaning Techniques
Caked on soil from shovel and pickaxes, hoes, and spades	
Rust spots on pruning shears, saw	
Soil residue on wooden handles	

[17] AMI Insurance (AMI). (n.d.). *How to keep your tools safe*. IAG New Zealand Limited. https://www.ami.co.nz/hub/how-to-keep-your-tools-safe

Mud and grit from the blades and handles	

Application Activity

Topic 2.2 Task 4:

1. Find examples of two different dirty farm tools and equipment. Write out the steps as to how you would clean them. Use the table below as an example on how to set out the steps.

Name of tool or equipment:

Step	Technique	Cleaning Material
1		
2		
3		
4		
5		
6		

Points to Remember

- Clean your tools and equipment after every use.
- Be careful as you wipe the blades as they are very sharp.
- Be sure to properly dry your tools before storing them.

Formative Assessment

1. Among the following tools and equipment, which ones need oiling?

- **a.** Wheelbarrow
- **b.** Spades
- **c.** Shovels
- **d.** Saws
- **e.** Pruning shears

2. What technique would you choose to properly remove rust from tools? Why?

3. …….. is a process that will reduce the spread of disease and ensure there is no lingering bacteria on the tools.

- **a.** Disinfecting
- **b.** Rubbing
- **c.** Washing
- **d.** Rinsing

Topic 2.3: Cleaning tools and equipment

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify the objectives of cleaning farm tools and equipment	**1.** Demonstrate the objectives of cleaning farm tools and equipment	**1.** Problem solver
2. State the cleaning tools and equipment procedures	**2.** Illustrate tools and equipment cleaning procedures	**2.** Detail-oriented
3. Describe the cleaning tools and equipment procedures	**3.** Employ the cleaning tools and equipment procedures	**3.** Methodical

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

Topic 2.3 Task 1:

1. With a partner, find some tools or equipment that require cleaning.

2. Explain some of the techniques and cleaning materials you would use to clean the tools or equipment.

3. Present your tools/equipment to the rest of the class.

Problem Solving Activity

Topic 2.3 Task 2:

1. Read the following scenario then advise Steve so he can effectively clean his tools.

Steve has spent all day preparing his garden for planting. He removed lots of rocks and weeds for the soil where he plans on planting many new plants. To do so, he used a pickaxe with a wooden handle to break up the dirt. He wore gloves to remove the rocks and put them in a wheelbarrow to transport them elsewhere where he would not be gardening.

2. Write the steps he would take to clean each of the tools including the gloves, wheelbarrow, and pickaxe.

3. Read **2.4 Key Facts** together.

2.4 Key Facts

Basic steps of cleaning

The basic steps of cleaning operations are as follows. It is not always necessary to do all the steps as some of them do not apply to certain tools and equipment.

The basics steps include:

1. **Pre-wash** (Dry cleaning): the removal of gross particles before applying the cleaning solution. Use brooms, brushes, shovels, and manure forks to sweep, scrape and remove organic material and debris from surfaces.

2. **Washing** (Wet cleaning): the physical action of scrubbing with detergents and surfactants helps to further reduce the number of microorganisms as well as removes any oil, grease, or exudates that may inhibit the action of disinfection. There are several other steps to facilitate this washing process.
   a. **Soaking** - Soaking surfaces before washing will cut down on the amount of time needed to do a more complete job
   b. **Detergents** — another excellent way to maximize cleaning and minimize time spent on the chore is to use special detergents to help break down manure and other organic matter. This is the equivalent of using soap to wash your hands
   c. **Abrasive cleaning** - abrasive type powders and pastes are used for removing difficult soil.[18]

3. **Rinsing:** After washing, all surfaces, tools and equipment should be thoroughly rinsed, as residues from cleaners and detergents can inactivate certain chemical disinfectants.[19]

4. **Drying or ventilating:** Whenever possible, tools and equipment should be allowed to dry completely before application of a disinfectant.

[18] Ramirez, A. (2009, October 15). *Four steps to effective cleaning and disinfecting*. National Hog Farmer. https://www.nationalhogfarmer.com/health-diseases/1015-effective-cleaning-disinfecting-steps
[19] U.S. Department of Agriculture. (2018, November). *Standard operating procedures: 15. Cleaning and disinfection*. Animal and Plant Health Inspection Service. https://www.aphis.usda.gov/animal_health/emergency_management/downloads/sop/sop_cd.pdf

5. **Disinfecting:** This is a critical step in the cleaning process that requires some use of science. Unless surfaces are completely cleaned (none-to-minimal organic matter), disinfection will not be effective. Disinfectants are defined as chemicals used to control, prevent or destroy microbes on inanimate objects or surfaces.[20]

6. **Oiling:** Apply oil such as used motor oil for metals or linseed oil for woods to provide a protective layer to the material. Oiling can prevent rust, drying out or other forms of degradation of the materials.

Guided Practice Activity

Topic 2.3 Task 3:

1. At the school training centre or in your own farm, find tools and equipment that need to be cleaned.

2. Using the basic steps to cleaning tools and equipment from **2.4 Key Facts**, attempt to follow the steps and clean your tools and equipment.

Application Activity

Topic 2.3 Task 4:

1. Visit a larger farm that has many tools and equipment.

2. Ask the farmer or the workers how they clean the tools and equipment at the farm.

3. If possible, ask if you can assist in cleaning the tools and equipment with the farmer or workers at the farm.

4. Share your experience with a peer and explain to them the different methods the larger farm used to clean their tools and equipment.

[20] Ramirez, A. (2009, October 15). *Four steps to effective cleaning and disinfecting*. National Hog Farmer. https://www.nationalhogfarmer.com/health-diseases/1015-effective-cleaning-disinfecting-steps

Points to Remember

- Always observe manufactures instructions for cleaning tools and equipment.
- Never attempt to clean equipment while it is plugged in or operational. You will risk serious injury.
- Remember to use safety equipment (gloves and goggles) to protect from splashing chemicals in your eyes.
- You must clean the tools and equipment properly before you disinfect them.
- Before using any disinfectant, read the label and follow the instructions and precautions.

Formative Assessment

1. Among the following steps, which *is not included* in the cleaning tools and equipment process?
   a. Pre-wash
   b. Put tool in proper place
   c. Rinse
   d. Disinfection
   e. Drying

2. Detergents are chemicals used in cleaning to:
   a. Remove dirt
   b. Break down debris and grease
   c. Disinfect tools and equipment
   d. Remove the disinfectant
   e. Remove all moisture

3. What tool did you learn about cleaning in the large farm? Write out the steps to clean the tool you cleaned or learned about cleaning.

Self- Reflection

1. You have come to the end of the unit. You will repeat the survey you did at the beginning of the unit to help you self-assess 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.

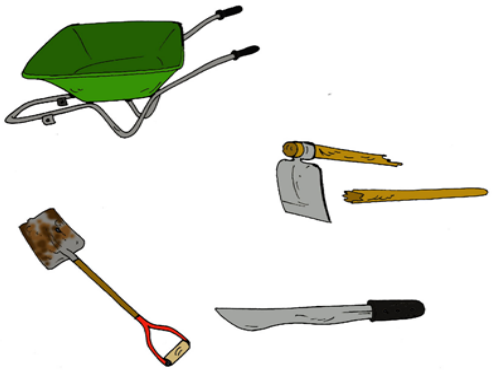
My experience **Knowledge, skills, and attitudes**	**I don't have any experience doing this.**	**I know a little about this.**	**I have some experience doing this.**	**I have a lot of experience with this.**	**I am confident in my ability to do this.**
Choose relevant cleaning materials for cleaning tools and equipment					
Demonstrate the selection criteria of cleaning materials for cleaning tools and equipment					
Choose appropriate disinfectant used in cleaning process					
Demonstrate cleaning techniques of farm tools and equipment					
Discover the criteria to consider when selecting cleaning techniques					
Demonstrate the objectives of cleaning					

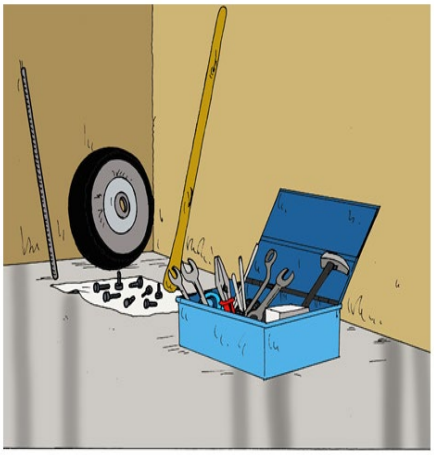
My experience Knowledge, skills, and attitudes	I don't have any experience doing this.	I know a little about this.	I have some experience doing this.	I have a lot of experience with this.	I am confident in my ability to do this.
farm tools and equipment					
Illustrate tools and equipment cleaning procedures					
Employ the cleaning tools and equipment procedures					

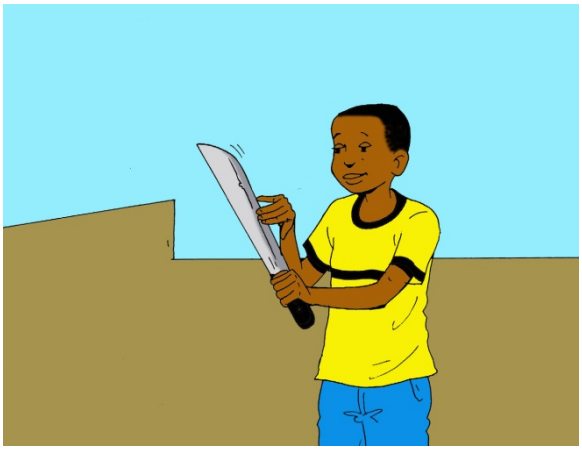
2. Complete the table below by identifying areas from the unit where you have improved and where you need improvement with the actions/strategies you will use to help you improve when receiving and interpreting information at the workplace.

