RWANDA POLYTECHNIC

TVET LEVEL II

AGRICULTURE

Animal Shelter Construction

TRAINER MANUAL

RWANDA POLYTECHNIC

Approved by: Workforce Development Authority

USAID FROM THE AMERICAN PEOPLE

EDC Education Development Center

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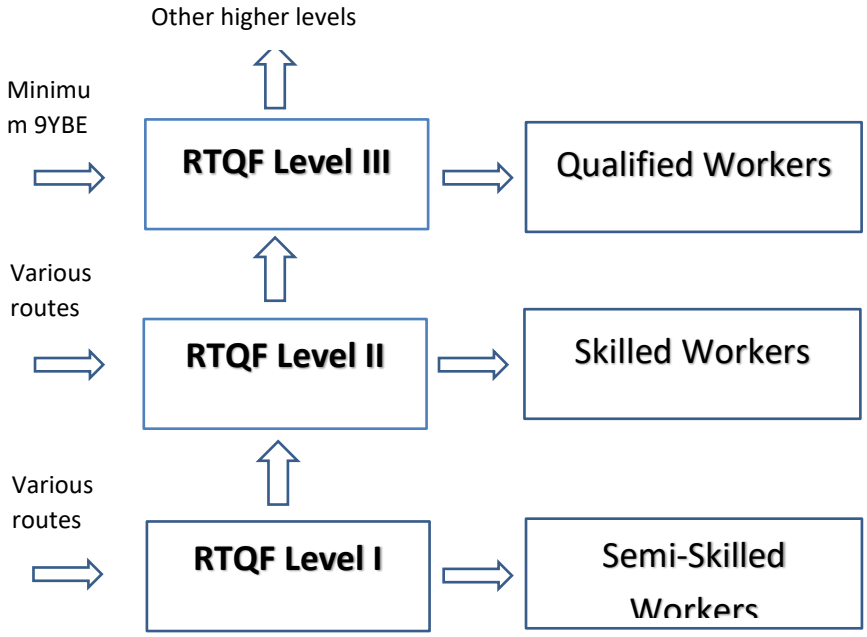
Introduction to RTQF Level II Training Modules

Background

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



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

Module Requirements:

Basic Education	Soft Skills	Vocational Skills
• English • Kinyarwanda • Mathematics	• Basic Entrepreneurship Skills • ICT Essentials • Communication Skills	• Vocational programmes will have a set of 6 – 8 required technical modules.

• Integrated Science (Physics, Chemistry, Biology)	• Safety, Health and Sustainable Environment • Personal Development and Career Guidance	E.g. Food Crop Production and Processing includes the following modules: 1. Food Crop Production 2. Small Scale Post-Harvest Operations 3. Growing Medium 4. Food Safety and Sanitation 5. Food Preservation and Storage 6. Flour Processing

Organization of the Training Manuals

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

Teaching and Learning Methodology of RTQF Level II 2 TVET Materials

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

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

- Applying social inclusion principles: Finding ways to include all types of youth (and trainers) – males and females; different cultural/ethnic/religious backgrounds, people with disabilities (PWD); people with different types of health status …

- Encouraging risk taking – promote questioning and being free to explore

- Promoting habits of mind that support life-long learning: curiosity and wonder, open mindedness, creativity

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

1. **Key Competencies:** Table found at the beginning of each Learning Outcome that describes the main knowledge, skills and attitudes to be gained by the end of the activities.

2. **Self-Assessment:** Conducted at the beginning and end of each Learning Unit to get a sense of trainees' knowledge and skills going into it and what they have gained by the end of the Learning Unit (and steps they need to take to further their understanding and skills).

3.  **Getting Started Activity:** Typically, a quick activity or questions to 1) give the trainer a sense of trainees' existing knowledge and skills; 2) spark the interest of trainees in the topic; 3) introduce the objectives and key competencies of the topic.

4.  **Problem Solving Activity:** A challenging activity to get trainees engaged and to learn through discovery instead of memorization of facts. A variety of teaching and learning methodologies are used, including individual and group work such as reading real life work-based scenarios and answering accompanying questions to activities such as identifying proper tools and equipment from the school workshop to conduct a certain activity. Following the sharing of responses, the trainer guides trainees through the content and processes being introduced.

5.  **Guided Practice Activity:** Building on the concepts and skills gained in the problem solving activity, the trainer guides trainees through practical examples.

6.  **Application Activity:** Consolidates trainees' knowledge and skills through a real life application of the topic in the classroom, community or workplace. Trainees are given more independence in applying what they have learned.

7. **Key Facts boxes:** Throughout the Trainee Manual, one will find Key Facts boxes. These contain the main information or content for a given Learning Outcome. They are there for the trainees' reference and are used throughout the different types of activities.

8.  **Points to Remember:** List of the top key learning points or "take-aways" from the topic.

9.  **Formative Assessment:** Questions and activities to assess trainees' level of understanding of the concepts introduced.

10.  **Summative Assessment:** Based on the integrated, real life situation approach used in other TVET levels, this is done at the end of every module for agricultural modules and, with some variations, at the end of each Learning Unit for Basic Education and Soft Skills modules.

11.  **Self-Reflection:** Trainees re-take the Self-Assessment given at the beginning of the Learning Unit and identify their strengths, challenges and actions to improve their level of competence.

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

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

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

ANIMAL SHELTER CONSTRUCTION

Learning Units	Learning Hours	Learning Outcomes
Learning Unit 1: Assist in ruminant building construction	12	**1.1** Select site
		1.2 Organize construction
		1.3 Equip cattle, goat and sheep shelter
		1.4 Maintain shelter
Learning Unit 2: Assist in piggery construction	8	**2.1** Select site
		2.2 Organize construction
		2.3 Equip piggery
		2.4 Maintain piggery
Learning Unit 3: Assist in hutches construction	8	**3.1** Select site
		3.2 Organize construction
		3.3 Equip hutches
		3.4 Maintain hutches
Learning Unit 4: Assist in poultry construction	12	**4.1** Select site
		4.2 Organize construction
		4.3 Equip poultry house
		4.4 Maintain poultry house

Learning Unit 1: Assist in ruminant building construction

Learning Outcomes

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

1.1 Select site

1.2 Organize construction

1.3 Equip cattle, goat and sheep shelters

1.4 Maintain shelter

Learning Unit 1 Self-Assessment

1. Ask the trainees to look at the unit illustration above and discuss what they see. Based on the illustration, what do they think this unit will include? After brainstorming, share the main topics. Explain to the trainees that ruminants include cows, sheep, goats, buffalo and antelopes. Ruminants are mammals that can acquire nutrients from plant-based food by fermenting it in a specialized stomach prior to digestion.

2. Explain that this Learning Unit is going to focus on constructing animals shelters for ruminants, such as cattle, goats, and sheep.

3. Ask the trainees to fill out the self-assessment at the beginning of the unit in their Trainee Manuals. Explain that the purpose of the self-assessment is to become familiar with the topics in the unit and for them to see what they know or do not know at the beginning. At the end of the unit, they will do a self-reflection, which includes re-taking the self-assessment and identifying their strengths as well as areas that need improvement and further actions to take. Explain that the self-assessment is not a test!

Learning Outcome 1.1: Select site

Objectives: By the end of this topic, trainees will be able to:

a. Describe the factors considered in selecting a site for ruminant shelter construction.

b. Assess the soil and weather factors for ruminant shelter construction.

c. Be careful and aware of the risks during the selection of a site for a ruminant shelter.

Time Required: 3 hours

Learning Methodology: Brainstorming, small group discussions, large group discussions, peer-to-peer learning, individual work, and field work

Materials Needed:

- **Standard training materials --** flip chart, markers, black/white board, chalk, tape, A4 paper
- **Sample measurement tools --** topographic maps, thermometer, hygrometer, anemometer, compass
- **Visual equipment and photos --** pictures for examples/multimedia examples

Preparation:

- ❑ Gather and prepare all materials (thermometer, anemometer, compass, hygrometer, sand, clay, silt, gravel, topographic images, etc.).
- ❑ Identify a field in advance near the school to do field work.
- ❑ Review and prepare the scenarios, questions, and sample answer for the activities (tasks) and assessments in this unit in advance.

Cross Cutting Issues:

- ✔ **Environment and Sustainability**: Acknowledge that the site for a ruminant shelter should not cause pollution to environment.
- ✔ **Standardization Culture:** Emphasize the need to use measuring tools to properly assess the shelter site.

Prerequisites:

- ❑ Basic Mathematics: Reading numbers and percentages

Key Competencies:

Knowledge	Skills	Attitudes
1. Describe the factors considered in the selection of a site for a ruminant shelter.	**1.** Select a good place for ruminant shelter construction.	**1.** Careful
2. Describe the soil factors considered while selecting a site for a ruminant shelter.	**2.** Assess the land and soil for ruminant shelter construction.	**2.** Collaborative
3. Identify weather conditions to consider in selection of a site for a ruminant shelter.	**3.** Assess the weather factors for ruminant shelter construction.	**3.** Aware

Steps:

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

Inform the trainees that they are going to talk about the picture in **Topic 1.1 Task 1** of their trainee manuals (give the reference page):

1. Show the picture to make sure that they understand what is happening in the picture.

2. Ask the trainees to brainstorm the answers for the following questions (one by one):
   - **a.** What is the common name of the structure?
   - **b.** Why do you give it that name?
   - **c.** What purpose can it serve?
   - **d.** What do you think of (consider) when selecting a place to build this structure? *(examples: wide open space, rural, quiet, natural, etc.)*.

3. Provide enough time and opportunities to all trainees to give their responses. Write their responses on the board/flipchart to be visible for reference.

4. After the brainstorming session, ask trainees what topic they think this activity relates to.

5. Introduce the learning outcomes and have the trainees turn to the Key Competencies table in their books to see what they will learn and review it together (considering their expectations). Explain that this learning outcome/session will focus on selecting a site for ruminant shelter construction.

 Problem Solving Activity

Inform the trainees that they going to work in groups and each group will be given a task that they will read and answer questions about. Tell the trainees that they must use what they know (or think they know) about farms and ruminants (cows, goats, etc.). They will then share their results with the rest of the class:

1. Form 3 small groups, with each group addressing subtopics in bullets below.

2. Each group should read the following scenario from **Topic 1.1 Task 2** in their manuals**:**

   Kagabo is a farmer of small ruminants in Gicumbi district, he is planning to buy a new plot of land to construct a shelter for 60 goats. He requests that you help him select a site by considering all the factors to consider before deciding.

3. Each group will work on questions allocated to them. When finished the trainees will discuss their answers together with the trainer.

   - **Group 1:** Factor for Location of Site
     - **a.** What do you think are some important regulations and laws to respect in the selection of a site for a ruminant shelter?
     - **b.** How could laws and regulations impact the decisions Kagabo makes?
     - **c.** List what other factors you think Kagabo should consider while selecting the location for ruminants' shelter location.

   - **Group 2:** Identification of Soil
     Provide the group with: Pictures of different topography, including mountains and hills, plains and plateaus, valleys, and glaciers. Also provide pictures of different soil particles, including clay, silt, sand, and gravel.

a. Identify the types of topography and what their impact on construction activities could be.
b. Identify the soil structures you see and what their impact on construction activities could be.
c. Help Kagabo understand why animal waste (faeces and urine) is harmful to the groundwater.

- **Group 3:** Weather Factor Consideration
  Provide the group with measuring instruments: Thermometer, hygrometer, anemometer, and compass.
  a. Using the tools you have, explain the weather factors Kagabo should measure when selecting a site for a ruminant shelter.
  b. Why do you think checking the weather parameters is important before deciding where to build a shelter?

4. Give trainees enough time to discuss and to complete their tasks. Provide all necessary materials they require for the tasks.

5. When all groups have finished with their tasks, inform them of how they will present their findings: Group 1 will present their responses followed by Group 2 then Group 3. After each group is finished presenting, allow other groups to ask questions. Tell trainees to write the responses to these questions where they can be referred to later on.

6. When all groups have presented, allow trainees to add other ideas that are missing from the tasks above.

7. Explain to the trainees that they will return to this activity and revise their answers after discussing the **1.1 Key Facts** of this learning outcome.

Guided Practice Activity

1. Read **1.1 Key Facts** out loud to/with the class. Pause after each fact to ask questions and return to the questions in the **Problem Solving Activity**. Give trainees time to revise their answers and ask them to share what they changed. Continue reading through **1.1 Key Facts**, checking to make sure the trainees understand the content throughout.

2. Form small groups of 4-5 trainees. Inform them that each group will read the scenario from **Topic 1.1 Task 3** in their manuals and answer questions that follow. Give the necessary instruments to each group.

   A farmer named Beatrice has a swamp-land around Nyabarongo River. She is planning to construct a cow shelter on that land because it is near water and the rest of the land will serve as a pasture, which will be productive even in dry seasons. You are called to analyse her project by answering the following questions:
   - **a.** Do you think Beatrice's site selection is a good choice? Give reasons to support your response.
   - **b.** Do you think her reasons are sufficient to go ahead and construct the animal shelter? Give reasons to support your response.
   - **c.** Do you think the authorities will allow her to continue with the construction? Give reasons to support your response.
   - **d.** Advise her on the possible impact her choice may have on the environment.
   - **e.** In your own view, advise her on what factors to consider while selecting a good site for ruminant shelter construction.
   - **f.** Using the appropriate instruments (thermometer, hygrometer, anemometer, and compass), take turns demonstrating to your groupmates how to check the parameters in selecting a site for ruminant shelter construction and then explain what the ideal measurements would be for selecting a site.

3. Give groups enough time to discuss the scenario and questions. As groups are discussing, guide or assist them where they need support, especially in the practice of checking weather parameters.

4. After all the groups have finished their discussions, inform them that they are going to have a large group discussion as a class. You will read each question and then each group will give their response to that question. When a response is repeated, put a tick against it. Remind trainees about **1.1 Key Facts** in their trainee manuals.

5. When the large group discussion is finished, thank the groups and harmonize their answers together as a class.

Answers to Question 2:

- **a.** No, construction in a swamp is not allowed.
- **b.** No, because:

- Water and pasture are not the only requirements for the installation of a ruminant shelter;
- She must check the regulations and laws.

c. No, they will not allow her to continue with construction.

d. Farm waste pollutes the groundwater.

e. 1. Location: Government laws, friendly neighbourhood, security, available facilities.
2. Soil: Topography, soil structure, sewage disposal, presence of groundwater.
3. Weather: Wind (direction and speed), natural light, temperature, precipitation/humidity.

f. Check to make sure the trainees know how to properly use a thermometer (temperature), anemometer (wind speed), hygrometer (humidity), and a compass (direction/orientation). Ask several trainees to demonstrate to you how to use the instruments in a hypothetical (imagined) location.

Application Activity

Inform the trainees that in their groups from the last activity, they are going to perform field work where they will help a farmer select a site for ruminant shelter construction.

1. Take groups to a nearby plot of land/field you have chosen in advance. Provide the necessary instruments to the groups and ask them to imagine that the site is where a farmer wants to build a ruminant shelter for five cows. They must help the farmer make the right choice by responding to the following tasks listed in **Topic 1.1 Task 4** in their manuals.

Using a notepad/paper, tell trainees to record their findings for the following tasks:

a. Observe the land and explain if it meets legal requirements.

b. Assess the topography and explain its impact on shelter construction.

c. Assess the soil structure and explain its impact construction activities.

d. Using your instruments (thermometer, anemometer, hygrometer, etc.) assess the weather parameters and give your observations.

e. What could be the impact of this farm (farm sewage) on the groundwater and what is your recommendation (if any)?

f. What do you think of the facilities, security, and neighbourhood in relation to this site?

2. Let each group begin their tasks. Allow enough time and ensure that all trainees are participating.

3. When the groups have finished, let each group visit another group to discuss their findings. Make sure that all groups have been visited and that they have been given time to discuss their findings.

Points to Remember

- Ruminant shelters must be constructed in a place that is easy for personal access, easy to get water, and easy to bring food to.
- Security and safety should be considered before choosing a site for a ruminant shelter.
- Consider the government regulations and laws before selecting a site.

Formative Assessment

Explain that the following assessment is individual. Tell the trainees to carefully read the instructions and respond to the questions.

1. List the criteria to consider in selection of site for a ruminant shelter.

2. Explain three types of topography and their impact on construction of ruminant shelter construction.
   1.

   2.

   3.

3. What weather conditions should be considered when selecting a site for ruminant shelter construction?

4. What is the impact of farm waste on ground water quality?

5. Choose the correct answer below and give the reason.
When constructing a ruminant shelter, farmers prefer:
- **a.** Single-fraction soils
- **b.** Uniformly graded granular soils
- **c.** Mixed - fraction soils

Answers:

1. Friendly neighbourhood, security, facilities available, topography, weather, soil, laws and regulations.

2. **Mountains and Hills**: Height of more than 300 meters. Hills on the other hand, only cover a height of about 150-300 meters. Animal shelter construction needs more land preparation as the slope increases.
Plains and Plateaus: Plains are flat or gently rolling lands while a plateau is simply an elevated land (less than 150 meters). Animal shelters are easily constructed on this topography.
Valleys: A low area of land between hills or mountains, typically with a river or stream flowing through it. Rwanda regulations do not allow the construction of animal shelters on this land.

3. Weather factors considered when selecting site for ruminant shelter construction:
- Wind direction and speed (optimum 0.2-1 m/s)
- Natural light
- Temperature (optimum 10-20^{o}C)
- Precipitation (rain)

4. Farm waste can sink into the soil and pollute the groundwater.

5. C

Learning Outcome 1.2: Organize construction

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

a. Identify the parts/blocks and facilities needed for a ruminant shelter.

b. Interpret a sketch and select construction materials.

c. Be careful and promote collaboration during the construction of a ruminant shelter.

Time Required: 3 hours

Learning Methodology: Brainstorming, large group discussion, small groups discussion, individual work, peer-to-peer learning, and field work

Materials Needed:

- **Standard training materials --** flip chart, markers, black/white board, chalk, tape, A4 paper
- **Measuring tools --** measure tape**,** rope, hammer, sticks

Preparation:

- ❑ Acquire and prepare materials in advance.
- ❑ Read through scenario and questions in advance.
- ❑ Prepare tasks/activities and assessments in advance.
- ❑ Prepare a nearby plot of land for practice.
- ❑ Contact a farmer in advance to plan a visit to a ruminant farm.

Cross Cutting Issues:

- ✔ **Environmental and Sustainability:** The site for animal shelter should not cause environmental pollution.
- ✔ **Standardization Culture:** Emphasize the use of measuring tools for construction to ensure a safe shelter.

Prerequisites:

- Basic Mathematics: Calculating the metric system

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify the parts (blocks) of a ruminant shelter.	**1.** Interpret the sketch of a ruminant shelter.	**1.** Attentive
2. Identify other facilities (infrastructures) for production and management.	**2.** Select construction materials for a ruminant shelter.	**2.** Willingness
3. Identify the construction materials for a ruminant shelter.	**3.** Assist in the construction of a ruminant shelter.	**3.** Collaborative

Steps:

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

Inform the trainees that they are going to use the picture from **Topic 1.2 Task 1** in their trainee manuals:

1. Show the picture from **Topic 1.2 Task 1** their trainee manuals.

2. Ask the trainees to observe the picture and brainstorm the answers of the following questions:
   - **a.** Which activity do you see in picture?
   - **b.** What are the materials used?
   - **c.** What are other possible materials that can be used in this activity?

3. Provide enough time and motivate all trainees to participate.

4. Write trainees' responses on the board/flipchart for reference.

5. After the brainstorming session, ask the trainees to predict the topic they are going to learn.

6. Introduce the learning outcome and ask trainees to turn to the Key Competencies in their manuals to see what they will learn and review it together. Explain that this learning outcome (topic) will focus on organizing ruminant shelter construction.

 Problem Solving Activity

Inform the trainees that they are going to do an activity related to sketching a ruminant shelter.

1. Make small groups of about 5 trainees.

2. Refer to **Topic 1.2 Task 2** in the trainee manuals. With the trainees silently reading along, read the following scenario and respond to the following questions as a class:

   A medium scale farmer is planning to start a dairy farm of 8 cows with a bull for mating. The farmer estimates to get 6 calves per year and will start selling them after one year to maintain the same number in the farm. Before construction of the shelter and the related facilities, the farmer wants a sketch from a more experience farmer. You are called to help him in this planning.

   You must do the following:
   a. List all the parts (blocks) needed for the shelter.
   b. Specify how many square meters are needed for each category of animal (m^2/animal).
   c. List other necessary infrastructures (facilities) needed in/around the shelter.

3. After reading the scenario with the trainees, ask one person to read each of the **1.2 Key Facts** out loud. After each section of **1.2 Key Facts** is read, ask if there are any questions or confusion.

4. With the trainees' input, provide a detailed explanation to the first two questions (a and b). Support the trainees by providing your own sketch and reasoning on a flipchart or whiteboard so the trainees can see and use yours as an example for the following activities. Also direct the trainees to draw this sketch together with you as a class.

5. Ask each group to discuss the third question (c). Choose a group leader who is going to share their group's answers to the whole class.

6. After five minutes of small-group discussions, allow each group leader to share. When a response is repeated, put a tick against it. Remind them to also consult the **1.2 Key Facts** in their trainee manuals during this discussion.

7. After the discussion, thank the groups and harmonize their answers together as a class.

Answers to Question 2:

a. Parts (blocks) needed in all shelter: Refer to **1.2 Key Facts**.

b. Square meters needed for each category of animals:
- Young cattle: 1.5-3 m^2
- Mature cows: 3.5-5 m^2
- Bull pen: 12-15 m^2

c. Other necessary infrastructures: Refer to **1.2 Key Facts**.

