RWANDA POLYTECHNIC

Approved by: Workforce Development Authority

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2020

RWANDA POLYTECHNIC

TVET LEVEL II

AGRICULTURE

Ruminant Farming

TRAINER MANUAL

Acknowledgements

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

Under Rwanda Polytechnic (RP) supervision and involvement

Under Workforce Development Authority (WDA) guiding policies and directives

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

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

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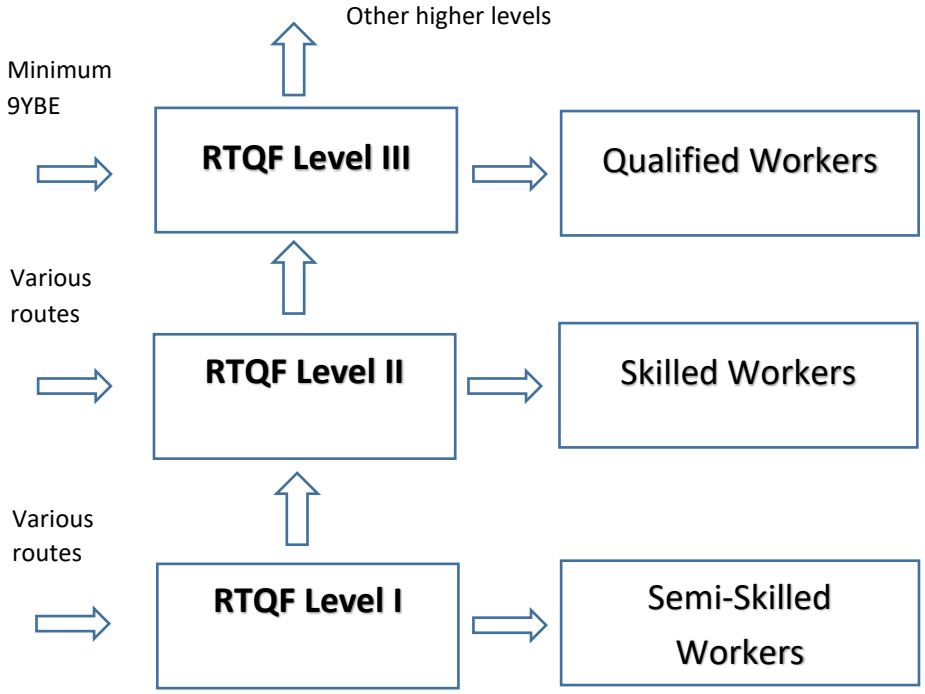
Introduction to RTQF Level II Training Modules

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 & 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.

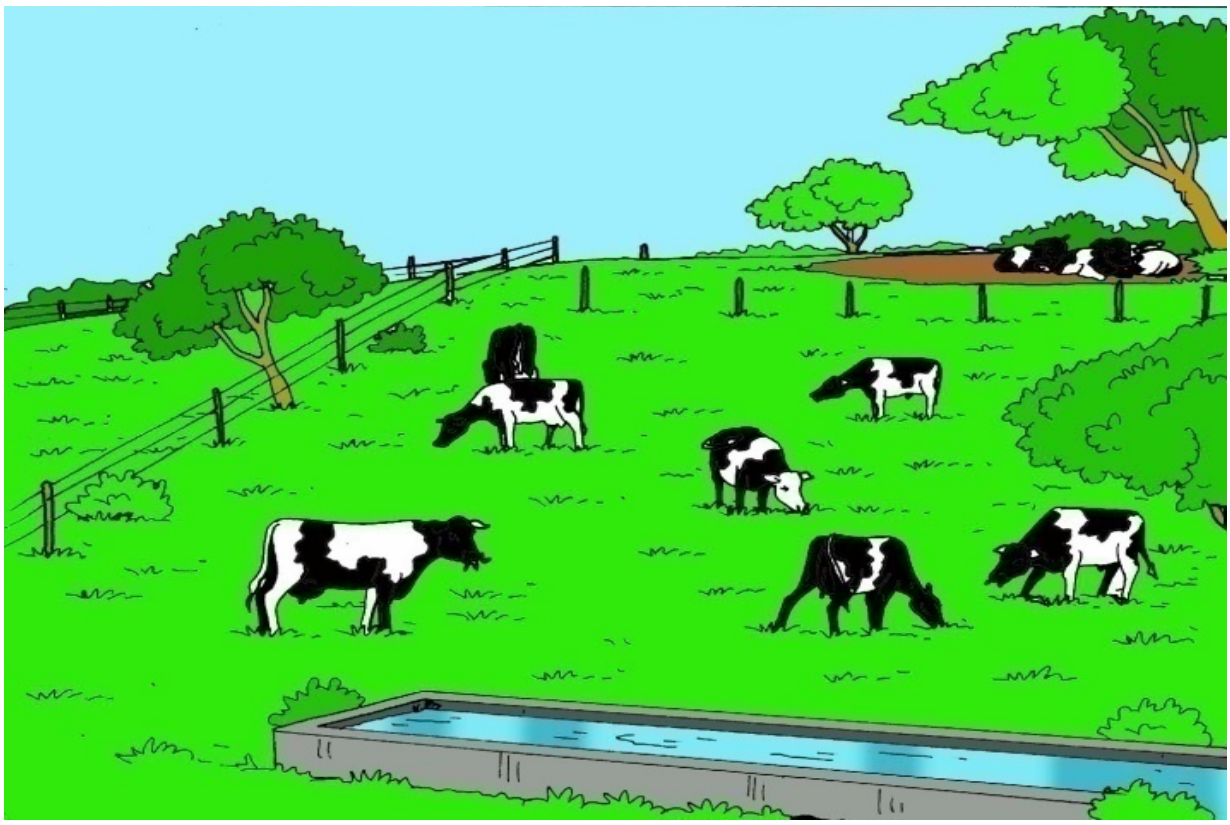
The Trainer's Manual includes answers (or guidelines to the trainer as appropriate) to Formative and Summative Assessments as well as to problems given throughout the activities. Summative Assessments are not included in the Trainee's Manual. These are meant to be used as a guide for those who will be 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.

RUMINANT FARMING

Learning Units	Learning Hours	Learning Outcomes
Learning Unit 1: Plant fodder crops and maintain pasture	10	**1.1** Plant fodder crops
		1.2 Harvest and post-harvest fodder crop
		1.3 Maintain pasture
		1.4 Establish fodder crops
Learning Unit 2: Perform ruminant management practices	30	**2.1** Install ruminant in shelter
		2.2 Feed and water the ruminant
		2.3 Perform minor surgery
Learning Unit 3: Assist with ruminant reproduction	20	**3.1** Select breed
		3.2 Detect heat
		3.3 Assist artificial insemination and mating
		3.4 Monitor pregnancy
		3.5 Assist parturition
		3.6 Perform weaning
Learning Unit 4: Carry out milking operations	20	**4.1** Apply hygiene and safety measures
		4.2 Apply milking techniques
		4.3 Store and transport milk

Learning Unit 1: Plant fodder crops and maintain pasture



Learning Outcomes

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

1.2 Plant fodder crops

1.3 Harvest and post-harvest fodder crop

1.4 Maintain pasture

Learning Unit 1 Self-Assessment

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

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

Learning Outcome 1.1: Plant fodder crops

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

a. Determine planting season
b. Identify and classify types of fodder
c. Identify agro-ecological requirement of species
d. Prepare land and establish plant in land

Time Required: 4 hours

Learning Methodology: Brainstorming, group work, demonstration, practical exercises

Materials Needed:

- **Standard training materials -** flip chart, markers, black/white board, chalk, tape, A4 paper
- **Fodder crop tools and materials -** Farm, Cereals, Legumes, Boots , Hoe, Wheelbarrow, Spade
- **Reference materials –** internet, reference book

Preparation:

- ❑ Organise a visit to a local ruminant farm, including transportation.
- ❑ Organize tools and materials for planting fodder crops.

Cross Cutting Issues:

- ✓ **Environment and sustainability:** Ensure the environment is maintained while disposing of waste.
- ✓ **Gender and inclusivity:** Consider gender balance and inclusion of trainees with disabilities while forming the groups.

Prerequisites:

- Math: Calculations

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify seeds to be planted	**1.** Select fodder crop species to plant	**1.** Detail-oriented
2. Determine planting season based on climatic conditions	**2.** Describe best practices for forage planting	**2.** Patience
3. Describe planting methods of forage	**3.** Plant fodder crops	**3.** Responsibility

Steps:

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

1. Divide trainees into small groups and choose a secretary for each group.

2. Tell the trainees to go outside and each bring a plant back inside.

3. Ask trainees to describe and classify the plants according to their physical characteristics:
   a. Describe each plant's colour, shape, size, and parts.

   b. Determine if each plant is used for animal feed or not.

4. Ask the secretaries to share their group's responses and discuss as a class. Clarify any misconceptions about parts of plants and the difference between fodder crops and forage crops.

5. Introduce the learning outcome and the Key Competencies table, which includes the knowledge, skills, and attitudes the trainees will gain by the end of this topic.

Problem Solving Activity

1. Present the following scenario and tell the trainees to answer the questions that follow with their groups from the previous activity:

   A farmer of ruminants needs to plant fodder crops and he needs technical assistance.

2. Ask trainees to answer following questions:

a. How do you select a good fodder crop to plant?

b. Explain the difference between:
- Forage and fodder crops
- Groups of fodder crops: grasses (roughage/cereals) and legumes

c. Give examples of cereal and legumes.

d. Predict the different planting methods for fodder crops.

3. After the trainees discuss, bring them together as a class and tell them to compare their answers. Write the brainstormed answers on the board/flipchart for the trainees to see.

4. With the class, read through **1.1 Key Facts**. Tell trainees to do the following as they read:
a. Verify your answers from the discussion.

b. Write a star (*) any information you predicted incorrectly and any information you did not include.

Answers to Question 2:

a. Characteristics of good fodder crops:
- Adaptable to the climate
- Stimulate animals' appetites
- Produce high yield
- Resistant to diseases and disasters

b. Forage crops are crops on which animals graze independently, or crops that have purposes other than animal feed, while fodder crops are crops that are cultivated primarily for animal feed.

c. Cereals: Grasses; see **1.1 Key Facts**
Legumes: Trees; see **1.1 Key Facts**

d. Examples of planting methods: by seed, by vegetative parts, by seedling

Guided Practice Activity

1. Tell trainees that their next task is to work in small groups (2-3 people) to research specific information about fodder crops in Rwanda. They may use the resources

available to them, including the internet, reference books, **1.1 Key Facts**, and other school staff.

2. Instruct trainees to record their findings in the chart (sample below). Guide the trainees while they use the resources.

3. After researching, ask each group to present their findings. Confirm that their findings apply to ruminant farming in Rwanda (not somewhere else). Encourage all groups to cite their sources and come to a full agreement on the correct information.

Fodder Crop	Grass or Legume	Planting Method	Space Between Crops	Soil Characteristics
Pennisetum purpureum				
Calliandra *spp*				
Desmodium *spp*				
Tripsacum andersonii				
Leucaena *spp*				

4. Tell the groups that they will confirm at least some of their research in the next activity, when they visit a ruminant farm.

Application Activity

Organise a visit to a ruminant farm. Confirm that the farm has a variety of fodder crops in advance.

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

2. Take a tour of the farm and tell the trainees to identify the fodder crops they see. Tell them to record their findings in the chart (sample below).

Fodder Crop	Grass or Legume	Planting Method	Space Between Crops	Soil Characteristics

3. Encourage trainees to ask the farmer for guidance in identifying the crops as well as the other information about each one. They should also refer to **1.1 Key Facts** and their research from the previous activity.

4. If possible, facilitate as the trainees assist the farmer in planting new fodder crops on the farm.

5. After the visit, facilitate a class discussion using the following questions:
   a. What did you learn?
   b. How did your research compare to your experience?
   c. What was the same?
   d. What was different?

Points to Remember

- All legumes have similar fruits, called pods.
- Select fodder crops with high productivity, resistance to diseases, and appetitive to animals.

Formative Assessment

1. List three factors that should be avoided when planting fodder crops:
   1.
   2.
   3.

2. List two characteristics of high quality fodder crops:
   1.
   2.

3. Explain the difference between fodder crops and forage crops.

4. Determine if the following fodder crops are grasses or legumes:
   a. Calliandra:
   b. Tripsacum andersonii:

c. Desmodium:
d. Leucaena:
e. Pennisetum purpureum:

Answers:

1. Small area land, low yielding crops, poor soil fertility and irrigation, presence of insects/diseases/weeds, high amounts of chemical fertiliser, overgrazing
2. Possible Answers: Adaptable to the climate, stimulate animals' appetites, produce high yield, resistant to diseases and disasters
3. Fodder crops are grown with the specific purpose of feeding them to animals. Forage crops, on the other hand, are crops that animals eat/graze on independently.

ⓘ Further Information for the Trainer

1. Syllabus of AGRAH306: FODDER CROP AND RANGELAND MANAGEMENT, Level 4, 2015.
2. Fodder to ruminants within agroforestry systems in Rwanda (Swedish University of Agricultural Sciences): https://stud.epsilon.slu.se/5790/1/holmstrom_l_130628.pdf
3. Fodder Production: https://www.infonet-biovision.org/AnimalHealth/Fodder-production

Learning Outcome 1.2: Harvest and post-harvest fodder crop

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

a. Determine when to harvest fodder according to the species
b. Perform fodder harvesting
c. Perform hay-making process
d. Perform silage-making process

Time Required: 3 hours

Learning Methodology: Brainstorming, group work, demonstration, practical exercises

Materials Needed:

- **Standard training materials -** flip chart, markers, black/white board, chalk, tape, A4 paper, pens
- **Harvesting tools and materials -** Machetes, molasses, hoes, machete , wheelbarrows, tarp, bricks, and cement.

Preparation:

- ❑ Organise a visit to a farm for a demonstration. Arrange transportation.
- ❑ Acquire and organise materials for harvesting and conservation.

Cross Cutting Issues:

- ✓ **Environment and sustainability**: Ensure environment is maintained while disposing waste.
- ✓ **Gender and inclusivity**: Consider gender balance and people with disabilities balance while forming groups.

Prerequisites:

- Math: Basic calculations

Key Competencies:

Knowledge	Skills	Attitudes
1. Determine when to harvest fodder crops	**1.** Identify fodder crops at harvesting time	**1.** Detail-oriented
2. Describe how harvest fodder crops	**2.** Harvest fodder crops	**2.** Precise
3. Describe hay-making and silage-making processes	**3.** Conserve fodder crop	**3.** Responsibility

Steps:

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

1. Split the trainees into small groups (2-3 people). Tell them to discuss the following points from **Topic 1.2 Task 1** in their manuals:

   a. What are the problems we have with animal feeding in Rwanda?

   b. What causes these problems?

   c. What can we do to correct the problem?

2. Ask them to choose a presenter from their groups to share their responses. Facilitate a class discussion. Note that there is a problem with animal feeding in Rwanda especially in fodder crop scarcity in quality and quantity during dry season.

3. Introduce the learning outcome and the Key Competencies table, including the knowledge, skills, and attitudes they will gain by the end of this topic.

