



# **TVET LEVEL II**



**AGRICULTURE** 

**Poultry Farming** 

TRAINER MANUAL











### **Acknowledgements**

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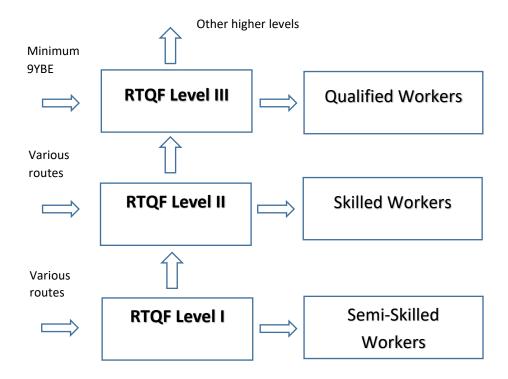
# **Technical Support**

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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**

- English
- Kinyarwanda
- Mathematics

### **Soft Skills**

- Basic Entrepreneurship Skills
- ICT Essentials
- Communication Skills

### **Vocational Skills**

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

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

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

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

## **Organization of the Training Manuals**

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

## **Teaching & Learning Methodology of RTQF Level II 2 TVET Materials**

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

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

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

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

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

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

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

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

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

# **POULTRY FARMING**

Learning Units	Learning Hours	Learning Outcomes
Learning Unit 1: Raise starter	30	<b>1.1</b> Prepare starter room house
		1.2 Receive chicks
		1.3 Distribute feed and water
		1.4 Monitor physical parameters
Learning Unit 2: Raise layers	30	2.1 Prepare layers house
		2.2 Receive layers
		2.3 Distribute Feed and water
		2.4 Monitor physical parameters
		2.5 Ensure eggs quality
Learning Unit 3: Raise broilers poultry	30	<b>3.1</b> Prepare broilers house
		<b>3.2</b> Receive Broilers
		3.3 Distribute Feed and water
		<b>3.4</b> Monitor physical parameters
		3.5 Perform slaughtering

# **Learning Unit 1: Raise starters**



### **Learning Outcomes**

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

- **1.1** Prepare starter room house
- 1.2 Receive chicks
- **1.3** Distribute feed and water
- **1.4** Monitor physical parameters

## **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: Prepare starter room house**



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

- a. Identify the equipment to be installed in a starter room house
- **b.** Describe the process of disinfecting a starter room house
- c. Describe the factors considered when establishing physical parameters
- d. Establish physical parameters for a starter room house



Time Required: 8 hours



**Learning Methodology:** Brainstorming, small group work, presentations, class discussions, peer to peer feedback

#### **Materials Needed:**

- Standard training materials flip chart, markers, tape, A4 paper
- Sample equipment or images of equipment feeders, fresh litter, heating elements, brooders, lighting, cleaning materials and equipment
  - Photos/Visuals computer, internet, projector, photos of installed chicken starter room/house



#### **Preparation:**

- ☐ Make sure samples of the sample equipment are available and/or research and download photos of them.
- ☐ Research and download photos showing an installed chicken house.

### **Cross Cutting Issues:**



- ✓ **Environment and sustainability:** Consider how the environment could affect and influence physical parameters, such as space, moisture, and lighting.
- ✓ **Gender and inclusivity:** While forming groups, consider gender balance when giving roles and opportunities to trainees.

### **Prerequisites:**



- Basic knowledge of animal shelters
- Basic knowledge of animal diseases prevention
- Basic hygiene practices

### **Key Competencies:**

Knowledge	Skills	Attitudes
Identify the     equipment to be     installed in a starter     room house	Install equipment in     a starter room house	1. Detail-oriented
2. Explain the process of disinfecting a starter room house	2. Disinfect a starter room house	2. Methodical
3. Explain the factors considered when establishing physical parameters	3. Establish physical parameters for a starter room house	3. Proactive



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

- **1.** Tell trainees to open their manuals to **Topic 1.1 Task 1** and discuss the following questions with a partner:
  - **a.** Do you know someone who has raised chickens?
  - **b.** Which type of chickens did they raise?
  - **c.** What safety and biosecurity measures do you think are necessary for a poultry house or room?
  - **d.** What other factors do you consider when preparing the room for raising chickens?
- **2.** Encourage trainees to share their ideas for **questions c and d** with the rest of the class. Correct any clear errors and wrong answers, but primarily focus on facilitating a discussion based on prior knowledge.