Guided Practice Activity

Explain to the trainees that they are going to do another activity in groups.

1. Ask the trainees to return to the same groups used in the previous activity (groups of 5).

2. Provide each group with drawing materials, including paper, pens, and pencils.

3. Tell trainees to refer to **Topic 1.2 Task 3** in the trainee manuals. Read the following scenario to the trainees:

   A family wants to keep a few goats at home to sell milk and meat from them. They call you to design and assist in the construction of a shelter for 3 does. They want to use minimum resources and they have enough trees in their forest to supply their own wood.

4. Ask every group to select a group leader who is going to write the answers while all group members discuss the following questions:
   a. Calculate the square meters (m^2) needed for 3 does in a pen.
   b. Calculate the square meters needed for 3 kids in a pen.
   c. Propose how many square meters needed for store.
   d. Explain the criteria to select construction materials.

e. Select the construction materials which can be used.
f. Make a simple design (drawing) showing how the blocks can be arranged.

5. Allow enough time to discuss the scenario and answer the questions. As groups discuss, assist them where they need support.

6. After all groups have finished their discussions, inform groups that they are going to have a large group discussion as a class. You will read the questions as each group gives their response to that question. Write their responses on the board/flipchart and when a response is repeated, put a tick next to it.
7. Hang all the drawings from the groups on the wall. Have the trainees walk around the room and observe the other groups' drawings. After their observations, ask one member from each group present the drawing and explain its components.

8. As a class, briefly comment on the provided answers and guide them toward the correct answers (if necessary), referring to the **1.2 Key Facts** in the trainee manuals.

9. When the discussion is finished, thank the groups and give general observations and feedback.

Answers to Question 4:
a. Does: 1.4 m^2 x 3 = 4.2 m^2
b. Kids: 0.5 m^2 x 3 = 1.5 m^2
c. Reasonable space (about 4-6m^2)
d. Criteria for selection of construction materials: Availability, cost, technology, durability, strength
e. Wood, timber, metal sheet, nails
f. Look for an arrangement that respects the space (standard measures) for does and kids.

Application Activity

Explain that this **Application Activity** is going to be done in two parts and that they will need the data from the previous activities. Direct trainees to **Topic 1.2 Task 4** in their manuals.

Part 1:

1. Bring the trainees to a nearby plot of land/field outside of the school that has been prepared in advance and is considered as a possible site for small ruminant shelter construction. Ask for volunteers to demonstrate organizing and measuring the shelter.

2. Provide the needed materials or equipment (measure tape, small sticks, hammer, and rope).

3. Ask each volunteer to take the materials/equipment provided and fix the sticks, linking them using the rope in order to show where every part/pen will be constructed (doe block, kid block, and store). Tell them to respect the design/sketch from the previous activity in **Topic 1.2 Task 3.**

4. While the volunteers are working, the rest of the class is assisting and participating in order to have a common understanding. Walk around, facilitate discussion, and give observations.

Part 2:

1. Bring the trainees to a previously contacted ruminant farm to observe:
   - **a.** The parts/blocks of the ruminant shelter and their sizes.
   - **b.** Other facilities present on the ruminant farm.
   - **c.** The construction materials used in a ruminant shelter.

2. During the observation, explain and give comments to the trainees with assistance from the farmer.

3. At the end, ask the trainees to share what they learned on the farm.

Points to Remember

- Each category of animal should have a separate pen/block with adequate space.
- Stocking density (the space for each animal) must be respected.
- Selection of construction materials is based on their availability, their cost, durability, and technology.

Formative Assessment

Explain that the following assessment is individual. Tell the trainees to carefully read the instructions and respond to the questions.

1. List the criteria for construction material selection for a ruminant shelter.

2. Circle the correct answers:
   1. Stocking density in ruminant shelters are based on:
      A. Species B. Size C. Age
      D. Physiology E. Colour
   2. Stocking density in a ruminant shelter is the same for:
      A. Does and Ewes B. Lambs and Bulls C. Bucks and Rams

   3. Which of the following are blocks that are necessary in a cattle shelter?

      A. Lactation block B. Dry cows block C. Maternity block
      D. Calf rearing block E. Breeding bull block F. Car parking block

3. Select five materials to use in the construction of a ruminant shelter and explain each one's purpose.

Answers:

1. Availability, cost, technology, durability, strength

2. Circled Answers:
   a. A and D
   b. A and C
   c. A, B, C, and D

3. **Possible Answers**: Timber, wood, metal sheets (provides roofing for shelter), nails (to secure roof onto shelter), ropes, bricks, concrete blocks (to put up walls), cement, sand, stones, metallic tubes (for drainage to run away from shelter).

Learning Outcome 1.3: Equip cattle, goat, and sheep shelters

	**Objectives:** By the end of the learning outcome, trainees will be able to: **a.** Identify and determine the uses of equipment in ruminant shelters. **b.** Install and use common equipment in ruminant shelters. **c.** Be attentive and methodical while installing equipment in ruminant shelter.
	**Time Required:** 3 hours
	**Learning Methodology:** Brainstorming, large group discussion, individual work, small group discussion, peer-to-peer learning, and field work
	**Materials Needed:** ● **Standard training materials --** flip chart, markers, black/white board, chalk, tape, A4 paper ● **Demonstration tools --** sprayer
	**Preparation:** ❑ Obtain and prepare a sprayer that can be used in class with the trainees for a demonstration. ❑ Review all scenarios and tasks in advance. ❑ Preview assessment questions and answers in advance. ❑ Obtain pictures of the equipment discussed in **1.3 Key Facts.** ❑ Contact the agro-dealer/farmer & cattle shelter to visit in advance.
	**Cross Cutting Issues:** ✔ **Financial Education:** Trainees should be familiar with using the minimum resources and being resourceful to find low-cost alternatives when assembling equipment. ✔ **Standardization Culture:** Trainees should be familiar with how assembling and using equipment according to industry standards can improve prices, reduce working capital, and minimize operating expenses.
	**Prerequisites:** Basic Animal Biology/Physiology

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify equipment for a ruminant shelter.	**1.** Select the equipment used a in ruminant shelter.	**1.** Attentive
2. Determine the uses of each piece of equipment used in a ruminant shelter.	**2.** Install the equipment used in a ruminant shelter.	**2.** Methodical
3. Match the equipment used in a ruminant shelter to their appropriate places.	**3.** Test the equipment used in a ruminant shelter.	**3.** Decisive

Steps:

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

Try to understand what the trainees already know about the equipment used in ruminant shelters by doing the following:

1. Refer trainees to the following directions found in **Topic 1.3 Task 1** in their manuals**:**

Turn to the person sitting next to you. Based on your own experience and knowledge, discuss and create a list of equipment you have seen in a ruminant (cow, sheet, goat) shelter before**.**

2. Give the trainees five minutes to discuss. Then facilitate a group brainstorm with the trainees, discussing what equipment they thought of. As the group shares ideas, write them on the board/flipchart.

3. Ask the trainees to observe the answers that they brainstormed and introduce the topic they are going to learn: Equipping cattle, goat, and sheep shelters.

4. Introduce the topic and ask the trainees to turn to the table of knowledge, skills and attitudes in their manuals to see what they will gain from the topic and review it together (considering their expectations). Explain that this learning topic will focus on properly equipping ruminant shelters.

Problem Solving Activity

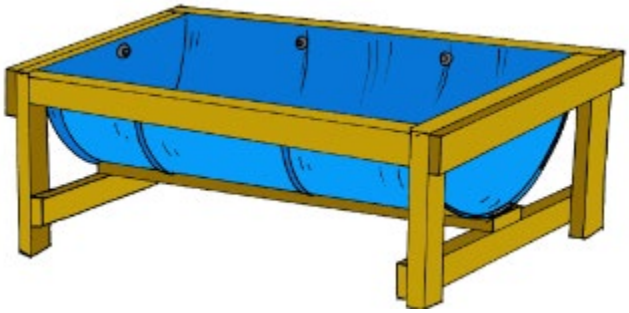
Prepare the tasks and a sprayer for practice. Inform the trainees that there are two parts in this activity and ask them to be attentive:

Part 1:

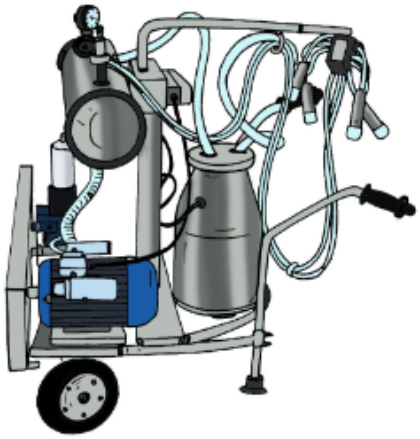
1. Refer to the **Topic 1.3 Task 2** in the trainee manual and ask the trainees to observe each picture (see below):

A1

A2



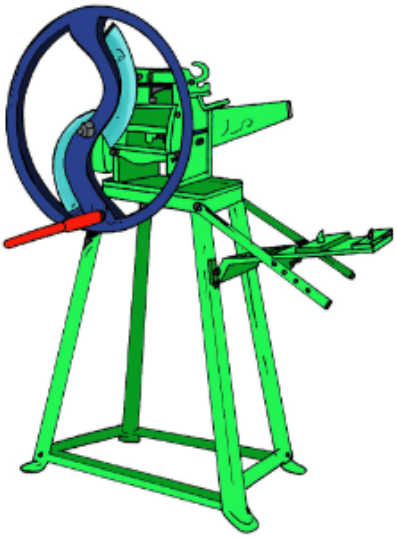
B



C

D

E



F

2. Ask the trainees the following questions and tell them to brainstorm answers for each one:
   a. What do you think each piece of equipment is called?
   b. What do you think each piece of equipment does? Discuss this with one of your colleagues.
   c. Where do you think these pieces of equipment should go on a ruminant farm?

3. Give the trainees enough time to discuss their answers while you write the best answers on the board/flipchart.

4. Provide enough time for the trainees to give their comments and ask any questions before moving on.

Part 2:

1. Show the class a sprayer you have brought in and ask a volunteer to tell you the name of the equipment.

2. Ask two other volunteers to come in front of the class and help you show the rest of class how to disassemble the sprayer.

3. Ask two more volunteers to come and help you show the class how to reassemble the sprayer.

4. Walk around the class and ask different trainees to share the skills they learned from this practice. Allow them to ask questions and give comments. Ask the trainees if they need another demonstration for disassembly or reassembly of the sprayer in order to fully understand the content. If so, demonstrate how to disassemble and assemble the spray again.

Answers for Task 1 Question 2:

1. A1 = Feeder for small ruminants
   A2 = Feeder for cattle
   B = Drinker
   C = Milking machine
   D = Can
   E = Sprayer
   F = Fodder/grass chopper
2. Refer to **1.3 Key Facts** in the trainee manuals.
3. Refer to **1.3 Key Facts** in the trainee manuals.

Guided Practice Activity

1. Read through **1.3 Key Facts** with the trainees and refer to the pictures from the **Problem Solving Activity (Topic 1.3 Task 2)** in the trainee manuals to ensure their understanding.

2. Inform the trainees that they are going to do an activity related to helping a farmer equip a ruminant shelter. Form small groups of trainees.

3. Tell each group to choose a group secretary to write the answers and a group architect to draw the model.

4. Refer to **Topic 1.3 Task 3** in the trainee manual. Read the following scenario and questions together as a class:

   A farmer in Kigali City has 20 cows with some calves, all in a zero-grazing system where they are kept within housing structures and food is brought to them. The farmer is planning to equip the shelter with the most important equipment that will help him make the most money and take good care of his animals.

The farmer knows that you have some knowledge and skills regarding how to equip ruminant shelters. You are requested to:

a. Identify the equipment needed in the cow shelter.

b. Explain the role of each piece of equipment.

c. Allocate the equipment in the shelter.

d. Draw and label the shelter with all the necessary equipment.

5. After reading the scenario and the questions, ask volunteers to read through **1.3 Key Facts** again out loud. After each fact, ask clarifying questions to other trainees to ensure they are listening and understanding.

a. Examples of clarifying questions: "What does a sprayer do?" "What is the importance of a feeder in a ruminant shelter?"

6. Now, ask groups to answer all the questions while the group secretaries write the answers. Remind them to discuss each answer before it is written in order to get the best answers.

7. Give each group enough time to discuss the scenario. As each group is discussing, assist as needed.

8. After the discussions, ask the first group to write their answers on the board/flipchart. Direct the other groups to comment on the first group's answers. Remind them to refer to **1.3 Key Facts** in their manuals to guide them.

9. Then, organise a gallery walk. For a gallery walk, the trainees will walk around the room to observe the others' drawings and give feedback.

10. Thank each group and harmonize their answers together as a class.

Answers: Answers are given in **1.3 Key Facts** in the trainee manuals. Drawings are based on a review of previous activities.

Application Activity

Refer the trainees to **Topic 1.3 Task 4** in their manuals for the following activities.

Part 1: Inform the trainees that they are going to visit a farm/livestock input shop for practical work. Contact a local farmer to prepare the visit in advance.

1. Bring the trainees to the farm/livestock input shop and introduce them to the employees.

2. Ask the trainees to observe and name different pieces of equipment in the shop.

3. Form small groups. If possible, tell each group to disassemble and reassemble at least two pieces of equipment. Along with the farmer/livestock input seller, assist the groups and give support as needed.

4. After each group has reassembled the equipment, have group members demonstrate that the reassembled equipment is working properly. Provide feedback to each group. Repeat the process for each group.

5. At the end, thank the farmer/livestock input seller for helping you. Ask the trainees if they have any questions or comments for the farmer/livestock input seller before leaving.

Part 2: Inform the trainees that they are going to visit a cattle shelter to observe the equipment that is in use. Contact a local farmer to prepare the visit in advance.

1. Bring the trainees to a cattle shelter.

2. Ask the trainees to observe different pieces of equipment in the shelter.

3. Form small groups. Give each group a card with a piece of equipment written on it. The groups must find that piece of equipment in the shelter. Once each group has identified each piece of equipment, groups discuss how that equipment functions in the shelter.

4. Have one person from each group act as a speaker. Have the speaker from each group tell the rest of the trainees about their assigned piece of equipment and its purpose/function in the animal shelter.

Points to Remember

- The equipment commonly used in ruminant shelters are feeders, drinkers, milking equipment (milking machine and cans), sprayers, and choppers.

Formative Assessment

Explain that the following assessment is individual. Tell the trainees to carefully read the instructions and respond to the questions.

1. List the five most important pieces of equipment in a dairy ruminant shelter.
   1.
   2.
   3.
   4.
   5.
2. Why do you think it is necessary to have a chopper for ruminants?

3. Do you need to dilute acaricides before spraying? Support your answer by giving reason(s).

4. Answer: True or False
   a. The role of the feeder is to clean the shelter.
   b. Sprayers can be used in the application of acaricides on animals.
   c. Choppers must always be mobile in a ruminant shelter.

5. Choose the correct answer:
   The best equipment to collect milk is made from:
   a. Wood
   b. Plastic
   c. Metal
   d. Stainless steel

Answers:

1. Feeders, drinkers, milking equipment (milking machine and cans), sprayers, chopper.
2. Choppers help make the food into smaller pieces. This helps the animals digest.
3. It is important to dilute acaricides according to the manufacturer's specifications. Not diluting acaricides could harm the environment by sinking into the groundwater or irritating the animals or surrounding people.
4. a. False
   b. True
   c. False
5. D

Learning Outcome 1.4: Maintain shelter

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

a. Identify the components to evaluate a ruminant shelter.

b. Establish and implement a maintenance plan for a ruminant shelter and its equipment.

c. Be observant and realistic while maintaining ruminant shelter.

Time Required: 3 hours

Learning Methodology: Brainstorming, individual work, small group discussion, peer-to-peer learning, large group discussion, and field work

Materials Needed:

- **Standard training materials -** flip chart, markers, black/white board, chalk, tape, A4 paper

Preparation:

- ❑ Prepare all materials in advance.
- ❑ Read all scenarios and questions in advance.
- ❑ Read assessment questions and answers in advance.
- ❑ Contact the farmer in advance for field work and ask him/her to have maintenance projects ready for the trainees to help with.

Cross Cutting Issues:

- ✔ **Financial Education**: Observe how the trainees use resources and explain to them that they must always try to minimize expenses without affecting the quality of work.
- ✔ **Gender and Inclusivity:** Consider gender balance when forming groups.

Prerequisites:

- Basic arithmetic calculations
- Basic knowledge of amortization

Key Competencies:

Knowledge	Skills	Attitudes
1. Explain the role of maintenance in ruminant farming.	**1.** Evaluate a shelter and the status of its' equipment.	**1.** Observant
2. Identify the components to evaluate in a ruminant shelter.	**2.** Establish a maintenance plan for a ruminant shelter and accompanying.	**2.** Realistic
3. Identify maintenance activities in ruminant farming.	**3.** Implement a shelter and an equipment maintenance plan.	**3.** Proactive

Steps:

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

1. Refer trainees to **Topic 1.4 Task 1** in their manuals and facilitate a discussion about maintaining equipment and machines in our daily lives in order to activate prior knowledge. Ask for examples of items we must maintain for them to keep working properly (bicycles, cars, computer, etc.).

2. Inform the trainees that in all farms there are common activities related to maintenance and ask them what they know about those maintenance activities.

3. Tell trainees to brainstorm those maintenance activities and write their responses on the board/flipchart.

4. Ask trainees to observe the brainstormed answers and discover the topic they are going to learn.

5. Introduce the topic and ask trainees to turn to the Key Competencies table in their trainee manuals to see what they will gain from the topic and review it together

(considering their expectations). Explain that this topic will focus on the maintenance of ruminant shelters.

Problem Solving Activity

1. Inform the trainees that they are going to do an exercise related to the maintenance of shelters and equipment.

2. Refer trainees to **Topic 1.4 Task 2** in their manuals and read the following scenario to the whole class:

A dairy farm in Kicukiro has various equipment, including a fodder chopper and milking machines. The owner is planning to hire personnel to oversee maintenance for the shelter and its equipment.

Imagine that you are interested in applying for that job. In the interview with the farmer, you are asked to do the following:

a. List the types of maintenance applicable in farms.
b. Provide an example maintenance plan.
c. List the components of the shelter that you must inspect.
d. List activities that are part of an elaborated maintenance plan.

3. Form small groups of four trainees (one question per trainee) and ask each group to discuss the answers using the knowledge gained from the previous learning outcomes.
a. Tell one person in each group to write the answers on the board/flipchart.
b. Tell trainees to provide comments on the answers of each group.

4. Explain to the trainees that they will have an opportunity to revise their answers after discussing **1.4 Key Facts** as a class.

Answers to Question 1:
a. Types of maintenance: Refer to **1.4 Key Facts.**
b. Example of maintenance plan:
- Daily activities (Cleaning, inspection of shelter and equipment, simple and urgent repairs)
- Weekly activities (oiling machines, repairs and replacements)

- Monthly activities (repairs and replacements, oiling machines, liming, painting)
- Annual activities (repairs and replacements, liming, painting, etc.)

c. Components of shelters that are inspected for maintenance are: Refer to **1.4 Key Facts** in the trainee manuals.

d. Maintenance activities include: Refer to **1.4 Key Facts**.

Guided Practice Activity

1. Read through the **1.4 Key Facts** with the trainees. Ask different trainees to read different **1.4 Key Facts.** After each one reads, ask questions and give examples of other types of maintenance they may already be familiar with, such as bicycle maintenance, haircuts, bathing yourself, and/or computer maintenance.

2. To help them understand the terms of frequency, ask them the following questions in between **1.4 Key Facts**. Tell them to identify if the task is done daily, weekly, or monthly.
   a. I cut (maintain) my hair every week. What type of maintenance is this?
   b. I wash my body every morning. What type of maintenance is this?
   c. I clean my car and change my oil every month. What type of maintenance is this?

3. Inform the trainees that they are going to do another activity related to maintenance and ask them to be more specific in answering questions. Refer to **Topic 1.4 Task 3** in the Trainee Manual and ask the trainees to read the following situation individually:

   Mugisha is a businessman and wants to run a farm of Merino sheep in Musanze. Since he is a beginner, you are going to give him more information regarding shelter and equipment maintenance.

4. Ask them to return to their groups from the previous activity and answer the following questions:
   a. Explain the role of hygiene: cleaning, liming and painting.
   b. Explain why regular maintenance of shelter and equipment is necessary.
   c. Establish a maintenance plan for his farm that he can follow. Your plan must include activities that Mugisha should perform daily, weekly, monthly and annually.

5. While the trainees are discussing in groups, move around and give more clarifications as needed. Additionally, ask guiding questions throughout the discussion. For example:

Why is it important to check if things are working properly? Why is it necessary to put on new paint every year? What would happen if we didn't put on new paint annually?

6. Ask group delegates to share their answers with the class while you are writing the answers. Put a tick against a repeated answer.

7. Provide time for general comments by the class and give your observations.

Answers to Question 4:

a. Refer to **1.4 Key Facts.**

b. Refer to **1.4 Key Facts.**

c. Proposal of maintenance plan for Mugisha: Go through this in more detail. Provide an example (see below) and ask trainees to use what they wrote in their plans to help you fill this one out. This is an opportunity to clear up misunderstandings about the importance of a maintenance plan.