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

Unit 3: Repair tools and equipment







Topics

3.1 Selection of spare parts based on damaged parts

3.2 Identification of repairing techniques of tools and equipment

3.3 Repairing tools and equipment

3.4 Testing repaired tools and equipment

Unit Summary:

This unit concerns the different considerations and skills that are necessary when repairing farming tools and equipment. To prolong the life of different tools and equipment, you will become skilled at finding spare parts, performing repairs, and testing repairs for farm tools and equipment.

Self-Assessment: Unit 3

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

2. Fill in the self- assessment below.

There are no rights or wrong ways to answer this survey. It is for your own use during this course. The trainer will read a skill that is listed 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. 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.**
Identify damaged parts and the causes of tools and equipment damages					
Choose appropriate spare parts according to damaged parts					
Demonstrate repairing techniques of tools and equipment					
Choose appropriate repairing techniques of tools and equipment					
Perform repairing tools and equipment techniques					
Prepare tools and equipment repaired for testing					
Test the functionality of tools and equipment					

Topic 3.1: Selection of spare parts based on damaged parts

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify damaged parts of tools and equipment	**1.** Assess an issue with farming tools and equipment then evaluate the damage	**1.** Attention to detail
2. Explain the causes of malfunctions the farm tools and equipment spare parts	**2.** Discover malfunctions and damage in a farm tool or piece of equipment	**2.** Methodical
3. Identify appropriate spare parts of tools, equipment	**3.** Choose appropriate spare parts according to damaged parts	**3.** Patient

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

Topic 3.1 Task 1:

1. Find a partner.

2. Consider a time you have broken a farm tool or piece of equipment.
   a. What happened? How did the tool break?

   b. How did you repair the tool? How did you find the spare part?

   c. What would you have done differently?

3. Exchange experiences of repairing broken farm tools with another person.

Problem Solving Activity

Topic 3.1 Task 2:

1. Fill out the chart below with different tools and the different ways they might become damaged or defective.

Tool or Equipment	Way Tool or Equipment Might Become Damaged or Defective

2. Read **3.1 Key Facts** together.

3.1 Key Facts

Why should we report defects or damage to tools?

- It is essential that problems and malfunctions be immediately reported to the correct person to prevent risk of injury with the tools.
- It is important to respect the roles of the people placed in charge of organizing and maintaining tools because this also protects your safety.

Tools and equipment damage or defects may include:

- Tools becoming blunt
- Sprayers becoming blocked
- Screws and bolts becoming loose
- Chisels and wedges with mushroomed heads
- Split or cracked handles
- Chipped or broken drill bits
- Wrenches with worn out jaws
- Tools which are not complete, such as files without handles
- Faulty trigger locks
- Broken or inoperative guards
- Insufficient or improper grounding due to damage on double insulated tools
- No ground wire (on plug) or cords of standard tools

- The on/off switch not in good working order
- Tool blade is cracked
- The wrong grinder wheel is being used or loose wheel cover
- The guard has been wedged back on a power saw
- Loosen of nuts and bolts
- Loose or bent blade

Causes of tools and equipment defective includes:

- **Operators:** In most cases the cause of malfunction in tools and equipment is negligence or mistakes made by the farmers or operator, (human error).
- **Insufficient maintenance or no maintenance is probably the most common cause of malfunction**. Often an operator oversees a tools and equipment without being properly trained for this task and this may lead to mistakes causing malfunction. If a tools and equipment is not used for its intended purpose by its operator it may lead to misuse and cause malfunction.
- **Faulty tools and equipment**: On very few occasions the cause of malfunction is faulty tools, equipment or machinery. Normally such a malfunction will be apparent in the first period after purchase and will be covered by the supplier's warranty. Supervisors need to be trained to check that labourers use tools in a proper way.[21]

Definition of spare parts

- Spare parts are parts that you can buy separately to replace old or broken parts in a piece of equipment.
- They are usually parts that are designed to be easily removed or fitted.

Spare parts are needed for the following reasons:

- Spare parts are kept on site typically for one of two reasons; unexpected failures, and poor work management practices. We should have the right spare parts on hand to enable a quick repair.
- In other cases, spare parts are stocked to perform routine preventive maintenance and planned work. Preventative maintenance includes consistently cleaning and oiling the different tools and equipment.[22]

Spare parts classification:

Spare parts can be broadly classified into two groups: repairable and consumable.

[21] Republic of South Africa National Department of Agriculture, & AgriSETA. (2006, July). *Assessment guide: Primary agriculture: Repair & maintain*.
AgriSeta. https://www.agriseta.co.za/downloads/LearningMaterial/116060_AG.pdf

[22] Kovacevic, J. (2019, August 13). *The right parts at the right time: How to manage your spare parts successfully*. Prometheus Group. https://www.prometheusgroup.com/posts/the-right-parts-at-the-right-time-how-to-manage-your-spare-parts-successfully

- **Repairable**
  Repairable parts are parts that are deemed worthy of repair, usually by virtue of economic consideration of their repair cost
- **Consumable**
  Parts that are not repairable are considered consumable parts. Consumable parts are usually scrapped, or "condemned", when they are found to have failed.[23]

Guided Practice Activity

Topic 3.1 Task 3:

1. Separate into groups and read the following scenario:

You are an agricultural worker responsible for overseeing association of coffee farmers in the Karongi region. You receive a donation of pruning shears to distribute, in the order of 10 shears per association. These shears must be used to prune the coffee plants each year.

2. With your group, discuss the following questions and be prepared to present your answers to the rest of the class:
   a. What kinds of damage do you risk encountering next year? Why?

   b. What kinds of spare parts needs for repairing these shears?

   c. What to consider when choosing out spare parts for repairing these shears?

3. Choose one person from your group to present your responses. Then, discuss as a large group until you reach an agreement on what needs to be done for the shears.

[23] Yamato Scale. (n.d.). *Genuine vs pirate: The true cost of maintenance*. https://www.yamatoscale.co.uk/wp/media/2019/08/yamato-genuine-vs-pirate-parts-whitepaper.pdf

Application Activity

Topic 3.1 Task 4:

1. Bring together a large assortment of tools and equipment. Then answer the following questions regarding the tools and equipment.
   a. Which parts of tools or equipment are damaged?

   b. Identify the main causes of these tools or equipment damages.

   c. Suggest appropriate spare parts need to remedy them.

   d. Explain the factors to consider when suggesting these spare parts.

   e. Explain the process of finding and replacing these spare parts.

Topic 3.1 Task 5:

1. Identify the spare parts frequently used for repairing the following tools and equipment
   a. Hand operated sprayer pump:

   b. Wheelbarrow:

   c. Manure fork:

   d. Rakes:

   e. Hoes:

2. Discuss your answers with the rest of the class and verify them with the trainer.

Topic 3.1 Task 6:

1. Suppose that your sector leases small farm tools and equipment to till 5 hectares of deep terraces at your school.
   a. What kinds of wear and tear do you risk encountering during the use of these tools and equipment for terraces tillage?

b. Order the spare parts of tools and equipment that tools and equipment should have and that the school must buy according to the types of their damage. Write your answers in the following table:

Tools/equipment	Spare parts name	Total number	Type of damage	Number of damaged tools/equipment

Points to Remember

- Always read descriptions of all parts of tools and equipment.
- Review the owner's manual and manufacturer manual when choosing parts.
- Consistently make note of the conditions of the different tools and equipment.

Formative Assessment

1. What factors might you consider when searching for spare parts?

2. List a common issue you might find with the following tools and the appropriate spare part.

Tool or equipment	Issue	Spare Part
Pruning shears		
Hoe		
Shovel		
Wheelbarrow		

Topic 3.2: Identification of repairing techniques of tools and equipment

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify basic repairing operations of tools and equipment	**1.** Apply basic repairing operations of tools and equipment	**1.** Attention detail
2. Describe repairing techniques of tools and equipment	**2.** Demonstrate repairing techniques of tools and equipment	**2.** Willing to seek clarification
3. Select appropriate repairing techniques of tools and equipment	**3.** Choose appropriate repairing techniques of tools and equipment	**3.** Respectful

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

Topic 3.2 Task 1:

1. Consider some past experiences where you have had to get rid of broken tools or equipment.

a. What caused you to get rid of the tool or equipment rather than repairing it?

b. What were the main issues with the tool or equipment?

c. What could you have done to keep the tool or equipment in better shape to extend its life? Could any parts have been repaired sooner?