Problem Solving Activity

1. Tell trainees that they have been asked to help a group of local farmers groups to harvest and conserve of fodder crops. With a partner, tell them to discuss the following questions based on **Topic 1.1** and their own experiences, found in **Topic 1.2 Task 2** in their manuals:

a. How do you know when to harvest fodder crops?

b. Do you harvest grasses and legumes at different times? Explain your responses.

c. What could you do if you have additional fodder crops and want to conserve them for later?

2. Ask the trainees to share their ideas from the discussions. Encourage them to compare their different ideas and explain their reasoning.

3. As a class, read through **1.2 Key Facts**. Tell trainees to do the following as they read:
- ❖ Star the information that you discussed with your partner from **Question 1.**
- ○ Circle the information that is new or that you have more questions about.

4. After reading **1.2 Key Facts,** tell trainees to discuss again with their partners:

a. What is the difference between hay-making and silage-making?

b. Describe the processes of making hay and silage <u>in your own words</u>. Do not read directly from **1.2 Key Facts.**

5. Bring the trainees together again to share their answers and clarify any misunderstandings.

Guided Practice Activity

1. Tell trainees to read the following scenario and answer the questions with their small groups from **Topic 1.2 Task 1.** Refer them to **Topic 1.2 Task 3** for this activity.

Ange has a ruminant farm in the Eastern province. During the rainy season, she grew more fodder crops than she needs. She wants to conserve some of them to feed her animals during the dry season. She does not have a silo available.

Ange calls you and asks you the following questions:

a. Which method should I use to conserve the fodder?

b. What tools and materials do I need?

c. What steps do I take?

d. How do I know if it is high quality?

2. Tell the trainees to discuss and write their advice to Ange on a piece of paper. Remind them that they must address every question. Encourage them to refer to **1.2 Key Facts** for guidance.

3. After the groups have completed the task, bring them together and ask each group to present their advice to Ange. Encourage the other groups to listen and give feedback.

4. Explain the correct/possible answers using the key below and **1.2 Key Facts**.

Answers to Question 1:

a. Hay production method

b. Machetes to cut the fodder; wooden boxes/crates to store the fodder in; tarp to dry the fodder on; farm fork to test the dryness of the fodder

c. Cut the fodder; dry it on tarps in the shade; turn and break it to test the dryness; organize into a box/compact space; compact tightly

d. High quality hay is a leafy and greenish colour, has no foreign material mixed with it, and has no smell

Application Activity

Organise a visit to a local ruminant farm with fodder crops, preferably during harvesting time.

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

2. Instruct the trainees to observe as the farmer or other staff demonstrate how to harvest fodder crops. Tell them to note what they see in the chart (sample below) from **Topic 1.3 Task 4** in their manuals.

Fodder Crop	Tools/Materials Used	Method of Harvesting

3. Then, take a tour of the farm to observe the fodder conservation practices. Tell different trainees to ask the farmer the following questions about fodder conservation:

Questions	Answers
Do use conserve your fodder? Which method do you use (hay or silage production)?	
Why do you conserve your fodder?	
What materials and tools do you use?	
What are the challenges of conserving fodder?	
What advice do you have for ruminant farmers who want to conserve their fodder crops?	

4. If possible, facilitate while the trainees assist with farmer with one of the fodder conservation methods. Refer them to **1.2 Key Facts** to confirm that the hay and/or silage is high quality.

5. After the visit, discuss as a class:
- **a.** What did you learn?
- **b.** What surprised you?
- **c.** What are the challenges of fodder harvesting and conservation?

Points to Remember

- Timing of harvest must be considered according to the fodder species.
- Consider the fodder's water content during the conservation process.
- Large thunderstorms prevent hay from being properly preserved; it must then be stored in bulk and pressed under a shed. But if it is harvested too wet, it will produce fermentations which will warm the mass and will make low quality hay.
- Silage is created through anaerobic lactic fermentation.
- Silage-making has toxicity risks when certain precautions are not taken.

Formative Assessment

1. List the characteristics of high-quality hay and silage:

Hay	**Silage**
1.	**1.**
2.	**2.**
3.	

2. Explain the difference between the hay- and silage-making processes.

3. Complete the following sentences:

a. When making silage, you should sprinkle the chopped materials with a ……. and …… mixture.

b. ……. is an often forgotten step when making silage.

c. Silage should be left in the silo for a few …… before using it.

d. Mix ……. and …… for better quality hay.

Answers:

1. Hay: leafy/greenish colour; no foreign material (e.g. rocks) mixed in; no smell
Silage: yellowish/green colour; fruit and acidic smell

2. Hay production conserves fodder through drying while silage production conserves fodder through the wet method (anaerobic lactic fermentation).

3.

a. When making silage, you should sprinkle the chopped materials with a **molasses** and **water** mixture.
b. **Compaction** is an often forgotten step when making silage.
c. Silage **should** be left in the silo for a few **months** before using it.
d. Mix **grasses** and **legumes** for better quality hay.

ⓘ Further Information for the Trainer

1. Look up information on: Fermentations during silage making; How to assess value of silage by examination of the products and by the analysis.
2. Visit www.fao.org on Forage Production and Conservation Manual, 2002.
3. Fodder to ruminants within agroforestry systems in Rwanda (Swedish University of Agricultural Sciences): https://stud.epsilon.slu.se/5790/1/holmstrom_l_130628.pdf

Learning Outcome 1.3: Maintain pasture

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

a. Renew properly pastures

b. Perform properly rotation in pasture

c. Maintenance infrastructures

Time Required: 3 hours

Learning Methodology: Brainstorming, group work, demonstration, practical exercises

Materials Needed:

- **Standard training materials -** flip chart, markers, black/white board, chalk, tape, A4 paper, pens
- **Pasture maintenance tools and materials:** Farm, wheelbarrow, spade, machete, fodder crops, seeds, grasses, legumes, boots, hoe

Preparation:

- ❑ Organise a visit to a local ruminant farm, including transportation.
- ❑ Arrange tools and materials in advance.

Cross Cutting Issues:

- ✓ **Environment and sustainability:** Emphasise the role of pasture maintenance in keeping the pasture fertile and healthy for ruminants.
- ✓ **Gender and inclusivity:** Consider gender balance and people with disabilities when forming groups for activities.

Prerequisites:

- None

Key Competencies:

Knowledge	Skills	Attitudes
1. Explain how to perform pasture renewal practices	**1.** Renew pastures through various methods	**1.** Responsibility
2. Describe the importance of paddocking/rotational grazing	**2.** Apply pasture rotation/paddocking technique	**2.** Detail-oriented
3. Describe how to maintain pasture infrastructures	**3.** Maintain pasture infrastructures	**3.** Innovative

Steps:

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

1. Divide trainees into small groups.

2. Refer them to **Topic 1.3 Task 1** in their manuals and ask them to discuss what they know about pasture grazing:

   a. From your own experience, describe how animals graze in your community.

   b. Are they fenced in? Or are they free to graze anywhere?

   c. What happens when the grass in the pasture becomes dry or eaten?

3. After they have discussed, bring the groups together and ask them to share their ideas with the class.

4. Introduce the learning outcome and direct trainees to the Key Competencies table, which includes the knowledge, skills, and attitudes they will gain by the end of this topic.

Problem Solving Activity

1. With their groups from the first activity, tell the trainees to consider the following methods for pasture renewal found in **Topic 1.3 Task 2** in their manuals.
   - **a.** Weeding
   - **b.** Replacing grasses
   - **c.** Applying fertilisers
   - **d.** Over-sowing

2. For each method, tell the groups to brainstorm a definition, one advantage, and one disadvantage of each method using their previous knowledge and experience. One person in each group should write their ideas down.

3. After the groups have discussed, ask them to share their ideas. Ask a volunteer to record these ideas on the board/flipchart for the class to observe.

4. Now, read through **1.3 Key Facts** as a class. Ask volunteers to read each section.

5. After reading all of **1.3 Key Facts**, tell the groups to revise their responses to **Question 1** by adding or removing information from each pasture renewal method. Clarify any misunderstandings about these methods.

6. Finally, facilitate a class discussion about paddocking/rotational grazing:
   - **a.** Have you ever witnessed paddocking/rotational grazing in your communities?
   - **b.** What are the benefits?
   - **c.** What are the challenges?

Guided Practice Activity

1. In their small groups, tell trainees to read and record their responses to the following scenario and questions found in **Topic 1.3 Task 3** in their manuals:

   After researching the benefits of paddocking, Jean de Dieu decides to implement this grazing system on his ruminant farm. Before getting started, Jean de Dieu asks your advice on the following items:

a. How should the paddocks be divided?

b. What tools and materials will he need?

c. Once he has established his grazing system, how can he maintain the infrastructure to ensure productive and effective grazing?

2. After the groups have completed the task, ask someone from each group to present their advice to Jean de Dieu. Encourage the trainees to listen closely and give feedback to each group.

3. After all the groups have presented, clarify the correct answers using the key below and **1.3 Key Facts**.

Answers to Question 1:

a. Divide into squares to reduce the length of fence needed and promote uniform grazing distribution.

b. Fencing, water sources (more than one depending on how paddocks are organised); labour.

c. He should keep animals within 250 metres of water sources; move animals through pathways so that they don't destroy other paddocks; establish and maintain shading trees to preserve grass; keep infrastructure up to date including water and fencing systems to control animal movements and flooding.

Application Activity

Organise a visit to a local ruminant farm. Confirm that the farmer has a grazing system in place and will be available to answer questions.

1. Visit a ruminant farm and introduce the trainees to the farmer and any other staff present.

2. Instruct the trainees to first interview the farmer about the different pasture renewal processes he or she uses. Tell them to use the chart (sample below) to guide them and as a place to record the information.

Pasture Renewal Method	Uses? (Yes or No)	Benefits	Challenges
Weeding			
Replacing grasses			
Applying fertilisers			
Over-sowing			

3. Then, take a tour of the farm with the farmer. Tell the trainees to observe the ruminants as they graze. Facilitate a class discussion using the following questions:
   a. What do you notice about the grass or other fodder crops? What colour are they?

   b. Are there shading trees? Are there pathways/lanes for the animals to move through?

   c. Where is the water source located?

   d. Is the grazing uniformly distributed? Why or why not?

2. Encourage the trainees to ask the farmer any additional questions they have about pasture maintenance.

Points to Remember

- Graze animals when grass is at the early flowering stage by moving animals from paddock to paddock.

- Four essential steps to be followed for establishing improved pastures:
  1. Perimeter fencing
  2. Paddocking
  3. Establishment of watering points/troughs
  4. Planting fodder

- The productivity of a pasture is biomass formed during a specific time (usually one year), on a given area.

Formative Assessment

1. Explain one advantage and one disadvantage of rotational/paddock grazing:
   Advantage:

   Disadvantage:

2. Explain the difference between natural and artificial pastures.

3. Identify each statement as either **true** or **false**:
   a. Over-sowing reduces grass productivity.

   b. You should replace 50% of field area with new grasses each year.

   c. It is advisable to do a soil test before selecting and applying a fertiliser.

Answers:

1. Advantage: Better management of forage and fodder within the pasture.
   Disadvantage: Requires more labour
2. Natural pastures are native, hard, and consist mainly of wild herbs and shrubs. Whereas artificial pastures are non-native, soft, and contain more biomass, which makes them ideal for grazing.
3.
   a. **False:** Weeds reduce grass productivity.
   b. **False**: You should only replace 25% of field area with new grasses each year.
   c. **True.**

Self-Reflection

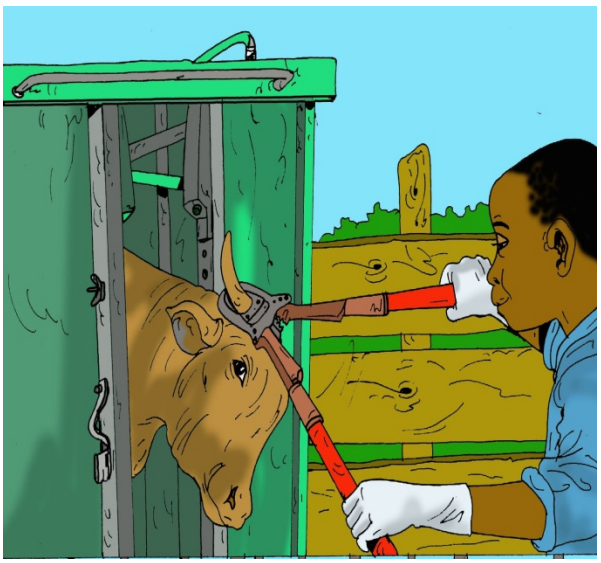
1. Ask trainees to re-take the self-assessment at the beginning of the unit. They should then fill in the table in the Trainee's Manual to identify their areas of strength, areas for improvement and actions to take to improve.

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. Visit www.fao.org on pasture management practices and improving pasture management in arid and semi-arid lands in the Horn of Africa through pastoralist field schools.
2. Paddock Grazing System: A Solution to Cattle Production in Africa: https://snohomishcd.org/blog/2016/3/22/xxwep7sr64iijnmie89veam3c9y6it

Learning Unit 2: Perform ruminant management practices



Learning Outcomes

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

2.1 Install ruminant in shelter

2.2 Feed and water the ruminant

2.3 Perform minor surgery

Learning Unit 2: Self-Assessment

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

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

Learning Outcome 2.1: Install ruminant in shelter

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

a. Apply cleaning and disinfection to ruminant shelters

b. Separate ruminants in different boxes

c. Describe different climactic factors to consider when establishing ruminant shelters

Time Required: 10 hours

Learning Methodology: Brainstorming, group work, demonstration, practical exercises**,** multiple choice on different disinfectants, farm visit

Materials Needed:

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

Preparation:

- ❑ Organise a visit to a ruminant farm, including transportation.
- ❑ Arrange materials in advance.

Cross Cutting Issues:

- ✓ **Environment and sustainability**: Consider the potential harmful effects of disinfectants and other cleaning products is misused or disposed of improperly. is
- ✓ **Gender and inclusivity**: Consider gender balance and inclusion of people with disabilities while forming the groups.

Prerequisites:

- None

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify cleaning products	**1.** Clean ruminant shelters	**1.** Detail-oriented
2. Identify disinfectants and their role in the cleaning process	**2.** Disinfect ruminants shelters	**2.** Proactive
3. Identify the characteristics of ruminant boxes	**3.** Separate ruminants into boxes	**3.** Methodical

Steps:

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

1. Split trainees into small groups (2-3 people) and tell them to choose the secretary for each group. Tell them to discuss ruminant shelters using the following questions found under **Topic 2.1 Task 1** in their manuals:

   a. What does a ruminant shelter look like?

   b. How are ruminants organised within the shelter? Do all ruminants live in the same box or stall area?

   c. How should ruminant shelters be maintained to keep animals healthy?

2. After discussing, ask trainees to share their answers and ideas. Encourage them to explain their reasoning, using previous knowledge or experiences.

3. Introduce the learning outcome and the Key Competencies table, including the knowledge, skills, and attitudes they will gain by the end of this topic.

Problem Solving Activity

1. Tell trainees to consider the following situations from **Topic 2.1 Task 2** with a partner. They should discuss the potential effects of the situation and what actions they would take:

a. There is dirt covering the walls of cattle box/area and several centimetres of mud inside.

b. The temperature in the sheep shelter is 22 C.

c. There is very little wind and excess manure in the animal shelter.