Period	**Activity**
Daily	Clean stalls
	Pick up trash
	Inspection of shelter and equipment
	Any simple or urgent repairs
Weekly	Oiling sheep hair shaving machine, and other equipment (example: wheelbarrow)
	Inspect & repair damaged construction and equipment
	Replacement of damaged parts
Monthly	Oiling machines (generators)
Annually	Repair of damaged construction and equipment
	Liming
	Painting
	Additional repairs (correction of design, extension of constructions)

Application Activity

Prepare a visit to a farm in advance. At the farm, inform the trainees that they are going apply their knowledge of maintenance procedures. Direct them to **Topic 1.4 Task 4** in their manuals and then do the following:

1. Bring the trainees to a farm and introduce them to the farmer.

2. Explain to the farmer that they are going to do some exercises related to the shelter and equipment maintenance.

3. Ask one or two of the trainees to explain the role of maintenance to the farmer.

4. Separate the trainees into small groups and assign a leader in each group.

5. Instruct each group to do the following tasks:
   a. Inspect the shelter (roof, wall, floor, facilities) and equipment and evaluate their status.
   b. Explain what maintenance activities are needed for the shelter and equipment.
   c. With the farm workers, participate in a maintenance activity: cleaning, liming (if possible), or repairing (if possible).
   d. Propose a maintenance plan for this farm.

6. Provide enough time for discussion and groupwork, move around in groups to see if the work is productive for them and give support as needed.

7. At the end, ask group leaders to present their results and reflections from the tasks they were given.

8. Finally, have the trainees make general comments as a class while you give feedback based on the status of the shelter and the equipment.

Points to Remember

- Routine maintenance helps to extend the life of construction and equipment.
- It is important to have a detailed and specific maintenance plan because it keeps the farm up to date and running effectively.
- You must clean off the equipment before performing maintenance.
- Any malfunction or damage should be repaired as soon as possible.

Formative Assessment

Explain that the following assessment is individual. Tell the trainees to carefully read the instructions and respond to the questions.

1. State the role of shelter and equipment maintenance.

2. Answer with True or False:
   a. All maintenance of a shelter and equipment is done only once a month.
   b. A farm should normally have a written maintenance plan.
   c. Oiling machines is done as often as indicated by manufacturer.

3. Name 3 activities you can include in a farm maintenance plan.
   1.
   2.
   3.

4. Circle the wrong answer.
   The types of maintenance are:
   a. Day to day repair
   b. Annual repair
   c. Special repair
   d. Record keeping
   e. Addition and alteration repair
   f. Preventive maintenance

5. What are the parts (components) of a farm that are inspected during the development of a maintenance plan?

6. Complete the following sentences:
   1. Farmers should be _____ and _____ when maintaining and finding solutions to problems on their farms.
   2. Applying lime helps to _____in barns and stalls.

Answers:

1. Role of Maintenance:
   - To keep the whole construction strong (roof, wall, floor, annexes).
   - To keep a good image of the farm (to the employees, customers and the community).
   - To better conserve the equipment and increase its life expectancy
   - To improve safety and quality conditions for all activities
2. a. False
   b. True
   c. True
3. See **1.4 Key Facts**
4. D
5. The construction and hygiene of the shelter, machines and equipment, paint (see **1.4 Key Facts**).
6. a. Flexible and resourceful (or other adjectives that make sense).
   b. Reduce the smell of ammonia/waste/bad odours/bad smells

Self-Reflection

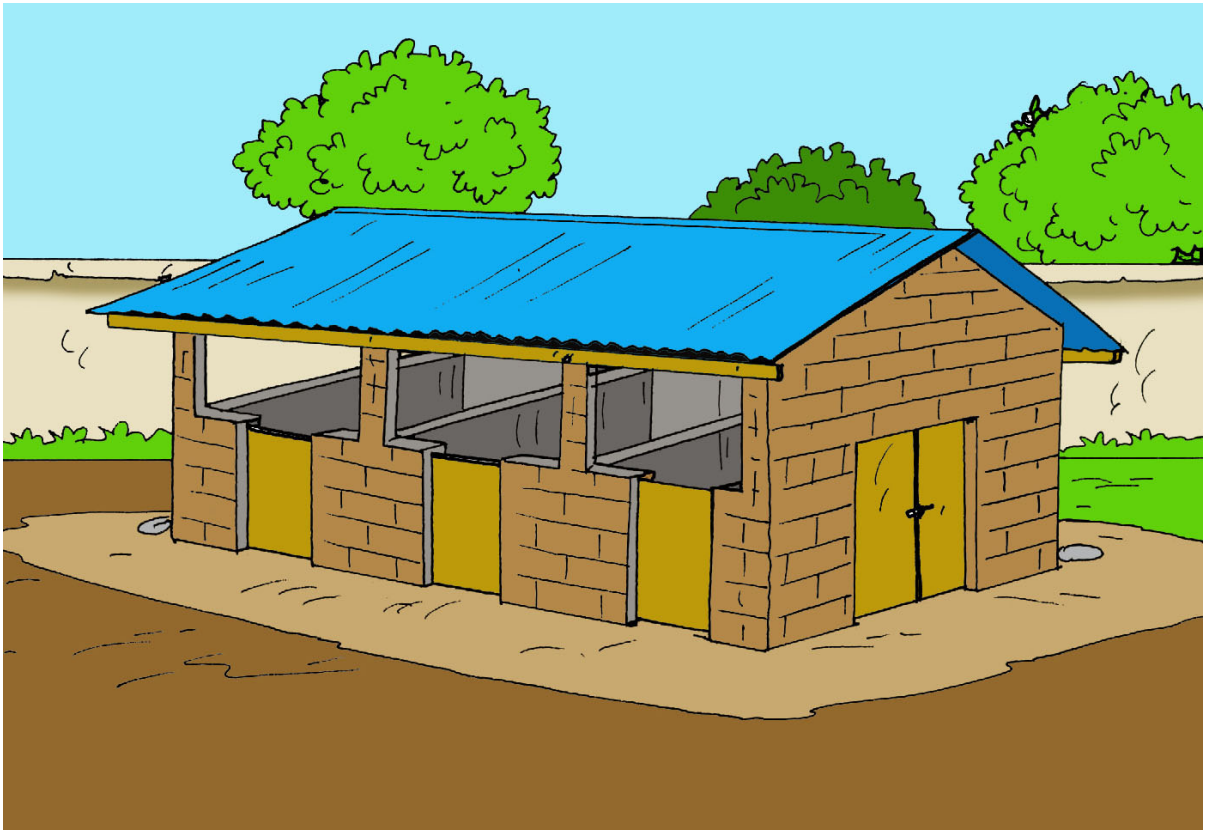
1. Ask the trainees to re-take the self-assessment at the beginning of Unit 1. They should then fill in the table in the Trainee's Manual to identify their areas of strength, areas for improvement and actions needed to improve.

2. Discuss the trainees' results with them. Identify any areas that are giving many trainees difficulties and plan to give additional support as needed (ex. use class time before you begin the next learning outcome to go through commonly identified difficult concepts).

ⓘ Further Information for the Trainer

1. Kane, J. (2019, March 2). Topography Types. Retrieved December 19, 2019, from https://sciencing.com/topography-types-5935444.html.
2. Soils - Part 2: Physical Properties of Soil and Soil Water. (n.d.). Retrieved December 19, 2019, from https://passel.unl.edu/pages/informationmodule.php?idinformationmodule=1130447039&topicorder=4&maxto=10&minto=1.
3. For equipment (learning outcome 1.3) you can look for more clear images

Learning Unit 2: Assist in piggery construction



Learning Outcomes

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

2.1 Select site

2.2 Organize construction

2.3 Equip piggery

2.4 Maintain piggery

Learning Unit 2 Self-Assessment

1. Ask the trainees to look at the illustration above and discuss what they see. What do they think this unit will include based on the illustration? After some brainstorming, share the main topics.

2. Explain that this Learning Unit is going to focus on establishing a pig shelter, including how to select, organize, equip, and maintain a piggery.

3. Ask trainees to fill out the self-assessment at the beginning of the unit in their Trainee Manuals. Explain that the purpose of the self-assessment is to become familiar with the topics in the unit and for them to see what they know or do not know at the beginning. At the end of the unit, they will do a self-reflection, which includes re-taking the self-assessment and identifying their strengths, areas that need improvement, and actions to take. Explain that self-assessment is not a test!

Learning Outcome 2.1: Select a site

Objectives: By the end of this topic, trainees will be able to:

a. Describe the factors considered in selecting a site for piggery construction.

b. Identify soil and weather factors while selecting site piggery construction.

c. Be aware of the risks during selection of site for piggery.

Time Required: 2 hours

Learning Methodology: Brainstorming, individual work, large group discussion, small group discussion, peer-to-peer learning, and field visits.

Materials Needed:

- **Standard training materials --** flip chart, markers, black/white board, chalk, tape, A4 paper
- **Measurement tools --** topographic maps, thermometer, hygrometer, anemometer, compass
- **Soil samples**
- **Site materials --** Images of potential sites/locations for piggery construction, index cards with details of hypothetical location details (topography, surrounding communities, security, etc.)

Preparation:

- ❑ Prepare all materials (thermometer, anemometer, compass, hygrometer, sand, clay, silt, topographic images, etc.) .
- ❑ Locate and prepare a nearby plot of land/field for the Application Activity - Task 4.
- ❑ Read through the tasks and assessment in advance.
- ❑ Prepare index cards with site information on them and images of landscapes for Guided Practice Activity - Task 3.

Cross Cutting Issues:

- ✔ **Environment and Sustainability:** The site for the animal shelter should not cause the pollution to the environment.
- ✔ **Standardisation Culture:** Emphasize the need to use measuring tools for accurate and appropriate site selection.

Prerequisites:

- ❑ Basic Mathematics: reading numbers and percentages

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify the criteria to select a site for piggery construction.	**1.** Select a good site for piggery construction.	**1.** Risk awareness
2. Describe the soil conditions for piggery construction.	**2.** Assess the soil for piggery construction.	**2.** Proactive
3. Identify weather factors to consider in the selection of the piggery site.	**3.** Assess weather factors for piggery construction.	**3.** Teamwork spirit

Steps:

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

Facilitate curiosity among the trainees for the topic:

1. Remind the trainees that some of them may be entrepreneurs and pig production may be a profitable project for them.

2. Ask the class to brainstorm what factors they should think about when selecting a site for pig shelter construction.
   a. Provide enough time to all participants to brainstorm their responses.
   b. Write their responses on the board/flipchart to be visible for reference.
   c. After brainstorming, ask trainees what topic they think this activity relates to.

3. Introduce the topic and have trainees turn to the Key Competencies table in their trainee manuals to see what they will gain from the topic and review it together (considering their expectations). Explain that this topic will focus on selecting a site for piggery construction.

Problem Solving Activity

1. First, engage the class with a brief review of Unit 1. Facilitate a group discussion by asking the following questions found in **Topic 2.1 Task 2** in their manuals.

a. What kind of effect does farm waste have on water and air pollution?

Answer: Farm wastes cause pollution. Ruminant farm waste, including manure and urine causes air pollution (by emission of methane gas) and water pollution (by ammonia). Low altitude topography and soil structures that favour water infiltration facilitate ground water pollution by these farm wastes.

b. What weather factors should a farmer consider when building a shelter?
Answers: Wind direction and speed, natural light, temperature, precipitation (rain)

c. What is one regulation you remember from Unit 1?
Possible Answers:

- Animal shelter is constructed on a farmer's own land or officially rented land.
- The land use master plan is to be respected (construct ruminant shelter in a zone reserved for livestock when you are in urban land).
- In urban land, permission from legal authorities is required before construction of animal shelter.
- Respect legal distance from swamps, marshland, rivers, and lakes.
- Rwanda law prohibits animal shelters to be constructed in valleys - low areas of land between hills or mountains, typically with a river or stream flowing through it.

d. Animal shelters are most easily constructed on which type of topography/land?
Answers: Plains and plateaus. Plains are flat or gently rolling lands while a plateau is simply an elevated land (less than 150 meters).

2. After the review, inform the trainees that they are going to work in groups. Ask the trainees to form three groups (A, B, and C) and choose a group leader.

3. Ask everyone to be attentive and read the following scenario from **Topic 2.1 Task 2** in their manuals:

A small farmer named Mugenzi in Nyamagabe is planning to become a professional and wants to expand his pig farm. He asks for help with installing a piggery. He is going to buy new land and you are asked to help him find some information.

4. Assign each groups one of the following tasks. Tell them to discuss the answers and have the group leaders write the answers.

Group A:

a. Based on your knowledge from Unit 1, what laws and regulations may Mugenzi need to consider before beginning his construction on the piggery?

b. What type of criteria do you think is necessary for selecting a good location for a piggery?

Group B:

Provide this group with photos of topography and samples of soil structures.

a. Based on what you learned from Unit 1, describe different types of topography and their impact on construction.

b. Describe different soil structures and their impact on construction.

Group C:

a. Explain the impact of farm waste on the groundwater to Mugenzi.

b. Are there any weather factors that Mugenzi should consider? What are they?

5. Ask the group leaders to share the answers. While each group is presenting, prompt the rest of class to ask questions and give comments.

6. After all groups have presented, allow the trainees to add any other ideas that are missing.

7. Explain to them that they will return to revise their knowledge and answers after discussing **2.1 Key Facts** as a class.

Answers:

Group A

a. Land management regulations and law in Rwanda: Refer to **2.1 Key Facts**.

b. Impact of land management regulations on animal shelter installation: Refer to **2.1 Key Facts.**

c. Criteria to select a good location: Refer to **2.1 Key Facts**.

Group B

a. Types of topography and their impact on piggery construction: Refer to **2.1 Key Facts**.

b. Soil structures and their impact on piggery construction:

- Single-fraction soils: It is difficult to compact.
- Uniformly graded granular: This soil cannot be compacted.
- Mixed- fraction soils: It is easy to compact. It is also favourable as it absorbs water to avoid flooding around construction.

*The more difficult the soil is to compact, the more it needs a stronger foundation and walls for support.

Group C

a. Impact of farm wastes on groundwater quality: it causes groundwater and air pollution.

b. Weather factors to consider when selecting a site for a piggery: Refer to **2.1 Key Facts**. Role of checking weather parameters in the selection of a piggery site: it helps to determine the materials to use in construction. See **2.1 Key Facts** for more information.

Guided Practice Activity

1. First, read through the **2.1 Key Facts** with the entire class and ask questions/check for understanding regarding the vocabulary.

a. Have trainees read some **2.1 Key Facts** while you read others.

b. Emphasize the similarity between site selection for ruminant and pig shelters.

c. Ask for examples and make sure all trainees understand before proceeding.

2. Direct the trainees to go back to **Topic 2.1 Task 2** in their manuals to revise their answers based on the information provided in **2.1 Key Facts.**

a. Ask if they made any changes and to share their responses.

3. Inform the trainees that they are going to do another activity that will require them to look at pictures of locations and judge whether or not each location will be an appropriate location for a piggery.

4. Ask the trainees to return to their groups formed in the previous activity. Equip each group with the necessary instruments: a thermometer, hygrometer, anemometer, and compass.

5. Provide each group with a picture of a location along with several bullet points that provide details on the picture's surroundings and topography.

6. Read the following scenario from **Topic 2.1 Task 3** and give the related tasks to each group:

   Your friend wants to construct a piggery in the location of the picture your trainer has provided. Your help is requested to determine if the location will be suitable or not. You are requested to do the following with your group:

   a. Examine the picture and read the details that come with it. Could there be a piggery here? Why or Why not?
   b. Assume that the weather in the location is the same as where you are now. Using a thermometer, hygrometer, anemometer, and compass, show how to assess weather parameters to make sure that they meet pig farming criteria. Is this a good location?
   c. Based on the information, are there any unfavourable characteristics for piggery construction? Explain your reasons.

7. Give the groups enough time to discuss their responses while a volunteer in each group writes the responses. As groups are discussing, provide support as needed.

8. After all groups have finished their discussions, inform them that they are going to have a large group discussion.

9. Ask volunteers from each group to share their answers. Other groups should listen and comment/provide feedback.

10. When the discussion is finished, thank the groups and harmonize their answers together as a class.

Answers to Question 6:

a. Good site for a piggery: Refer to **2.1 Key Facts.**
b. Check how the trainees take weather parameters.
c. Refer to the **2.1 Key Facts.**

Application Activity

Explain to the trainees that they are going to perform fieldwork that is similar to the **Guided Practice Activity (Topic 2.1 Task 3).**

1. Bring the trainees to a site in the community that has been prepared in advance.

2. Form small groups and provide each group with measuring instruments (thermometer, anemometer, hygrometer and compass).

3. Inform the groups that the site is where the school wants to construct a piggery and ask them to perform the following tasks found in **Topic 2.1 Task 4** in their manuals:
   a. Observe the land and explain if it meets legal requirements.
   b. Assess the topography and explain its impact on piggery construction.
   c. Assess the soil structure and explain its impact on construction activities.
   d. Using your instruments, assess the weather parameters and give your observations.
   e. What do you think the impact of this farm will be on the groundwater at this site? What is your recommendation?
   f. What do you think of the facilities, security, and neighbourhood relations at this site (including distance from residential houses)?

4. Provide each group with enough time and ensure all trainees are participating.

5. When the groups have finished, ask groups to share their findings and decisions.

6. Thank the trainees and give your observations/feedback.

Points to Remember

- A good site for piggery construction has access to a good, all-weather road and clean water.
- Piggeries should be located a sufficient distance from residential areas and in a safe/secure area.
- Remember to check if the location is allowed by government regulations.
- Determine if the piggery location has adequate topography, easily compacted soil, and favourable weather conditions for construction.

Formative Assessment

Explain that the following assessment is individual. Tell the trainees to carefully read the instructions and respond to the questions.

1. Describe the qualities of a good site for piggery installation.

2. Read the following scenario and offer your advice to Jean Claude.

Jean Claude lives in a crowded community with a reliable source of clean water near his house. He thinks this will be perfect for the construction of a piggery.

Explain why it may **not** be a good idea for him to construct a piggery in his community:

3. Answer with True or False:
- **a.** A mixed fraction soil is a best soil structure for piggery construction.
- **b.** Among the types of topography, valleys are suitable for piggery construction.
- **c.** Checking weather parameters helps to determine the construction materials for a piggery.

4. Using the appropriate instruments, demonstrate how to assess the weather parameters before beginning construction of a piggery.

Answers:

1. Possible Answers:
- Easy to access a good, all-weather road
- Easy to access clean water
- Sufficient distance from residential areas
- Safe location (security)
- Location allowed by government regulations
- Adequate topography
- Soil which is easy to compact
- Favourable (good) weather parameters for construction

2. His community is crowded. It may not be allowed, and it may be too close to residential areas and sources of clean drinking water.

3. a. True
b. False
c. True

4. With a checklist, observe the trainees. Check if they are properly using the instruments to measure the weather conditions.

Learning Outcome 2.2: Organize construction

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

a. Identify the parts (pens) and other facilities needed in piggery.

b. Interpret the sketch and select materials for piggery construction.

c. Develop a teamwork spirit and express willingness in construction activities.

Time Required: 2 hours

Learning Methodology: Brainstorming, large group discussion, individual work, small group discussion, peer-to-peer learning, and field work.

Materials Needed:

- **Standard training materials -** flip chart, markers, black/white board, chalk, tape, A4 paper
- **Measuring tools --** calculator, tape measurer
- **Visual aides --** images, index cards with construction materials written on them, index cards with ruminant & piggery shelter components written on them

Preparation:

- ❑ Preparation of index cards and images in advance for Task 2.
- ❑ Read all activity questions and answers and assessments in advance.
- ❑ Contact a local farmer and arrange logistics to visit for practice.

Cross Cutting Issues:

- ✔ **Environment and Sustainability:** The site for the animal shelter should not cause environmental pollution.
- ✔ **Financial Education**: When selecting construction materials, you can focus on low cost and durable materials as well as recycling and repurposing what you can to avoid high expenses.

Prerequisites:

- ❑ Basic arithmetic calculations

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify the parts in a piggery.	**1.** Interpret the sketch of a piggery.	**1.** Proactive
2. Identify other facilities for pig production and management.	**2.** Select construction materials for a piggery.	**2.** Willingness
3. Identify construction materials for a piggery.	**3.** Assist in piggery construction.	**3.** Teamwork spirit

Steps:

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

Begin by evaluating the knowledge of trainees on piggery construction:

1. Inform the trainees that they are going to do a small exercise and ask them to pay close attention.

2. Ask the trainees to think about the learning outcomes from building and organizing ruminant shelters. As a class, brainstorm and review some of the information from **1.2 Key Facts**.

3. Ask the following guiding questions to aid their recall of **Topic 1.2**. Encourage the trainees to discuss and review their answers with their peers to foster peer to peer learning and accountability.

a. Do you remember the different parts of a cow shed? What are they? Do you think they will be similar or different for a piggery? Why?

Answers:

Parts:

- Lactation block/pen
- Dry cows block/pen
- Maternity block/pen
- Calf rearing block/pen

- Young cattle block/pen
- Breeding bull pen

Why? It may be similar because they are all mammals. It may be different because they are of a different species. Answers depend on trainees' brainstorming and level of discussion.

b. What facilities are in ruminant shelters? Do you think they will be similar or different for pigs? Why?
Answer: Storage room/block, office and sanitation room/block, feeding alley, waste management facilities (Drainage, manure alley, etc.).

c. What are some of the common materials used to build a ruminant shelter? Do you think those will be similar for pigs?
Answer: Wood, timber, metal sheets, nails, ropes, bricks, concrete blocks, cement sand, stones, metallic tubes

4. Allow trainees time to brainstorm answers and write their answers on the board/flipchart. Remind the trainees that because this is a brainstorm, there are no wrong answers. All of the correct information will be provided and discussed within this learning outcome.