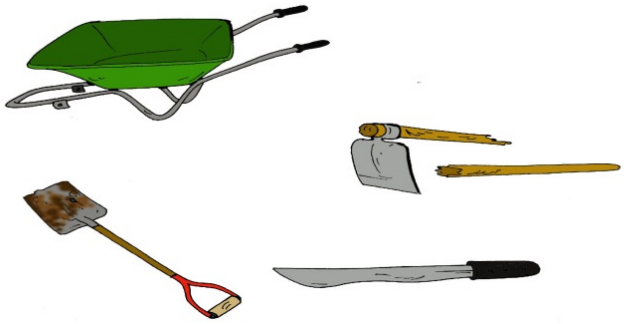
d. Why do you think it is important to repair tools and equipment?

2. Read the Key Competencies table together.

Problem Solving Activity

Topic 3.2 Task 2:

1. Carefully look at the tools and equipment pictures below. Fill out the table for describing the tools, the way they are damaged, and the way to repair/replace the damaged part.



Name of tool	Damaged part	How the part is damaged	Spare part	Way to repair/replace the damaged part

2. Read **3.2 Key Facts** below.

3.2 Key Facts

Repair means to respond to the breakdown of equipment and undertaking work to correct the problem in order to return the equipment to a working condition.[24]

Here are some basic techniques to repair tools and equipment to keep them in a good and safe working condition:

- Sharpening blunt tools/equipment, edges of tools and cutting parts
- Screwing in loose screws or replacing screws
- Rust removal by scraping off rust as soon as it arrives to avoid degradation
- Repair cracked or broken handles or fixing on a new handle

[24] Walia, D. S., Huria, J., & Cordero, I. (2010, September 1). *Equipment maintenance and repair*. Community Eye Health Journal. https://www.cehjournal.org/article/equipment-maintenance-and-repair/

- Lubricating gears or lubricating tools regularly to prevent rust, drying out, or other damage
- Cleaning nozzles on sprayers and tools
- Checking and maintaining cables and plugs

Guided Practice Activity

Topic 3.2 Task 3:

1. Read each of the scenarios and describe the best repairing technique to use.

a. Sprayer nozzle drips and is due to a loose handle
Repairing technique:

b. Machete blade is too dull
Repairing technique:

c. Pruning shears are so rusty they are hard to close when cutting
Repairing technique:

d. Shovel head keeps sliding off due to loosely tightened screws
Repairing technique:

Application Activity

Topic 3.2 Task 4:

1. Make a list of farm tools and equipment either found at your school or home. Check whether the tools function and then suggest the type of repairing techniques that should be performed for each tools and equipment. Copy your answers in the following table.

Tools/equipment	Types of damage	Repairing technique

Points to Remember

- If the tools are seriously damaged, have them repaired by a qualified person.
- Always check manufacturer's instructions.
- Be creative when repairing tools. Sometimes the tools can be fixed using other, non-traditional parts.

Formative Assessment

1. Among the following agricultural tools and equipment, which ones need oiling? Choose all that apply.

a. Wheelbarrow
b. Spades
c. Shovels
d. Saws
e. Hoes
f. Pruning shears

2. The main lubricants used for repairing include:
Choose one answer.

a. Oils/greases
b. Water
c. Detergents
d. Chemicals

3. Basic repairing operations of tools and equipment may include:
Choose all that apply.

a. Sharpening
b. Handle fixing
c. Rust removal
d. Lubrication
e. Painting
f. Storing

4. Screwing consists of ……

5. True or False?
Repair means responding to the breakdown of equipment and undertaking work to correct the problem in order to return the equipment to a working condition.

Topic 3.3: Repairing tools and equipment

Key Competencies:

Knowledge	Skills	Attitudes
1. Define tools and equipment maintenance	**1.** Demonstrate tools and equipment maintenance	**1.** Work independently
2. Apply tools and equipment repairing techniques	**2.** Perform tools and equipment repairing	**2.** Decisive
3. Recognize tools and equipment repairing safety	**3.** Apply safety for repairing tools and equipment	**3.** Self -control

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

Topic 3.3 Task 1:

1. Now that you know some techniques for repairing tools and equipment, make a list of concerns you have about repairing tools and equipment. Help the trainer understand the farming activities you want to perform and the different tools you may need to replace or repair.

2. Define the different tools or materials you would need to repair these different tools or equipment.

Problem Solving Activity

Topic 3.3 Task 2:

1. Suppose that you are going to lubricate the school power tiller and pruning shears.
   a. What type of lubricant would you choose? Why?

   b. How would you apply the lubricant to these tools?

Topic 3.3 Task 3:

1. Now suppose the battery of the power tiller dies.
   a. How would you replace the battery?

   b. Where would you find out which battery was in the machine?

   c. What steps would you take to replace the battery?

2. Read **3.3 Key Facts** together.

3.3 Key Facts

Lubricating farm tools and equipment:

- Use and apply all-purpose oils to lubricate and clean tools with exposed metal parts, especially those that have adjustable parts. Lightly spray your tools with oil and use a rag to wipe any excess oil before storing. This practice can also help prevent rust and corrosion on your tools.

- If your tools are already rusted, you can easily remove them by using an oil and wire brush. Lightly spray oil to rusted tools and scrub them with a wire brush until the rust is removed. Wipe them dry with a clean rag and reapply a coat of oil to prevent rust from coming back.[25]

Guided Practice Activity

Topic 3.3 Task 3:

Try to perform the following activities:

1. Remove the rust from rusty hoes. To do this, first rub the hoes with a brush and then dip the tools in a container of sand soaked with motor oil.

2. Straighten the teeth of rakes using a hammer or pliers. To do this, push the teeth against an anvil and straighten with a 200 g-500 g hammer, depending on the size of the rake.

[25] The Mechanic Doctor. (2019, January 24). *A mechanic's guide to tool and equipment maintenance*. https://www.themechanicdoctor.com/a-mechanics-guide-to-tool-and-equipment-maintenance/

3. Sharpen machetes with a millstone.

4. Replace loosen nuts and screws from wheelbarrow and pump sprayer.

Application Activity

Topic 3.3 Task 4:

1. You have pieces of eucalyptus cuttings, at least 40 mm in diameter and each 1.80 m long (dry and straight). Properly fit handles to the spades and forked hoes. If you do not have the opportunity to fit the handles into the farm tools, work together to explain how you would do it.

2. Attempt to remove rust from a metal tool such as a spade, hoe, or pruning shears.

3. Use a metal file or millstones to lightly sharpen the edges of tools like pruning shears, panga and saws. Again, you don't want to grind away too much of the metal, just use it to smooth out nicks, remove burrs, and create a nice clean edge. Using a clean rag, apply lubricating oil to both the wooden handle and the metal blade for a shovel, spade, and panga. You can use used motor oil as lubricant to prevent rust.

Points to Remember

- Wear appropriate clothes and personnel protective equipment to prevent bodily harm.
- Refer to the manufacturer's instructions and/or service manual.
- Work with the lubricant and other tools you can find locally.

Formative Assessment

1. What daily and periodic maintenance practices should you advise the farmers to carry out to keep their tools and equipment in good condition?

2. If you are given a rusty spade, how could you remove the rust and ensure rust does not corrode the tools in the future?

Topic 3.4: Testing repaired tools and equipment

Key Competencies:

Knowledge	Skills	Attitudes
1. Recognize tools and equipment functioning	**1.** Demonstrate tools and equipment functioning	**1.** Willing to seek clarification
2. Arrange tools and equipment repaired for testing	**2.** Prepare tools and equipment repaired for testing	**2.** Persistent
3. Describe testing procedures of tools and equipment repaired	**3.** Operate testing of tools and equipment repaired	**3.** Accurate

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

Topic 3.4 Task 1:

1. Consider the following questions with a partner:

a. How do we determine whether a farm tool is damaged or defective?

b. How do we determine whether a farm tool needs to be repaired?

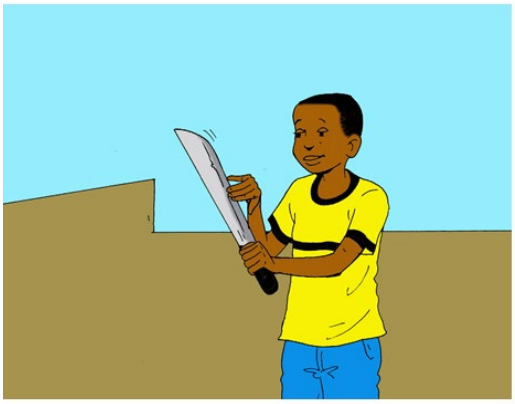
c. What might happen if we do not test tools before using them?

d. Have you or anybody you know experienced negative consequences from not testing farm tools before using them?