2. After the trainees have discussed, ask them to share their ideas and write them on the board/flipchart for everyone to see. Encourage them to apply any previous knowledge they have about climactic factors to the situations. Clarify any major errors but tell them the answers will be revealed in **2.1 Key Facts**.

3. Now, instruct the trainees to individually and silently read through **2.1 Key Facts.** As they read, trainees should:

- ✓ Check or tick the information that applies to the situations in **Question 1**.
- ❖ Star any information that is interesting or surprising to you.
- o Circle any information that is confusing or unclear to you.

4. After all the trainees have read and marked **2.1 Key Facts,** clarify the answers to **Question 1** using the key below.

5. Then, ask them to share what they found surprising/interesting and what they found confusing. Clarify any misunderstandings and confusion at this time.

Answers to Question 1:

a. Potential effects: Spread of diseases through dirt and mud.
Actions to take: Clean and disinfect the area.

b. Potential effects: Overheating or heat exhaustion of sheep.
Actions to take: Increase ventilation/air movements, provide more shade, remove animals from direct sunlight

c. Potential effects: Ammonia or other toxic gases concentrate the air at a harmful level.
Actions to take: Increase ventilation/air movements (by opening windows, doors, etc.).

Guided Practice Activity

1. Tell trainees to turn to **Topic 2.1 Task 3** in their manuals and consider the following scenario with their groups from **Task 1**:

Marie Claire has just purchased a small ruminant farm from her neighbour. The farm currently houses several cattle, but she wants to add her own goats as well. She plans to make some renovations on the animal shelters. Please advise her on the following points:

a. What steps should she take to clean the shelter?

b. What products or materials will she need to clean and disinfect?

c. What climactic factors should she consider when renovating the shelter?

d. How should she house the cattle and sheep?

2. Ask each group to present their advice to Marie Claire to the rest of the class. Encourage the others to listen and provide feedback at the end of each presentation.

3. After all the groups have presented and given each other feedback, verify the correct answers using the key below.

Answers to Question 1:

a. Pre-cleaning, main cleaning, rinse, disinfect, final rinse, dry (see **2.1 Key Facts**).
b. Cleaning product (soap/detergent), disinfectant, sponge, water, basin, cloth/towel.
c. Temperature, humidity, radiation, air movement, precipitation (see **2.1 Key Facts** for more details).
d. They should be housed separately. The cattle should have lots of shade, concrete flows, and a roof of at least 3 metres high provided. The sheep need a simple structure to provide shade and protect them from rain. It should be built on well-drained soil to avoid mud.

Application Activity

Organise a visit to a local ruminant farm, preferably one with cattle, sheep, and goats.

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

2. Take a tour of the ruminant shelters and tell the trainees to note what they see in the chart (sample below) from **Topic 2.1 Task 4** in their manuals.

Type of Ruminant	Shaded Areas	Temperature/Heat	Mud/Dirt

3. After touring and taking notes, encourage the trainees to ask the farmer any questions they have about ruminant shelters. Remind them that this is the time to get information from a professional in the field.

4. After the visit, facilitate a class discussion:
   a. What did you learn?
   b. What surprised you?

Points to Remember

- Be aware of the chemicals in disinfectants and be sure to dispose of them safely.
- Always read the manufacturer's instructions on disinfectants and detergents.
- Cleaning schedules are always needed and useful.
- Monitor and record the status of ruminant shelters to ensure they are maintained properly.

Formative Assessment

1. Explain the difference between cleaning and disinfection.

2. List two of the most important areas for cleaning.

3. Identify each statement as either **true** or **false**:
   a. Mud is not a problem for cattle shelters as long as it is all in one corner of the box.

   b. Air movement can lead to excessive cooling in low temperatures.

c. Pregnant ruminants do not need to be kept in a separate area when they are close to giving birth.

d. Radiation is caused by direct sunlight and sunlight reflected from clouds.

Answers:

1. Cleaning removes dirt or other unwanted matter, while disinfection kills bacteria and should be performed after cleaning.
2. Possible Answers: pre-vaccination surfaces, animal housing between occupants, high contact surfaces, yourself
3. **a. False:** Mud can lead to the spread of diseases.
   b. True
   c. False: Pregnant ruminants should be kept in maternity boxes and monitored closely at the end of their pregnancies.
   d. True

ⓘ Further Information for the Trainer

1. Search information on:
- Four elements of an effective shelter sanitation program
- Types of cleaning products
- How to choose a disinfectant
- The most important areas for cleaning:
2. Visit www.shelterpro.org
3. Animal Environmental Requirements (FAO): http://www.fao.org/3/s1250e/S1250E10.htm#Animal%20environmental%20requirements
4. Cattle Housing (FAO): http://www.fao.org/3/s1250e/S1250E11.htm
5. Sheep and Goat Housing (FAO): http://www.fao.org/3/s1250e/S1250E17.htm#Sheep%20and%20goat%20housing

Learning Outcome 2.2: Feed and water the ruminants

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

a. Classify types of feeds
b. Weigh and ration feeds according to animal dietary needs
c. Clean drinkers and feeders to promote animal health
d. Distribute feed and water according to animal age and physiological status

Time Required: 10 hours

Learning Methodology: Simulation, practical exercises, demonstrations

Materials Needed:

- **Standard training materials -** flip chart, markers, black/white board, chalk, tape, A4 paper, pens
- **Sample feeding materials -** Cereals, legumes, drinkers, feeders, balance, Scale, mineral block, ingredient of concentrate feed
- **Sample cleaning materials -** disinfectants, water basin, soap

Preparation:

- ❑ Organise a visit to a local ruminant farm, including transportation.
- ❑ Arrange materials in advance.

Cross Cutting Issues:

- ✓ **Environment and sustainability**: Ensure the environment is protected and maintained while disposing of cleaning product waste.
- ✓ **Gender and inclusivity:** Consider gender balance and the inclusion of people with disabilities while forming the groups.

Prerequisites:

- Learning Unit 1: Plant fodder crops and maintain pasture

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify different types of ruminant feeds	**1.** Differentiate between types of feed based on ruminants' needs	**1.** Precision
2. Explain measuring and rationing feeds	**2.** Distribute feed and water to ruminants	**2.** Detail-oriented
3. Describe the importance of cleaning feeders and drinkers	**3.** Clean drinkers and feeders	**3.** Responsibility

Steps:

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

1. Tell trainees to discuss the following questions from **Topic 2.2 Task 1** with a partner based on their previous knowledge and experiences:

a. What do ruminants eat?

b. What do ruminants drink?

c. What is the importance of feed and water for ruminants? How do they affect animal health?

2. Ask volunteers to share their ideas with the rest of the class. Give trainees the opportunity to compare and contrast their answers:

a. Do you agree with each other?

b. Do you disagree?

c. Why or why not?

d. Explain your reasoning based on specific knowledge and experiences.

3. Introduce the learning outcome and the Key Competencies table, including the knowledge, skills, and attitudes they will gain by the end of this topic.

Problem Solving Activity

1. Refer trainees to **Topic 2.2 Task 2** in their manuals. Tell them to consider the following information and discuss the questions with their partners from **Task 1**:

Ruminants need the right amounts of protein, minerals, and nutrients to be productive and healthy.

a. Do you think forage and fodder provide enough protein, minerals, and nutrients for ruminants? Why or why not?

b. What could you do to increase the amount of protein, minerals, and nutrients in a ruminant's diet?

c. What preventative actions could you take to ensure animals don't consume dirty or spoiled food and water?

2. After the partners have discussed, ask them to share and debate their ideas as a class.

3. After the class discussion, direct trainees to **2.2 Key Facts.** Read each section out loud as a class. As they read, tell trainees to do the following:

- ❖ Star the ways to increase the amount of protein, minerals, and nutrients in a ruminant's diet (**part b**).
- ○ Circle the preventative actions that could be taken to ensure animals don't consume dirty or spoiled food and water (**part c**).

4. After reading, ask trainees to share which information they starred and circled. Encourage them to refer back to their responses to **Question 1** and clarify the correct answers.

Guided Practice Activity

1. Separate trainees into small groups (3-4 people) and tell them to read the following scenario which can be found in **Topic 2.2 Task 3** in their manuals:

You have been hired to establish a feeding plan at a local ruminant farm. The farmer informs you that the ruminants are eating a lot of grasses/cereals and no legumes. They are able to access water in the mornings and evenings. The cleaners and drinker are

refreshed once per week and cleaned once per month. All of the different animals are given the same amount of food.

2. With their groups, instruct trainees to write a plan/report that addresses the following:

   a. What are the problems with the current feeding plan?

   b. What suggestions can you offer to the farmer?

   c. Explain the importance of each suggestion.

3. After each group has finished, tell them to exchange their reports with another group. They should give written feedback with explanations to the other group.

4. Then, tell trainees to return the reports to their writers and ask volunteers to share their suggestions for the farmer. Allow for discussion if there is disagreement about the correct answers.

5. Finally, explain the correct answers using the key below.

Answers to Question 2:

a. **Problems**: Type of feed provided, lack of access to water, dirty/unkept drinkers and feeders, food distribution.
b. **Suggestions**: Reduce the amount of grasses/cereals and add more legumes and supplements; provide water at all times; remove old feed and water daily and clean drinkers and feeders more often (i.e. once per week); distribute different amounts of food based on type of animal, age, and physiology.
c. **Importance**: Grasses have low digestibility which reduces their appetite and does not provide enough nutrients; water is an essential nutrient to life and helps regulate animal body temperature; old/dirty feed and water could lead to diseases or animals stop consuming it which reduces productivity; different animals require different amounts of food and nutrients to be healthy and productive.

Application Activity

Organise a visit to a local ruminant farm in advance.

1. Visit a local ruminant farm and introduce the trainees to the farmer and other staff.

2. First, tell the trainees to closely observe the farmer as he/she demonstrates how to weigh and distribute feed to the animals. Note the tools and materials used below:

Tools	Materials

3. Then, tell the trainees to ask the farmer how much feed is distributed to different types of animals and note his/her responses in the chart (sample below):

Type of Ruminant	Age	Pregnant?	Amount of Feed Given

4. If possible, facilitate as trainees assist the farmer with feed distribution in small groups.

5. Finally, encourage the trainees to ask the farmer what the challenges are with feed and water distribution in his/her experiences. Note the response.

Points to Remember

- Concentrate must be fed individually according to production requirements.
- Over-feeding concentrates may result in off feed and indigestion.
- Abrupt changes in the feeding schedule should be avoided.
- Grains should be ground to medium degree of fineness before being fed to cattle.
- Long and thick-stemmed fodders such as Napier may be chopped and fed.
- Highly moist and tender grasses may be wilted or mixed with straw before feeding.

- Legumes may be mixed with straw or other grasses to prevent the occurrence of bloat and indigestion.

Formative Assessment

1. Explain the importance of cleaning feeders and drinkers regularly.

2. List three of the components that should be combined in feed rations and their purposes:
   1.
   2.
   3.

3. Select the correct answer.
   Which type of animal requires no supplement concentrate if the grazing pasture is good?
   a. Dairy cattle
   b. Bulls
   c. Sheep and goats
   d. Pregnant animals

4. Select the correct answer.
   Which type of animal's ration should be supplemented with green fodder each day?
   a. Dairy cattle
   b. Bulls
   c. Sheep and goats
   d. Pregnant animals

5. Explain the benefits of mineral blocks.

Further Information for the Trainer

1. Principles of Ration Formulations for Ruminants: https://inis.iaea.org/collection/NCLCollectionStore/_Public/33/032/33032967.pdf?r=1&r=1
2. Feed Quality (FAO): http://www.fao.org/ag/againfo/themes/documents/PUB6/P618.htm
3. Animal nutrition and feed rations: https://www.infonet-biovision.org/AnimalHealth/Animal-nutrition-and-feed-rations
4. The Best Way to Clean Water Troughs: https://www.hobbyfarms.com/the-best-way-to-clean-water-troughs/

Learning Outcome 2.3: Perform minor surgery

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

a. Identify surgical material
b. Apply disinfection and sterilization to surgical materials
c. Apply restraining, castration, and dehorning techniques
d. Apply hoof trimming and tail docking techniques

Time Required: 10 hours

Learning Methodology: Brainstorming, group work, demonstration, practical exercises

Materials Needed:

- **Standard training materials -** flip chart, markers, black/white board, chalk, tape, A4 paper
- **Audio/visual materials –** internet, projector, screen
- **Sample surgery materials -** Wheelbarrow, spade, machete, boots, weighing scale, surgical kit, restraining materials, drugs

Preparation:

❑ Organise a visit to a ruminant farm, including transportation.
❑ Arrange all materials in advance.

Cross Cutting Issues:

✓ **Environment and sustainability:** Ensure the environment is maintained and protected while disposing waste and using toxic materials such as disinfectants and drugs.
✓ **Gender and inclusivity:** Consider gender balance and inclusion of people with disabilities while forming groups.

Prerequisites:

- Math: Calculations
- Biology: Anatomy, Animal physiology

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify materials used in minor surgery	**1.** Select, manipulate, and maintain surgical materials	**1.** Precision
2. Describe restraining techniques	**2.** Restrain ruminants	**2.** Diligent
3. Describe castration, dehorning, trimming, and tail docking techniques	**3.** Perform minor surgical operations on ruminants	**3.** Detail-oriented

Steps:

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

1. With a partner, tell trainees to brainstorm responses to the following questions found in **Topic 2.3 Task 1** in their manuals:

   a. What are the different surgery operations that are performed on ruminants?

   b. Why do you think a ruminant might need surgery?

2. After discussing, ask volunteers to share their ideas with the rest of the class.

3. Introduce the learning outcome and the Key Competencies table, which includes the knowledge, skills, and attitudes they will gain by the end of this topic.

Problem Solving Activity

1. Tell the trainees that there are four common types of minor surgeries for ruminants:
   a. Castration (removal of testicles)
   b. Dehorning (removal of horns)
   c. Caudectomy (removal of tail)
   d. Hoof trimming

2. Separate trainees into small groups (3-4 people) and refer them to **Topic 2.3 Task 2** in their manuals. For each type of surgery, tell the groups to brainstorm three or more possible causes and/or purposes for performing these surgeries.

3. After brainstorming the causes of each type of surgery, tell the groups to discuss how they could restrain, or hold, the animals while performing surgeries.

4. Next, ask groups to share some of their answers and write them on the board/flipchart for everyone to observe.

5. To confirm the correct answers, direct trainees to **2.3 Key Facts.** Read the information out loud as a class.

6. After reading **2.3 Key Facts** as a class, tell the trainees to read the information again with their groups. This time, they should do the following while they read:
   - _ Underline the definitions for each type of surgery.
   - ✓ Check or tick the reasons and causes they guessed correctly from **Question 2**.
   - ❖ Star the reasons and causes they did not guess or guessed incorrectly from **Question 2**.
   - ○ Circle any materials needed for the different types of surgeries.

Guided Practice Activity

Research and download videos of each of the four minor surgery operations in advance.

1. Refer trainees to **Topic 2.3 Task 3** in their manuals and tell them to watch four videos depicting the four common ruminant surgeries closely. They should note the following for each procedure:
   a. Materials used

   b. Restraining techniques applied

   c. Challenges

2. Then, divide them into four groups and assign each group one of the four minor surgery operations: castration, dehorning, hoof trimming, or tail docking/caudectomy.