5. After all the questions are answered, introduce the topic and ask trainees to look at the Key Competencies table in their manuals to see what they will gain from the learning outcome and review it together (considering their expectations). Explain that this topic will focus on organizing piggery construction.

Problem Solving Activity

Inform the trainees that they are going to do an activity related to the organization of a piggery.

1. Separate the trainees into small groups.

2. Provide each group with a 10 to 15 index cards with materials and/or components of a shelter written on them.
a. Example: One card says "Milking Machine." Another says "Wood." Another may have "Growing Pen" written on it.

3. Refer to **Topic 2.2 Task 2** in their manuals and explain to the trainees that their task is to determine which materials and components they think they need for a piggery and which do not belong (ex: milking machine).
   a. Advise the trainees to make a "Need" pile of index cards and a "Do Not Need" pile of index cards.
   b. Give them 10-15 minutes to discuss and properly sort the cards into their appropriate piles.
   c. Inform the trainees that they must come to a consensus (everyone agrees) regarding what cards they need/do not need.
   d. After 10-15 minutes, stop the groups and have each group read through which cards they think are needed for a piggery.

4. As each group reads the cards, encourage the other groups to offer comments and ask questions (Example: Why do you think you need that for a piggery?).

Guided Practice Activity

1. Divide the trainees into five groups and refer them to **Topic 2.2 Task 3** in their manuals.

2. Assign each group one of the five sections of **2.2 Key Facts**. Give the trainees three to five minutes to discuss **2.2 Key Facts** they were assigned. Circulate the room to assist them.

3. After five minutes, have each group present to the rest of the class their section of **2.2 Key Facts**. Encourage other groups to ask questions and make comments to help everyone understand.

4. Now, tell trainees to read the following scenario and tasks:

   A farmer named Jean is starting a project of producing piglets which he will eventually sell after weaning. He will have 5 breeder sows and estimates that he will raise 75 piglets every 6 months. His architect is referring to you for the technical specifications. He asks you to:
   a. Calculate the space needed for 5 sows that will stay permanently in the same pens.
   b. Calculate the space needed for the weaner pens for 75 piglets.

c. Propose construction materials so that the farmer and architect can have what they need to begin building.

5. Tell the groups to discuss the tasks and refer to **2.2 Key Facts** as needed.

6. After the groups have finished discussing, instruct one group to write their answers on the board/flipchart. Then, others should make amendments (add answers and other comments under your supervision).

7. Thank the groups and give them your observations and feedback.

Answers to Question 4:

a. Space for sows: 6-10 m^2 x 5 = 30-50 m^2

b. Space of weaner pen: 0.25-0.35 m^2 piglet x 75 piglets = 18.75 – 26.25 m^2

c. Construction materials: Refer to key facts in trainee manual

Application Activity

Part 1:

1. Bring the trainees to a field prepared around the school. Explain that the place is being considered as a site for piggery construction.

2. Make small groups and separate the groups. Each group should choose a group leader.

3. Tell each group to look at the picture below **Topic 2.2 Task 4** in their manuals. Imagine they are on the field of a farmer who needs to construct a piggery like the one shown in the picture. The farmer has one boar, two sows, and 11 new piglets. The farmer needs their help. In their groups, they must do the following, found in **Topic 2.2 Task 4** in their manuals:

a. Create a new sketch of the piggery with the correct dimensions needed for his pigs as well as the correct orientation of the shelter.

b. List the construction materials that he will need.

c. Check the availability of needed facilities or possibility to create them.

d. Write a report for the farmer that will show him everything he needs to properly get started. The report should include the following information:

- Space needed
- Blocks/pens needed

- Facilities needed
- Construction materials needed
- Factors to consider when buying materials

4. Provide time to complete the tasks as you move around to each group, providing support as needed.

5. After group discussions, ask each group to share their answers and receive comments.

6. At the end, thank the groups and give general feedback on answers.

Part 2:
Contact a farmer in advance to visit. Inform the trainees that you are going to visit a pig farm.

1. Bring the trainees to the pig farm and introduce them to the farmer and any workers who are present.

2. Tell the trainees to observe the following found in **Topic 2.2 Task 4** in their manuals:
   a. The construction materials used in the piggery
   b. The parts/pens in the piggery
   c. Facilities that may be missing and are needed on the pig farm

3. Ask volunteers to share what they learned from this experience.

Points to Remember

- Each category of pig--except sow and piglets before weaning--should have separate pens/blocks.
- Pens for boars and suckling pigs should have 6-10 m^2 of space.
- An east-west orientation of a piggery is preferable to minimize exposure to the sun.
- Selection of construction materials is based on their availability, their cost, durability, and technology.

Formative Assessment

Explain to the trainees that the following assessment is individual. Tell them to carefully read the instructions and respond to each question.

1. What are the materials used in the construction of a piggery?

2. What should you consider when selecting construction materials?

3. List the different pens you can find in a piggery.

4. Answer with True or False:
   a. During construction, a piggery is oriented in East-West direction.
   b. During construction, a piggery is oriented in North-South direction.
   c. During the construction of a piggery, space changes according to the size and density of the pigs.

5. Calculate the following:
   a. How much space is needed for 20 suckling piglets?
   b. How much space is needed for nine sows?
   c. What specific pens will be needed for 20 piglets and the nine sows?

Answers:

1. Wood, timber, metal sheets, nails, bricks, concrete blocks, cement, stones, metallic tubes
2. Availability, cost, technology, durability, strength
3. Pregnant sow pens/block, lactating sow pens/block, weaner pens/block, growing pens, fattening pens/block, breeding boar pen
4. a. True
   b. False
   c. True
5. a. 120-200 m^2
   b. 14.76-20.25 m2/sow
   c. Pregnant sow pens/block, lactating sow pens/block, weaner pens/block, and growing pens.

Learning Outcome 2.3: Equip piggery

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

a. Identify different equipment and their uses in a piggery.

b. Install and test the common equipment used in a piggery.

c. Be methodical and adaptive when installing equipment in a piggery.

Time Required: 2 hours

Learning Methodology: Brainstorming, large group discussion, individual work, small group discussion, peer-to-peer learning, and field visit

Materials Needed:

- **Standard training materials --** flip chart, markers, black/white board, chalk, tape, A4 paper
- **Sample piggery equipment --** feeders, drinkers, heaters, littering boxes, drenching gun, safety and handling equipment, weighing scale, weighing cage, sprayers, cleaning equipment
- **Visual and activity materials --** pictures, index cards with names of different equipment written on them, index cards with locations of different equipment written on them, index cards with the roles of different equipment written on them

Preparation:

- ❑ Prepare all materials (index cards) and equipment are prepared in advance for Tasks 2 & 3.
- ❑ Read and review and all questions/scenarios and answers to tasks and assessments in advance.
- ❑ Contact the farmer to visit in advance.

Cross Cutting Issues:

- ✔ **Financial Education:** When equipping a piggery, you can focus on low cost and durable materials, as well as recycling and repurposing what you can to avoid high expenses.
- ✔ **Standardisation Culture:** Use standard equipment and measurement tools to properly equip the piggery and ensure uniformity.

Prerequisites:

- Basic animal biology/physiology

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify equipment to use in a piggery.	**1.** Select equipment to use in a piggery.	**1.** Resourceful
2. Determine the uses of equipment in a piggery.	**2.** Install equipment in a piggery.	**2.** Attentive
3. Match the equipment used in a piggery with their place.	**3.** Test the equipment used in a piggery.	**3.** Methodical

Steps:

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

Assess trainees' knowledge of the equipment used in a piggery:

1. Read the following scenario and question, found under **Topic 2.3 Task 1**, to the trainees:

A farmer knows that you can properly equip a ruminant shelter and as a result, she asks for your advice on equipping a piggery. Based on what you know about ruminant shelters, what equipment do you think the farmer needs to properly manage her piggery?

2. Ask the trainees to brainstorm the equipment that is needed in a piggery and write the answers on the board/flipchart.

3. Ask the trainees to observe the answers they have brainstormed and to discover the topic they are going to learn.

4. Introduce the topic and ask the trainees to turn to the Key Competencies table in their trainee manuals to see what they will gain from the topic and review it together (considering their expectations). Explain that this topic will focus on equipping a piggery.

Problem Solving Activity

1. Direct the trainees to form small groups (four or five trainees per group) and choose a group leader for each group.

2. Refer to **Topic 2.3 Task 2** in the Trainee Manuals. Explain that they are going to discuss the following scenario and do their best to answer the questions:

   A farmer named Rita in Gicumbi bought five pregnant sows to start a modern pig farm. Before bringing the sows to the piggery, she is going to buy and install all the necessary equipment in piggery. As a beginner, she is looking for your advice. Help Rita with the following:
   - **a.** What are three pieces of equipment you think she may need in a piggery? Use your knowledge of equipment needed for ruminants.
   - **b.** What important could be filled by the equipment you thought of?
   - **c.** Based on what you know about the organization of piggeries, where should the equipment be allocated?

3. While the trainees are discussing, move around in groups to support them as needed.

4. After the groups discuss, ask group leaders to share the answers from their groups and write their answers on the board/flipchart.

5. Summarize their answers and give your observations.

6. Explain that they do not need the correct answers for this activity because it is exploratory. They will have an opportunity to revise their knowledge and learn the correct answers while discussing **2.3 Key Facts** as a class.

Guided Practice Activity

In advance: Prepare different equipment to use for practice, including a weighing scale, littering box, drench gun, sprayer, hog snare, and pig board. If the equipment is not available, use pictures such as those found in **Topic 2.3 Task 3** of the Trainee's Manual. Also prepare index cards (using information from **2.3 Key Facts**) with the locations, roles, and

name of equipment on them. Each card should have one item—either a location, a role, or a name.

1. First, read through the information in **2.3 Key Facts** as a class and ask trainees clarifying questions to make sure they understand the terminology. Ask different trainees to read **2.3 Key Facts** as the rest of the class listens carefully.

2. Inform the trainees that the next activity will require them to walk around and match the equipment with labelled cards.

Part 1:

1. Place the equipment at different locations around the room/space.

2. Hand each trainee a card with identifying information of equipment written on it (the name, the role, or the location).
   Examples:
   a. Role: A trapping device used to control hogs
   b. Name: Feeder
   c. Location: Kept with the piglets in the suckling pen

3. Explain to the trainees that their task is to walk around the room with their cards and the information they have and match the cards with the appropriate equipment.
   a. When a trainee has matched a piece of equipment with a card, they should stand next to that equipment.
   b. They must do this until all cards and equipment are in their correct space.
   c. Encourage them to refer to **2.3 Key Facts** and discuss with one another before deciding where to stand.
   d. Move around and assist as needed.

4. When all trainees have stopped moving around and are standing next to a piece of equipment, ask them to explain to the class why they matched their card with the equipment they are standing next to.
   a. Each trainee should share their answer.
   b. Encourage other trainees to correct answers or add ideas.

5. Thank the class and give your observations.

Part 2:

1. Choose one piece of equipment and model how to assemble it and use it.

2. Then, ask for two volunteers to help you do the same with two other pieces of equipment. While modelling how to use the equipment, encourage trainees to pay attention because they will be doing this in a moment.

3. Ask the trainees to form groups of four or five people. Inform them that they are all going to practice using the equipment. Give one piece of equipment to each group.
4. Tell each group to do the following:
   a. Identify the piece of equipment.
   b. Explain the use of the equipment.
   c. Model assembling and using the equipment.

5. As the groups are discussing, move around provide support as needed.

6. Ask the groups to share their answers and encourage other groups to give comments.

7. Thank the groups and give your observations and feedback.

Application Activity

Contact the farmer in advance to visit his or her piggery. Confirm that the trainees can observe different equipment used in a piggery.

On the day of the field visit:

1. Bring the trainees to the farm and introduce them to the farmer and any other workers present.

2. Ask the trainees to identify the names of the equipment present at the piggery.

3. The farmer will demonstrate several pieces of equipment while the trainees are encouraged to pay attention and ask questions.

4. If possible and with supervision, ask the trainees to disassemble and reassemble some of the equipment. With the farmer, provide support as needed.

5. At the end, give your observations and thank the farmer for his/her help.

Points to Remember

- Essential equipment in a piggery includes feeders, drinkers, heaters, littering boxes, drenching guns, a weighing scale, safety equipment, and cleaning equipment.
- Safety and handling equipment includes pig boards and hog snares.

Formative Assessment

Explain that the following assessment is individual. Tell the trainees to carefully read the instructions and respond to the questions.

1. List five essential pieces of equipment used in a piggery.
   1.
   2.
   3.
   4.
   5.

2. Why is it important to clean and disinfect equipment after using it?

3. Explain the role of littering boxes in the suckling pen.

4. Answer with True or False:
   a. A drenching gun is equipment used for administering drugs to animals.
   b. Littering boxes serve as beds to protect the piglets from low temperature.
   c. A weighing scale is used for feeding.
   d. A pig board is used to carry pigs

5. Explain the purpose of the following pieces of equipment and why they are important to have in a piggery:
   a. Pig board:
   b. Sprayer:

Answers:

1. **Possible Answers:** Feeders, drinkers, heaters, littering boxes, drenching gun, safety and handling equipment (pig board, hog snare), weighing scale, cleaning equipment

2. **Answer**: It is important to clean and disinfect equipment after using it because it could help stop spread of bacteria that cause diseases in animals and humans. Clean equipment also lasts longer and helps the farm keep a good image in the community.

3. Littering boxes are used to serve as beds for smaller pigs.

4. a. True
   b. True
   c. False
   d. False

5. Pig board: Pig boards can be used to push pigs along and prevent them turning around. They are used to train pigs to be moved by the farmer. The handler should always keep the pig board between him or herself and the pig.

   Sprayers: A device used to apply chemicals, such as acaricides (pesticides that control/kill ticks and mites that can be harmful to the animal).

Learning Outcome 2.4: Maintain piggery

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

a. Identify the components of a piggery to evaluate during maintenance.

b. Establish and implement a piggery maintenance plan.

c. Be attentive and observant during the maintenance of a piggery and equipment.

Time Required: 2 hours

Learning Methodology: Brainstorming, individual work, large group discussion, small group discussion, peer-to-peer learning, and field work

Materials Needed:

- **Standard training materials --** flip chart, markers, black/white board, chalk, tape, A4 paper
- **Maintenance equipment and materials --** metric hex keys, screwdrivers, personal protective equipment (PPE) such as gloves, helmets, goggles etc., hammer and nails

Preparation:

- ❑ Prepare all materials (training and maintenance materials).
- ❑ Read and review all scenarios, questions and answers to tasks, and assessments in advance.
- ❑ Contact the farmer in advance for field work and ask him/her to prepare some maintenance activities that the trainees can help with on his/her farm.

Cross Cutting Issues:

- ✔ **Financial Education**: When maintaining a piggery, a farmer should focus on low cost and durable materials, recycling, and repurposing what they can to avoid high out of pocket expenses.
- ✔ **Gender and Inclusion**: Consider gender balancing when forming groups.

Prerequisites:

- ❑ Basic knowledge of how to organise a written maintenance plan
- ❑ Basic knowledge of how to organise and equip of a piggery

Key Competencies:

Knowledge	Skills	Attitudes
1. Explain the role of maintenance of a piggery and equipment.	**1.** Evaluate a piggery and the status of its equipment.	**1.** Attentive
2. Identify which components of a piggery to evaluate.	**2.** Establish a maintenance plan for a piggery.	**2.** Observant
3. Identify necessary maintenance activities.	**3.** Implement a maintenance plan for piggery and its equipment.	**3.** Realistic

Steps:

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

Prepare the trainees for the topic and remind them that the current unit is about managing a piggery.

1. Inform the trainees that everything has life expectancy (shelf life), but good maintenance can extend that life and save a lot of money.

2. Refer trainees to **Topic 2.4 Task 1** in their manuals and tell them to read the following scenario and brainstorm responses to the question:

Imagine you are working on a pig farm. Just like a cattle farm, there are certain activities farmers must do to ensure a long life for the materials and equipment they need for the farm to be effective. What do you think some of these activities may be?

3. As they are brainstorming, ask the trainees to call out their ideas and answers so you can write them on the board/flipchart.

4. Introduce the topic and ask trainees to turn to the Key Competencies table in their manuals to see what they will gain from the topic and review it together (considering

their expectations). Explain that this topic will focus on how to properly maintain a piggery.

Problem Solving Activity

Inform the trainees that they are going to advise a farmer on piggery maintenance.

1. Separate the trainees into small groups (about 4 trainees per group).

2. Direct trainees to the scenario and questions from **Topic 2.4 Task 2** in their manuals. Tell them to read and discuss the questions with their groups.

   A pig farmer in Rwamagana managed to equip his piggery as advised by a livestock professional. However, to meet the maintenance requirements, the farmer has chosen to work closely with your school and your class has been requested to assist him.
   a. Brainstorm the role of maintenance in pig farming.
   b. Discuss what types of maintenance might take place at a piggery.
   c. List the most important maintenance activities at a piggery.
   d. Discuss the locations and types of equipment in a piggery you think the farmer should inspect on a regular basis.

3. Give the groups enough time to discuss each item. Groups should nominate a group leader who will write their responses. Move around to each group. Help facilitate discussion and provide clarification as needed.

4. Ask each group leader to write their answers for each question on the board/flipchart. Encourage other group members to comment and ask questions.

5. Provide necessary feedback and observations.

Guided Practice Activity

Before the next activity, divide the trainees into six groups.

1. Assign each group one of the sections of the **2.4 Key Facts** to discuss for five minutes.

2. After five minutes, ask each group to read out loud the section they discussed. Encourage other groups to ask questions and make sure the trainees understand the terminology used.

3. Now, ask trainees to return in their previous groups of four from **Task 2**, and refer to the **Topic 2.4 Task 3** in their manuals.

4. Read them the following scenario and associated questions:

   A farmer named Devota in Bugesera is operating an industrial pig farm. After realizing that some of the equipment needs to be repaired or replaced, she decided to include maintenance among her many priorities. Your class is going to advise Devota on piggery maintenance.

   a. Write a proposal for a maintenance plan that Devota can follow.
   b. List the frequently needed maintenance activities and explain to Devota why they are important.
   c. What initial mistake did Devota make? How can she avoid this same mistake in the future?

5. Give enough time to the groups for discussion and ask each group leader to write their answers on a piece of paper. Remind the groups to use **2.4 Key Facts** as needed.

6. As groups discuss, move around to give assistance and check that all trainees are participating.

7. Ask the group leaders to share their answers for each question.

8. Provide time to the class to make the comments on the answers and then, give your observations and feedback.

Answers to Question 2:

a. Maintenance plan: Refer to **2.4 Key Facts**.
b. Frequently needed maintenance activities: Refer to **2.4 Key Facts**.
c. Devota should have prioritized maintenance from the beginning. If she routinely inspects, cleans, and repairs equipment, she will have a more productive pig farm and longer lasting equipment.

Application Activity

Prepare a visit to a pig farm in advance.

On the day of the visit:

1. Bring the trainees to the farm and introduce them to the farmer and any workers present.

2. Explain to the farmer that the trainees are here to volunteer with maintenance and practice the skills learned in the classroom.

3. Ask a trainee to explain the role of maintenance in pig farming. Add comments if necessary.

4. Form small groups (of about five trainees) and choose a group leader. Each group must complete the following tasks found in **Topic 2.4 Task 4** in their manuals:
   a. Create an inspection checklist in the piggery, including roof, wall, floor, alleys, annexes, and equipment to evaluate their status.
   b. Identify the maintenance activities that may be needed for this piggery and its equipment.
   c. Propose a future maintenance plan for this piggery, including roof, wall, roof, alleys, annexes, and equipment.
   d. With the farm workers, participate in cleaning and repairing activities as needed to learn and/or show best practices.

5. Provide enough time to work in groups and make sure that each trainee is participating.

6. At the end of the activity, bring everyone together and direct each group leader to give a short presentation on what they have learned during the visit.

7. Tell each group to share their proposed maintenance plan and needed maintenance from their inspection checklist. Encourage others to comment (agree/disagree and why).

8. Provide any necessary feedback and thank the farmer for his/her help.

Points to Remember

- Maintenance helps extend the life expectancy of a piggery and its equipment.
- Elaboration and respect of a maintenance plan is a key. It must be detailed and completed as planned.
- It is important to switch off the equipment and/or electricity before performing maintenance for safety reasons.
- Any mechanical failure or break should be repaired as soon as possible.

Formative Assessment

Explain that the following assessment is individual. Tell the trainees to carefully read the instructions and respond to the questions.

1. Explain the role of maintenance in a piggery.

2. List the types of maintenance in pig farming.

3. List the parts of a piggery to inspect during the implementation of piggery maintenance.

4. Answer with True or False.
To the pig farmer, good hygiene is very important because it helps:
   a. Control and prevent diseases.

   b. Increase the number of employees and expenses.

   c. Increase life expectancy of the pigs.

   d. Keep a good image of the piggery.

5. How do you decide whether to replace or repair a piece of equipment during routine maintenance in a piggery?

Answers:

1. Role of Maintenance:
- To keep the construction strong (roof, wall, floor, annexes).
- To keep a good image of the farm (to the employees, customers, and the community).
- To improve the safety and the quality of the piggery.
- Better conservation and increased life expectancy of equipment. *

2. Types of Maintenance:
- Day to day repair – daily tasks
- Annual repair – once a year tasks
- Special repair – on an as needed basis
- Additions and alterations – to meet the special requirements for functional efficiency
- Preventive maintenance – regular tasks to make sure equipment is running properly

3. Roof, wall, floor, feeding alley, manure alley, annexes (storage room, sanitary room), all equipment and machinery.

4. a. True
b. False
c. True
d. True

5. Fix vs. Repair. Think about the following:
- ✔ How long have you had the equipment?
- ✔ Do you still have to make payments on it?
- ✔ What is the estimated cost of a repair?
- ✔ In what condition is the piece of equipment?
- ✔ What is the estimated cost of replacing the equipment with a new one?