2. Share your ideas and discuss with the rest of the class.

Problem Solving Activity

Topic 3.4 Task 2:



1. Carefully observe the picture above and answers the following questions:
   a. Which part of the tools are the farmers testing?

   b. Which activity do you think follows testing the tools?

   c. Why is important to test tools and equipment before use? Consider the case when the tools are recently repaired.

   d. Is there a better way to test if the head on a hoe is secure?

   e. Is there a better way to test if a machete is sharp?

2. Read **3.4 Key Facts** together.

3.4 Key Facts

Testing tools and equipment: Done to make sure that the tools and equipment are performing correctly according to safety requirement specification.

Potential issues with tools:

- ✓ Deformations (for steel-based tools)
- ✓ Visual damage
- ✓ Loose components

Shovel example: Using the example of a shovel, here are the details to look for when testing repaired tools and equipment

- **Handle design and fixing:** In considering what shovel you want, you must consider its handle, because that's what you're going to be holding onto
- **Blade material and sharpening:** Make sure the blades are sharp.
- **Durability:** You want your shovel to be durable and able to hold up to its intended job. So, it's important to take the durability of your digging and weeding tools and equipment into consideration. Is the blade attached to the handle in a way that won't encourage the handle to snap?

Guided Practice Activity

Topic 3.4 Task 3:

1. Read the following scenario:

Suppose that you are tasked to test the working condition of tools and equipment like shovels, trowels, spades, garden fork, hoes, wheelbarrow, pump sprayer and power tiller after repairing.

2. Discuss the questions with a partner:

a. What issues will you look for in each of the tools?

b. How would you test each of the tools?

Topic 3.4 Task 4:

1. Read the following scenario:

Donata is a farmer growing horticulture crops in Rubengera sector, Karongi district. After the growing season, she notices that some of tools and equipment aren't functioning properly. The tools have issues such as broken handles, misshapen blades, and loose components. Donata pays a technician to repair her farm tools and equipment. Once the technician has finished repairing the tools and equipment, she needs to test them to make sure they are in good shape.

2. In small groups, advise Donata on the following points:

a. Part to be tested

b. Procedures to follow for testing their tools and equipment

c. How to report the issues to the technician

Application Activity

Topic 3.4 Task 5:

1. Visit a tool repair technician. Ask them the following questions then share the responses with your peers.

a. What tools does the technician commonly repair? Add other tools you think will be relevant to your future farming work.

Name and location of technician:

Tool	Potential issues	Where to find spare parts	How to test the repairs

Points to Remember

- To avoid repairs, try to keep tools in good condition.
- Testing repairs will save lots of money in the long run by avoiding repeat repairs.
- Wear safety glasses or goggles and well-fitting gloves appropriate to avoid hazards when doing various testing tasks.

Formative Assessment

1. Explain the benefits of testing repaired tools and equipment.

2. List techniques for testing the following tools:
   a. Shovel handle secured onto shovel:

   b. Panga blade sharpness:

   c. Screws on pruning shears:

   d. Wheelbarrow wheel securely fastened:

Self-Reflection

1. You have come to the end of the unit. You will repeat the survey you did at the beginning of the unit to help you self-assess 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.
Identify damaged parts and the causes of tools and equipment damages					
Choose appropriate spare parts according to damaged parts					
Demonstrate repairing techniques of tools and equipment					

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.
Choose appropriate repairing techniques of tools and equipment					
Perform repairing tools and equipment techniques					
Prepare tools and equipment repaired for testing					
Test the functionality of tools and equipment					

2. Complete the table below by identifying areas from the unit where you have improved and where you need improvement with the actions/strategies you will use to help you improve when receiving and interpreting information at the workplace.

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

Unit 4: Adjust and calibrate tools and equipment

Topics

4.1 Checking tools and equipment for functioning

4.2 Calibration of tools and equipment

4.3 Adjusting tools and equipment

Unit Summary:

In this unit you will gain the skills to adjust and calibrate tools and equipment to your farming needs.

Self-Assessment: Unit 4

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

2. Fill in the self-assessment below.

There are no rights or wrong ways to answer this survey. It is for your own use during this course. The trainer will read a skill that is listed 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. 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.
Show tools and equipment checking procedures for functioning					
Apply checking procedures of tools and equipment for functioning					
Apply tools and equipment user instructions					
Employ calibration instructions for tools and equipment					
Demonstrate tools and equipment calibration process					
Perform tools and equipment calibration process					
Show adjustment criteria for farm tools and equipment					

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.
Demonstrate tools and equipment adjustment types					
Perform tools and equipment adjustment					

Topic 4.1: Checking tools and equipment for functioning

Key Competencies:

Knowledge	Skills	Attitudes
1. Describe checking procedures for tools and equipment functioning	**1.** Perform tools and equipment checking procedures for functioning	**1.** Forward thinking
2. Explain why it is important to check for tools and equipment functioning	**2.** Apply checking procedures of tools and equipment for functioning	**2.** Methodical
3. Describe the contents of a user instructions manual	**3.** Follow and apply tools and equipment user instructions	**3.** Self-confidence

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

Topic 4.1 Task 1:

1. Respond to the following questions with a partner:

a. Have you ever received a user instructions manual with farm tools or equipment?

b. Have you ever read a user instructions manual?

c. What did you use the user instructions manual to do?

d. Were there any instructions in the manual that helped you check if the tools were functioning properly?

2. If you have never seen a user instructions manual, ask your peers or members of the community if they have an example you can borrow to observe.

3. Read the Key Competencies table together.

Problem Solving Activity

Topic 4.1 Task 2:

1. Find an example of a user instructions manual for any farm tool or equipment. Briefly read through the manual and identify the different parts of the manual.

a. Is there a section that describes how to check if the tools or equipment are functioning properly?

b. What sections might be useful in maintaining the farm tool or equipment?

c. Can all the parts be replaced in your community? Can the parts be replaced in Rwanda?

d. Could you repair or replace the parts, or do you need a technician?

e. Share your findings with a peer.

2. Read **4.1 Key Facts** together.

4.1 Key Facts

Why should we check the tools?

- To identify whether work equipment can be operated, adjusted, calibrated, and maintained safely – with any deterioration detected and remedied before it results in a health and safety risk.[26]
- Not all work equipment needs formal inspection to ensure safety and, in many cases, a quick visual check before use will be sufficient.

[26] Spiers Engineering Safety. (n.d.). *Who can carry out a PUWER inspection?* https://www.spierssafety.co.uk/resources/who-can-carry-out-puwer-inspection

- However, inspection is necessary for any equipment where significant risks to health and safety may arise from incorrect installation, reinstallation, deterioration or any other circumstances.[27]
- The need for inspection and inspection frequencies should be determined by assessing the risk of the tool or equipment if it does not function properly.

Who can check tools and equipment?

Tools and equipment can be checked by anyone who has enough knowledge and experience of it to enable them to know:

- what to look at
- what to look for
- what to do if they find a problem

What needs to be remembered when checking tools and equipment?

- user instructions manual
- advice from technicians and others that use these tools
- your own experience of the tools and equipment, its use, the factors of the workplace and the people using the work tools and equipment

A checking can vary in its extent, as the following demonstrate:

- quick checks before use, such as handle fixing, functional testing of brakes, lubrication, screwing, and sharpening
- weekly checks, such as the presence of bolts, screw and guarding, and function of safety devices
- more extensive examinations, undertaken every few months or longer

Guided Practice Activity

Topic 4.1 Task 3:

1. Find some farm tools and equipment, possibly some of the different equipment at the training centre.

a. Identify how often different work tools and equipment should be checked to makes sure they are working correctly.

i. What might one do in a weekly check?

ii. What might one do in a monthly check?

[27] On Site Form. (n.d.). *Construction site inspection software*. https://onsiteform.com/construction-site-inspection-software/

b. Demonstrate the correct procedures to follow when checking tools and equipment for functioning. Check the tools and equipment to see if they are functioning properly.

c. Which measures will help operators to prevent further damage to their tools and equipment in the case of malfunction?

2. Share your experience with the rest of the class.

Application Activity

Topic 4.1 Task 4:

1. Look closely at the two wheelbarrows found at the training centre. In small groups, observe the operating parts of these equipment.

a. What are the operating parts of the first wheelbarrow? Are the parts fixed or are they moving parts? Is this wheelbarrow good equipment? Why?

b. Answers the same questions for the second wheelbarrow.

c. Can these wheelbarrows be leased to the work in the field? Why?

d. For what types of adjustment operations would you recommend this kind of farm equipment?

e. Consult the user instructions manual for any uncertainties you have.