3. Inform the trainees that each group must write a manual for how to perform their assigned surgery. Refer them to **2.3 and 2.4 Key Facts** as well as other resources,

including the internet, reference books, the videos from earlier, and other professionals on campus. The manuals must include:

a. The importance of the surgery.

b. The causes/reasons for the surgery.

c. How to restrain the animal for surgery.

d. 2-3 techniques for surgery.

e. Materials needed for surgery.

f. Sanitation measures.

4. Give the groups sufficient time to research and write manuals about their assigned minor surgery. Provide guidance as needed. Remind the groups that they will each need to present their manuals to the rest of the class.

5. After the manuals have been completed, ask each group to present their manuals. Encourage them to cite their sources for any information included outside of **2.3 and 2.4 Key Facts**.

6. After all the groups have presented, provide feedback and clarify any misunderstandings.

Application Activity

Organise a visit to a local ruminant farm. Confirm that the farmer will be performing at least one of the minor surgeries on the day of the visit. If you are not able to find a farm performing surgeries, confirm that a farmer is available to answer questions about minor ruminant surgeries.

1. Before visiting a local farm, tell trainees to work with their groups from the previous activity to create interview questions for the farmer. Each group's questions should correspond to the minor surgery they were assigned previously. They should write their questions into the chart found in **Topic 2.3 Task 4** in their manuals (sample with example question given):

Questions	Answers
Which technique do you use for castration?	

2. Visit a local ruminant farm and introduce trainees to the farmer and any other staff present.

3. Begin by telling each group to interview the farmer using the questions they created earlier. Tell them to note the answers in the chart.

4. Then, instruct the trainees to watch closely as the farmer demonstrates how to restrain and perform one of the minor surgeries on an animal.

5. If possible, facilitate as small groups of trainees assist the farmer with the minor surgery process.

6. After the visit, discuss as a class:

a. What did you learn?

b. What surprised you?

c. How was your experience similar to and/or different from the videos you watched during **Task 3**?

Points to Remember

- All operations must be done in aseptic conditions.
- All materials must be sterilized and disinfected.
- The operation area must be cleaned and disinfected between operations.
- Prevent post-operative complications of the wound.
- Monitor physiological status of the operated animals.
- Safely dispose of waste after operations as a biosecurity measure.

- Before operation, take the time to understand the anatomy of the animal to be operated on, especially the testicles, horns, hooves, and tails.

Formative Assessment

1. List three of the purposes of performing castration surgery.

2. Identify and explain the two techniques for dehorning animals.

3. Complete the following sentences:

a. When performing a caudectomy, an …….. tool can be used to both cut and crush the tail.

b. The …….. method or technique crushes the blood vessels to kill/remove the body part. It does not have the cutting feature.

c. Heating a …… …… and pressing it to the horns of an animal is a quick and cheap way to remove the horns.

Answers:

1. Possible Answers: To remove injured, cancerous, or retained testicles; To treat prostate disease or tumours; To increase growth rate; To improve quality of meat; To prevent aggressive behaviour; To prevent unwanted mating; To maintain a certain male to female ratio

2. Disbudding/hot iron method: Place hot iron into horns to remove them and seal off blood vessels
Saw/wire saw method: Give animal anaesthesia, mark around the horns, and cut them off using a saw.

3. a. When performing a caudectomy, an **emasculator** tool can be used to both cut and crush the tail.
b. The **Burdizzo** method or technique crushes the blood vessels to kill/remove the body part. It does not have the cutting feature.
c. Heating a **hot iron** and pressing it to the horns of an animal is a quick and cheap way to remove the horns

Further Information for the Trainer

1. Search information on surgical pathologies.
2. Animal Handling: Restraining Cattle: https://animalhandling101.fandom.com/wiki/Restrain_cattle
3. Instrument Preparation and Sterilization: https://www.research.psu.edu/arp/surgery/instrument-preparation-and-sterilization.html

Self-Reflection

1. Ask trainees to re-take the self-assessment at the beginning of the unit. They should then fill in the table in 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).

Learning Unit 3: Assist with ruminant reproduction

Learning Outcomes

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

3.1 Select breeds

3.2 Detect heat

3.3 Assist artificial insemination and mating

3.4 Assist parturition

3.5 Perform weaning

Learning Unit 3: Self-Assessment

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

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

Learning Outcome 3.1: Select breed

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

a. Select breeds according to production purpose

b. Check breed pedigree based on data record

c. Check health status of breed in line with health standard

Time Required: 4 hours

Learning Methodology: Brainstorming, group work, demonstration, farm visit

Materials Needed:

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

Preparation:

- ❑ Organise a visit to a local farm, including transportation. Contact farmers to organize farm field visit.
- ❑ Research, download, and print photos of different breeds of cattle, sheep, and goats.

Cross Cutting Issues:

- ✓ **Environment and sustainability:** Ensure the environment is protected and maintained while disposing waste.
- ✓ **Gender and inclusivity:** Consider gender balance and inclusion of people with disabilities while forming groups.

Prerequisites:

- Biology: Anatomy

Key Competencies:

Knowledge	Skills	Attitudes
1. Differentiate between cattle breeds for milk and for meat	**1.** Select milk and meat cattle breeds	**1.** Accurate
2. Differentiate between goat breeds for milk and for meat	**2.** Select milk and meat goat breeds	**2.** Precise
3. Differentiate between sheep breeds for wool and for meat	**3.** Select wool and meat sheep breeds	**3.** Detail-oriented

Steps:

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

1. Tell trainees to discuss answers to the following questions from **Topic 3.1 Task 1** in their manuals with a partner:

a. What is the purpose of ruminant farming?

b. What are the two main uses of cattle?

c. What are the two main uses of sheep?

d. What are the two main uses of goats?

2. After discussing, ask volunteers to share their ideas for each question. Write their answers on the board/flipchart for the class to see. Encourage trainees to discuss and debate each other's answers.

3. After most people have shared, explain that ruminant farming plays a significant role in sustainable agriculture. By eating pasture and fodder crops, ruminants are able to convert them into food for humans (their own meat). In addition to meat, ruminants produce milk and wool for economic gains. (Information from: https://www.ncbi.nlm.nih.gov/pubmed/8791215)

4. Introduce the learning outcome and the Key Competencies table with the knowledge, skills, and attitudes they will gain by the end of this topic.

Problem Solving Activity

1. Divide trainees into small groups (3-4 people) and refer them to **Topic 3.1 Task 2** in their manuals. Tell them to reflect on their own experiences and previous knowledge raising ruminants.

2. Using their own experiences and previous knowledge, tell trainees to brainstorm a list of qualities that characterise good cattle, goat, and sheep breeds. One person in each group should write the answers on a piece of paper.

3. After brainstorming, tell the groups they must agree on a list of five qualities that apply to cattle, sheep, and goats. Ask the groups to take turns sharing one quality they discussed. After a group shares a certain quality, they should explain their reasoning. The other groups should then express either agreement or disagreement with the idea. Write the final agreed list of five qualities on the board/flipchart.

4. Next, facilitate a class discussion:
   a. How can we measure each of these good qualities?

   b. How can we preserve these good qualities in animals?

5. Introduce the concept of breeding: Animals inherit, or take on, the qualities of their parents. Selection is when we choose certain animals with superior qualities to mate in order to preserve and pass on good traits and eliminate bad ones.

6. Finally, direct the trainees to **3.1 Key Facts**. Read the information out loud as a class.
   a. Use the **breed selection** section to reinforce the information you introduced in **Question 5**.
   b. Tell trainees to check or tick the qualities they correctly guessed from **Question 2**.

Guided Practice Activity

1. Direct trainees to **Topic 3.1 Task 3** in their manuals. With their groups from the previous activity, tell them to consider the scenario and discuss the questions that follow:

   Rosine owns a ruminant farm and needs to select which animals to breed to maintain optimal meat production. Select one male and one female from the lists below to breed. Explain your choices.

Cattle	
Male	**Female**
A. Long legs; high ability to convert feeds	**A.** Resistant to diseases; matured early
B. Adaptable to changing temperatures; grows fast	**B.** Sensitive to changing temperatures; deep chest

Sheep	
Male	**Female**
A. Average reproduction level	**A.** Rarely lambs
B. Soft, uniform wool coat	**B.** Requires little care

Goats	
Male	**Female**
A. Early and fast growth rate	**A.** High reproduction rate
B. Unusual distribution of muscles	**B.** Sensitive to environmental changes

2. After all the groups have made their decisions, facilitate a class vote on which animals in each category should be selected for breeding. Encourage trainees to cite their evidence from **3.1 Key Facts.** After the voting, verify the correct answers using the key below.

3. Facilitate a class discussion: How can we keep track of and pass on knowledge about breeding over the years?

4. After the trainees have discussed, remind them of the **breed pedigree**, which tracks an animal's ancestors. If they keep detailed records, they can continue to breed superior quality animals.

Answers to Question 1:
Cattle: Male B and Female A
Sheep: Male B and Female B
Goats: Male A and Female A

Application Activity

Organise a visit to a ruminant farm with various breeds of ruminants/ruminants with various purposes. This activity may require visiting multiple farms in order to observe a variety of animals with various purposes (meat, wool, milk).

1. Visit a ruminant farm and introduce the trainees to the farmer and any other staff present.

2. Take a tour of the farm and tell trainees to do the following in small groups, referring to **Topic 3.1 Task 4** in their manuals:

   a. Differentiate between dairy and meat cattle. Identify the best cattle according to their purpose.

   b. Differentiate between wool and meat sheep. Identify the best sheep according to their purpose.

   c. Differentiate between dairy and meat goats. Identify the best goats according to their purpose.

3. After noting their observations, tell the trainees to confirm their observations with the farmer.

4. Encourage trainees to ask any remaining and/or clarifying questions to the farmer. Remind them that he/she is a professional in this field.

Points to Remember

- The breeding system, including feeding, housing, and health management, must be considered for a successful ruminant production farm.

- Reproduction indicators must be considered when selecting animals to raise.

Formative Assessment

1. Select **all** the choices that apply.
   Which of the following are qualities of a good wool production sheep?
   a. Uniform fleece
   b. Average rate of wool production
   c. Fine grade fleece
   d. Soft fleece texture
   e. Fragile fibres

2. List three qualities of a good milk production cow.

3. Complete the following sentences:
   a. …… …… is the most reliable method of sample collection for laboratory analysis.

   b. Choosing animals based on the performance of their parents is called …….. selection. It requires well-kept ……

   c. Consider the …… of animals, meaning their temperament and ease of handling during activities such as milking.

Answers:

1. a, c, d
2. Possible Answers: pliable but firmly attached udder; good feet; strong legs; deep, long body; wide ribs; long neck; slight leanness of body; not stocky or beefy
3. a. blood sampling
   b. pedigree; records
   c. docility

Further Information for the Trainer

1. Rwanda Livestock Master Plan: http://extwprlegs1.fao.org/docs/pdf/rwa172923.pdf
2. Sheep, Goats, and Small Ruminants (USDA): www.nal.usda.gov/sheep-goats-and-small-ruminants
3. Sheep Breed Selection: http://www.sheep101.info/201/breedselection.htm
4. Selection Breeding: https://aces.nmsu.edu/sheep/selection_breeding/improving.html
5. Breeds and Production Traits of Meat Goats: https://content.ces.ncsu.edu/breeds-and-production-traits-of-meat-goats
6. Instructions for Animal Sampling: https://www.genomia.cz/en/pokyny/

Learning Outcome 3.2: Detect heat

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

a. Observe physical signs of heat in animals
b. Describe the benefits of heat synchronisation
c. Select and use heat detection monitoring tools
d. Keep proper records

Time Required: 4 hours

Learning Methodology: Brainstorming, field visit, group work

Materials Needed:

- **Standard training materials -** flip chart, markers, black/white board, chalk, tape, A4 paper
- **Learning materials –** Photos of cattle, goats, and sheep demonstrating signs of heat.
- **Audio/visual equipment –** Internet, projector, screen

Preparation:

- ❑ Organise a visit to a ruminant farm during breeding season.
- ❑ Arrange classroom materials in advance.
- ❑ Research and download 10-15 photos or videos of cattle, goats, and sheep demonstrating signs of heat.

Cross Cutting Issues:

- ✓ **Environment and sustainability**: Recognise the relationship between the environment and an animal's reproductive health.
- ✓ **Gender and inclusivity:** Consider gender balance and inclusion of people with disabilities while forming groups.

Prerequisites:

- ▸ Biology: Basic physiology and animal behaviour

Key Competencies:

Knowledge	Skills	Attitudes
1. Describe heat synchronization benefits and methods	**1.** Select heat detection monitoring tools	**1.** Detail-oriented
2. Identify physical heat signs	**2.** Observe heat in animals	**2.** Proactive
3. Describe data to be recorded	**3.** Keep records	**3.** Responsible

Steps:

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

1. With a partner, tell trainees to discuss ruminant reproduction using the following questions from **Topic 3.2 Task 1** in their manuals:

a. What do you know about ruminant reproduction?

b. When is the best time for female ruminants to breed with males?

c. How can you recognise this ideal time for breeding?

2. Ask volunteers to share their responses and discuss as a class.

3. Introduce the learning outcome and the Key Competencies table, which includes the knowledge, skills, and attitudes they will gain by the end of this unit.

Problem Solving Activity

1. Explain to the trainees that to effectively breed ruminants, farmers must identify the signs of ovulation, which is when eggs are released from a female's ovary and may be fertilised by male sperm cells. The name for this time in an animal's cycle is called **heat or oestrus**.

2. Using their previous knowledge and experience, tell trainees to discuss the following questions from **Topic 3.2 Task 2** in small groups (3-4 people):

a. What factors do you think farmers monitor to determine a female animal's heat?

b. How long do you think the heat period lasts?

c. What do you think the challenges are with detecting animals' heat?

d. What are the benefits of synchronising all females' heats to occur at the same time?

3. Trainees may not have a lot of knowledge or experience on this subject. Encourage them to think critically and apply what they already know about animal behaviour.

4. Ask each group to share some of their ideas and responses to the questions. Encourage them to discuss, agree, and disagree with one another.

5. After a fruitful class discussion, direct trainees to **3.2 Key Facts.** Tell trainees to read the information with their small groups. As they read, tell them to do the following:
- ✓ Check or tick the information that they predicted correctly from **Question 2**.
- ❖ Star new terms that they are not familiar with and need clarification on.
- ○ Circle the significance of record keeping for heat detection.

6. After all groups have read and marked **3.2 Key Facts,** ask trainees to share any terms that they starred (*). Clarify and explain these terms until all trainees understand them.

Guided Practice Activity

Research and download 10-15 photos or videos of cattle, goats, and sheep demonstrating signs of heat in advance.

1. Display photos and videos of cattle, goats, and sheep demonstrating various signs of heat for trainees to observe.

2. With their groups from the previous activity, tell trainees to determine which signs are being displayed in each photo or video.

3. Then, tell trainees to turn to **Topic 3.2 Task 3** in their manuals and consider the following scenario with their groups. One person in each group should write the answers on a piece of paper.