Self-Reflection

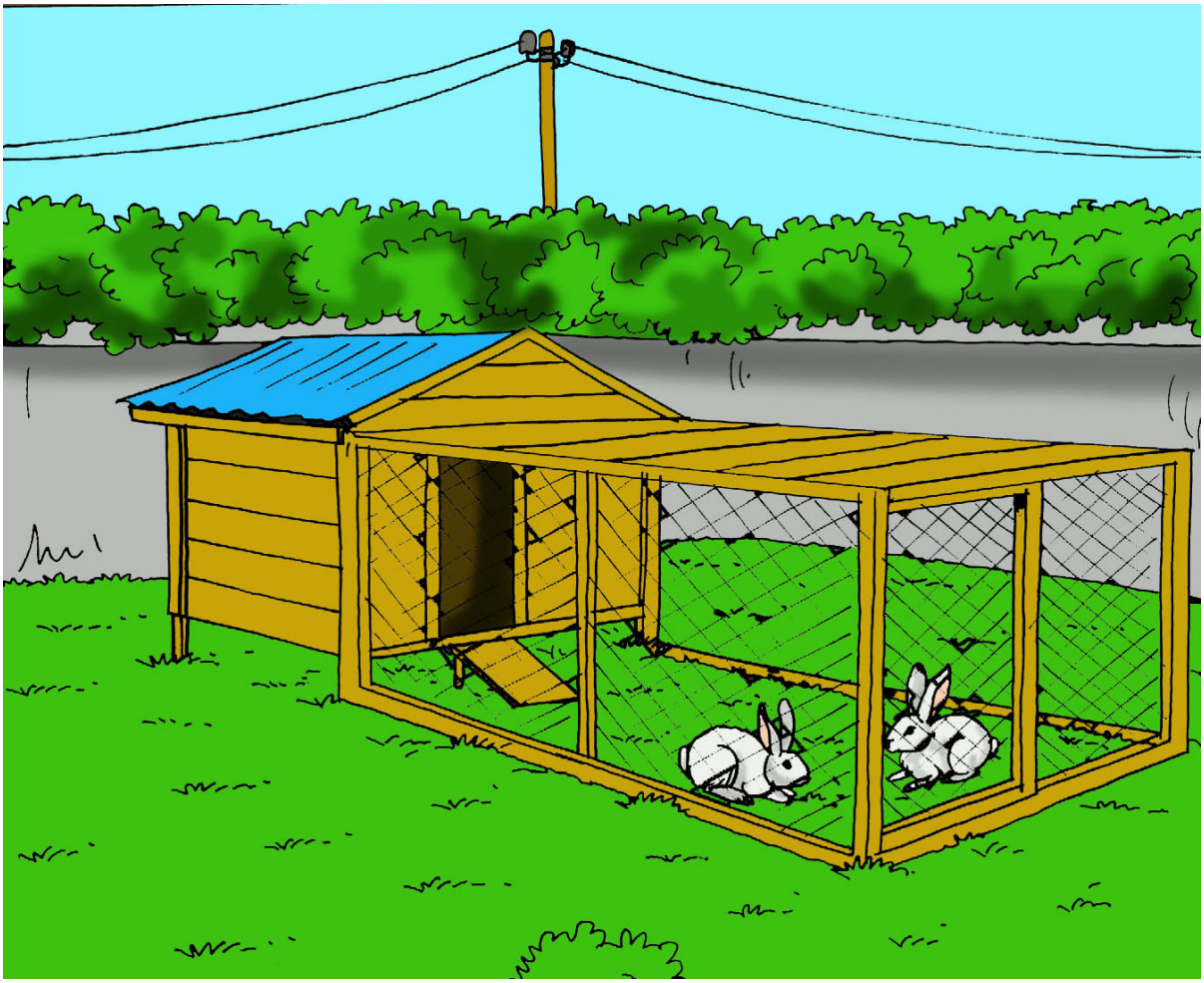
1. Ask the trainees to re-take the self-assessment at the beginning of the unit. They should then fill in the table in the Trainee's Manual to identify their areas of strength, areas for improvement, and actions to take to improve.

2. Discuss trainees' results with them. Identify any areas that are giving many trainees difficulties and plan to give additional support as needed (ex. use class time before you begin the next learning outcome to go through commonly identified difficult concepts).

Further Information for the Trainer

1. For equipment discussed in Learning Outcome 2.3, use a Google Images search.

Learning Unit 3: Assist in rabbit hutches construction



Learning Outcomes

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

3.1 Select site

3.2 Organize construction

3.3 Equip hutches

3.4 Maintain hutches

Learning Unit 3 Self-Assessment

1. Ask the trainees to look at the unit illustration and discuss what they see. What do they think this unit will include based on the illustration? After some brainstorming, share the main topics.

2. Explain that this Learning Unit is going to focus on establishing rabbit hutches, including selecting a site, organizing the construction and equipment, and maintaining the hutches.

3. Ask the trainees to fill out the self-assessment at the beginning of the unit in their Trainee Manuals. Explain that the purpose of the self-assessment is to become familiar with the topics in the unit and for them to see what they know or do not know at the beginning. At the end of the unit, they will do a self-reflection, which includes re-taking the self-assessment and identifying their strengths, areas that need improvement, and actions to take. Explain that self-assessment is not a test!

Learning Outcome 3.1: Select site

Objectives: By the end of this topic, trainees will be able to:

a. Identify the criteria for selecting a site for rabbit hutch construction.

b. Assess weather factors for rabbit farming.

c. Be observant and aware of risks while selecting a site for rabbit hutches.

Time Required: 2 hours

Learning Methodology: Brainstorming, large group discussion, small group discussion, peer-to-peer learning, and field work

Materials Needed:

- **Standard training materials --** flip chart, markers, black/white board, chalk, tape, A4 paper
- **Measurement tools --** topographic maps, thermometer, hygrometer, anemometer
- **Soil sample**
- **Visual and learning materials --** images, internet, reference book, pictures of different landscapes, index cards with details of those landscapes written on them (average temperature, rain fall, altitude, etc. details about the community and security, etc.)

Preparation:

- ❑ Prepare all materials are prepared in advance (thermometer, hygrometer, images, soil sample, etc.).
- ❑ Preview all scenario, questions, and answers to tasks and assessments in advance.
- ❑ Prepare a plot of land near the school in advance for field work.

Cross Cutting Issues:

- ✔ **Environment and Sustainability**: The site for a rabbit hutch should not cause the pollution to environment.
- ✔ **Standardisation Culture**: Emphasize the need to use measuring tools to properly assess weather and other physical conditions for hutch construction.

Prerequisites:

- Basic Mathematics: reading numbers and percentages

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify the criteria for selecting a site for rabbit hutch construction.	**1.** Select a good place for rabbit hutch construction.	**1.** Risk awareness
2. Explain the impact of topography on the construction of rabbit hutches.	**2.** Select good topography for rabbit farming.	**2.** Observant
3. Identify weather factors to consider when selecting a site for rabbit hutches.	**3.** Assess weather factors for rabbit farming.	**3.** Resourceful

Steps:

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

1. Encourage the trainees to brainstorm and discuss everything they can remember about site selection for ruminant and pig shelters. Refer them to the questions found under **Topic 3.1 Task 1** in their manuals. Tell them to brainstorm answers to the following:
   a. What should you look for?
   b. What do you know about soil types and their impact on construction?
   c. What types of topography are available in Rwanda for building animal shelters?

2. Write their ideas on the board/flipchart.

3. Ask the trainees to observe the answers brainstormed and discover the topic they are going to learn.

4. Introduce the topic and ask trainees to turn to the Key Competencies table in their trainee manual to see what they will gain from the topic and review it together (considering their expectations). Explain that this topic will focus on selecting a site for rabbit hutch construction.

Problem Solving Activity

Inform the trainees that they are going to do the following activity in groups and they must activate and use the knowledge and resources they have learned from the last two units on building animal shelters.

1. Make three groups of trainees (A, B, and C) and to choose a group leader for each group.

2. Refer trainees to **Topic 3.1 Task 2** in their manuals and read the following scenario:

   Mugenzi is a young entrepreneur with big goals. After realizing that rabbits are profitable and easy to raise, he decided to start a rabbit farming business. He approaches you for advice on selecting a site for his business.

3. Tell trainees to discuss the questions according to their groups (A, B, or C). Group leaders should write the answers down.

   Group A:
   - **a.** What could be some of the criteria to select the location for rabbit hutch construction?
   - **b.** Do you think the same laws and regulations that apply for ruminants and pigs apply for rabbit hutch construction? Why or Why not?

   Group B:
   Give this group the photos of topography and samples of soil structures.
   - **a.** Describe the types of topography and their impact on building animal shelters.
   - **b.** Describe the soil structures and their impact on construction activities.

   Group C:
   - **a.** Explain the impact of farm waste on the groundwater.
   - **b.** Ruminants, pigs, and rabbits are all very different animals. What does your group think will be different about building rabbit hutches?

4. Ask the group leaders to share the answers. While each group is presenting, encourage the rest of class to ask questions and give comments.

5. After all groups have presented, allow trainees to add any other ideas that may be missing from the answers given. Supplement their responses with information from **3.1 Key Facts**.

Guided Practice Activity

1. Divide the class into groups and assign each group a section from **3.1 Key Facts** to read and study for five minutes. During this time, move around the room, making sure the trainees understand what they are reading and discussing.

2. After five minutes, tell each group to present and read their section from **3.1 Key Facts** to the rest of the class. Emphasise the last two sections about unfavourable climate conditions and rabbit body temperature**.**

3. Now, ask the trainees to stay in their groups and hand each group an image of a landscape with an accompanying index card/piece of paper detailing the site's topography, climate, proximity to facilities, etc.

4. Refer trainees to **Topic 3.1 Task 3** in their manuals and read the following scenario and related questions:

   Suppose that your school wants to buy land in the country to construct and manage a rabbit farm. Your trainer hands you an image of a possible site along with details of that location and asks you to help the school decide if the location is appropriate for rabbit farming. With your group discuss the following:

   a. Explain and elaborate on each factor to consider when selecting a good place for rabbit hutch construction. Be specific to your location and details your trainer gave you.
   b. Are the climatic parameters suitable for rabbit farming? Demonstrate how you would measure the climatic parameters provided to you by your trainer (temperature, hygrometer, and wind).
   c. Give recommendations and feedback to your school about the location you've been presented with.

5. Provide all groups with instruments to check the weather parameters (thermometer, hygrometer, anemometer and compass) for **part b.** They should demonstrate how to use them to you and their colleagues.

6. Provide enough time to work in groups, move around to check that all trainees are participating, and give support where needed.

7. After all groups have finished their work, facilitate a large group discussion as a class. Ask a volunteer in each group to share their answers. Provide comments and observations as needed.

Answers:

a. Factors to consider**:**

- Accessibility
- Friendly neighbourhood
- Enough security (protected from predators and noise)
- Availability of utility sources (water and energy)
- Availability of necessary facilities (road, food, etc.)

b. Checking weather parameters**:**

✔ Make sure that they are correctly interpreting the information provided (temperature, humidity, wind speed, and wind direction). As you move around the room, ask each group to show you how to measure these factors and explain what they are doing.

c. In case of low temperature, strong wind, and/or heavy rains, recommend strong construction materials (make a solid wall in the direction facing the prevailing wind, increase the surface of closed wall) and a provision of temporary protections.

In case of hot climate, recommend increasing the ventilation and providing more cool water for the rabbits to drink.

Application Activity

Explain to the trainees that they are going to go outside of the classroom to apply what they have learned so far.

1. Bring the trainees to an area on the school grounds or nearby to assess if it is suitable for rabbit farming.

2. Form small groups (of 5-6 trainees) and nominate a group leader for each group.

3. Separate the groups and inform each group to imagine that the site is where the school wants to construct rabbit hutches. Tell them to complete the following tasks, found in **Topic 3.1 Task 4** in their manuals:
   a. Within the space provided, select a good place to begin constructing rabbit hutches. Explain the reason why you chose the specific location and orientation.
   b. Match the present weather conditions with the preference of rabbit farming using the appropriate instruments.
   c. Is the altitude and/or topography good enough for rabbit farming? What is your recommendation for the next step?

4. Provide each group with weather checking instruments to measure the wind (direction and speed), temperature, and precipitation.

5. Provide each group enough time to work and ensure all trainees are participating.

6. After the groups have finished, bring all groups together. Tell the group leaders to present their group's findings. Other trainees should comment and ask questions.

7. Thank the trainees and give your observations and feedback.

Points to Remember

- A good site for hutches construction is easy to access and has access to clean water.
- Hutches should be in a friendly neighbourhood where there is security and silence.
- Be sure that the site for construction is allowed by the land management master plan.

Formative Assessment

Explain that the following assessment is individual. Tell the trainees to carefully read the instructions and respond to the questions.

1. What are the characteristics of a good site for rabbit hutches constructions?

2. Answer with True or False.
Favourable weather conditions for rabbits are:
- **a.** Adequate air circulation (wind)
- **b.** Fairly natural light
- **c.** Moderate temperature
- **d.** Heavy rains

3. Choose the correct answer.
When the weather is either too cold or too windy, you should:
- **a.** Cancel the rabbit farming project
- **b.** Strengthen and increase the wall surface
- **c.** Improve artificially indoor micro-climate
- **d.** Both B and C
- **e.** No correct answer is provided.

4. When your rabbits are too hot, what are two things can you do to help them be more comfortable?
   1.
   2.

5. When your rabbits are too cold, what are two things can you do to help them be more comfortable?
   1.
   2.

Answers:

1. **Possible Answers**: location allowed by government regulations, easy access for the farmer, friendly neighbourhood, security (protected from predators, noise, and dust),

nearby utility sources (running water and energy supply, near public facilities (roads, food store, etc.)

2. a. True
b. True
c. True
d. False

3. D

4. **Possible Answers**: Provide shade for them to rest under, increase the ventilation in their hutches, provide cold/cool drinking water

5. **Possible Answers**: To avoid lower temperatures in a hutch, the construction should have solid walls in the direction facing prevailing winds. Providing plenty of hay/straw for the rabbits to sleep on. Temporary protection from strong winds, low temperatures, and rain should also be provided with curtains of hessian (a strong, coarse fabric made from hemp or jute, used for sacks.), grass, plastic, etc.

Learning Outcome 3.2: Organize construction

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

a. Identify the different types of rabbit hutches.

b. Select materials for rabbit hutch construction.

c. Be aware of any risks and be proactive during construction of rabbit hutches.

Time Required: 2 hours

Learning Methodology: Brainstorming, large group discussion, small group discussion, individual work, peer-to-peer learning, and field visits

Materials Needed:

- **Standard training materials --** flip chart, markers, black/white board, chalk, tape, A4 paper
- **Measurement tools --** calculator, tape measure
- **Visual and learning materials --** internet, reference book, cards or poster board with images of different types of hutches on one side and the name of the hutch and its purpose on the other side

Preparation:

- ❑ Prepare all materials in advance, especially copies of images of hutch types.
- ❑ Read scenarios, questions, and answers to tasks and the assessment in advance.
- ❑ Plan a visit to a farm for practice in advance.

Cross Cutting Issues:

- ✔ **Financial Education**: When selecting construction materials, it is always better to focus on low cost and durable materials.
- ✔ **Standardisation Culture:** Emphasize the need to use measuring tools to properly assess the parameters for constructing a rabbit hutch.

Prerequisites:

- ❑ Basic Mathematics: arithmetic calculations

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify different types of rabbit hutches.	**1.** Select the appropriate type of rabbit hutch.	**1.** Risk aware
2. Identify facilities needed for rabbit farming.	**2.** Supervise construction of rabbit hutches.	**2.** Proactive
3. Identify materials for rabbit hutch construction.	**3.** Select construction materials for rabbit hutches.	**3.** Observant

Steps:

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

1. Try to evaluate the trainees' knowledge of rabbit hutch construction by telling them to read and discuss **Topic 3.2 Task 1** in their manuals as a class:

After being introduced to rabbit farming, you can choose to operate a rabbit farm as a business. Suppose that you have already chosen an appropriate and you are now going to organize the construction.

- **a.** What are the materials you think you will need to construct rabbit hutches?
- **b.** As a resourceful farmer, what should you consider before choosing materials?
- **c.** Do you think you will need facilities in addition to hutches? If yes, list what you think those will be.

2. Write their answers on the board/flipchart.

3. After all the questions are answered, ask trainees to discover topic they are going to learn.

4. Introduce the learning topic and ask trainees to look to the Key Competencies table in their manuals to see what they will gain from the topic and review it together

(considering their expectations). Explain that this topic will focus about organizing rabbit hutch construction.

Problem Solving Activity

Inform the trainees that they are going to do an activity to learn the different types of rabbit hutches that they will be constructing in the future.

1. Divide the trainees into three groups.

2. Hand each group a poster/image with a type of hutch on it. On the back of the image there will be information about that type of hutch (definition and purpose).

3. Tell the trainees to turn to **Topic 3.2 Task 2.** Using the images and definitions, direct the trainees to infer the following about the hutch that is on their card:
   a. Types of materials for construction
   b. Advantages of this material
   c. Disadvantages of this material

4. Ask each group to discuss their ideas and write their answers. Make sure that the discussions are productive and remind them to carefully inspect the images, read the definitions and purposes, and use the knowledge they learned from past units to make good inferences.

5. After group discussions, call the group leaders to share the answers from their groups. Write those answers on the board/flipchart.

6. Give the trainees time to add comments. Inform them that this is meant to be a challenge and that they will now go over **3.2 Key Facts** to check if their inferences were accurate.

Guided Practice Activity

1. Begin by asking the groups from the **Problem Solving Activity** to read **3.2 Key Facts** and identify the hutch from their cards**.**

a. They should confirm the type of hutch, advantages, disadvantages, and materials used for the image of the hutch there were handed (ground hutch, battery hutch, or cage hutch).

2. Next, tell trainees to read through the rest of **3.2 Key Facts** as a class. Pause after each section to ask the trainees clarifying questions and make sure they understand the terminology used.

3. Now, inform the trainees that they are going to do another activity in groups. Direct the trainees to form groups (about five people per group) and choose a group leader.

4. Refer to **Topic 3.2 Task 3** in the Trainee Manual and read the following scenario:

Your school wants to begin rabbit farming. You already helped select a site. Now we are ready to begin organizing the construction of the hutches. Your school has 2 does, 2 bucks, and 12 kits (young rabbits) which will be fattened before being sold. You must participate in the construction and stocking of the hutches.

5. Do the following tasks with the trainees to guide them and make them feel comfortable. Make sure they are paying attention to how you come to your answer and ask them to assist you with comments and observations.
a. Indicate the categories of cages needed in this rabbit farm.
b. Calculate the minimum space needed for breeder rabbits.

6. Then, tell the trainees to do the following in their groups by applying what they have learned in **3.2 Key Facts:**
a. Calculate the minimum space needed for growing rabbits estimated. The school cannot have more than 70 rabbits at one time.

b. Calculate the minimum space needed for rabbits to be fattened. The school cannot exceed 70 rabbits at one time.

c. Select construction materials available in the region to be used for the construction of the rabbit hutches.

7. After working in groups, instruct one group to write their answers on the board/flipchart and encourage others comment based on their answers and **3.2 Key Facts.**

8. Thank the groups and give your observations and feedback.

Answers to Questions 5 and 6:

a. Cages needed: doe cages, grower cages, fattening cages, buck cages

b. Space needed for breeder rabbits

1. Does: 12 x (80×115) cm^2 = 110 400 cm^2 =11.04 m^2

2. Bucks: 2 x (80 x80) cm^2 = 12 800 cm^2 = 1.28 m^2

c. Space needed for grower rabbit: 70 x 450 cm^2 = 31 500 cm^2 = 3.15 m^2

d. Space needed for fattening: 80 x (60 × 80) cm^2 = 384 000 cm^2 = 38.4 m^2

e. Examples of construction materials: Wire mesh, wood (timber, bamboo), galvanized steel sheet, nails, hammer, stones, bricks, cement

Application Activity

Organise a visit to a local rabbit farm in advance.

Explain to the trainees that they are going to apply what they have learned in the field.

1. Bring the trainees to the rabbit farm and introduce them to the farmer and any workers present.

2. Explain that rabbits are sensitive to noise, so they must be quiet and gentle while working with them.

3. Form small groups (of about 5-6 trainees) and nominate a group leader for each group. Separate the groups.

4. Give the following tasks to each group, found in **Topic 3.2 Task 4** in their manuals:

- **a.** Make a checklist and document different categories of rabbit cages present on this rabbit farm.
- **b.** Ask the farmer to show you the categories of cages he/she has, to confirm that your checklist is accurate.
- **c.** Using a tape measure to check the parameters of cages including the size, height, and elevation from the floor. Record your findings.
- **d.** Compare the size of rabbit cages with the standards from the **3.2 Key Facts** that you learned in class.

e. Observe the construction materials used, explain their advantages and give any recommendations (if needed).

f. Discuss the facilities that are present (feeding alley, waste management alley, store, etc.) and give your observations.

g. Evaluate the orientation of the hutches as well as the weather conditions for rabbit farming in this location.