2. Share and compare your experience with the rest of the class.

Points to Remember

- It is important to keep track of the age of tools and equipment so you know when you may need to test or check it for potential repairs.
- Always keep and safely guard the use instructions manual.

Formative Assessment

1. Identify two reasons to check tools and equipment for functioning.

2. What must you take account of when checking tools and equipment?

3. Who should perform checking procedures for work tools and equipment?

4. How often should one check tools and equipment?

Topic 4.2: Calibration of tools and equipment

Key Competencies:

Knowledge	Skills	Attitudes
1. Describe tools and equipment calibration instructions	**1.** Evaluate calibration of tools and equipment	**1.** Respectful
2. Describe tools and equipment calibration process	**2.** Demonstrate calibration process of tools and equipment	**2.** Forward thinking
3. Relate calibration processes to one another	**3.** Perform tools and equipment calibration	**3.** Willing to try

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

Topic 4.2 Task 1:

1. Discuss the following questions with a partner:

a. The verb '*to calibrate'* means to assess how accurate an instrument is and then to make the appropriate adjustments to create the desired, accurate output. Have you ever calibrated a tool or piece of equipment?

b. What did the calibration you performed consist of?

c. If you have not calibrated a farm tool or equipment, perhaps you calibrated something for cooking to make sure the measurements were more accurate. Try to make a list of examples then share them with a peer.

2. Share your responses with the large group. Then, review the Key Competencies table together.

Problem Solving Activity

Topic 4.2 Task 2:

1. Carefully observe the picture. Then, answer the following questions in small groups:
   a. What is happening in this picture?

   b. What tools do you notice in this picture?

   c. What tools or equipment are being calibrated?

   d. When do instruments, tools and equipment need to be calibrated?

   e. How can you calibrate tools and equipment?

   f. How do you think they are working to calibrate the sprayer?

   g. What other tools and equipment need to be calibrated before use?

3. Read **4.2 Key Facts** below.

4.2 Key Facts

Definition: To calibrate means to assess an instrument's accuracy then make appropriate adjustments to create the desired, accurate output or measurement. Proper calibration of an instrument allows people to have a safe working environment and produce valid data for future reference.[28]

Here are a few reasons detailing why calibration is important:

- Equipment calibration can help reduce costs from manufacturing errors
- Calibration ensures the accuracy of the tools
- Calibrating your equipment and technology are great ways to maximize the efficiency and profit potential of your farm

Instruments, tools, and equipment need to be calibrated:

- **Indicated by manufacturer:** Read the user manual instructions to see if there is a guide detailing the requirements for calibration. Manufacturers will indicate how often the instrument will need to be calibrated.
- **Before major critical measurements:** Before any measurements that requires highly accurate data, send the instruments out for calibration and remain unused before the test.
- **After major critical measurements:** Send the instrument for calibration after the test helps user decide whether the data obtained were reliable or not. Also, when using an instrument for a long time, the instrument's conditions will change.
- **After an event:** The event here refers to any event that happens to the instrument. For example: when something hits the instrument or any kinds of accidents that might impact the instrument's accuracy. A safety check is also recommended.
- **When observations appear questionable:** When you suspect the data's accuracy that is due to instrumental errors, send the instrument to calibrate.[29]

[28] The Internal Consultant. (2014, July 7). *PM types Part 4-Calibrations*. Maintenance Basics. https://maintenancebasics.wordpress.com/2014/07/07/pm-types-part-4-calibrations/

[29] Ainsworth, R. (2016, November 1). *How often should you calibrate?* Fluke Calibration. https://us.flukecal.com/blog/how-often-should-you-calibrate

Guided Practice Activity

Topic 4.2 Task 3:

1. Observe a tool that requires calibration.

2. Find a user instructions manual for a tool that requires calibration. Using a user instructions manual, read through the calibration process.
   a. Write down the steps in a more simplified form.

   b. Explain the steps to calibrate the tool to a peer.

4.3 Key Facts

Instructions to calibrate a spirit level:
Taken from DoItYourself.com's *How to Calibrate a Spirit Level* article:

"A spirit level is a tool that helps you gauge whether an object is level. The glass tube in the level is comprised of a liquid or a spirit like ethanol, which in turn indicates the exact reading. If the spirit creates an imbalance, the level will give out an inaccurate reading. The process of rectifying this error is known as calibrating.

Step 1 - Prep Work
Before you start calibrating the spirit level, make sure you have all the materials handy. First and foremost, you need a sturdy table. You will be using this table as the base to judge the level.

Step 2 - Place
Begin with the process by placing the spirit level on the table. Make sure you place it gently without using swift movements.

Step 3 - Wait
After you place the spirit level on the table, wait for 20 to 25 seconds. This will allow the level of the liquid to stabilize in case a swift motion was applied or too much vibration was generated while moving it. This will also produce a true reading.

Step 4 - Note
The next step is to observe the reading. Note the point where the bubble rests on the spirit level's scale. This scale is printed on the outside of the glass vial.

Step 5 - Turn
The next step is to turn the level. This will result in the top edge now going to the bottom as you have revered the spirit level. Wait for 20 to 25 seconds to help in settling the vibrations created while the shift was taking place.

Step 6 - Observe
Look at where the bubble is resting and note its position. Now compare it to the position what you had noted in Step 4. If both are the same, then the level has been calibrated. In case the readings differ, look at which end the bubble is proximal to. Flip the level over, and again check which side the bubble is resting. If the bubble in both positions rests on the same side, then it is an indication that the surface of the table is not in a level position.

Step 7 - Fix
Take any material with a flat surface and can be used as a wedge. Place it under the leg of the table. Adjust till the bubble reached the centre of the scale.

Step 8 - Flip
To check the legitimacy of the level, flip it around one last time. If the bubble shifts in the direction opposite to the reading, you need to readjust the level.

Step 9 - Locate the Screw
Find the screw on the edge of the glass tube.

Step 10 - Calibrate
Place the spirit level on the table. The screw edge should face upward. Turn this screw with a screwdriver. This will adjust the level of the spring. Turn the level's screw until the bubble is centred."[30]

Instructions to calibrate a sprayer:
Taken from Strip-Till Farmer's *9 Easy Steps to Calibrate Your Sprayer* article:

"Step 1
Fill the sprayer tank (at least half full) with water.

Step 2
Run the sprayer, inspect it for leaks, and make sure all vital parts function properly.

[30] Doityourself Staff. (2010, June 10). *How to calibrate a spirit level*. DoItYourself.com. https://www.doityourself.com/stry/how-to-calibrate-a-spirit-level

Step 3
Measure the distance in inches between the nozzles

Step 4
Measure an appropriate travel distance in the field based on this nozzle spacing. The appropriate distances for different nozzle spacing is as follows:

- 125 metres for a 25-cm/0.25-m spacing
- 83 metres for a 40-cm/0.4-m spacing
- 62 metres for a 50-cm/0.5-m spacing
- 41 metres for a 75-cm/0.75-m spacing
- 31 metres for a 100-cm/1-m spacing

Step 5
Drive through the measured distance in the field at your normal spraying speed and record the travel time in seconds. Repeat this procedure and average the two measurements.

Step 6
With the sprayer parked, run the sprayer at the same pressure level and catch the output from each nozzle in a measuring jar for the travel time required in **step 5** above.

Step 7
Calculate the **average nozzle output** by adding the individual outputs and then dividing by the number of nozzles tested.

The **final sprayer output** in litres per hectare (L/ha) you get is equal to:
(average nozzle output (mL) / nozzle spacing (m)) * 0.2

Step 8
Compare the actual application rate with the recommended or intended rate. If the actual rate is more than 5 percent higher or lower than the recommended or intended rate, you must make adjustments in either the spray pressure or the travel speed or in both. For example, to increase the flow rate you will need to either slow down or increase the spray pressure. The opposite is true when you need to reduce application rate. As you make these changes stay within proper and safe operating condition of the sprayer. Remember increased pressure will result in increasing the number of small, drift-prone droplets.

Step 9

Repeat steps 5-8 above until the recommended application error of ±5% or less is achieved." [31]

Tip to get more uniform applications from your sprayer:

- Check condition of hoses, filters, clamps, pump, tank, valves, and nozzles--everything the spray passes through is a checkpoint for potential problems, such as leaks, clogs, cracks, and poor seals.
- Check your sprayer's calibration. Several surveys of farm equipment have revealed significant calibration errors. It is recommended that you check for nozzle wear; nozzles with flow greater than 10 percent of a new nozzle should be replaced.[32]

Application Activity

Topic 4.2 Task 4:

A spirit level is a tool that helps you gauge whether an object is level. The glass tube in the level is comprised of a liquid or a spirit like ethanol, which indicates the exact reading. If the spirit creates an imbalance, the level will give out an inaccurate reading. The process of rectifying this error is known as calibrating.

1. Go into the community and ask different farmers how they calibrate a spirit level.

2. After interviewing 2-3 community members, share the results with your peers.

3. Compare your findings with the steps for calibrating a spirit level provided in **4.3 Key Facts**.

   a. How are the processes similar?

   b. How are they different?

   c. Which method do you think is best for user safety?