Joan Divine owns a farm with cattle. Breeding season is always very stressful because the female cows experience heat at different times. It is also economically costly because she must hire additional workers to help her monitor all the cows.

a. Explain to Joan Divine the concept of heat synchronisation.

b. Describe the different methods/protocols of heat synchronisation she can use.

c. Explain the benefits of heat synchronisation for her farm.

4. Ask volunteers to share their information for Joan Divine with the rest of the class. Encourage the others to listen and give feedback.

5. Verify the correct information with the trainees using **3.2 Key Facts** and the key below.

Answers to Question 3:

a. Heat synchronisation is the manipulation of females' heat cycles using hormones so that they can all be bred/mate at the same time.

b. The three different methods depend on the type of hormone supplied to the females:
- Progestins: Extend oestrous cycle and keep animals out of heat.
- Prostaglandins: Shorten oestrous cycle and bring females into heat.
- GnRH: Cause ovulation.

c. Benefits: Shorter calving interval, fewer demands on time and labour to detect each animal's heat, more uniform calves with similar ages.

Application Activity

Organise a visit to a ruminant farm during breeding season.

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

2. First, tell the trainees to interview the farmer using the questions found in **Topic 3.2 Task 4** in their manuals (sample below) as well as some of their own questions.

Questions	**Answers**
Do you use heat monitoring tools? If so, which one(s)?	
Do you use heat synchronisation on	

your farm? If so, which method do you use?	
What are the challenges of detecting heat?	
What records do you keep related to heat detection? Why?	
Your question:	
Your question:	

3. After interviewing the farmer, tell trainees to observe the female ruminants alongside the farmer.

a. Which females are showing signs of heat?

b. Which females are not showing signs of heat?

4. Tell trainees to confirm their observations with the farmer.

5. After the visit, discuss as a class:

a. What did you learn?

b. What surprised you?

c. What information do you still need?

Points to Remember

- Adequate cow nutrition is necessary to ensure the cows are cycling.
- If 5% of the herd is seen in heat one day, then most of the cows are probably cycling.
- If previous conception rates were not good, then the hormones used to synchronize oestrus will not improve conception rates.
- If a group of ruminants is to be synchronised, then there must be a sufficient amount of handling facilities and manpower to handle the animals.

Formative Assessment

1. Name three physical signs of heat for cattle, goats, and sheep:

Cattle	Goats	Sheep
1.	1.	1.
2.	2.	2.
3.	3.	3.

2. Explain the purpose and benefits of heat synchronisation.

3. Complete the following sentences:
   a. Heat should be recorded on a daily basis in order to …….. detection and …….. future cycles.

   b. The animals' heat periods have become …….. over time and more …….. to detect.

   c. In addition to observations of physical behaviour, …….. …….. may be used to detect heat more accurately.

Answers:

1. Refer to **3.2 Key Facts** for all possible answers.
2. Purpose: Get all females on the same heat cycle.
   Benefits: Shorter calving interval, fewer demands on time and labour to detect each animal's heat, more uniform calves with similar ages.
3. a. improve; predict
   b. shorter; difficult
   c. monitoring tools

Further Information for the Trainer

1. Heat Detection:
   http://www.allice.fr/insemination-reproduction/insemination-on-farms/heat-detection.html
2. Cattle Estrus Detection Monitors:
   https://extension.umn.edu/beef-production-management/cattle-estrus-detection#electronic-mounting-monitors-1796162
3. Estrus Synchronization for Heifers:
   https://www.pubs.ext.vt.edu/400/400-302/400-302.html

4. Estrous Synchronization: https://extension.uga.edu/publications/detail.html?number=B1232&title=Estrous%20Synchronization%20for%20Beef%20Cattle
5. Heat Detection and Timing of Insemination for Cattle: https://extension.psu.edu/heat-detection-and-timing-of-insemination-for-cattle#section-39

Learning Outcome 3.3: Assist artificial insemination and mating

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

a. Explain the artificial insemination process and benefits.

b. Assist with artificial insemination in cows.

c. Describe the processes of sire selection and restraining.

d. Identify ruminants' reproductive cycles and assist with pregnancy diagnosis.

Time Required: 3 hours

Learning Methodology: Brainstorming, group work, practical exercises, field visit

Materials Needed:

- **Standard training materials -** flip chart, markers, black/white board, chalk, tape, A4 paper
- **Artificial insemination materials -** A.I, kit**,** A.I, record sheet**,** cattle crush, restraining materials, scale

Preparation:

- ❑ Organise a visit to a ruminant farm to observe and assist with artificial insemination.
- ❑ Arrange artificial insemination kits and other materials.

Cross Cutting Issues:

- ✓ **Environment and sustainability**: Explain the relationship between reproductive cycles, pregnancy, artificial insemination, and animal health.
- ✓ **Peace values**: Consider animal welfare, including ruminants' comfort and calmness, while performing artificial insemination.

Prerequisites:

- Animal physiology
- Anatomy

Key Competencies:

Knowledge	Skills	Attitudes
1. Explain the procedures and methods for artificial insemination	**1.** Perform artificial insemination on cattle	**1.** Detail-oriented
2. Explain the benefits of artificial insemination	**2.** Prepare materials, tools, and equipment for artificial insemination	**2.** Precise
3. Identify the reproductive cycles of ruminants and how to diagnosis pregnancy	**3.** Keep proper records of ruminant reproductive cycles	**3.** Proactive

Steps:

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

1. Tell trainees to brainstorm responses to the following questions from **Topic 3.3 Task 1** in their manuals with a partner:

a. What is reproduction?

b. What is insemination?

c. What is the difference between natural and artificial insemination?

2. After discussing, ask volunteers to share their answers and ideas. Ask trainees if they can relate their answers to ruminant farming.

3. Briefly explain the terms from **Question 1**. Assure the trainees that you will be learning more in-depth information throughout the topic.

a. Reproduction is the process by which animals (including humans) produce offspring, or children.

b. Insemination is the process of placing male sperm in the reproductive tract of a female animal.

c. Natural insemination is when a male ejaculates sperm cells directly into the female's vaginal tract. Whereas artificial insemination involves the collection of semen/sperm from a male by the farmer, who then inserts it into the female's reproductive tract using equipment.

2. Introduce the learning outcome and the Key Competencies table, including the knowledge, skills, and attitudes they will gain by the end of this topic.

 Problem Solving Activity

1. Separate trainees into small groups (2-3 people) and refer them to **Topic 3.3 Task 2** in their manuals.

2. First, tell trainees to consider the difference between natural and artificial insemination from the previous activity. Given what they have learned about ruminant farming, tell the groups to reflect on and brainstorm the benefits and limitations of artificial insemination compared to natural insemination.

3. Next, tell trainees to work together to put the following steps for artificial insemination in the correct order.

Set time for insemination.	Assemble equipment and supplies
Perform artificial insemination.	Collect semen from male.
Detect heat in female.	Restrain animal.
Restrain animal.	

Correct Order:

1.

2.

3.

4.

5.

6.

3. After the groups have determined the steps for artificial insemination, instruct them to compare their answers with another group. Tell them to discuss, agree, and disagree until both groups come to a final agreement.

4. Finally, direct the trainees to **3.3 Key Facts** to have their ideas from this activity confirmed or corrected. Read through **3.3 Key Facts** as a class. As they read, tell trainees to:
   - ✓ Check or tick the benefits of artificial insemination that they guessed correctly.
   - o Circle the benefits of artificial insemination that they had not considered.
   - ❖ Star any other information that you do not understand and would like more clarification on.

Guided Practice Activity

1. In their small groups from the previous activity, tell trainees to read the following scenario and questions from **Topic 3.3 Task 3** in their manuals.

   Thierry is a cattle farmer in the Southern Province. He has detected heat in several of his female cows and plans to artificially inseminate them. He has asked for your advice on the following points:

   a. What method of artificial insemination should he use? What are the steps for this method?

   b. What are important techniques for restraining the cattle to perform the process?

   c. What information should Thierry record about his cattle?

   d. How can Thierry test if his cattle have become pregnant? How long after the insemination?

2. Tell the trainees to write their responses down. Emphasise that they should refer to **3.3 and 3.4 Key Facts**, but they should NOT copy the information directly. Instead, they should rephrase the information into their own words. Monitor the groups as they work to ensure this.

3. After the groups have finished working, present each question and ask volunteers to share their responses. Again, enforce that they cannot read directly from the **Key Facts**.

4. Verify the correct answers by referring to **3.3 and 3.4 Key Facts**.

Application Activity

Organise a visit to a ruminant farm that performs artificial insemination. If possible, arrange the visit so that the trainees can observe the farmer performing artificial insemination. Ask the farmer to arrange the tools, materials, and equipment of artificial insemination in advance.

1. Visit a local ruminant farm and introduce the trainees to the farmer and any other staff.

2. First, tell trainees to observe the tools, materials, and equipment used for artificial insemination. Tell them to identify the different tools, materials, and equipment and their uses. Finally, have the farmer confirm or correct their observations.

3. Then, instruct the trainees to ask the farmer about his or her record keeping procedures.
   a. What information do you record?

   b. How are these records beneficial?

   c. What are the challenges of good record keeping?

4. Finally, if possible, facilitate as the trainees observe the farmer as he or she demonstrates how to perform artificial insemination. They may assist the farmer if he or she requests it.

5. After the visit, discuss as a class:
   a. What did you learn?
   b. What surprised you?
   c. What knowledge and/or skills do you still need to perform artificial insemination?

Points to Remember

- Pregnancy Associated Glycoproteins (PAGs) test is a very accurate test for diagnosing pregnancy in animals.
- Accurate and detailed records provide the farmer with valuable measures of herd performance in the long-term.
- Skilled technicians and appropriate equipment are required to perform artificial insemination.

Formative Assessment

1. List four data points that should be collected for record keeping related to insemination.
   1.
   2.
   3.
   4.

2. Complete the following sentences:
   a. The restraint area for animals should be free of …….. conditions, well-lit, and have …… and ……. Provided.

   b. A liquid nitrogen tank is used to store the …… ……

   c. Artificial insemination may increase the …….. to a sire.

3. Explain the difference between natural and artificial insemination.

Answers:

1. Possible Answers: ID, date of birth, vaccination record, breeding and heat dates, calving history (dystocia, RFM (Retained Fetal Membranes)), mastitis, other health history information, reproductive exam information
2. a. stressful; food; water
   b. semen straws
   c. damage
3. Natural insemination is when a male ejaculates sperm cells directly into the female's vaginal tract. Whereas artificial insemination involves the collection of semen/sperm from a male by the farmer, who then inserts it into the female's reproductive tract using equipment.

Further Information for the Trainer

1. Search information on:
   - Why is reproduction important?
   - What is the process of animal reproduction?
   - How is artificial insemination performed?
   - What new technologies are being utilized to manage the reproductive success of animals?
2. Artificial Insemination:
   www.agritech.tnau.ac.in/animal_husbandry/animhus_cattle_AI.html

3. Artificial Insemination Equipment: www.slideshare.net/mohammadazizi4/artificial-insemination-equipment
4. Reproduction Management: http://infovets.com/healthycowinfo/A716.htm
5. Breeding Programme to Increase Production Efficiency of Small Ruminants in Developing Countries (FAO): http://www.fao.org/3/ah221e/AH221E06.htm#ch6
6. 8-Step Guide to Artificially Inseminating a Dairy Cow: https://www.fwi.co.uk/livestock/livestock-breeding/8-step-guide-artificially-inseminating-dairy-cow
7. Pregnancy Testing in Ruminants: https://waddl.vetmed.wsu.edu/animal-disease-faq/pregnancy-testing-in-ruminants

Learning Outcome 3.4: Monitor pregnancy

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

a. Describe different signs of pregnancy

b. Explain and perform rectal palpation on cattle

c. Estimate the stage of pregnancy through a rectal palpation

Time Required: 3 hours

Learning Methodology: Brainstorming, group work, farm visit, demonstrations

Materials Needed:

- **Standard training materials -** flip chart, markers, black/white board, chalk, tape, A4 paper
- **Sample rectal palpation materials –** long gloves, PPE, lubricant/oil
- **Audio/visual materials** – internet, projector, screen, computer, photos of cow rectum/reproductive system

Preparation:

- ❑ Organise a visit to a local ruminant farm with pregnant cattle.
- ❑ Arrange all materials in advance.
- ❑ Research and download photo(s) of cow anatomy/reproductive system.

Cross Cutting Issues:

- ✓ **Environment and sustainability:** Recognize the relationship between the environment and animal reproductive health.
- ✓ **Standardisation culture:** Emphasise the need to follow techniques and procedures precisely in order to accurately assess animal pregnancy.

Prerequisites:

- Anatomy and physiology
- Animal behaviours

Key Competencies:

Knowledge	Skills	Attitudes
1. Describe the different signs of pregnancy	**1.** Identify the signs of pregnancy	**1.** Proactive
2. Explain methods used in pregnancy diagnosis	**2.** Perform rectal palpation on cattle	**2.** Methodical
3. Explain how estimate the stage of pregnancy during a rectal palpation	**3.** Estimate the stage of pregnancy using a rectal palpation	**3.** Precise

Steps:

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

1. Tell trainees to find a partner and discuss the following questions from **Topic 3.4 Task 1** in their manuals:

a. How do you know when a woman is pregnant?

b. How do you know when a ruminant is pregnant?

c. What parts of the body (internal) are affected by pregnancy?

d. How could you assess these internal body parts/organs?

2. Ask volunteers to share their responses and discuss as a class. Clarify any major misconceptions about pregnant ruminants.

3. Introduce the learning outcome and the Key Competencies table with the knowledge, skills, and attitudes they will gain by the end of this topic.

Problem Solving Activity

1. With their partners from the previous activity, tell trainees to complete the following task found in **Topic 3.4 Task 2** in their manuals. They must predict how each body part or function changes when a ruminant is pregnant. **Part a** has been done as an example.

a. *Body weight - increases*
b. Womb
c. Skin
d. Pulse rate
e. Udder
f. Body temperature

2. After predicting, tell the partners to compare their ideas with another group. The two groups should discuss and debate their predictions, using previous knowledge and experience as evidence.

3. Now, explain that the easiest, fastest, and most accurate method to determine a cow's pregnancy is through rectal palpation. Display a photo of a cow's reproductive organs/anatomy. Explain that a strong knowledge of these parts is essential to performing a rectal palpation. Assist trainees in identifying the following parts from the photo:
a. Cervix
b. Rectal passage
c. Vulva
d. Uterus
e. Uterine horns

4. Now, direct trainees to **3.5 Key Facts**. Read the information out loud as a class.
a. While reading about signs of pregnancy, trainees should confirm or correct their predictions from **Question 1**.

b. While reading about rectal palpation, refer trainees to the image(s) you displayed as well as those in their manuals so that they can visualise this process.

5. Clarify any misunderstandings or confusion from **3.5 Key Facts.**

Guided Practice Activity

1. Separate trainees into small groups (2-4 people) and tell them to consider the following scenario and questions from **Topic 3.4 Task 3** in their manuals:

Christian raises cattle in the Eastern province. He artificially inseminated several cows and wants to determine if they are pregnant or not. He plans to perform a rectal palpation exam, but he is nervous because it will be his first time doing this procedure. He asks for your advice on the following points:

a. What materials do I need to do a rectal exam?

b. What are the positive signs of pregnancy?

c. What if I am not sure about the cow's pregnancy diagnosis after I complete the exam?

d. What are the main body parts/organs that I should be familiar with for this exam?