5. Provide enough time for group discussion and ensure all trainees are participating.

6. When the trainees have finished, bring all the groups together to present their findings in a discussion format.

7. Give your observations on the findings recorded buy the trainees.

8. Thank the farmer for his/her help.

Points to Remember

- Make sure rabbits have enough space: 4-5 times the body size of the rabbit should be the minimum amount of space given to each animal. There should be a cage for each adult rabbit.
- Provide rabbits with fresh air and light but keep them out of direct sunlight.
- Protection from wind and rain is key to rabbit hutch construction.
- Consider the sanitary conditions of the space, if it is easy to clean, and if it allows rabbits to be handled easily.
- Prioritise construction that is stable and affordable (not too expensive), but also free from conditions that could injure the animals.
- Ensure that wooden bars and wire mesh are close enough (not more than 2cm).

Formative Assessment

Explain that the following assessment is individual. Tell the trainees to carefully read the instructions and respond to the questions.

1. Explain the advantages and disadvantages of the different types rabbit hutches that are used.

2. What are two differences between battery hutches and ground hutches?
1.
2.

3. What are four characteristics of a good rabbit hutch?
1.
2.
3.
4.

4. Circle the **wrong** answer.
The following are the types of rabbit outdoor colonies:
a. Ground hutches
b. Battery hutches
c. Cage hutches
d. Underground hutches

5. Why is it important to provide a rabbit with a resting board in a cage with a wire mesh on the bottom?

Answers:
1. Refer to **3.2 Key Facts.**

2. Battery hutches are elevated; ground hutches are on the ground.
Battery hutches are stacked; ground hutches are not stacked.

3. **Possible Answers**:
    - Make sure rabbits have enough space: 4-5 times the body size of the rabbit you are housing should be the minimum amount of space given to each animal
    - Fresh air and light but keep out of direct sunlight
    - Protection from wind and rain
    - Sanitary conditions and easy to clean
    - Stable and affordable (not too expensive) construction. Free from conditions that could injure the animals. Wooden bars and wire mesh are close enough (not more than 2cm).
    - Convenience of handling
    - A cage for each adult rabbit

4. D

5. If the rabbit is always standing on mesh wire, it will be uncomfortable and possibly injure its feet.

Learning Outcome 3.3: Equip hutches

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

a. Identify different equipment used in rabbit hutches.

b. Install and test the common equipment used in rabbit hutches.

c. Be observant and methodical when installing equipment in rabbit hutches.

Time Required: 2 hours

Learning Methodology: Brainstorming, large group discussion, individual work, small group discussion, peer-to-peer learning, and field visits

Materials Needed:

- **Standard training materials --** flip chart, markers, black/white board, chalk, tape, A4 paper
- **Visual and learning materials --** pictures of equipment, index cards with names of different equipment written on them, index cards with locations of different equipment written on them, index cards with the roles of different equipment written on them
- **Sample hutch equipment --** feeders, drinkers, heaters, nest box, safety and handling equipment, cleaning and disinfection equipment

Preparation:

- ❑ Research, download, and prepare all images to use in class, index cards with information written on them, and cleaning equipment to use as visual aids while teaching (see Tasks 2 & 3).
- ❑ Read all scenarios, questions, and answers to the tasks and assessment in advance.
- ❑ Contact the farmer to visit in advance and confirm that he/she has maintenance activities that the trainees can help with (liming, disinfecting, repairing, etc.)

Cross Cutting Issues:

- ✔ **Financial Education**: When selecting equipment, prioritize low cost yet durable materials/equipment.
- ✔ **Gender and Inclusivity:** Consider gender balance when forming groups.

Prerequisites:

- Basic Animal Biology/Physiology

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify equipment to use in rabbit hutches.	**1.** Select equipment to use in rabbit hutches.	**1.** Resourceful
2. Explain the role of equipment used rabbit hutches.	**2.** Properly install equipment in rabbit hutches.	**2.** Methodical
3. State the proper location of equipment in hutches.	**3.** Test the equipment used in rabbit hutches.	**3.** Observant

Steps:

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

1. Start by encouraging curiosity in the trainees. Refer them to **Topic 3.3 Task 1** in their manuals and tell them:

In rural areas, rabbit farming is among the most profitable agri-businesses. However, a rabbit farmer, like any farmer, must be proficient in everything there is to know about operating a rabbit farm including the equipment used.

2. Facilitate a discussion of the statement above:
- **a.** Do you agree or disagree?
- **b.** What information do you think is important to know about operating a rabbit farm?

3. Then, display some sample equipment in front of the trainees and ask them to observe them and brainstorm what their purposes are.

4. Facilitate a group discussion based on the trainees' brainstormed answers. Tell them that it is ok if they are incorrect because by the end of this learning outcome, they will have the correct information.

5. Ask trainees to observe the answers they have brainstormed and discover the topic they are going to learn.

6. Introduce the topic and ask trainees to turn to the Key Competencies table in their trainee manuals to see what they will gain from the topic and review it together (considering their expectations). Explain that this topic will focus on properly equipping rabbit hutches.

Problem Solving Activity

Inform the trainees that they are going to do a matching activity that will require walking around the room and activating past knowledge. Direct them to **Topic 3.3 Task 2** in their manuals.

1. Place equipment at different locations around the room/space.

2. Hand each trainee a card with identifying information about a piece of equipment written on it (the name, the role, or the location).

   For Example:
   a. Role card: "Littered box to accommodate rabbit kinds (newborns)."
   b. Name card: "Nest box"
   c. Location card: "In a doe's cage."

3. Explain to the trainees that their task is to walk around the room with their cards and match the cards with what they think is the appropriate equipment.
   a. They must do this until all cards and equipment are matched.
   b. Encourage them NOT to look at **3.3 Key Facts** yet. Instead, they should discuss with their colleagues and use any information they have already learned.
   c. After a trainee has matched a piece of equipment with a card, they should stand by that equipment.
   d. While the trainees are discussing and matching their cards with the equipment, move around and assist them as needed. Do not give them the answer yet, but ask guiding questions to help their thinking (Example: "Why do you think this should go only in the doe's cage?").

4. When all trainees have stopped moving around and are standing next to a piece of equipment, they will explain to the class why they matched their card with the equipment they are standing next to.

5. Ask each trainee to share their answers and encourage other trainees to comment.

6. Ask the trainees to leave the cards with the information next to the equipment they selected. After the class reviews the **3.3 Key Facts**, they will go back and correct any mistakes made in the selection of equipment.

7. Thank the class and give your observations.

Guided Practice Activity

Before this activity, prepare four pieces of equipment to use for practice: feeder for fodder (A1), feeder for concentrate (A2), a drinker (B), and a nest box (C).

1. Read through all of **3.3 Key Facts** aloud as a class. Pause after each fact to ask questions and ensure that the trainees understand the terminology.

2. Then, tell trainees to move around the room and observe the cards next to the equipment from the last activity. Ask the trainees to make changes that may be necessary now that they have read and understood the correct information regarding the equipment from the **3.3 Key Facts.**

3. Direct trainees to **Topic 3.3 Task 3** in their manuals and separate them into four groups. Each group must choose a group leader.

4. Place the four pieces of equipment in the corners of the room/space. Assign each group to a piece of equipment. Tell them to answer the following questions:
   - **a.** What is the name of this equipment?
   - **b.** What is the use of this equipment?
   - **c.** Where is this equipment installed in a rabbit hutch?
   - **d.** Demonstrate how to install and use this equipment in a rabbit hutch.

5. After the groups have sufficiently discussed the questions, rotate them to a different piece of equipment. Repeat the discussion from **Question 4.**

6. Repeat this process until the groups have discussed each piece of equipment in the room.

7. Throughout the activity, visit each group and assist them with installing and demonstrating how to use the equipment (**part d**).

8. After the groups have discussed each piece of equipment in the room, tell the group leaders to present their findings. Encourage trainees to give comments and observations.

Answers:

a. A1 = Grass feeder, A2 = Concentrate feeder
B = Drinker
C = Nest Box

b. Refer to **3.3 Key Facts**

c. Refer to **3.3 Key Facts**

Application Activity

Prepare a visit to a rabbit farm where the trainees are going see different equipment used.

1. Bring the trainees to a rabbit farm and introduce them to the farmer and any workers present.

2. Make small groups of four trainees and inform them that each group needs a leader.

3. Refer to trainees to **Topic 3.3 Task 4** in their manuals. Ask the groups to carefully look into the cages one at a time and do the following:
   a. Identify the equipment that is present.
   b. Identify the equipment that is missing.

4. With the help of the farmer and workers, tell the groups to observe how the equipment is installed in the hutches.

5. Using the equipment in unoccupied cages, instruct trainees to practice reinstalling the equipment with the help of the farmer and under your supervision.

6. Confirm that each group shows you that the equipment they reinstalled is functioning properly.

7. Then, bring together all the groups. Ask volunteers from each group to present the observations from their groups. Encourage all trainees to comment or ask questions.

8. At the end, give your observations/feedback and thank the farmer for his/her help.

Points to Remember

- The essential equipment in rabbit hutches includes feeders, drinkers, nest boxes, and cleaning and disinfectant equipment.
- Heaters are used in regions with very cold climates.

Formative Assessment

Explain that the following assessment is individual. Tell the trainees to carefully read the instructions and respond to the questions.

1. What are the most important pieces of equipment used in rabbit hutches?

2. Answer with True or False.
   The following are the types of feeders in rabbit hutches:
   a. Crocks
   b. Bamboo troughs
   c. Grass mangers
   d. Nest box
   e. Hoppers

3. Circle the **wrong** answer:
   The following are types of drinkers usable in rabbit hutches:
   a. Crocks
   b. Enamel cups

c. Ceramic crocks
d. Bamboo trough
e. Thermometer
f. Cans
g. Automatic watering

4. Explain the location and role of nest box in hutches

5. Explain the advantages and disadvantages of installing an automatic watering system for rabbit hutches.
Advantages:

Disadvantages:

Answers:

1. The essential equipment in rabbit hutches: feeders, drinkers, nest boxes, heaters (in some regions with very cold climates), cleaning and disinfectant equipment
2. a. True
b. True
c. True
d. False
e. True
3. E
4. Location: In a doe's cage only.
Role: Littered boxed to accommodate rabbit kinds (newborns)

5. Advantages: Practical, sanitary, saves time, easy to install
Disadvantages: Expensive.

Learning Outcome 3.4: Maintain hutches

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

a. Identify the components of rabbit hutches to evaluate for maintenance.

b. Establish and implement a maintenance plan for rabbit hutches.

c. Be observant and careful while maintaining rabbit hutches.

Time Required: 2 hours

Learning Methodology: Brainstorming, individual work, large group discussion, small group discussion, peer-to-peer learning, and field work

Materials Needed:

- **Standard training materials --** flip chart, markers, black/white board, chalk, tape, A4 paper, pens,
- **Visual materials –** pictures
- **Sample maintenance equipment and materials --** metric hex key, screwdriver, personal protective equipment (gloves, helmet, goggles), hammer, and nails

Preparation:

- ❑ Prepare all materials (training and maintenance materials).
- ❑ Read all scenarios, questions, and answers to the tasks and assessment in advance.
- ❑ Contact the farmer for field work and verify that he/she has maintenance activities that trainees can help with.

Cross Cutting Issues:

- ✔ **Financial Education:** When maintaining rabbit hutches, a farmer should focus on low cost and durable materials, recycling, and repurposing what they can to avoid high out of pocket expenses.
- ✔ **Standardisation Culture**: When developing a maintenance plan, a farmer should be able to prioritize his/her needs and communicate those needs in a well drafted plan in order to take appropriate action.

Prerequisites:

- ❑ Basic Mathematics: Arithmetic calculations

Key Competencies:

Knowledge	Skills	Attitudes
1. Explain the role of maintenance in rabbit farming.	**1.** Evaluate the status of rabbit hutches.	**1.** Observant
2. Identify the components of rabbit hutches to evaluate for maintenance.	**2.** Establish a maintenance plan for rabbit hutches.	**2.** Proactive
3. Identify maintenance activities for rabbit hutches.	**3.** Implement a maintenance plan for rabbit hutches.	**3.** Careful

Steps:

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

Remind the trainees that you are still learning about establishing rabbit shelters.

1. Read the following scenario from **Topic 3.4 Task 1** in the trainees manuals and tell trainees to discuss the questions that follow:

We often ask for a guarantee when we purchase new equipment, meaning that we want to keep our assets for a long period of time. Suppose that you have rabbit farm with a lot of equipment, and you want to keep the equipment in good condition for as long as possible.

a. How do you keep equipment in good condition?
b. What activities can you do to ensure that it lasts a long time?

2. Write the answers on the board/flipchart.

3. Ask the trainees to observe the brainstormed answers and discover the topic they are going to learn.

4. Introduce the topic and ask the trainees to turn to the Key Competencies table in their manuals to see what they will gain from the topic and review it together (considering their expectations). Explain that this topic will focus on maintaining rabbit hutches.

Problem Solving Activity

1. Direct the trainees to form groups of five people and assign a group leader.

2. Ask the trainees to read the following scenario from **Topic 3.4 Task 2** in their manuals and discuss the following questions:

   Ange is new to rabbit farming. She has selected an excellent site for her rabbit farm and has new equipment that will ensure that her farm is productive and of the highest quality. However, all of the sudden her rabbits start getting sick, and her machines begin to break and stop working properly. She doesn't know what is going on. Ange's rabbit farm stops running and she begins to lose money.

   a. Why do you think Ange's rabbits are getting sick?
   b. Why do you think Ange's machines are breaking?
   c. What can Ange do so avoid these problems in the future?
   d. Explain the role of maintenance on a farm.

3. Provide enough time to each group to discuss. Tell the group leaders to write the responses. Move around to each group to ask guiding questions and help focus their thinking.

4. Ask each group leader to write their answers on the board/flipchart. Give time to other groups to add their answers.

5. Provide time to the class to comment on the answers provided. Provide your observations.

6. Explain to the group that you will return to this activity after they have read **3.4 Key Facts** to check their answers.

Guided Practice Activity

Prepare the equipment to use for practice in class so that every five trainees have one piece of equipment.

Part 1:

1. Divide the trainees into five groups and assign each group a section of **3.4 Key Facts** to read through together and discuss.

2. After they have read and discussed, ask each group to stand up and read their section of **3.4 Key Facts** to the rest of the trainees. After each group has presented their section of **3.4 Key Facts**, pause and ask the trainees questions to ensure they understand the terminology used. For example: "Can someone give me an example of a special repair that happens on an 'as needed basis'?

Part 2:

1. Return to the previous scenario from **Topic 3.4 Task 2**:

   Ange is new to rabbit farming. She has selected an excellent site for her rabbit farm and has new equipment that will ensure that her farm is productive and of the highest quality. However, all of the sudden her rabbits start getting sick, and her machines begin to break and stop working properly. She doesn't know what is going on. Ange's rabbit farm stops running and she begins to lose money.

   a. Why do you think Ange's rabbits are getting sick?
   b. Why do you think Ange's machines are breaking?
   c. What can Ange do so avoid these problems in the future?
   d. Explain the role of maintenance on a farm.

2. Ask each group to read this scenario again take a few minutes to revise their answers to be more specific now that they have read and discussed **3.4 Key Facts.**

3. After a few minutes, ask group members to share what they added to make their answers more specific according to **3.4 Key Facts.**

Part 3:

Inform the trainees that they are going to do another activity in groups.

1. Ask the trainees to return in their previous groups and refer to the activity from **Topic 3.4 Task 3** in their Trainee Manuals.

2. Read the following scenario from **Topic 3.4 Task 3** and tell trainees to discuss the questions in their groups:

   A fifteen-year-old boy named Kagabo has always been interested in rabbit farming. One year, his mother gives him a medium-sized rabbit farm as a gift. Kagabo wants to keep his farm for many years and in good working condition. He does not have any money, so he wants to take good care of equipment and rabbits. He approaches you for help and asks the following questions:
   - **a.** What are four important maintenance activities on a rabbit farm and their role?
   - **b.** How often is maintenance done?
   - **c.** Using examples (of equipment and hutches), demonstrate how to perform maintenance.
   - **d.** Based on your education in animal shelters, what do you think is the most important thing to know about farm maintenance?

3. Provide one piece of equipment used in rabbit farming to each group and ask them to discuss and brainstorm answers to Kagabo's questions. Ask the group leaders to write the answers during the discussion.

4. As the groups discuss, check that all trainees are participating and provide support for the maintenance demonstrations (**part c**) as needed.

5. After group discussions, ask each group leader to share their answers and demonstrate how to maintain the equipment they have. Encourage other trainees to ask questions and give comments.

6. Finally, give your observations and feedback.

Answers:

Refer to **3.4 Key Facts**

a. Important maintenance activities and their objectives:
   1. Inspection: to evaluate the status of the farm (construction and equipment) and to decide on the actions to take (repair or replacement).
   2. Cleaning: to prevent diseases and keep a good image of the farm.

3. Painting: to increase the life expectancy (for construction and equipment) and to maintain a good image of the farm.
4. Littering: to avoid low temperatures (especially in nest boxes) and to keep the cages clean (as you can train rabbits to defecate only in the littering box).

b. Frequency of maintenance: Maintenance is done every day (most maintenance activities are daily). Once a week, you should thoroughly clean the nest box and other cages.

c. Demonstration of maintenance:
- Inspect: evaluate the status of equipment or construction.
- Decide on action to take (repair or replace) based on the value of the equipment and the condition that it is in.
- Implement the chosen action.

d. Answers may vary.

Application Activity

Prepare a rabbit farm to visit in advance.

On the day of the visit:

1. Bring the trainees to the rabbit farm and introduce them to the farmer and any workers present.

2. Explain to the farmer that the trainees are going to apply what they've discussed and practiced in class about maintenance on a rabbit farm.

3. Ask a volunteer to explain to the farmer the role of maintenance in rabbit farming. Ask the farmer to add or clarify any of the information given based on his/her experience.

4. Form small groups (of about four trainees) and choose a group leader for each group.

5. Tell the trainees to do the following tasks found in **Topic 3.4 Task 4** in their manuals with their groups:
   a. Inspect the hutches and their equipment. Evaluate their status. Write your recommendations.

b. Ask the farmer what his routine maintenance activities are and write your observations. Do not forget to talk about cleaning, liming, littering, and painting.

c. Based on what you see on the farm, design a maintenance plan for this rabbit farm considering its status.

d. Participate in hygienic and/or other maintenance activities (cleaning, liming, littering, and repairing if possible).

6. Provide the trainees with time to work in groups as you move around to check that they are doing well. With the farmer, give the support as needed.

7. Bring everyone together and ask each group leader to make a short presentation on the tasks done. Ask guiding questions, such as "Why did you recommend _____ in the maintenance plan?"

8. Encourage trainees to provide comments and give feedback on the answers from the groups.

9. Provide your observations/feedback and thank the farmer for his/her time and support.

Points to Remember

- Maintenance helps to extend the life expectancy of rabbit hutches and equipment.
- Elaboration and respect of maintenance plan is a must.
- Any malfunction should be repaired as soon as possible.
- Littering, especially in the nest box, helps provide adequate temperatures to the rabbits and should be thoroughly cleaned out once a week.

Formative Assessment

Explain that the following assessment is individual. Tell the trainees to carefully read the instructions and respond to the questions.

1. Explain the role of hutch maintenance on a rabbit farm.

2. What are the components of rabbit hutches to evaluate for maintenance?

3. Answer with True or False:

a. It is necessary to put litter in a nest box.

b. Lime helps protect your equipment from rain.

c. Most of the maintenance activities are done every day on a rabbit farm.

4. Explain how applying lime can be good for the health of your farm workers and animals.

Answers:

1. Hutch maintenance helps keep hutches clean and free of harmful bacteria. This maintenance helps keep a good image of your farm and your animals healthy.

2. Evaluation and maintenance components:

- Cages: Roof, wall, bottom
- Floor
- Feeders and drinkers
- Drainage and manure alley
- Annexes (storage room, sanitary room, etc.)
- Equipment
- Fences (enclosures)

3. a. True
b. False
c. False

4. Answer should include information related to the following:

"Lime is crushed up limestone – also known as Calcium Carbonate. It's used to prevent the smell of ammonia build-up and odours in barns and stalls. Ammonia comes from the urine in livestock waste when it's left sitting and not cleaned up. Ammonia can cause a variety of problems for your livestock, such as, respiratory issues and immune system issues. Barn lime can help keep animal pens, barn floors and gutters all clean, dry and sweet."