4. With the trainer's assistance, calibrate a spirit level in class.

[31] Ozkan, E. (2017, June 12). *9 easy steps to calibrate your sprayer*. Strip-Till Farmer. https://www.striptillfarmer.com/articles/2378-easy-steps-to-calibrate-your-sprayer

[32] Iowa State University. (n.d.). *Check equipment calibration before planting*. https://crops.extension.iastate.edu/encyclopedia/check-equipment-calibration-planting

Topic 4.2 Task 5:

1. Read the importance of calibrating sprayers below:

Using a sprayer to distribute pesticides requires calibration of the sprayer. Too little pesticide may result in ineffective pest control, whereas too much pesticide wastes money, may damage the crop, and increases the potential risk of contaminating ground water and the environment. The primary goal with calibration is to determine the actual rate of application in gallons per unit of area, then adjust to minimize the difference between the actual rate and the intended rate.

2. Listen closely and follow along in **4.3 Key Facts** as the trainer explains how to calibrate a sprayer and tips for a uniform application.

3. Perform the calibration spraying pump available at the school so that they disperse more uniform and intended levels of application of pesticides and fertilizers.

Points to Remember

- It is the responsibility of the user to verify the calibration of the instrument before each use.
- The user is responsible for the proper use and care of the tools and equipment.
- Consult operator's or user instructions manual for calibration instructions.

Formative Assessment

1. What does it mean to calibrate a tool or piece of equipment?

2. What are some examples of tools or equipment that require calibration before use?

3. Where might you find information on how to calibrate a tool or piece of equipment?

Topic 4.3: Adjusting tools and equipment

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify tools and equipment adjustment criteria	**1.** Evaluate adjustment criteria for farm tools and equipment	**1.** Critical thinking
2. Describe tools and equipment adjustment types	**2.** Demonstrate tools and equipment adjustment types	**2.** Discerning
3. Explain tools and equipment adjustment process	**3.** Perform tools and equipment adjustment	**3.** Confident

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

Topic 4.3 Task 1:

1. Answer the following questions with a partner:

a. What do you do when a farming tool or piece of equipment isn't working well for the task you are performing? Consider a case where the tool is right for the job but isn't working quite right.

b. Have you ever had to adjust a tool so that it worked more effectively?

c. Have you ever had to adjust the amount of fuel or oil so that a machine ran more smoothly?

d. Have you ever sharpened a tool?

e. Have you ever tightened a loose handle or screw?

f. Consider all these tasks and think of any other adjustments you have made to a tool.

2. Share your responses and ideas with the rest of the class.

3. Read the Key Competencies table as a large group.

Problem Solving Activity

Topic 4.3 Task 2:

1. Carefully observe the picture above. Answer the following questions:
   a. What is happening in this picture?

   b. What is the man doing to the three-pronged fork hoe?

   c. Why might he be adjusting this tool?

   d. Are there any other adjustments he might make to this tool so that it works more effectively?

2. Read **4.4 Key Facts** below.

4.4 Key Facts

What does adjustment mean?
Adjustment means the process of bringing the various part of a tool/equipment into a more effective and efficient relationship with another part of a tool/equipment.

To make proper adjustments, one must:

- Know the methods or tests used to determine if a tools or equipment is out of adjustment.

- Know the procedures and sequence for making adjustments.
- Determine the effect that an adjustment of one element will have on other parts.

Adjusting a tool or piece of equipment

- When preparing to adjust a tool or piece of equipment, always consult the operator/user instructions manual.
- It is important to clean off excess dirt and debris from the tool, even to sanitize the tool, when performing an adjustment.
- Sometimes fuel and oil levels may also need to be adjusted for a machine to run more effectively.

Types of adjustment

- **Minor adjustments**: Minor adjustments can generally be done in the field using simple tools. If the defect in the tools and equipment cannot be corrected by minor adjustment or minor repair, do not attempt to disassemble it; instead, make necessary arrangements for sending the tools and equipment to the manufacture or special skills person.[33] Minor adjustments of tools and equipment involve:
  - ✓ Depth and spacing
  - ✓ Fixing of screw
  - ✓ Sharpening
  - ✓ Handle fixing
  - ✓ Nozzles diameter/capacity

- **Major adjustments**: Major adjustments generally need to be done in the factory by equipment specialist generally employed by the manufactures of the tools and equipment. Never attempt to make a major adjustment yourself.

Guided Practice Activity

Topic 4.3 Task 3:

1. Using the table below, make a list of different tools that might require adjustments prior to being used.

2. List the potential adjustments you might make to these tools.

[33] Naval Education and Training Program Development Center. (1976). *Engineering aid 3 & 2, Vol. 1*. Bureau of Naval Personnel.

Tool	Way in which the tool may need to be adjusted	Minor or Major adjustment

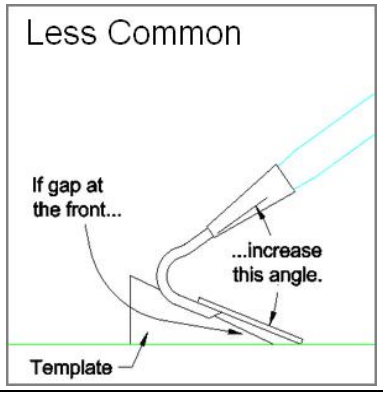
4.5 Key Facts

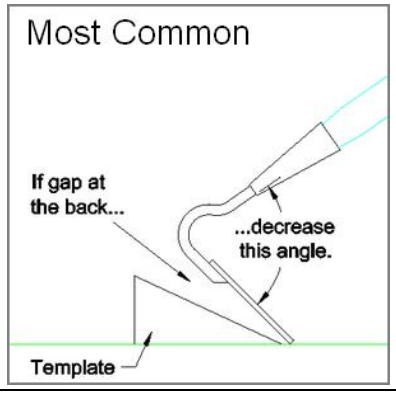
How to adjust a garden hoe:
Adapted from Easy Digging's *Can I adjust a garden hoe to fit my height?* article.

"To adjust a garden hoe, you just need an angle template.

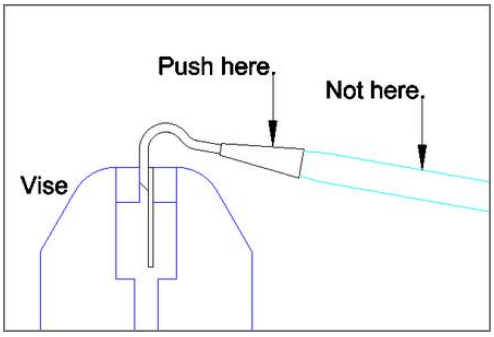
Step 1:
Stand with your hoe on a smooth floor. Hold it like you are weeding the garden. But do not hunch or bend over much, even if that is how you are used to hoeing. Stand fairly upright, with one hand on the end of the hoe handle at about bellybutton height, and the other hand about 1/3 m or 30 cm in front. The hoe will not be straight out in front of your torso, it will be to your left or right, depending on your dominant hand. It helps to point your forward foot towards the hoe blade.

Step 2:
Have a friend get down on the floor and slide the template up close to the hoe blade. This will show how much adjustment is needed, and in which direction.





Step 3:
Clamp the blade in a bench vise as shown. If the vise has a vertical V-notch for round rods, try to position the neck in that notch To bend the hoe neck, push down (or pull up) on the ferrule (steel cone) Do NOT push or pull on the wooden handle – it will damage the handle. Bend just a little at time, not all at once.



Step 4:
Start again at Step 2 to see how much additional adjustment is needed."[34]

Application Activity

Topic 4.3 Task 4:

1. Most garden hoes are adjustable. Getting the angles right will make the tool a joy to use, instead of an exhausting backbreaker. Answer the following questions for adjusting a garden hoe using **4.5 Key Facts** for guidance.
   a. Why should you adjust your hoe?

   b. What types of garden hoes are adjustable?

   c. How can you adjust a garden hoe?

2. Find a garden hoe at the training centre or on your own farm and properly adjust it so that it can be a more effective and efficient tool for the tasks you would normally be performing during this season. If a vice and angle template are available, use the instructions below:

[34] Baka, G. (n.d.). *Can I adjust a garden hoe to fit my height?* Easy Digging. https://www.easydigging.com/garden-hoes/faq/adjust-hoe-angle.html

Points to Remember

- Following standard operating procedure and manufactures specification before, during and after adjustment.
- Always consult the owner of a tool before adjusting it for your own use.