2. Encourage trainees to discuss and write the answers with their groups. Once all groups have finished, ask volunteers to share their ideas. After all the questions have been addressed, verify the correct answers using the key below.

3. Now, add the following information to the scenario:

Christian completes the rectal palpation procedure and determines that the cow is pregnant. He records that one of the uterine horns is enlarged and the walls are thinner. He feels a foetus that is about 2.5 cm long.

4. Direct trainees to **3.6 Key Facts** and tell them to read the facts with their groups and determine which stage of pregnancy Christian's cow is in.

5. After the groups have discussed, verify that this cow is in the **45-Day** pregnancy stage.

6. Clarify any misunderstandings or confusion about **3.6 Key Facts**.

Answers to Question 1:

a. Materials: Long plastic gloves, oil/lubricant, PPE, cattle crush/restraint
b. Positive signs of pregnancy: Foetus, cotyledons, amniotic vesicle, foetal membrane slip.
c. If you are not sure after the exam, you must recheck the cow later that day or the next day.
d. Main body parts/organs: Rectum, vulva, uterus, uterine horns, cervix

Application Activity

Organise a visit to a local ruminant farm with pregnant cattle.

1. Bring trainees to a local ruminant farm and introduce them to the farmer and any other staff.

2. Tell the trainees to observe the pregnant cow(s) and note any signs of pregnancy in the chart (sample below). Allow them to measure the last two (pulse rate and body temperature) with the farmer's assistance, if possible.

Body part/function	**Description**
Body weight	
Skin	
Udder	
Pulse rate	
Body temperature	

3. Next, tell the trainees to observe closely while the farmer demonstrates how to perform a rectal palpation on one of the pregnant cows.

4. Based on the farmer's experience and description, tell trainees to determine which stage of pregnancy the cow is in by referring to **3.6 Key Facts**.

5. Give trainees the opportunity to ask the farmer any questions they have about rectal palpation and how to master this skill.

6. After the visit, discuss as a class:
   a. What did you learn?
   b. What surprised you?
   c. What information do you need about monitoring pregnant ruminants?

Points to Remember

- Always be systematic in your rectal examination.
- Observe the Golden Rules of pregnancy diagnosis by rectal palpation.

Formative Assessment

1. List five signs of ruminant pregnancy:

2. Why should someone use the rectal palpation pregnancy diagnosis method for cattle?

3. Complete the following sentences regarding the Golden Rules of the rectal pregnancy exam:
   a. Be sure to examine the entire ……..

   b. In order to determine that a cow is pregnant, you must find one of the …… ……

   c. If you are not sure of the animal's pregnancy status after the exam, you must ……. the cow later.

Answers:

1. Possible Answers: Refer to **3.5 Key Facts**
2. It is the easiest, cheapest, fasts, and most accurate diagnosis method.
3. a. (rectal) tract
   b. positive signs
   c. recheck

Further Information for the Trainer

1. Search for information on:
   - The Golden Rules of Rectal Pregnancy Exam
   - Estimation of stage of pregnancy by rectal palpation
2. Pregnancy in Ruminants: http://vikaspedia.in/agriculture/livestock/general-management-practices-of-livestock/pregnancy-in-ruminants
3. Reproductive Tract Anatomy and Physiology of the Cow: https://aces.nmsu.edu/pubs/_b/B212/welcome.html

4. Pregnancy Diagnosis of Animals: Importance, Methods, and Procedures: http://www.yourarticlelibrary.com/dairy-farm-management/pregnancy-diagnosis-of-animals-importance-methods-and-procedures/35867
5. Pregnancy Diagnosis (Palpation): https://www.birdvilleschools.net/cms/lib/TX01000797/Centricity/Domain/1390/Pregnancy%20and%20Palpation%20Lesson.pdf

Learning Outcome 3.5: Assist with parturition

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

a. Identify signs of calving, lambing, and kidding.

b. Prepare maternity room.

c. Care for mothers and newborns.

d. Apply newborn identification techniques.

Time Required: 4 hours

Learning Methodology: Brainstorming, field visit, group work, practical exercises, demonstration

Materials Needed:

- **Standard training materials -** flip chart, markers, black/white board, chalk, tape, A4 paper
- **Sample identification materials -** ear tags, ear tag applicator, tattooing materials
- **Signs of parturition photos –** 5-10 photos of cattle, sheep, and goats showing signs of parturition.
- **Audio/visual equipment –** internet, projector, screen

Preparation:

- ❑ Organise a visit to a local ruminant farm to observe pregnant animals and/or a birthing.
- ❑ Arrange all materials and equipment in advance.
- ❑ Research and download 5-10 photos of animals with signs of parturition for display.

Cross Cutting Issues:

- ✓ **Environment and sustainability**: Emphasise the need to protect and monitor animal health during and after the parturition process.
- ✓ **Gender and inclusivity**: Consider gender balance and inclusion of people with disabilities while forming groups.

Prerequisites:

- Basic anatomy
- Basic physiology

Key Competencies:

Knowledge	Skills	Attitudes
1. Know the various signs of parturition	**1.** Identify females during parturition time	**1.** Precise
2. Explain how to care for mothers and newborns immediately after birth	**2.** Prepare maternity room	**2.** Patience
3. Identify newborns using ear tag or tattoos	**3.** Apply ear tags and tattoos to newborns	**3.** Proactive

Steps:

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

1. Tell trainees to discuss the following questions with a partner from **Topic 3.5 Task 1** in their manuals. They should apply their previous knowledge and experiences.

   a. How do you know when an animal is going to give birth soon?

   b. Have you ever seen a ruminant give birth? What did it look like?

   c. What precautions should you take when assisting with a ruminant birth?

2. After discussing, ask volunteers to share their answers with the rest of the class. Facilitate a class discussion on the topic of ruminant births, or parturition. Let the trainees discuss freely; the correct answers will be revealed throughout this topic.

3. Introduce the learning outcome and the Key Competencies table, which includes the knowledge, skills, and attitudes they will gain by the end of this topic.

Problem Solving Activity

1. With their partners from the previous activity, tell trainees to work together to determine if the following statements are true or false. Encourage them to discuss and debate the statements, using their own experience and previous knowledge as evidence.

   a. It is better for ruminants to give birth naturally.

   b. Animals giving birth for the first time will not have any problems compared to older animals.

2. Explain that the correct answers will be confirmed in **3.7 Key Facts**. But before reading the **Key Facts**, the trainees should discuss the following situation with their partners:

   One of your cows is giving birth. You are expecting the head to come out first and then both front feet. However, only the head has come out.

   a. What should you do?

   b. Why?

   c. What are the potential consequences?

3. After the discussions, ask volunteers to share their ideas and explain their reasoning.

4. Then, refer the trainees to **3.7 Key Facts**. Read the sections out loud as a class. While reading, tell the trainees to:
   a. Confirm whether the statements from **Question 1** are true or false.

   b. Confirm what you should do if you face difficulties during calving, such as the scenario from **Question 2**.

   c. Underline or circle any other information that is unclear or confusing.

5. After reading, clarify any misunderstandings or confusion from **3.7 Key Facts**.

Guided Practice Activity

1. Divide the trainees into small groups (2-4 people) and refer them to **Topic 3.5 Task 3** in their manuals. Instruct the groups to compare and contrast the signs of parturition for cattle to the signs for sheep and goats using **3.3 Key Facts**.

Signs that are the same/similar:	Signs that are different:

2. Display photos of animals showing signs of parturition on the projector. Tell trainees to discuss and identify the signs shown by each animal. Verify their responses after each photo.

3. Next, direct trainees to **3.8 Key Facts**. Explain that this section of **Key Facts** covers how to care for mothers and newborns before and after parturition. Read through each section as a class. As you read, tell trainees to:
   - Underline the three things to check in a mother immediately after birth.
   - Star the two things to check in a newborn immediately after birth.
   - Circle the two methods of newborn identification.

4. After reading, ask trainees to share the information they underlined, starred, and circled while reading.

Application Activity

Organise a visit to a local ruminant farm where one or more animals is pregnant and/or going to give childbirth.

1. Bring trainees to a local ruminant farm and introduce them to the farmer and any other staff present.

2. Allow the farmer to guide the trainees to the pregnant animals. Referring to **3.7 and 3.8 Key Facts**, tell trainees to do the following:
   a. Observe the maternity room and note the arrangement (lighting, water, food, etc.):

b. Observe the pregnant animal(s). Check or tick the signs of parturition that you observe:

✓	**Signs of parturition**
	Increased belly size
	Filled udder
	Stiff teats
	Red and swollen vulva
	Mucous and blood-coloured fluid from vulva
	Presence of water bag
	Animal is away from others
	Restless behaviour
	Animal is straining

c. If possible, tell the trainees to observe as an animal gives birth and assist the farmer if requested. Remind them to pay close attention to the animal's behaviour and the farmer's actions before, during, and after the parturition.

d. If it is not possible, ask the farmer to explain in detail the process of parturition for cows, sheep, and goats. Encourage the trainees to ask questions.

3. After the visit, discuss as a class:

a. What did you learn?

b. What surprised you?

c. What other information do you need about ruminant parturition?

Points to Remember

- Remember that most newborn animals die because of lack of food. Cold and wet conditions are very bad for newborns and can cause lung diseases which may kill them.
- Lambing and kidding, like calving, are natural processes which normally take place without help. Observation is required in case there are any difficulties.
- Sheep and goats, unlike cattle, may frequently have twins (2 young) or triplets (3 young).
- Cows calving for the first time (heifers) tend to have more problems than older cows and therefore need more attention when calving.

- From birth, the young animal is vulnerable to disease and is completely dependent on the mother for food for survival.

Formative Assessment

1. Circle the signs of lambing/kidding from the list below:
   a. Animal behaviour is violent.
   b. Discharge from the vulva.
   c. Animal begins to strain.
   d. Vulva skin is tight and dry.
   e. Animal stays away from others.

2. What should you do if there are difficulties during calving?

3. Complete the following sentences:
   a. The mother's …… ……. should come out naturally, but you can help remove it by pulling on it.

   b. Check that there are not any ……. …….. in the uterus because they could cause an …….

   c. …… ……. are used globally to identify newborns.

Answers:
1. b, c, e
2. Ask the veterinarian to help or help the cow yourself. See full steps in **3.6 Key Facts**.
3. a. water bag
   b. dead young; infection
   c. Ear tags

Self-Reflection

1. Ask trainees to re-take the self-assessment at the beginning of the unit. They should then fill in the table in 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. Search for information on:
   - Abnormal presentations
   - When and how to help with parturition
   - Vaginal prolapsed
   - Different presentations and positions
2. Care and Management of Pregnant Animal: http://vikaspedia.in/agriculture/livestock/cattle-buffalo/breeding-management-1/care-management-of-pregnant-animal
3. Pregnancy in Ruminants (FAO): http://www.fao.org/3/t0690e/t0690e05.htm#unit%2018:%20pregnancy%20in%20ruminants

Learning Outcome 3.6: Perform weaning

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

a. Determine weaning period

b. Facilitate transition from milk to dry feed

c. Install weaned calves and kids in their sections

Time Required: 3 hours

Learning Methodology: Brainstorming, group work, field visit, practical exercises, demonstration

Materials Needed:

- **Standard training materials -** flip chart, markers, black/white board, chalk, tape, A4 paper
- **Learning and reference materials -** Internet, reference books, computers

Preparation:

- ❑ Organise a visit to a local ruminant farm. Confirm that the farm has calves, kids, and/or lambs that in the process of weaning.
- ❑ Arrange all materials in advance.

Cross Cutting Issues:

- ✓ **Peace values**: Consider animal welfare while creating and implementing a management system for ruminants.
- ✓ **Gender and inclusivity**: Consider gender balance and inclusion of people with disabilities while forming groups.

Prerequisites:

- None

Steps:

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

1. Tell trainees to discuss the following questions from **Topic 3.6 Task 1** with a partner:
   a. What does a newborn animal eat/drink for nourishment?

   b. Where does this nourishment come from?

   c. What does the term “weaning” mean?

   d. Why is it important?

2. After discussing, ask trainees to share their ideas with the rest of the class. Clarify any major misconceptions.

3. Introduce the learning outcome and the Key Competencies table with the knowledge, skills, and attitudes they will gain by the end of this topic.

Problem Solving Activity

1. Assign the trainees small groups (2-3 people). Using the resources available to them (internet, books, other staff/professionals), tell them to research definitions of the following terms from **Topic 3.6 Task 2** in their manuals:
   a. Rumen

   b. Lactation

   c. Weaning

2. After researching the terms, tell trainees to research and write an explanation how the three terms relate to each other, specifically with ruminant animals. Emphasise that the groups should research, understand, and rephrase the information using their own words.

3. Ask each group to share their explanation of the relationship between rumens, lactation, and weaning. Clarify any errors and/or guide them using the key below.

4. Direct them to **3.9 Key Facts** in their manuals. Read through the information as a class. As they read, tell trainees to:
   - ❖ Star the terms rumen, lactation, and weaning.
   - ○ Circle any information that is confusing or unclear.

5. After reading, ask trainees to share the information they circled. Clarify the information for them as needed.

Answers to Questions 1 & 2:

1. Definitions
   - **a.** Rumen: The first stomach of a ruminant, which partially digests food (cud) using microbes/bacteria and then passes it to the reticulum.
   - **b.** Lactation: The action of suckling milk by an infant from its mother.
   - **c.** Weaning: To accustom an infant/young mammal to food other than its mother's milk.

2. Relationship: Ruminants have two stomachs—the first is called the rumen, which digests food first using microbes. But an animal's rumen is not activated/developed while they are lactating/drinking from their mother's milk because the milk provides sufficient nutrients. In order to increase profit/production by collecting milk for sale rather than for newborn consumption, farmers must wean the newborns off of milk/lactation. They must slowly transition the newborns to dry feed, such as grasses, in order to slowly develop the rumen for long-term and healthy consumption habits.

Guided Practice Activity

1. In their groups from the previous activity, tell trainees to read the following scenario and questions from **Topic 3.6 Task 3** in their manuals. They should use **3.9 Key Facts** for reference but not copy the information directly.

   One of Jean Baptiste's dairy cattle recently gave birth to a calf. He knows that the calf needs to be weaned but he lacks the essential information for this process. Help Jean Baptiste by discussing and writing the following:

   - **a.** Explain the significance and role of weaning in ruminant farming.

   - **b.** Identify when a dairy cow's calf should be weaned.

   - **c.** Describe how to transition the calf from milk to dry feed.

d. Describe how the calf should be installed after weaning.

2. After the groups have discussed and written their advice to Jean Baptiste, pair them with another group to compare and contrast their responses. Encourage the groups to explain their reasoning to one another and come to a common agreement.

3. Review the correct answers with the trainees by referring to **3.9 Key Facts**.

4. Finally, ask the trainees how the weaning process differs for calves, lambs, and kids. After some discussion, explain that the weaning periods differ for each type of animal AND their purpose (milk, meat, etc.). The lactation period (time mother produces milk) also differs, which means that the amount of milk the mother can produce for consumption and/or sale is different. They can find the specific numbers in **3.9 Key Facts.**

Application Activity

Organise a visit to a local ruminant farm where there are newborns in the weaning process.