Self-Reflection

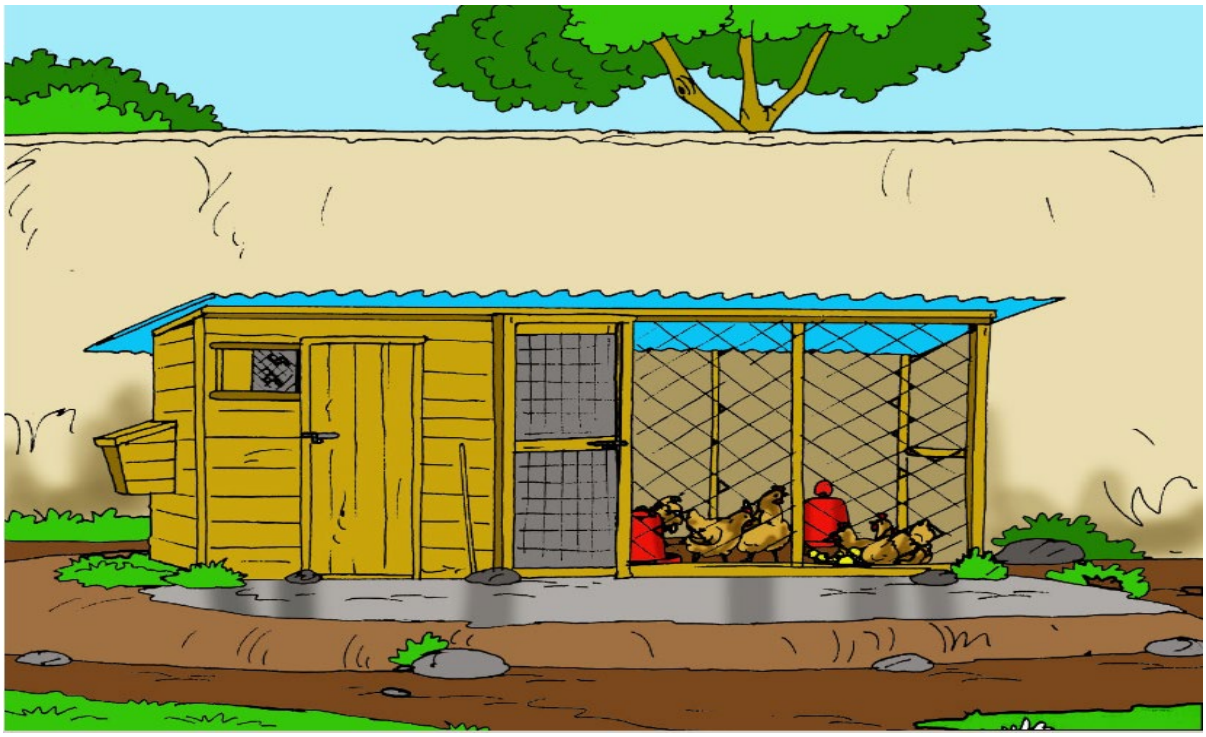
1. Ask the trainees to re-take the self-assessment at the beginning of the unit. They should then fill in the table in their manuals to identify their areas of strength, areas for improvement, and actions to take to improve.

2. Discuss the trainees' results with them. Identify any areas that are giving many trainees difficulties and plan to give additional support as needed (ex. use class time before you begin the next learning outcome to go through commonly identified difficult concepts).

Further Information for the Trainer

1. For images of equipment (Learning Outcome 3.3), you can look for clearer images using a Google search for the specific pieces of equipment.

Learning Unit 4: Assist in poultry construction



Learning Outcomes:

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

4.1 Select site

4.2 Organize construction

4.3 Equip poultry house

4.4 Maintain poultry house

Learning Unit 4 Self-Assessment

1. Ask the trainees to look at the unit illustration and discuss what they see. What do they think this unit will include based on the illustration? After some brainstorming, share the main topics.

2. Explain that this Learning Unit is going to focus on constructing poultry houses, including how to select a site, organize construction, and equip and maintain poultry houses.

3. Ask the trainees to fill out the self-assessment at the beginning of the unit in their Trainee Manuals. Explain that the purpose of the self-assessment is to become familiar with the topics in the unit and for them to see what they know or do not know at the beginning. At the end of the unit, they will do a self-reflection, which includes re-taking the self-assessment and identifying their strengths, areas that need improvement, and actions to take. Explain that self-assessment is not a test!

Learning Outcome 4.1: Select site

Objectives: By the end of this topic, trainees will be able to:

a. Identify the criteria to select a site for a poultry house.

b. Assess weather parameters for poultry farming.

c. Be careful and aware of the risks during site selection for poultry houses.

Time Required: 3 hours

Learning Methodology: Brainstorming, large group discussion, small group discussion, individual work, peer-to-peer learning, and field work

Materials Needed:

- **Standard training materials -** flip chart, markers, black/white board, chalk, tape, A4 paper, pens
- **Measurement tools --** topographic maps, thermometer, hygrometer, anemometer
- **Soil sample**
- **Visual and learning materials --** stack of drawing papers, images of possible site locations, index cards with possible site details (average temperature, wind direction, precipitation, etc.)

Preparation:

- ❑ Prepare all materials in advance (thermometer, hygrometer, images, soil sample, index cards with site information, drawing paper).
- ❑ Read all scenarios, questions, and answers in the tasks and assessment in advance.
- ❑ Identify and reserve a plot of land near the school for practical application.

Cross Cutting Issues:

- ✔ **Environment and Sustainability**: The site for poultry houses should not cause the pollution to environment and should maintain a healthy balance within the surrounding ecosystems.
- ✔ **Standardisation Culture:** When selecting a site for a poultry house, a farmer must be aware of and follow the current standards as well as understand why such standards are in place.

Prerequisites:

- Basic Mathematics: Arithmetic calculations

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify the criteria to select a good location for poultry house construction.	**1.** Select a good place for poultry house construction.	**1.** Risk awareness
2. Identify the soil conditions for poultry house construction.	**2.** Select the soil structure for poultry house construction.	**2.** Observant
3. Explain the role of evaluating weather parameters for poultry houses.	**3.** Assess weather parameters for poultry house construction.	**3.** Attentive

Steps:

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

1. To attract the attention of the trainees, inform them that you are going to talk about an interesting topic because it relates to a delicious food that many of them eat. Direct them to **Topic 4.1 Task 1** in their manuals.

2. As a group, ask the trainees to brainstorm responses to the following questions:
   - **a.** How many of you have eaten eggs before?
   - **b.** What do you think some of the steps are before the egg arrives on your plate for you to eat?
   - **c.** In what ways do you think chicken (poultry) farming is similar to the other animals we have discussed in class?
   - **d.** You have likely seen chicken/poultry houses before. What were the sites like where the poultry houses were location?

3. Ask a few volunteers to share their ideas and write the ideas on the board/flipchart. Encourage trainees to discover what topic they are going to learn.

4. Introduce the topic and ask the trainees to turn to the Key Competencies table in their trainee manuals to see what they will gain from the topic and review it together (considering their expectations). Explain that this topic will focus on selecting a site for poultry house construction.

 Problem Solving Activity

Inform the trainees that they are going to do an activity in groups.

1. Form groups of trainees (four or five people in each group) and choose a group leader for each group.

2. Refer trainees to **Topic 4.1 Task 2** in their manuals and ask everyone to be attentive while you read the scenario out loud to the class:

   Youth Cooperative in Kigali City is proud to be a role model in rural development. Youth Cooperative received grant money to start poultry farming. They do not know how to select a site for poultry houses.

   They make the following decisions:
   - **a.** Because they need water, they decide to locate the poultry houses beside a nearby lake.
   - **b.** Chickens are small, so they decide to build the houses on top of their building in Kigali.
   - **c.** They have seen chickens in their community before, so they don't check the weather parameters. The chickens have feathers, so they will be warm.

3. Ask each group to think about what they know about laws, regulations, and best practices for selecting a site for animal shelters. Then, ask them to answer the following questions with their groups while group leaders write their responses:

   - **a.** What recommendations do you have for Youth Cooperative about their three decisions (**parts a, b, and c**)?
   - **b.** What could happen to the poultry house grant project if the group continues to make decisions without the proper education?

4. Ask the group leaders to take turns sharing the answers. While each group is presenting, ask a volunteer to write the answers on the board/flipchart and the rest of class can ask questions and give comments.

5. After all groups have presented, allow trainees to add other ideas that are missing and remind them that they will return to this activity to revise their work after reading through **4.1 Key Facts.**

Guided Practice Activity

Prepare in advance the materials to use for **Part 2** of this activity: thermometer, hygrometer, anenometer, compass, writing/drawing materials, drawing papers, and images of topography.

Part 1:

1. In their groups, tell the trainees to read through **4.1 Key Facts** and revise their answers from the **Problem Solving Activity**.

2. Ask several trainees to share what revisions they made to their answers after reading through **4.1 Key Facts.**
   Possible Answers:
   a. Before putting the poultry houses near a lake, they need to check current laws and regulations because it may be too close to that water source.
   b. On urban land, they need to have permission before building any animal shelters. If the houses are in Kigali City, they also need to be careful of the noise and vibration from construction projects around the city. It may be harmful to the chickens.
   c. Optimum climatic parameters vary with types of poultry, types of production, and age. They need to check climatic parameters and be certain of the types of poultry and production they are doing.

   Possible Answer: They could lose their grant money and the project could not happen if they do not properly measure and plan each step of the process.

3. Now, read through **4.1 Key Facts** one more time out loud to the class and ask questions along the way to ensure the trainees understand the terminology and content.

Part 2:

1. Provide the images of different types of topography (plains and plateaus, valleys, swamps, glaciers, mountains and hills) to the students.

2. Refer to the following scenario from **Topic 4.1 Task 3** in the trainee manuals and the related questions:
   After being convinced that poultry farming is a great way to generate income, many of the unemployed youth in one village have decided to start a community poultry farm. You and your colleagues have been asked to provide a training pamphlet (book, manual, brochure) to the youth of this village that shows the proper steps and helpful tips to select a good site for poultry farming.

   Help the youth of this village by making a pamphlet IN YOUR OWN WORDS with the following information:

   a. Directions on how to measure the climatic parameters using a thermometer, a hygrometer, and an anemometer.
   b. Three important laws and regulations to follow and what could happen if you don't follow them properly.
   c. Illustrations of the types of topography and information about which ones you could use for building animal shelters in Rwanda.
   d. Explanation of why good air circulation in poultry houses is essential and why natural air flow should not be interrupted.

3. Give trainees time to discuss and make their pamphlets. Move around to each group to motivate the trainees to participate and encourage them to make a high quality pamphlet.
   a. Pamphlets should use detail, be original, be artistic to help the youth understand, and accurately based on **4.1 Key Facts**. Make sure that the materials are being used correctly and give support as needed.

4. After all groups have finished their discussions and prepared their pamphlets, tell them to give their pamphlets to another group.

5. Each group will present another group's pamphlet to the class. During this time, ask the groups questions and encourage them to make comments and ask questions to the presenting group.

6. When the presentations are finished, thank the groups and offer your feedback and observations.

 Application Activity

Prepare a visit to a field/site in advance.

Inform the trainees that they are now going to do another activity to apply what we've practiced in the classroom.

1. Bring the trainees to the field.

2. Form small groups and nominate group leaders for each group.

3. Tell each group to imagine that the site they are standing on is where a farmer wants to construct a poultry house and give them the following tasks found in **Topic 4.1 Task 4** in their manuals:
   a. Look at your surrounding environment and select a good place for poultry house construction. Explain why you chose this specific location.
   b. Evaluate the soil structure and predict how it will have the impact on the poultry house construction activities. Record your findings.
   c. Observe the topography and explain how it could impact poultry house construction activities.
   d. Assess the current weather parameters (wind speed, wind direction, temperature and humidity). Are they suitable for poultry farming?
   e. Explain what other facilities the farmer may need at the selected site.
   f. Explain how animal waste will impact the environment.

4. Provide each group with weather measurement tools to measure wind (direction and speed), temperature, precipitation, and humidity.

5. Provide each group enough time and ensure all trainees are participating.

6. After the groups have finished, bring everyone together. One by one, ask the group leaders to present what each group discussed and recorded. Encourage the trainees to provide feedback and comment on the other groups' findings.

7. Thank the trainees and give your observations and feedback.

Points to Remember

- Well-drained land is an important feature of a good poultry house, especially when litter systems will be used.
- Poultry house sites should be within sight of the owner/supervising personnel and away from other chicken houses to reduce the spread of diseases.
- In hot climates, you should cast shade on the roof, such as by located the house near tall trees.
- Poultry houses should not interrupt the natural air flow/wind and should not allow direct sunlight to enter the house. They should therefore be constructed in the east-west direction.
- Access to a good road for transportation and a clean running water supply are essential to successful poultry houses.

Formative Assessment

Explain that the following assessment is individual. Tell the trainees to carefully read the instructions and respond to the questions.

1. What are three characteristics of a good site for poultry house construction?
   1.
   2.
   3.

2. Why is it important to check weather parameters for poultry farming?

3. Answer with True or False and explain.
   a. Animal waste is harmful when they are not well managed.

4. Which facilities are needed at the site of poultry farming?

5. List the types of topography suitable for construction of poultry houses in Rwanda.

Answers:

1. **Possible Answers**: Government laws; distance to water source, swamps, marshland, and human habitation; friendly and safe neighbourhood; security--not a lot of noise and vibrations, not too far from other communities; available facilities, including accessible roads, running water supply, and reliable electricity

2. **Possible Answer**: To ensure good heat dissipation (spread) by minimal radiation, air temperature, humidity, and maximal air velocity. To prevent of diseases (natural air circulation brings in oxygen which removes bad air and moisture; high humidity favours microbes and diseases). To determine the construction materials and sizes of walls and openings (based on speed and direction of prevailing wind, precipitation, and temperature).

3. True because if you do not dispose of it, it could pollute the ground water, cause bad odours, and spread diseases.

4. Accessible roads, running water supply, reliable electricity

5. See **4.1 Key Facts.**

Learning Outcome 4.2: Organise construction

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

a. Identify the different types of poultry houses.

b. Select construction materials for poultry houses.

c. Be careful in selecting types of poultry houses and construction materials.

Time Required: 3 hours

Learning Methodology: Brainstorming, large group discussion, small group discussion, individual work, peer-to-peer learning, and field visits

Materials Needed:

- **Standard training materials --** flip chart, markers, black/white board, chalk, tape, A4 paper, pens
- **Measurement tools --** calculator, tape measure
- **Visual and learning materials --** images of types of poultry houses

Preparation:

- ❑ Prepare all materials in advance (calculator, tape measure, images of type of poultry houses, flipchart, etc.)
- ❑ Read all scenarios, questions, and answers to the tasks and assessment in advance.
- ❑ Organise a visit to a farmer/poultry farm for practice.

Cross Cutting Issues:

- ✔ **Financial Education**: When selecting materials selection for construction, a farmer must focus on low cost yet dependable materials to ensure the integrity of his/her farm while avoiding high out of pocket expenses.
- ✔ **Standardisation Culture:** Emphasize the importance of using measuring tools to properly assess the poultry house construction parameters.

Prerequisites:

- ❑ Basic Mathematics: Arithmetic calculations

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify different types of poultry houses.	**1.** Select a good type of poultry house.	**1.** Willingness
2. Identify facilities needed for poultry farming.	**2.** Select construction materials for poultry houses.	**2.** Proactive
3. Identify materials for poultry house construction.	**3.** Supervise the construction of poultry houses.	**3.** Careful

Steps:

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

Try to evaluate the existing knowledge of trainees on poultry house construction.

1. Inform the trainees that poultry farming has many advantages, and that is why it is preferred by many farmers, especially in rural areas. Like other types of animal shelters, poultry houses must be carefully planned and organized before operating.

2. Refer trainees to **Topic 4.2 Task 1** in their manuals. Tell them to brainstorm all the different types of materials they think are available and useful in Rwanda for poultry farming. Encourage trainees to call out ideas and ask a volunteer to write them on the board/flipchart for the class to observe.

3. Introduce the topic and ask trainees to look at the Key Competencies table in their manuals to see what they will gain from the topic and review it together (considering their expectations).

4. Explain that this topic will focus on organizing poultry house construction.

Problem Solving Activity

1. Inform the trainees that they are going to do an activity where they will use their previously learned knowledge to predict how to organise a poultry house.

2. Put the trainees in small groups (of about 5 trainees) and choose a volunteer in each group to be the group leader.

3. Read the following scenario from **Topic 4.2 Task 2** in the Trainee Manual:

   Your close friend, Claudine, recently found out how profitable poultry farming can be and decided to start chicken farming. She has managed to select a good site, but she needs help understanding the roles of some of the different components for poultry houses. Using the information you have learned for other types of animals, make an educated guess about what the purposes are for the following types of house components:

   a. Brooder House:
   b. Grower House:
   c. Broiler House:
   d. Layer House:
   e. Hatchery:

4. Ask each group to discuss and write their predictions down. Make sure that all trainees participate. After group discussions, ask the group leaders to share the answers from their groups. Write the answers on the board/flipchart.

5. Give the trainees time to add comments to the answers.

6. Give your observations and explain that the class will return to this activity to revise their predictions based on the information they read and discuss in **4.2 Key Facts**.

Guided Practice Activity

1. Direct the trainees to read through **4.2 Key Facts** and revise their responses from the **Problem Solving Activity**. Ask trainees to share their revisions to their answers.

2. Read all of **4.2 Key Facts** out loud to the class. Pause after each fact to ask questions and make sure the trainees understand the terminology used.

3. Now, separate trainees into groups of five and choose a group leader. Refer them to the following scenario from **Topic 4.2 Task 3**:

Mr. Munyakazi is a poultry farmer in Kamonyi. He already has turkeys, guinea fowl, and squabs (pigeons). He wants to add geese, ducks, and chickens. The chickens will be reared only for egg production (after importation of 1200 one day old chicks), and the other birds will be reared for meat. He has selected land as a site for new poultry houses and each species will have separate houses. He approaches you to guide him in the construction of these houses.

4. Tell each group to do the following tasks, using **4.2 Key Facts** for guidance:
- **a.** Identify the poultry houses needed on his farm.
- **b.** List the construction materials used to construct poultry houses that are available in the region.
- **c.** Demonstrate the stocking density to respect in those poultry houses.
- **d.** Calculate the minimum space needed for chicken houses.

6. Provide enough time for discussions and give any support needed as you walk around the room.

7. After group discussions, instruct each group leader to write their answers (including formulas for calculations) on the board/flipchart and encourage others to comment and/or correct answers under your moderation.

8. Thank the groups and provide your observations and feedback.

Answers to Question 4:

a. Poultry houses needed: Refer to **4.2 Key Facts**.

b. Available construction materials for poultry houses: wood, metal, bricks, stones, gravel, sand, cement, iron sheets, nails, wire mesh

c. Stocking density in poultry houses: Refer to **4.2 Key Facts**.

d. Minimum space needed for chickens: $1200 \times ¼\ m^2 = 300\ m^2$

Application Activity

Organise a visit to a poultry farm in advance.

1. Explain to the trainees that they are going to visit a poultry farm to apply what they have learned and practiced in the classroom.

2. Bring the trainees to the poultry farm and introduce them to the farmer and any workers present. Give instructions on proper behaviour on a poultry farm, such as avoid making loud noises, disinfect your shoes when needed, etc.

3. Form small groups of five trainees and nominate group leaders for each group.

4. Refer trainees to **Topic 4.2 Task 4** in their manuals. Provide the following tasks to the groups:
   a. Observe the design and orientation of the poultry houses and provide your comments.
   b. Identify the types of poultry houses and construction materials used.
   c. Ask the farmer for the number of poultry in each house and calculate the surface area of the house (using a tape measure) to calculate the stocking density and give comments.

5. Provide time for a group discussion and ensure all trainees are participating. With the farmer, provide all necessary support to the trainees.

6. When the groups have finished their tasks, bring everyone together. Tell the group leaders to give a presentation on their findings as the other trainees comment and provide feedback.

7. Give time to trainees to provide any recommendation they have for ways to improve the farm.

8. Give your observations and feedback considering the situation of the farm.

9. Thank the trainees for their active participation and thank the farmer for his/her help.

Points to Remember

- Be sure to construct houses in a way that protect birds from adverse weather conditions and facilitates proper micro-weather conditions
- Prioritize an easy and economic (cost effective) operation whenever possible.
- Ensure scientific feeding in a controlled manner, effective disease control measures, and proper supervision.

Formative Assessment

Explain that the following assessment is individual. Tell the trainees to carefully read the instructions and respond to the questions.

1. What is an advantage of providing poultry with a run?

2. What are four poultry house components (facilities) needed in poultry farming? Explain their roles.
   1.
   2.
   3.
   4.

3. What are three general characteristics of a good poultry house?
   1.
   2.
   3.

4. Answer with True or False.
   The following are included in poultry:
   a. Chicken
   b. Turkeys
   c. Pig
   d. Pigeon (squab)
   e. Geese

5. Circle the wrong answer(s).
Stocking density in poultry is based on:
- **a.** Species
- **b.** Age
- **c.** Type of production
- **d.** Type of floor
- **e.** Type of poultry house

Answers:

1. Runs allow your birds to run, exercise, and be free to move around.

2. Any answers from **4.2 Key Facts -- Poultry house components (facilities).**

3. A good poultry house must be able to do the following: Protect birds from adverse weather conditions. Ensure easy and economic (cost effective) operation. Ensure scientific feeding in a controlled manner. Facilitate proper micro-weather conditions for the birds. Ensure effective disease control measures. Ensure proper supervision.

4. a. True
b. True
c. False
d. True
e. True

5. Refer to **4.2 Key Facts**.

Learning Outcome 4.3: Equip poultry house

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

a. Identify different equipment to use on a poultry farm.

b. Install and test common equipment used on poultry farms.

c. Be methodical when installing and testing the equipment on a poultry farm.

Time Required: 3 hours

Learning Methodology: Brainstorming, small group discussion, large group discussion, peer-to-peer learning, individual work, and farm visits

Materials Needed:

- **Standard training materials --** flip chart, markers, black/white board, chalk, tape, A4 paper, pens
- **Sample equipment –** feeders, drinkers, heaters, laying nests, safety and handling equipment (gloves and goggles), cleaning and disinfection equipment
- **Visual and learning materials --** printed images (if possible) of the equipment detailed in this topic

Preparation:

- ❑ Prepare all materials and equipment in advance.
- ❑ Read all scenarios, questions, and answers to the tasks and assessment in advance.
- ❑ Contact a poultry farmer to visit in advance and confirm that the farm has equipment for trainees to practice with and observe.

Cross Cutting Issues:

- ✔ **Financial Education**: When selecting equipment, give priority to low cost and durable materials/equipment in order to save money.
- ✔ **Standardisation Culture:** Emphasize the proper select use of equipment for the poultry house to promote animal welfare and productivity.