Formative Assessment

1. What is tool adjustment?

2. List at least four examples of tool and equipment minor adjustments.

Self-Reflection

1. You have come to the end of the unit. You will repeat the survey you did at the beginning of the unit to help you self-assess 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.
Show tools and equipment checking procedures for functioning					
Apply checking procedures of tools and equipment for functioning					
Apply tools and equipment user instructions					

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.
Employ calibration instructions for tools and equipment					
Demonstrate tools and equipment calibration process					
Perform tools and equipment calibration process					
Show adjustment criteria for farm tools and equipment					
Demonstrate tools and equipment adjustment types					
Perform tools and equipment adjustment					

2. Complete the table below by identifying areas from the unit where you have improved and where you need improvement with the actions/strategies you will use to help you improve when receiving and interpreting information at the workplace.

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

Unit 5: Maintain farm facilities

Topics

5.1 Identification of damaged farm facilities

5.2 Identification of materials and spare parts for repairing damaged farm facilities

5.3 Maintenance of farm facilities

Unit Summary:

This unit will teach you how to monitor, maintain, and repair damaged farming facilities. You will gain the skills of identifying the damage to the facilities and creating a plan of action to repair the facilities and assure that the problem does not persist.

Self-Assessment: Unit 5

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

2. Fill in the self-assessment below.

There are no rights or wrong way to answer this survey. It is for your own use during this course. The trainer will read a skill that is listed 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. At the end of this unit, we'll take this survey again.

My experience Knowledge, skills, and attitude	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.
Illustrate different types of farm facilities damages					
Discover the causes of farm facilities damage					
Select materials and spare parts for repairing farm facilities					
Prepare materials for repairing farm facilities					
Demonstrate repairing techniques for farm facilities					
Demonstrate basic maintenance of the farm facilities					
Perform monitoring of farm facilities					
Prepare a farm facilities maintenance schedule					

Topic 5.1: Identification of damaged farm facilities

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify farm facilities	**1.** Document different aspects of farm facilities	**1.** Detail-oriented
2. List the causes of farm facilities damages	**2.** Analyse the causes of farm facilities damage	**2.** Reflective
3. Identify damaged farm facilities	**3.** Evaluate damages in actual farm facilities	**3.** Observant

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

Topic 5.1 Task 1:

1. Reflect on the following questions with a partner:
   a. What is a farming facility?

   b. Have you ever seen a damaged farm facility?

   c. What type of facility was it?

   d. What part of the facility was damaged?

   e. What caused the damage?

   f. Could the damage have been prevented?

   g. Was the facility worth repairing?

2. Discuss your responses and experiences with the rest of the class.

3. Read the Key Competencies table together.

Problem Solving Activity

Topic 5.1 Task 2:

1. Consider your own or your family's farm facilities and answer the following questions with a small group:
   a. What is a farm facility? What are the critical roles of farm facilities or structures in agriculture?

   b. Do you have facilities use for farming operations at home? If yes, list some common facilities found at home.

   c. List the types of problems that might occur and what the possible causes could be. What would be the effect would be if the problem remains unresolved?

2. Share and discuss your experiences with the rest of the class.

3. Read **5.1 Key Facts** together.

5.1 Key Facts

Definitions:

- A **farm facility or building** is any of the structures used in farming operations, which may include buildings to house families and workers, as well as livestock, machinery, and crops.
- The **farm facility or building** plays a critical role in agriculture. They house our raw materials, finished product, equipment and livestock. They provide a place to work and shelter from the elements. Agriculture utilizes a wide variety of structures.[35]

Types of farm buildings:

There are many different types of buildings found on a farm; the size, type, and use will depend on the types of commodities produced, as well as the size and level of production on the farm. Below are types of farm facilities and their uses.

- **Farmhouse**: a structure used primary as residence for families, farmers and workers on a farm
- **Barn:** another popular type of farm facility and is used for more than one purpose. A barn can serve as a shelter for livestock or livestock feeds. It can be also used for

[35] Martinot, R. (n.d.). *Farm building*. Encyclopedia Britannica. https://www.britannica.com/topic/farm-building

storage of farm produces, farm suppliers, and farm tools and equipment. e.g: brooder house, chicken house and cowshed

- **A shed:** a shed is a simple facility used for storage of farm tools and equipment or as a workshop
- **Stable:** a structure used for keeping horses or some other types of livestock
- **Silo:** a silo is a storage facility for storing of grains such as maize, rice, etc…there are different types of silo such as tower, bunker, bag, concrete stave, fabric.
- **Greenhouse:** is a special type of farm facility used for cultivating plants and crops which require regulated whether conditions.
- **Milk shed:** milk shed is a farm facility with a very high hygienic standard used for milking.
- **Root cellar:** it is underground storage facility used for storing fruits, vegetables and other foods.
- **Abattoir or slaughterhouse:** a farm facility where animals for consumption are killed before being moved to packaging department
- **Several other structures** are present in agriculture and on farms. These structures include feed hoppers, old well pits and cisterns, pesticide storage tanks, bulk milk tanks, molasses storage tanks, and many other structures.

The general damage associated with agricultural structures or facilities includes:

- Being struck by objects such as a fallen tree
- Crushing by stored materials
- Electrical shock resulting in fires or burnt out cables
- Rodents and insects destroying the facility
- Fire and flammable materials
- Poor lighting due to electrical issues
- Weather and the negative effects of the environment
- Mechanical damage
- Poor housekeeping

Guided Practice Activity

Topic 5.1 Task 3:

1. Fill in the table regarding the farm facilities you think you will use in your farming activities. Include facilities that were not mentioned in the **5.1 Key Facts**. Once you have filled out the table, compare your findings with a peer that has similar interests to you.

Name of facility	Purpose of the facility	Potential damage to this facility

Application Activity

Topic 5.1 Task 4:

1. Visit a farm facility and ask the farmer different questions regarding past damage he/she has experienced at his/her farm. Use the following form to guide the conversation. However, if the farmer begins to tell you a story or you get more information, gather it as well so that you can share the information with the large group upon your return.

Name of farmer:	Type of farm:	
Existing or past facilities	**Ever damaged?**	**If damaged, cause of damage**

Points to Remember

- All farm facilities will be damaged eventually, however, continuous, proper maintenance can preserve the facilities for much longer periods of time.
- Identifying and making note of damaged facilities is the first step to repairing them.
- Repair damaged facilities as quickly as possible to preserve the facilities before it is too late, and you must destroy the entire facility.

Formative Assessment

1. Choose the options that would *not* be included as farm facilities:
   a. Building to house farm workers
   b. Livestock
   c. Tools and equipment
   d. Crops
   e. Church

2. Identify five different farm facilities.

3. Complete the following table related to the types of damages that could occur to farm facilities.

Components	**Potential type of damage**
Roof	
Wall	
Timber frame for building	
Foundation of building	

Topic 5.2: Identification of materials and spare parts for repairing farm facilities

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify materials and spare parts for repairing farm facilities	**1.** Select materials and spare parts for repairing farm facilities	**1.** Respectful
2. Describe materials for repairing farm facilities	**2.** Prepare materials for repairing farm facilities	**2.** Methodical
3. Identify repairing techniques for farm facilities	**3.** Demonstrate repairing techniques for farm facilities	**3.** Crafty

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

Topic 5.2 Task 1:

1. Reflect on the different damages that can occur with farm facilities from the previous topic. Share some of your experiences around possible materials and spare parts used for repairing farm facilities. When you are sharing experiences, be sure to answer the following questions:

   a. What farm facilities have you repaired?

   b. What part of the facility required reparations?

   c. Did you repair the facility? Who repaired the facility?

   d. How did the repairer know how to repair the facility?

   e. What materials/parts were used to repair the facility?

2. Read the Key Competencies table as a large group.

Problem Solving Activity

Topic 5.2 Task 2:

1. Read the following situation and propose a plan of action for Nadine to repair her barn.

Nadine moved to Kigali for a job and left her farm to be cared for by some farmhands. She has many cows and returns once or twice a year to check on the farm and make sure everything is running smoothly. One day she receives a call from one of her farmhands telling her that her barn has been severely damaged by heavy rain and wind.

She takes a trip out to the farm to find that the metal roofing is bent, the wooden frame for the roof is cracked, paint is chipped off, and one of the poles holding up the gate is falling over.

2. What materials does Nadine need to fix the barn?

3. What techniques can her farmhands use to repair the barn?

4. Read **5.2 Key Facts** together.

5.2 Key Facts

Why should we repair farm buildings?
The purpose of repair is to stop the process of decay and fix the damage without damaging facility

Materials used to repair these facilities depends on:

- The financial position of the farmer
- The purpose of the facility
- The farm's proximity to suitable materials.