1. Before visiting a local ruminant farm, tell trainees to work in their groups to create a list of five interview questions about weaning for the farmer. Tell them to write their questions on a separate piece of paper.

2. Ask the groups to share their questions. As a class, vote and agree on the five best questions to ask the farmer. Tell the trainees to write these questions into the chart (sample below):

Questions	Answers

3. Bring trainees to a local ruminant farm and introduce them to the farmer and any other staff present.

4. Facilitate as trainees take turns interviewing the farmer using the questions they created earlier.

5. After the interview, have the farmer guide the trainees to the weaning area and tell them to closely observe what they see. Have the farmer explain the following points for these specific animals to the trainees:
   a. Age of young animals.

   b. When they will be/were weaned.

   c. The transition from milk to dry food and the types of dry food provided.

   d. How they will be installed at the farmer after weaning.

5. After the visit, discuss as a class:
   a. What did you learn?

   b. What surprised you?

Points to Remember

- The smaller the animal, the higher the nutritional requirement will be for milk/feed/ nourishment.
- Feed a high-quality ration from the first day. Hay alone is not enough for young calves.
- Does not change the amount or type of feed suddenly – ease off and on, to allow the rumen microorganisms to adapt and to reduce stress.
- Very weak or sick calves may need to be separated and treated as a hospital group.

Formative Assessment

1. Match the ruminant to its lactation period:

Ruminant	Lactation Period
1. Sheep	**A.** 290-305 days
2. Cow	**B.** 240 days
3. Goat	**C.** 14-305 days

2. Explain the difference between weaning calves when the mother's purpose is meat production vs. when the mother's purpose is milk production.

3. Complete the following sentences about installing weaned infants:
   a. Weaned infants must be separate from their …… for complete weaning.

   b. Keep young in a …… place.

   c. Be sure to provide enough roughage, ……, and shade to weaned animals.

Answers:

1. 1-B, 2-C, 3-B
2. When the mother's purpose is for milk, the calves must be weaned sooner because they are consuming the milk that is meant to be sold. Whereas when the mother's purpose is for meat, the calves can continue to wean for as long as they want.
3. a. mothers
   b. familiar
   c. water

Self-Reflection

1. Ask trainees to re-take the self-assessment at the beginning of the unit. They should then fill in the table in 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. Wean Cattle:
   www.wikihow.com/Wean-Cattle
2. Turning Calves into Functioning Ruminants:
   https://formafeed.com/the-great-transition-turning-calves-into-functioning-ruminants/
3. Sheep Milk Production:
   http://www.milkingsheep.com/sheep-milk-production
4. Milking Lactation Workbook:
   http://www.holsteinfoundation.org/pdf_doc/workbooks/Milking_Lactation_Workbook.pdf
5. Small Ruminant Production in Developing Countries:
   http://www.fao.org/3/ah221e/AH221E05.htm

6. After the Calf is Born: http://www.fao.org/ag/againfo/themes/documents/pub6/p604.htm
7. Cellulose Digestion in Ruminants (image from 3.9 Key Facts): https://cmbiologynotes.wordpress.com/topics-covered/cellulose-digestion-in-ruminants/

Learning Unit 4: Carry out milking operations

Learning Outcomes

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

4.1 Hygiene and safety measures

4.2 Milking techniques

4.3 Storage and transport of milk

Learning Unit 4: Self-Assessment

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

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

Learning Outcome 4.1: Apply hygiene and safety measures

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

a. Maintain animal hygiene for milking
b. Maintain hygiene of milking materials
c. Maintain miller's hygiene

Time Required: 7 hours

Learning Methodology: Brainstorming**,** practical exercise, field visit, demonstration

Materials Needed:

- **Standard training materials -** flip chart, markers, black/white board, chalk, tape, A4 paper
- **Cleaning materials –** soap, hot water, brush
- **Sample milking materials -** milking machine, cans/containers

Preparation:

- ❑ Organise a visit to a local ruminant farm with lactating cattle.
- ❑ Obtain and arrange all materials in advance.

Cross Cutting Issues:

- ✓ **Environment and sustainability**: Understand the relationship between the environment (presence of bacteria), the cleanliness of people and materials, and animal health while performing milking.
- ✓ **Standardisation culture:** Recognise the symptoms and apply treatment for udder infections. Maintain proper hygiene by using a biosecurity system to prevent infections.
- ✓ **Gender and inclusivity:** Consider gender balance and inclusion of people with disabilities while forming groups.

Prerequisites:

- Biology: Anatomy

Key Competencies:

Knowledge	Skills	Attitudes
1. Recognise udder pathologies/diseases	**1.** Treat and prevent udder pathologies/diseases	**1.** Proactive
2. Describe cleaning procedures for milking materials and areas	**2.** Clean milking materials and areas	**2.** Methodical
3. Identify components of proper hygiene for the milker	**3.** Maintain milker's hygiene	**3.** Detail-oriented

Steps:

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

1. Refer trainees to **Topic 4.1 Task 1** in their manuals and tell them to find a partner. With their partners, tell trainees to brainstorm responses to the following questions:

a. What is "hygiene"?

b. Why is hygiene important in farming?

c. How could good or bad hygiene impact ruminant health and production?

2. Ask trainees to share their ideas. Clarify any major misconceptions or misunderstandings.

3. Introduce the learning outcome and the Key Competencies table with the knowledge, skills, and attitudes they will gain by the end of this topic.

Problem Solving Activity

1. With their partners, tell trainees to discuss and write down how they can maintain hygiene in the following components of milking from **Topic 4.1 Task 2** in their manuals:

a. Animal (udders)

b. Materials (milking machine, cans/containers, milking area)

c. Milker (hands, clothes, general health)

2. After discussing and writing their ideas, tell each pair of partners to find another pair and compare their ideas. Encourage the trainees to agree, disagree, and explain their reasoning.

3. Next, ask volunteers to share their ideas and write them on the board/flipchart for everyone to see.

4. After brainstorming as a class, direct the trainees to **4.1 Key Facts.** Read the information as a class. As they read, tell the trainees to:
- ✓ Check or tick the information that they predicted correctly from **Question 1**.
- ❖ Star the information that they predicted incorrectly or did not consider from **Question 1**.
- o Circle any information that is confusing or that you need more clarification on.

5. Ask trainees to share the information that they circled. Clarify and explain this information again using **4.1 Key Facts** as a guide.

Guided Practice Activity

1. Separate the trainees into small groups (3-4 people) and refer them to **Topic 4.1 Task 3** in their manuals. Tell the groups to read the following scenario and write a letter to Protais in response to his questions.

Protais recently began raising cattle for milk production. However, he is uneducated on animal health and hygiene matters. One of his cows died due to mastitis and he believes another one has the same infection. He needs your help and expertise.

Write Protais a letter responding to his questions:

a. How does mastitis infect the animals?

b. What are the signs of mastitis so that I can recognise it before another cow dies?

c. How do I treat mastitis?

d. What hygiene measures can I take to prevent mastitis and other infections from harming the animals? (Including: animal, materials, milker).

e. What should I do once I diagnose an animal with mastitis or another infection?

2. Remind trainees to use proper letter format ("Dear Protais,") and be supportive of Protais in his goal to raise cattle for milk production. At the same time, they should emphasize the importance of hygiene and animal health. Note that each group will present their letter to the rest of the class.

3. After all groups have written their letters, facilitate as a representative from each group reads their letter out loud to the class. After each letter is read, tell trainees to give feedback and correct any errors in their advice.

4. Collect the letters and review them after the session. Provide feedback as needed.

Application Activity

Organise a visit to a local ruminant farm where the cattle are lactating. Confirm that the farmer will be available to answer questions and demonstrate how to milk a cow using proper hygiene practices.

1. Bring the trainees to a local ruminant farm and introduce them to the farmer and any other staff present.

2. Begin by facilitating a discussion between the trainees and the farmer about hygiene and safety measures at the farm. Guide the discussion using the questions below, found in **Topic 4.1 Task 4** in the Trainee Manuals:
   a. Which milking materials do you clean?

   b. How often do you clean them? After every use? Daily? Weekly?

   c. What is the cleaning process for these materials?

   d. What precautions does the milker take before, during, and after milking?

   e. What can be done to prevent the spread of bacterial infections, such as mastitis?

3. After the trainees have discussed with the farmer, tell them to watch closely as the farmer demonstrates how to properly milk a cow using proper hygiene measures.

4. Tell the trainees to note their observations on the following points:
   a. Cleanliness of materials

b. Hands and clothes of the milker

5. Thank the farmer for his/her time. After the visit, discuss as a class:

a. What did you learn?

b. What surprised you?

c. Why is animal, material, and milker hygiene important?

After splitting trainees into groups, bring the trainees in a farm of ruminants where is lactating animals and milking machine and ask them:

1. To perform personnel hygiene
2. To perform hygiene of milking machine, materials and equipment
3. Perform hygiene of the cow before and after milking

Points to Remember

- Sources of milk contamination include udder infections, milking materials, the milker, feed and water, and the milking environment.
- Contamination of milk can be corrected through proper animal management, hygiene of milking equipment, milking practices, and personal hygiene of the milker.

Formative Assessment

1. Explain how udder diseases, such as mastitis, occur in ruminants.

2. What is the importance of record keeping in milk production and animal health?

3. Identify whether each statement is **true** or **false**:

a. Some milking machines cause the milk to return to the teat, which can cause infections.

b. Milking environments should be dark without windows.

c. It is essential to keep sick animals in the same area as healthy animals to encourage their recovery.

d. Milkers should wash their hands with clean water and soap as well as wear clean over-clothing before milking or handling milk.

Answers

1. Bacteria enters the udder after milking, while the sphincter muscle in the teat is open.

2. Keeping records help identify rapid changes in animal production and therefore identify potential diseases or infections.

3. a. True
b. False: Milking environments should be well-light with good ventilation.
c. False: Sick animals should be kept separate from healthy animals.
d. True

ⓘ Further Information for the Trainer

1. Milk Hygiene and Quality Control: http://www.fao.org/3/I9303EN/i9303en.pdf

2. Hygiene in Milk Production: http://www.milkproduction.com/Library/Scientific-articles/Milk--milking/Hygiene-in-milk-production/

3. Ministerial Order of Rwandan Ministry of Agriculture (MINAGRI).

4. Mastitis Control (FAO): http://www.fao.org/3/t0218e/t0218e04.htm

5. Managing Animal Health: https://www.dairynz.co.nz/milking/dairy-stockmanship/managing-animal-health/

Learning Outcome 4.2: Apply milking techniques

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

a. Select a milking method
b. Perform milking by hand
c. Operate milking machine

Time Required: 6 hours

Learning Methodology: Brainstorming, group work, practical exercises, field visit, demonstration

Materials Needed:

- **Standard training materials -** flip chart, markers, black/white board, chalk, tape, A4 paper
- **Sample milking equipment and materials -** milking machine, cans/containers, bucket, cleaning products, iodine solution
- **Audio/visual equipment –** internet, computer, projector, screen, videos of milking by hand and with a machine

Preparation:

- ❑ Organise a visit to a local ruminant farm with lactating ruminants.
- ❑ Obtain and arrange all materials in advance.
- ❑ Research and download 2-3 videos of farmers milking by hand and with a machine.

Cross Cutting Issues:

- ✓ **Environment and sustainability:** Consider the impact of environmental factors, such as dirt and waste, on animal health, particularly mastitis and other udder infections.
- ✓ **Standardisation culture**: Emphasize the need to follow correct procedures for milking to maintain safety and health.
- ✓ **Gender and inclusivity:** Consider gender balance and inclusion of people with disabilities while forming groups.

Prerequisites:

- Basic ruminant anatomy

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify milking methods	**1.** Select milking method	**1.** Decisive
2. Explain the importance of using a milking machine	**2.** Operate milking machine	**2.** Responsible
3. Explain the process of milking by hand	**3.** Perform milking by hand	**3.** Detail-oriented

Steps:

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

1. Direct trainees to **Topic 4.2 Task 1** in their manuals and tell them to find a partner. Explain that there are two milking methods: by hand and with a machine. With their partners, trainees should brainstorm responses to the following questions:

a. What are the advantages of milking by hand?

b. What are the disadvantages of milking by hand?

c. What are the advantages of milking with a machine?

d. What are the disadvantages of milking with a machine?

2. After discussing, ask trainees to share their ideas with the class. Clarify any major misconceptions or misunderstandings.

3. Introduce the learning outcome and the Key Competencies table with the knowledge, skills, and attitudes they will gain by the end of this topic.

Problem Solving Activity

1. With their partners, tell trainees to discuss the following questions from **Topic 4.2 Task 2** in their manuals:

a. What are the risks of milking by hand?

b. What are the risks of milking using a machine?

c. How can we promote animal health and safety while milking?

2. After discussing, ask trainees to take turns writing their responses to the questions on the board/flipchart. Focus their attention on **part c**: animal health and safety. Note the following points if they have not been mentioned already: Hygiene/cleaning, repair/maintenance of tools and equipment, deep knowledge of systems/processes (standardisation culture).

3. Then, direct the trainees to **4.2 Key Facts** in their manuals. Tell them to read the information individually. While they read, they should:
- ✓ Check or tick the three methods of milking by hand.
- ❖ Star the advantages of using a milking machine.
- ○ Circle any information or terms that are unclear or confusing.

4. Ask trainees to share the information that they circled in **4.2 Key Facts.** Clarify and explain the information.

Guided Practice Activity

1. Separate the trainees into small groups (3-4 people) and refer them to **Topic 4.2 Task 3** in their manuals. First, tell them to re-read the three methods for milking by hand. With their groups, they should practice imitating how to perform each method with their hands. Give them classroom objects similar to udders to use, if possible.

2. Then, ask volunteers to come to the front of the room and demonstrate each method (stripping, full hand, and knuckling). As they are demonstrating, explain the challenges/risks for each one.

3. Next, tell them to work with their groups to arrange the steps for using a milk machine into the correct order.

A. Clean the machine afterwards.	**B.** Grab the claw and hold it under the udder with the milk hose pointed to the front of the claw.	**C.** Move the cow so that it is standing in milking area with some feed.

D. Hook up the vacuum line to the vacuum port on the milker and turn on the vacuum pump.	**E.** Dip the teats into a 70% Iodine solution.	**F.** Move the bucket beside the cow.
G. Remove the cups when the milk going into the bucket slows to a stop.	**H.** Check the machine before use.	**I.** Turn off the machine and remove the lid from the bucket.
J. Attach all tubes and caps to the machine.	**K.** Check to see how and if the milk is flowing into the bucket.	**L.** Add the teat cups to the teats one at a time.
M. Clean the udder thoroughly.	**N.** Pour the milk into clean buckets or a milk container for storage and later use.	**O.** Store the machine in a warm dry place until next use.

1.	**2.**	**3.**
4.	**5.**	**6.**
7.	**8.**	**9.**
10.	**11.**	**12.**
13.	**14.**	**15.**

4. After they have attempted to order the steps, direct trainees to **4.3 Key Facts**. Tell them to read the information with their groups. As they read, they should confirm and correct their answers to the previous task.