Prerequisites:

- Basic Animal Biology/Physiology

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify the equipment to use in poultry farming.	**1.** Select equipment to use on a poultry farm.	**1.** Careful
2. Explain the role of equipment used in poultry farming.	**2.** Install the equipment on a poultry farm.	**2.** Methodical
3. Allocate equipment on a poultry farm.	**3.** Test the equipment installed on a poultry farm.	**3.** Risk aware

Steps:

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

1. To activate the trainees' knowledge and curiosity, ask them to brainstorm responses to the following with a partner, which can be found in **Topic 4.3 Task 1** in their manuals:

   a. Similarities between ruminants, pigs, rabbits, and poultry
   Possible Answers: All are warm blooded; all produce food

   b. Differences between ruminants, pigs, rabbits, and poultry
   Possible Answers: Rabbits and poultry are smaller and weaker than ruminants and pigs; ruminants need more land and resources; poultry provide eggs

   c. Equipment ruminants and rabbits both need
   Possible Answers: Feeders, drinkers, troughs, cages/hutches, pig boards, hoppers, crocks, littering boxes, sprayers, choppers

   d. Types of equipment that poultry may need
   Possible Answers: Cages, drinkers, feeders, heaters, litter

2. As trainees provide ideas, ask them guiding questions to activate prior knowledge.
   a. Example questions:
      - Do you remember what a chopper does and for which animals they are needed?

Answer: Ruminants. Choppers help cut the food up and help them digest it.

- What about crocks? What are they and which animal needs them?

Answer: Crocks are small dishes that carry food or water. They are for rabbits.

3. Ask two trainees to write the ideas on the board/flipchart. Ask trainees to discover what topic they are going to learn.

4. Introduce the topic and ask the trainees to turn to the Key Competencies table in their trainee manuals to see what they will gain from the topic and review it together (considering their expectations). Explain that this topic will focus on properly equipping poultry houses

Problem Solving Activity

Inform the trainees that they are going to do another activity in groups.

1. Divide the trainees into groups of three.

2. Either place pieces of equipment around the room or post images of equipment on the walls around the room. Label the equipment: A, B, C, D, etc.

3. Refer trainees to **Topic 4.3 Task 2** in their manuals. Tell trains that they will have five minutes at each piece of equipment/image of equipment to discuss and come to a consensus (all agree) on the following:

a. Equipment's name
b. Equipment's role & importance
c. Equipment's location on a poultry farm

4. After five minutes, tell the groups to move to another piece/image of equipment and repeat the process from **Question 3** until all groups have visited each piece of equipment.

5. During this time, move around the room and help facilitate discussion among trainees.

6. After each group has discussed and recorded the information needed, bring everyone together and present each group's findings.

7. During presentations, encourage others to comment (do they agree/disagree) and ask questions.

8. Remind trainees that after **4.3 Key Facts** are discussed as a class, they will go back and revise their responses.

Guided Practice Activity

Prepare equipment to use for practice (feeder, drinker, footbath, thermometer, and hygrometer) in advance.

1. Read through **4.3 Key Facts** with the class, pausing after each fact so that the trainees can ask questions and you can help them understand the terminology used.

2. Instruct trainees to go back to the **Problem Solving Activity** (**Topic 4.3 Task 2**) and change any answers that were incorrect or missing information.
   a. **Note**: Answers that may need revisions because they are new material are heater, perch, footbath, and laying nest

3. Ask the trainees to share their revisions and check by asking them to share with the class.

4. Ask the trainees to be attentive for the next activity. Tell them to return to their groups from the previous activity and refer to **Topic 4.3 Task 3** in their manuals. Provide each group with one piece of equipment used in poultry farming. Using this piece of equipment, tell the groups to do the following tasks:
   a. Observe the pictures A (A_1 and A_2), B, C, D, E, F and give the common names of each piece of equipment.
   b. Explain the use of each equipment (A, B, C, D, E, F).
   c. Determine the location of each piece of equipment on a poultry farm.
   d. Discuss and practice with your group how to install and use the equipment you have been given.

5. Give enough time for a group discussion. Move around to each group to give the support where needed, especially with **part d**. Ensure that they know how to use the

equipment and install it, so that at the end of the activity they can explain to the class how to install and use it.

6. Ask the group leaders to present their group's answers. Direct all trainees to pay attention because each group will demonstrate how to install and explain how to use a piece of equipment.

7. At the end, you give your observations and feedback to each group.

Answers to Question 4:

a. A= Feeder
B= Drinker
C= Perch
D= Battery Cage
E= Foot bath
F = Heater lamp/heat bulb

b. Refer to **4.3 Key Facts**

c. Refer to **4.3 Key Facts**

d. Closely monitor how the equipment is being installed and used. Make sure that all trainees get opportunity to experience the installation and use of each equipment.

Application Activity

Organise a visit to a poultry farm in advance. On the day of the field visit:

1. Bring the trainees to the poultry farm and introduce them to the farmer and any other workers present.

2. For this activity, assign each trainee a partner. Tell each group to do the following tasks:
   a. Look around the poultry farm and identify the equipment you see.
   b. Explain and confirm the importance of each piece of equipment to the farmer.
   c. Mention the equipment that is missing and ask the farmer if he/she has it somewhere else.
   d. After getting the permission from the farmer, remove some equipment and explain to your partner how to install it, use it, and where to place it on the farm.

e. Demonstrate to your partner how to use the equipment you have chosen to make sure that it functions properly.

3. During this time, move around listening to the trainees explain, observing their participation, and providing your input and assistance where necessary. The farmer should do the same.

4. At the end of the activity, you and the farmer should choose 3 to 4 teams to share/demonstrate their answers from **Question 2** to the rest of the trainees. Encourage others to ask questions and provide feedback.

5. At the end, you give your observations and thank the farmer for his/her help.

Points to Remember

- The most essential pieces of equipment in poultry farms are feeders, drinkers, laying nests, perches, heaters, thermometers, hygrometers, cleaning and disinfection materials (wheelbarrow, pail, broom, floor squeegee, sprayer, PPE), and footbaths.

- Cages are preferable because they result in fewer parasitic diseases, higher egg weights, higher body weight gain, easier selection during culling (process of removing inferior, sick, or injured chickens from the flock whenever you spot them), and less noise for poultry.

Formative Assessment

Explain that the following assessment is individual. Tell the trainees to carefully read the instructions and respond to the questions.

1. What are three of the most important pieces of equipment used on a poultry farm?
   1.
   2.
   3.

2. Explain the location and role of:
   a. Laying nests:

b. Perches:

c. Foot baths:

3. Choose the correct answer.
A hygrometer is used to measure:
a. Ammonia
b. Temperature
c. Humidity
d. Ventilation

4. Explain why it is important to always know the temperature and humidity in a poultry house.

5. Complete the following sentence:
a. Using cages on a poultry farm is preferable because _____.

Answers:

1. See **4.3 Key Facts.**

2. **Laying nests** are in the layer poultry house. They are littered boxes in which the eggs are laid (when the hens are not in cages).
Perches are in grower and adult poultry houses. They are horizontal fixed sticks which serve as a resting place for nervous birds or during night.
Footbaths are placed at the entrances of the poultry houses for the farmers/workers to disinfect their shoes/boots/feet after walking around on the poultry farm. This is an easy and effective way to stop the spread of bacteria and diseases.

3. C

4. A farmer should always know the temperature inside of his/her poultry houses/farms because birds can easily get too warm or too cold. A farmer must always know the humidity (moisture/water in the air inside of his/her poultry houses because too little moisture can result in dehydration and respiratory illness. Too much moisture leads to litter clumping and ammonia, which causes problems ranging from blindness to poor flock uniformity.

5. See **4.3 Key Facts.**

Learning Outcome 4.4: Maintain poultry house

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

a. State the role of maintenance and the components to maintain on a poultry farm.

b. Establish and implement a maintenance plan of poultry houses and equipment.

c. Be observant and attentive in the evaluation of a poultry house's status.

Time Required: 3 hours

Learning Methodology: Brainstorming, individual work, large group discussion, small group discussion, peer to peer learning, and field work

Materials Needed:

- **Standard training materials --** flip chart, markers, black/white board, chalk, tape, A4 paper, pens
- **Sample maintenance equipment and materials --** Metric hex key, screwdriver, PPE, hummer, nails

Preparation:

- ❑ Prepare all materials, including drinkers and feeders for trainees to practice with, in advance.
- ❑ Read all scenarios, questions, and answers to the tasks and assessment in advance.
- ❑ Contact the farmer for field work and verify he/she has maintenance activities the trainees can assist with on the farm, specifically, cleaning, littering, and liming.

Cross Cutting Issues:

- ✔ **Financial Education**: When maintaining poultry houses, a farmer should focus on low cost and durable materials, recycling, and repurposing what they can to avoid high out of pocket expenses.
- ✔ **Environment and Sustainability**: When changing the litter on a poultry farm, efforts should be taken to contribute to compost and recycle/reduce the waste output of the farm.

Prerequisites:

- Basic Math: arithmetic calculations
- Basic knowledge of amortization

Key Competencies:

Knowledge	Skills	Attitudes
1. Explain the role of maintenance in poultry farming.	**1.** Evaluate the status of poultry houses and equipment.	**1.** Attentive
2. Identify the components of poultry houses to evaluate for maintenance.	**2.** Establish a maintenance plan for a poultry farm.	**2.** Observant
3. Identify maintenance activities on a poultry farm.	**3.** Implement a maintenance plan on a poultry farm.	**3.** Resourceful

Steps:

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

1. Remind the trainees that you are still learning about poultry shelters. Then, read the scenario and associated questions found in **Topic 4.4 Task 1** in the trainee manuals:

Businesses are more profitable when they last for a long time. The same is true for poultry farming. It is important to perform routine maintenance so that the farmer can earn back the money that he/she invested into his/her farm.

2. Tell trainees to suppose that they are farmers and brainstorm three important activities that they think should go into a maintenance plan and why they chose those activities.

3. As trainees brainstorm those activities, write their ideas on the board/flipchart.

4. Ask trainees to observe the brainstormed answers and discover the topic they are going to learn.

5. Introduce the topic and ask trainees to turn to the Key Competencies table in their manuals to see what they will gain from the learning outcome and review it together. Explain that this topic will focus on the maintenance of poultry houses and equipment.

Problem Solving Activity

1. Inform the trainees that they will do a group activity, then form groups of about five trainees and have each team choose a group leader.

2. Ask them to be attentive and read them the scenario from **Topic 4.4 Task 2** in their manuals along with the following questions:

   A group of youth volunteers is committed to speeding up rural development through agribusiness. They decide to apply for grant money to organize and operate a poultry farm. They organize the training of beneficiaries on poultry farming but they realize that they lack some knowledge on poultry maintenance. Their application for the grant money needs a detailed plan of how they will maintain their farm and equipment. The youth know that you are studying livestock production and they request your support. They want you to write a draft of a maintenance plan that includes the following:
   - **a.** Daily maintenance tasks
   - **b.** Weekly maintenance tasks with examples
   - **c.** Monthly maintenance tasks
   - **d.** Annual maintenance tasks
   - **e.** A brief explanation of the role that routine maintenance will have on this poultry farm (2-3 sentences)

3. Give enough time to the groups to discuss. Move around the groups to give any clarification or support needed.

4. Ask some of the group leaders to write their answers for each question on the board/flipchart while other groups add their comments and feedback.

5. Inform the trainees that much of this information is passed on from previous units. However, there are some changes because the focus is poultry now. Inform the trainees that after the class reads and discusses **4.4 Key Facts,** they will go back and revise their responses for this activity.

Guided Practice Activity

Part 1:

1. Direct the trainees to read through **4.4 Key Facts** with a partner and revise their answers to the **Problem Solving Activity** from **Topic 4.4 Task 2** in their manuals. New content in this unit that may need to be revised includes littering, composting, and cleaning cages.

2. Ask trainees to share their revisions with the class. Add your comments and feedback as needed.

3. Next, read through **4.4 Key Facts** (not the **Reading Comprehension** section) with the class, pausing after each one to encourage them to ask questions and make sure they understand the terminology.

Part 2:

1. Now, inform the trainees that they are going to practice their reading comprehension, specifically about cleaning and disinfecting poultry houses.

2. Assign each trainee to a partner. Tell the partners to take turns reading the **Reading Comprehension** section in **4.4 Key Facts**. Then, they should answer the following questions using the information given:
   - **a.** After you completely clean out a poultry house, what should you do with the old litter?
   - **b.** Why is it important to mop/squeegee puddles immediately after washing?
   - **c.** What are the three steps of wet cleaning and why are they important?
   - **d.** Why do you think it is important to turn off the power before wet cleaning?

3. After the trainees have had time to discuss and record their answers, ask several pairs of trainees to share their answers while the other trainees provide comments and feedback.

Answers:

- **a.** All old litter should be removed. Litter can be added to a compost pile and recycled.
- **b.** It is important to mop/squeegee immediately after washing because bacteria can spread easily through puddles left on the floor.

c. The three steps of wet cleaning are: soaking, washing, and rinsing. These steps are important because thoroughly cleaning can help stop the spread of diseases and help maintain a good image of your poultry farm within the community.

d. It is important to turn off the power before wet cleaning because you could get electrocuted/shocked if you leave the electricity turned on.

Part 3:

Prepare in advance the materials to use for practice (at least 2 drinkers and 2 feeders - most frequently used equipment in poultry houses).

1. Ask two trainees to stand up and demonstrate how to inspect and evaluate a feeder and drinker for maintenance.
   a. Consider: Is it clean? Is it damaged? Is it functioning properly?
   b. Inspect every side of it. Look for dents, scrapes, and broken pieces. Is there clogged food or built up residue from old food or water?

2. Ask the trainees to make four groups and provide each group with one piece of equipment to maintain.

3. Tell the trainees to suppose that they are preparing to do field work to train farm workers on the best practices for maintenance. Tell each group to discuss and perform the following:
   a. Explain why the farmer should apply lime to the litter of a poultry farm.
   b. Explain how to inspect litter and decide when it is time for it to be changed.
   c. Using the equipment in your classroom, practice and demonstrate to your colleagues how to inspect and evaluate a feeder and drinker for maintenance.

4. Provide enough time to the groups to work on the tasks. Move around the groups to give any support needed and make sure that all group members are participating and properly handling the equipment.

5. Ask volunteers from each group to present their answers.

6. Give time to the class to comment on presentations and then, give your observations/feedback.

Answers:

a. Refer to **4.4 Key Facts.**

b. Refer to **4.4 Key Facts**.

c. Make sure that the equipment is inspected and evaluated/disassembled correctly, and that trainees explain how to clean the equipment.

Application Activity

Prepare a visit to a poultry house for field work in advance.

On the day of the visit:

1. Bring the trainees to the poultry farm and introduce them to the farmer and any workers present.

2. Explain to the farmer that they are going to apply what they have learned in the classroom by assisting him with maintenance activities.

3. Form small groups (of about five trainees) and choose a group leader for each group.

4. Explain the tasks for all groups, found in **Topic 4.1 Task 4** in their manuals:

- **a.** Inspect the poultry house and equipment, evaluate their status and explain your observations.
- **b.** Ask to the farmer to give you the opportunity to participate in:
  - Cleaning
  - Littering
  - Liming
  - Painting
  - Repairing

5. Provide the trainees with time to work in groups and move around the area with the farmer to give any needed support.

6. After the groups have finished, bring everyone together and ask each group leader share their findings and what they have done. Tell trainees to make general comments and provide your own observations/feedback.

7. Thank the farmer for his/her help.

Points to Remember

- Maintenance helps extend the shelf life of construction materials and equipment.
- Elaboration and respect of maintenance plan is key.
- Any damages should be repaired as soon as possible.
- Hygiene is very important to prevent diseases and succeed in poultry farming.

Formative Assessment

Explain that the following assessment is individual. Tell the trainees to carefully read the instructions and respond to the questions.

1. Explain the role of maintenance in poultry farming.

2. What are the components of a poultry farm to evaluate during maintenance?

3. List two of the most important hygienic activities and explain their roles.
1.

2.

4. Answer with True or False.
The types of maintenance in poultry house are:
a. Day to day repair
b. Treatment of sick poultry
c. Annual repair
d. Special repair
e. Additions and alterations
f. Preventive maintenance
g. Disinfection

5. Explain why you think it is important to recycle and compost old litter.

Answers:

1. Maintenance on a poultry farm helps extend the life of the equipment and the animals and helps maintain a good image of the farm within the community.
2. See **4.4 Key Facts.**
3. **Possible Answers**: Cleaning & disinfecting, littering, liming, and painting. See **4.4 Key Facts** for their roles.
4. a. True
   b. False
   c. True
   d. True
   e. True
   f. True
   g. False
5. Answers should include information about environmental conservation, reducing build of waste and pollution, and fertilizing soils and crops.

Self-Reflection

1. Ask the trainees to re-take the self-assessment they took at the beginning of the unit. They should then fill in the table in the Trainee Manual to identify their areas of strength, areas for improvement, and actions to take to improve.

2. Discuss trainees' results with them. Identify any areas that are giving many trainees difficulties and plan to give additional support as needed (ex. use class time before you begin the next learning outcome to go through commonly identified difficult concepts).

Further Information for the Trainer

1. Cleaning and Disinfecting Your Poultry House. (2019, April 15). Retrieved December 20, 2019, from https://smallfarms.cornell.edu/2014/04/cleaning-and-disinfecting-your-poultry-house.
2. Poultry Litter Management. (2019, December 16). Retrieved December 20, 2019, fromhttps://thepoultrysite.com/articles/poultry-litter-management.

Summative Assessment

Inform the trainees that they are going to do a summative assessment:

1. Make sure that all resources are present.

2. Make sure that the working space is well prepared.

3. Ask them to read the situation and to perform the tasks as indicated, then assess them using the checklist (provided after the situation).

4.

Integrated Situation	Resources
Gasana is farmer in Kamonyi district, Rukoma sector, Remera cell. He works in the field of poultry farming. He has three old poultry houses with a capacity of 1000 layers. The status of the poultry houses is negatively affecting egg production. He wants to do maintenance on them and repair them. In addition, he has a contract for supplying double the quantity of eggs, so he plans to build a new poultry house with a capacity of 2000 layers. At the same time, he has a contract for supplying poultry meat to a hostel. He plans to build a new poultry house for 2000 broilers. As a professional in poultry farming, he asks you to help him establish the new poultry houses and maintain the existing ones. To perform the said tasks, you should follow measures mentioned below: - For broilers: 10 chickens per m^2 - For layers: 5 chickens per m^2 **The following activities need to be demonstrated within 3 hours in order to advise Gasana about his shelter construction and maintenance:**	– PPE – Papers – Pen – Pencil – Henhouse – Drinker – Feeder – Heater – Lime – Litter – Disinfectant – Meter (tape measure) – Nest for layers – Anemometer – Hygrometer – Compass – Thermometer

- ✓ Sketch the infrastructure and facilities for the two new poultry houses
- ✓ Select the construction materials
- ✓ Select the needed equipment
- ✓ Write a maintenance plan for the old poultry house
- ✓ Confirm that all the materials and tools are in place

Assessment Criterion 1: Quality of Process

Checklist	Score	
	Yes	No
Indicator 1: The site is correctly located		
✓ Government laws		
✓ Friendly neighbourhood		
✓ Security		
✓ Available facilities		
Indicator 2: The soil characteristics are well determined		
✓ Topography		
✓ Soil structure		
✓ Sewage disposal		
✓ Presence of groundwater		
Indicator 3: Weather factors are considered		
✓ Wind direction		
✓ Natural Light		
✓ Temperature		
✓ Precipitation		
Indicator 4: Poultry farm facilities are identified		
✓ Starters facilities		
✓ Layers facilities		
✓ Broilers facilities		
Indicator 5: Construction materials are correctly selected		
✓ Availability		
✓ Cost		
✓ Technology		
✓ Durability		
✓ Strength		

✓ Wood or timber		
✓ Stones		
✓ Bricks		
Indicator 6: Construction activities are properly organized/prepared		
✓ Stocktaking: stocking density well calculated		
Indicator 7: Equipment based on farming requirements are well identified		
✓ Feeders		
✓ Drinkers		
✓ Laying nests		
✓ Perch		
✓ Cages		
✓ Heaters		
Indicator 8: Equipment are correctly tested		
✓ Feeders		
✓ Drinkers		
✓ Laying nests		
✓ Perch		
✓ Cages		
✓ Heaters		
Indicator 9: Equipment are correctly installed		
✓ Feeders		
✓ Drinkers		
✓ Laying nests		
✓ Perch		
✓ Cages		
✓ Heaters		
Indicator 10: Poultry house status is correctly evaluated		
✓ Roof		
✓ Floor		
✓ Walls		
✓ Annexes		
Indicator 11: Maintenance plan is properly established		
✓ Roof		
✓ Floor		
✓ Walls		
✓ Annexes		

Indicator 12: Maintenance plan is properly implemented		
✓ Roof		
✓ Floor		
✓ Walls		
✓ Annexes		
Observation		

Assessment Criterion 2: Quality of Product

Checklist	Score	
	Yes	No
Indicator 1: Finishing		
✓ Roughness quality		
✓ Painting quality		
Indicator 2: Layout of houses		
✓ Lighting		
✓ Wind direction		
✓ Humidity		
✓ Rainwater management		
Observation		

Assessment Criterion 3: Relevance

Checklist	Score	
	Yes	No
Indicator 1: Measurements/spacing for hen and broilers buildings are respected		
✓ 10 chicken per m2		
✓ 5 chicken per m2		
Indicator 2: Time limit for the activity is respected		
✓ 3 hours		
Observation		

Assessment Criterion 4: Safety

Checklist	Score	
	Yes	No
Indicator 1: PPE are worn appropriately		
✓ Choice		
✓ Use		
Observation		

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