Materials used to repair farm buildings include:

- Brick
- Earth (subsoil) made into large bricks, which were mortared together with earth mortar
- Timber-frames
- Clay tiles have been produced wherever suitable clays are found
- Thatch (straw/hay) used for roofing farm buildings
- Cement which makes concrete when mixed with water, gravel, and sand

- Bamboo mainly used as building poles but when the stems are split, the pieces can be loosely woven to make cribs/containers for grain storage and wooden fences.
- Metal may be used in the form of bars, poles, pillars, pipes, steel rods for reinforcement, nails, wires, wire netting.
- Paint and a paint brush

When selecting farm facilities repairing materials you consider the following:

- Extraction and manufacture
- Sourcing (availability, cost, transport to site)
- Construction/installation (ease of construction/installation, adaptability, health and safety during construction/installation)
- Performance (health and safety during the life of the building, structural capability, durability and maintenance, fire performance, moisture resistance, thermal performance and materials deterioration/decay)[36]

Different repairing tasks:

- Repair any broken or deteriorated posts and rails e.g. leaking roof, broken doors, cracking walls
- Repair any cracks in collecting yards, foots baths, dipping tank, silt trap, draining race and walls
- Repair any leakages/cracks in the side walls
- Ensure proper drainage in the surrounding area
- Ensure proper ventilation
- Repair leaking roof to prevent wetness of the floor
- Paint the walls white to keep off flies
- Repair broken parts of the structure
- Paint the wooden posts to last longer

Guided Practice Activity

Topic 5.2 Task 3:

Different types of damage can occur in farming facilities and different materials are used to repair them.

[36] Level. (2019, May 20). *Choosing materials for building projects*. https://www.level.org.nz/material-use/choosing-materials/

1. Using the table below, write out:
   a. Different damages that may occur for farming facilities.

   b. Indicate the type of material that would be used to repair.

   c. Indicate the potential technique that could be used for the repair.

2. Once you have completed the table, compare your findings with your peers and give each other advice regarding the materials and techniques each of you have indicated.

Damage to farming facility	List of materials necessary for the repair	Technique for repairing the damage
Example: Hole in sheet metal for roof	*Replacement metal a little larger than the hole, adhesive sealant to glue on the metal, saw to cut the metal, steel wool to clean off the metal, putty knife to apply adhesive*	*Clean off the roof near the hole as well as the metal that will be used to patch the hole, using the putty knife apply lots of adhesive sealant so the metal will stick, hold the metal onto the roof and make sure it dries on*

Application Activity

Topic 5.2 Task 4:

1. Read the following information:

   Traditional timber-frame construction in Rwanda is commonly used. Apart from natural aging due to weathering, most timber-frame problems result from excessive moisture getting into the wood's joints leading to rot and ultimately structural failure of the components**.**

2. Name the materials and spare parts needed to repair timber-frame on the buildings.

Topic 5.2 Task 5:

1. Go into the community and identify a damaged farming facility. Fill in the following table with a list of repairs for the facility. Then, share your findings with one of your peers.

Damage to farming facility	List of materials necessary for the repair	Technique for repairing the damage

Points to Remember

- When you cannot do a repair yourself, be sure to ask multiple other repairmen to make sure you get the best price.
- Make repairs as soon as you can to avoid further damages.
- Leaving damaged farming facilities is dangerous. If the facility collapses, it may harm a person or your animals.

Formative Assessment

1. What materials are necessary to fix a broken roof where:

a. The wood frame is cracked.

b. There is a hole in the tin roof.

2. If there is a hole in a concrete floor in part of the barn:

a. What materials will you need for the concrete?

b. How can you fix the concrete?

Topic 5.3: Maintenance of farm facilities

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify basic maintenance for farm facilities	**1.** Demonstrate basic maintenance of the farm facilities	**1.** Forward thinking
2. Recognize basic maintenance procedures of farm facilities	**2.** Execute farm facilities maintenance procedures	**2.** Problem solver
3. Describe a schedule of maintenance for farm facilities	**3.** Prepare schedule of maintenance for farm facilities	**3.** Adaptive

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

Topic 5.3 Task 1:

1. Consider the following questions and answer them based on either your experiences or the experiences of people you know:

a. What do you find people have done to keep well-maintained farm facilities?

b. What do you find people have done where their farm facilities were damaged and falling apart?

c. What techniques have you seen people use to monitor their farm facilities? How often do they perform routine monitoring of their facilities?

d. How have you seen people clean their farm facilities? Have they used chemicals? What other materials have you seen people use in cleaning the facilities?

e. What techniques have you noticed people use in painting the farm facilities?

2. Share your observations and experiences with your peers.

3. Read the Key Competencies table together.

Problem Solving Activity

Topic 5.3 Task 2:

1. Fill in each of the following tables regarding the different methods you would employ to monitor and maintain farm facilities.

Monitoring Farm Facilities

Be sure to include both the external and internal structure.

Monitoring activity	Desired output or objective of the activity	Frequency of performing the activity
Example: Checking the timber beams and frames holding the structure of the barn	*Ensure no cracks, rot, or other degradation occurs in the wood. Replace the wooden/timber beams before the barn suffers further damages*	*Once every two weeks*

Maintaining Farm Facilities

Be sure to include different aspects of cleaning the facilities.

Maintaining activity	Desired output or objective of the activity	Frequency of performing the activity
Example: Consistently repairing the fence	*Keeping the animals in and out of a closed area. A consistently repaired fence is much less vulnerable to larger damages and even, redoing the entire fence.*	*Once a month*

2. Refer trainees to **5.3 Key Facts.**

5.3 Key Facts

Maintenance is an essential to ensure that buildings and other built assets present a good appearance and operate at optimum efficiency. Apart from decay and degradation of the building itself, inadequate maintenance can reduce performance, affect heath and threaten the safety of occupants and those in the vicinity.[37]

Maintenance can help:

- Prevent the process of decay and degradation.
- Maintain structural stability and safety.
- Prevent unnecessary damage from the weather or from general usage.
- Optimize performance.
- Help inform plans for renovating and refurbishing buildings.
- Determine the causes of defects and so help prevent re-occurrence or repetition.
- Ensure continued compliance with statutory requirements[38]

General maintenance of farm facilities includes:

- Regular cleaning
- Repair broken or worn out parts e.g. leaking roofs, broken doors, broken fences cracking walls, loose, or chipped paint coatings
- Proper storage and organization of the tools and supplies
- Logging and record keeping regarding the state of the farm including the supplies, tools, and condition of all aspects of the farm
- A well-thought out, recorded plan and schedule for performing monitoring and maintenance of the farm

[37] Designing Buildings Wiki. (2020, July 16). *Planned preventive maintenance*. Retrieved August 11, 2020, from https://www.designingbuildings.co.uk/wiki/Planned_preventive_maintenance

[38] Designing Buildings Wiki. (2020, July 16). *Planned preventive maintenance*. Retrieved August 11, 2020, from https://www.designingbuildings.co.uk/wiki/Planned_preventive_maintenance

Guided Practice Activity

Topic 5.3 Task 3:

1. Discuss how you would carry out the following tasks with your small group:
   a. Suppose that you want to keep an old barn from falling apart. The entire facility is covered in dirt and cow dung and nothing is organized. The paint is falling off the walls. The timber frame is cracked and rotting. The tin roof has many holes such that when it rains the animals get wet. To restore the barn, identify the main steps to repair then maintain the facility.

   b. Establish schedule of monitoring the barn so that it stays in good condition.

2. Share your responses with the rest of the class and compare your ideas.

Application Activity

Topic 5.3 Task 4:

1. Using either your farm, your family's farm, or the farm of a member of your community, make a list of the different farming facilities. Use the table below for each of the facilities, mention the different aspects of the facility, including the internal and external structure. Create a schedule to monitor each of the farming facilities using your own judgement. If the farmer already has routine monitoring and maintenance plans, take note of these, as well.

Facility:		
Maintenance activity	**Desired output or objective of the activity**	**Monitoring activity and frequency of monitoring**

Facility:		
Maintenance activity	**Desired output or objective of the activity**	**Monitoring activity and frequency of monitoring**
Facility:		
Maintenance activity	**Desired output or objective of the activity**	**Monitoring activity and frequency of monitoring**

Points to Remember

- Continuous care for a monitoring of facilities can prevent unexpected damages and degradation which will save more money and contribute to the well-functioning and improvement of the farm.
- Always wear suitable protective clothing and gear when monitoring and maintaining facilities.
- When monitoring and maintaining facilities at heights, make sure ladders are propped at a safe angle and secured on firm ground.

Formative Assessment

1. What are two different ways of maintaining a farm facility?

2. What is it mean to monitor a farming facility? How can you determine how often to monitor different aspects of the facility?

3. Why is it important to maintain a farm facility rather than simply wait for everything to need to be repaired?

Self-Reflection

1. You have come to the end of the unit. You will repeat the survey you did at the beginning of the unit to help you self-assess 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.**
Illustrate different types of farm facilities damages					
Discover the causes of farm facilities damage					
Select materials and spare parts for repairing farm facilities					
Prepare materials for repairing farm facilities					
Demonstrate repairing techniques for farm facilities					
Demonstrate basic maintenance of the farm facilities					
Perform monitoring of farm facilities					
Prepare a farm facilities maintenance schedule					

2. Complete the table below by identifying areas from the unit where you have improved and where you need improvement with the actions/strategies you will use to help you improve when receiving and interpreting information at the workplace.

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

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