5. Ask the trainees if they have any questions about the information from **4.3 Key Facts**.

Application Activity

Organise a visit to a local ruminant farm. Confirm that some animals are lactating and that the trainees will be allowed to assist with milking operations. Download videos of farmers milking by hand and using a machine in advance.

1. Inform the trainees that they will visit a ruminant farm and assist a farmer with the milking process. Refer them to **Topic 4.2 Task 4** in their manuals.

2. Before visiting the farm, show the trainees the videos of farmers milking ruminants by hand and with a machine. Remind them to pay close attention and ask questions because they will perform these same tasks soon.

3. Bring the trainees to a local ruminant farm and introduce them to the farmer and any other staff present.

4. Divide the trainees into small groups and tell the groups to rotate observing and paying close attention while the farmer demonstrates to milk a ruminant by hand. Ask them to identify which method the farmer uses.

5. After each group has observed the farmer, give each trainee the opportunity to assist the farmer as she/he milks the animal(s) by hand, if there is enough time. If there is not enough time for each trainee to assist, tell each group to select a representative to assist while the others observe.

6. Then, ask the farmer to demonstrate how to use the milking machine. If possible, allow trainees to assist with this process as well.

7. Finally, encourage trainees to ask any questions they have about milking by hand and with a machine. They should ask the farmer about her/his experience with both methods and which one she/he prefers.

Points to Remember

- Quality assurance begins at the farm.
- Good hygiene practice in milk production and handling is key to milk quality and safety.

Formative Assessment

1. Identify and explain the best method for milking by hand.

2. What are two advantages to milking with a machine?
   1.

   2.

3. Complete the following sentences:
   a. You can disinfect teat ends after milking by dipping them in …….. solution.

b. Be sure to perform maintenance on the milking machine at least …….. per month to make sure the parts are working well and to make repairs as needed.

c. After using the milking machine, store it in a …….. …… place until the next use.

Answers:

1. Full hand method because it minimises injuries to the animal. Circle teat with index finger and thumb, then press with palm.
2. Possible Answers: Reduced labour cost, short time for milking, less injury to teats, most hygienic method of milk production.
3. a. antiseptic
   b. once
   c. warm, dry

ⓘ Further Information for the Trainer

1. http://www.kdb.go.ke/wp-content/uploads/2019/06/Guide-on-hygienic-milk-production.pdf
2. http://www.snv.org/public/cms/sites/default/files/explore/download/hygienic_and_quality_milk_production_training_manual_and_guideline.pdf

Learning Outcome 4.3: Store and transport milk

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

a. Select milk storage material and equipment
b. Clean material and equipment for milk storage
c. Transport milk

Time Required: 7 hours

Learning Methodology: Brainstorming, group discussion, field visit, demonstration

Materials Needed:

- **Standard training materials -** flip chart, markers, black/white board, chalk, tape, A4 paper
- **Sample storage and transportation materials –** cans/containers, cooling tank

Preparation:

- ❑ Organise a visit to a milk collection centre, including transportation. Confirm that an employee will be available to give a tour and answer questions
- ❑ Obtain and arrange all materials in advance.

Cross Cutting Issues:

- ✓ **Environment and sustainability:** Consider the effect of environmental factors, such as temperature, on milk storage and quality.
- ✓ **Standardisation culture:** Maintain temperature and room conditions for milk storage in order to preserve quality.
- ✓ **Gender and inclusivity:** Consider gender balance and inclusion of people with disabilities while forming groups.

Prerequisites:

- None

Key Competencies:

Knowledge	Skills	Attitudes
1. Describe milk storage conditions	**1.** Select and maintain milk storage material and equipment	**1.** Methodical
2. Identify milk storage materials and equipment	**2.** Store milk	**2.** Detail-oriented
3. Describe materials for milk transportation	**3.** Select material for milk transportation	**3.** Precise

Steps:

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

1. Refer trainees to **Topic 4.3 Task 1** in their manuals and tell them to discuss the following questions with a partner:

a. Where do you buy milk from?

b. Where is the milk kept in the store or shop?

c. What are the conditions (temperature, organisation) of the milk storage area?

2. After discussing, ask trainees to share their answers and ideas with the rest of the class. Clarify any major misconceptions or misunderstandings about milk storage.

3. Introduce the learning outcome and the Key Competencies table with the knowledge, skills, and attitudes they will gain by the end of this topic.

Problem Solving Activity

1. With their partners, tell trainees to turn to **Topic 4.3 Task 2** and brainstorm a list of all the materials and equipment they think are needed for milk transportation and storage.

Storage materials and equipment	Transportation materials and equipment

2. Using what they know about cleaning, tell the pairs to discuss:

a. How should milk storage material and equipment be cleaned? What are the steps?

b. What is the importance of cleaning these materials and equipment?

3. After discussing, ask trainees to share their ideas with the rest of the class. Encourage trainees to agree and disagree with each other and explain their reasoning.

4. Now, direct trainees to **4.4 Key Facts**. Read the information out loud as a class. As they read, tell trainees to:

- ✓ Check or tick the materials and equipment that you brainstormed correctly from **Question 1**.
- ✓ Check or tick the steps for cleaning that you brainstormed from **Question 2.**
- ❖ The importance of proper milk storage and transportation. Note: This will not be stated directly—you must use critical thinking to discover the importance.
- o Circle any information that is confusing or unclear.

5. Ask trainees to share the information that they circled. Clarify and explain any confusing concepts.

Guided Practice Activity

1. Divide trainees into small groups and direct them to **Topic 4.3 Task 3** in their manuals. First, tell them to compare and contrast the traditional milk operations processes to the modern ones that have been explained in their manuals. They should discuss and write their ideas in the chart (sample below).

Traditional	Both	Modern

2. Then, tell the groups to compare their ideas with another group. The groups should discuss and debate the similarities and differences between the methods.

3. After the discussions, ask volunteers to share their ideas with the class. Facilitate a class discussion:
   a. What are the advantages of modern milk operations (milking, storage, and transportation)?

   b. What are the cultural challenges and expectations for milk operations?

4. Next, tell the groups to read the following scenario and discuss the questions that follow:

   Celestine is new to dairy cattle farming. She has successfully milked her cows, but now she needs to store and transport it to the milk collection centre. Given your education in ruminant farming, she asks for your advice on the following points:

   a. What are the proper conditions for milk storage?

   b. Why is it important to properly store milk?

   c. What should I do with milk that smells like the feeds?

   d. When should I transport the milk to the milk collection centre? Why?

   e. What materials do I need to transport the milk?

5. After the groups have discussed and prepared their answers, ask them to share their answers to each question. Encourage the trainees to discuss and debate the responses.

6. Clarify the correct answers using the key below.

Answers to Question 4:

a. Clean room; temperature of about 4°C; dark, well-ventilated area.
b. Proper storage protects milk from chemicals, bacteria, and poor handling. All of these could contaminate or damage the milk, making it inconsumable/a waste.
c. Keep it separate and do not deliver/sell.
d. Transport the milk within 2 hours of milking to reduce the costs of cooling at home/the farm and reduce exposure to bacteria.
e. Materials: Vehicle for transportation (car, truck, bike); milk cans/containers; preferably a cooling method during transportation (cooling tank, ice cones).

Application Activity

Organise a visit to the closest milk collection centre (MCC). Confirm that an employee will be available to give a tour and answer questions.

1. Bring trainees to a nearby milk collection centre (MCC) and introduce them to the staff.

2. Take a tour of the area and tell trainees to observe the following storage factors, which can be found in **Topic 4.3 Task 4** in their manuals:
   - **a.** Temperature
   - **b.** Ventilation
   - **c.** Cans/containers
   - **d.** Cleanliness

3. Next, tell them to identify all of the storage and transportation material and equipment at the MCC. Are there any they should add to those listed in **4.4 Key Facts**?

4. Finally, tell the trainees to ask the MCC staff the following questions as well as some of their own about milk storage and transportation. They should note the responses in the chart (sample below):

Questions	**Answers**
What are the challenges of storing milk?	
What are the challenges of transporting milk?	
Which materials and equipment are difficult to find/buy in this area?	
What is your advice for someone who is just beginning their career in dairy farming?	
Your question:	
Your question:	

5. Finally, facilitate as the trainees assist with milk storage, if possible.

6. After the visit, discuss as a class:
   a. What did you learn?
   b. What surprised you?

Points to Remember

- Never add milk of a cow with mastitis to cans for delivery to the MCC.
- Do not deliver colostrum or any milk produced by a cow less than 5 days in lactation.
- Never deliver milk of a cow treated with antibiotics because this milk is dangerous even for home consumption.
- Be aware of milk taking odour from surrounding substances, such as fuels, chemicals, and feeds.
- Filters used improperly are major sources of bacteria in milk.

Formative Assessment

1. Circle the types of milk that should NOT be delivered to the milk collection centre:
   a. Fresh milk.
   b. Milk from a cow with mastitis.
   c. Colostrum.
   d. Milk that has been stored in a cooling tank.
   e. Milk that smells like fuels.

2. Explain the cleaning process for milk storage material and equipment.

3. Complete the following sentences:
   a. If you decide to store your milk in a well, be sure the water in the well is not ……. and keep the tops of the milk cans ……

   b. It is best to deliver milk to the MCC within ……. hours of milking in order to reduce the costs of ……. at home and reduce exposure to ……

   c. Transporting in milk cans ensures that milk from different producers is not ……..

Answers:

1. b, c, e
2. Remove residues, pre-rinse, clean with detergent, rinse, disinfect.
3. a. dirty; tight
   b. two; cooling; bacteria
   c. mixed

Further Information for the Trainer

1. Hygienic Milk Handling and Processing (FAO): http://www.fao.org/ag/againfo/resources/documents/MPGuide/mpguide1.htm
2. Hygienic and Quality Milk Production: https://snv.org/cms/sites/default/files/explore/download/hygienic_and_quality_milk_production_training_manual_and_guideline.pdf
3. Small-Scale Dairy Farming: Milk Preservation (FAO): http://www.fao.org/ag/againfo/resources/documents/Dairyman/Dairy/V1U4.htm

Self-Reflection

1. Ask trainees to re-take the self-assessment from 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).

Summative Assessment

A starter ruminant farmer located in Rubavu district got a loan from Banque Rwandaise de Developpement (BRD) and he has a wide market of meat of cow, meat of goat and meat of sheep in neighbouring town of Goma in Republic Democratic of Congo. He chose this business in order to solve a shortage of meat in Goma by fattening of ruminants.
After a deep analysis the station decides to increase the meat production by farming ruminants' kids for meats.

As trainer who finishes a module of Ruminant farming, you are called by this starter ruminant farming to select breed for meat purpose of ruminant, feed the ruminant and perform minor surgery for ruminant in 1 hour each task.

- The ruminants shelters are well constructed.
- The feed for ruminant is available.
- The material and equipment for minor surgery and feeding are presented.

Tasks:

- Select ruminant breed for meat
- Feed the ruminants for meat purpose
- Perform minor surgery for ruminant

Assessment Criterion 1: Quality of Process

Checklist	Score	
	Yes	No
Indicator 1: Pedigree is checked		
Indicator 2: Health status of breed is checked		
✓ Physical behavior is checked		
✓ Samples for laboratory analysis are collected		
Indicator 3: Criteria to select feed is respected		
✓ Forage is selected		
✓ Supplementary feeding is classified		
Indicator 4: Weighing of feeds		
✓ Cereals		
✓ Legumes		
✓ Food formulation/ration		
Indicator 5: Cleaning of drinkers and feeders		
✓ Clean feeders		
✓ Clean drinkers		
Indicator 6: Material of surgical are well selected		

✓ Material for dehorning are well selected		
✓ Material for castration are well selected		
✓ Material for caudectomy are well selected		
✓ Material for hoof trimming are well selected		
✓ Tools of restraining is well identified		

Assessment Criterion 2: Quality of product

Checklist	Score	
	Yes	No
Indicator 1: Ruminant for meat purpose are selected		
✓ Cattle breed for meat are selected		
✓ Sheep breed for meat are selected		
✓ Sheep breed for meat are selected		
Indicator 2: Feed is classified		
✓ Forage is classified		
✓ Supplementary feeding is classified		
▪ Concentrated feed is selected		
▪ Mineral block is selected		
Indicator 3: Feeds are weighed		
✓ Cereals are weighed		
✓ Legumes are weighed		
✓ Food formulation/ration is respected		
Indicator 4: Drinkers and feeders are well cleaned		
✓ Feeders are cleaned		
✓ Drinkers are well cleaned		
Indicator 5: Feed is distributed		
✓ Feed distribution depending on age is respected		
✓ Distribution depending on physiological status is well respected		
Indicator 6: Water is distributed		
Indicator 7: Disinfection and sterilization of surgical material is well done		
✓ Sterilization techniques is respected		
Indicator 8: Restraining techniques is well used		
✓ Physical techniques		
▪ Crush is well used		
Indicator 9: Castration techniques		
✓ Ruminant are well castrated using blood castration techniques		
✓ Ruminant are well castrated using non-blood castration techniques		
Indicator 10: Dehorning techniques		
✓ Young ruminants are dehorned		
✓ Adult ruminants are dehorned		
Indicator 11: Hoof are well trimmed		
Indicator 12: Tail is well cut		

Observation

Assessment Criterion 3: Relevance

Checklist	Score	
	Yes	No
Indicator 1: The quality of ruminant meat produced		
Indicator 2: Feed is classified		
✓ Ratio grasses and concentrate is respected		
✓ Supplementary food is given on time		
↳ Mineral block is given		
Indicator 3: Feeds are weighed		
✓ Cereals are acute weighed		
✓ Legumes are acute weighed		
✓ Food formulation/ration is respected		
Indicator 4: Drinkers and feeders are well cleaned		
✓ Feeders are cleaned		
✓ Drinkers are well cleaned		
Indicator 5: Feed is distributed		
✓ Enough food is distributed		
Indicator 6: Water is distributed		
Indicator 7: Disinfection and sterilization of surgical material is well done		
✓ Sterilization techniques is respected		
Indicator 8: Restraining techniques is well used		
✓ Physical techniques		
↳ Crush is well used		
Indicator 9: Castration techniques		
✓ Ruminant are well castrated using blood castration techniques		
✓ Ruminant are well castrated using non-blood castration techniques		
Indicator 10: Dehorning techniques		
✓ Young ruminants are well dehorned		
✓ Adult ruminants are well dehorned		
Indicator 11: Hoof are well trimmed		
Indicator 12: Tail is well cut		

Observation

Assessment Criterion 4: Safety

Checklist	Score	
	Yes	No
Indicator: PPE are well used		
✓ Boots are worn well		
✓ Gloves are worn well		
Indicator: Hazardous material are well used		
✓ Surgical materials are used well		
✓ Machete is used well		
✓ Hand chuff cutter is used well		
Indicator: Working place and materials are well cleaned and rearranged		
✓ Surgical materials are well disposed		
✓ Surgical materials are well rearranged		
✓ Surgical material is well cleaned		
✓ Drinkers and feeders are well cleaned		
✓ Workplace is well cleaned		
✓ The material for ruminant farming is well arranged		
Observation		

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This publication is made possible by the support of the American People through the United States Agency for International Development (USAID). The contents of this are the sole responsibility of Education Development Center (EDC) and do not necessarily reflect the views of USAID or the United States Government.

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