# Problem Solving Activity

**1.** Ask trainees to turn to **Topic 1.1 Task 2** and recall the four physical parameters of an animal shelter from Animal Diseases Prevention.

Answers: Lighting, Temperature, Humidity, Ventilation

2. Verify their answers before moving forward.

- 3. Instruct trainees to use what they know about poultry diseases to discuss how they think the physical parameters should be arranged in a poultry starter house with a partner. Monitor their discussions and encourage creativity, even if they are unsure of their ideas.
- 4. Now, tell trainees to brainstorm all of the equipment they think would be needed in a poultry starter house. They should list 3-5 items.
- 5. Facilitate a class discussion with the full class. Be sure to address the following questions, particularly d. Trainees should be accessing prior knowledge from the Animal Diseases Prevention module, Learning Unit 1.
  - a. What are the different ideas?
  - **b.** Does everyone agree?
  - **c.** Can multiple responses be possible?
  - **d.** What evidence and knowledge do you have from previous units?
- **6.** As a class, read through **1.1 Key Facts** and instruct trainees to do the following as they read:
  - ✓ Check or tick the information they predicted correctly from questions 3 and 4, above.
  - Circle information that relates to previous units or knowledge.
  - Star new or interesting information.



# Guided Practice Activity

1. Separate trainees in small groups and direct them to Topic 1.1 Task 3 in their manuals. Read the scenario below out loud and tell them to discuss the questions that follow in their respective groups. Monitor the groups as they discuss and correct any major errors. Trainees should refer to 1.1 Key Facts.

Mutesi successfully applied for a starter fund from Business Development Fund (BDF) for chicken farming. She has come to you for assistance because you are a person who has knowledge and skills in chicken farming.

She wants to start by raising starter chicks. She needs your help to prepare the starter room house.

a. Help her identify all the possible equipment to be installed in the starter room house.

Possible Answers: Brooders, drinkers/waters, feeders, litter, heating elements, Debeakers, lighting equipment, fans/ventilation equipment, non-reflective surfaces (for temperature control), open space/design

- **b.** Explain the procedure of installing the equipment identified above in her starter room house.
  - **Answer:** Trainees should explain that before installation, the starter room should be prepared and disinfected. Cleaning and disinfection should occur at least two weeks before the chicks arrive. Final preparation, including placement of equipment, should occur two days before chicks arrive. Equipment must be installed according to standard measures.
- c. Explain to her the factors and standards she should consider while setting litter. Answer: The litter should be dry and fresh to prevent moisture and diseases. It can include paddy husks, wood shavings, ground maize cob, chopped straw, saw dust, groundnut shell, and dried crushed sugarcane pulp. These litter items should be selected based on local availability and cost. There should be 5-6 centimetres of litter covering the floor.
- d. Explain to her the factors she should consider when establishing physical parameters for her starter room house.
   Answers: She should consider the lighting, heat/temperature, ventilation, humidity, and special arrangement. More information can be found in 1.1 Key
- 2. Mutesi wants to know more about the procedures for disinfecting her starter room.
  - a. What do you already know about disinfecting an area?

    Answers may vary. Trainees should access knowledge from previous modules.
  - What do you think applies to disinfecting a starter house?
     Answers may vary. Trainees should apply previous knowledge to new circumstances.
  - **c.** Consider the products, supplies, techniques, safety, and disposal.
- **3.** Require each group to present their advice to Mutesi to the rest of the class. Make sure that each group member contributes/speaks during the presentation.
- **4.** Encourage trainees to give each other feedback. They should give both positive and constructive feedback, addressing the following questions:
  - a. What did they do well?

Facts.

- **b.** Did they forget to include something?
- **5.** Correct any errors you observed after the trainees have given each other feedback.



# Application Activity

- 1. Keep trainees in their groups from the **Problem Solving Activity**. Each group is going to work together to design a starter room house. Direct them to Topic 1.1 Task 4 for the instructions.
- 2. Inside the classroom, somewhere outside, or at the school farm, assign each group an area where they will design a starter room house.
- 3. Instruct trainees to observe the area that they will use as a starter room and each group will have to:
  - **a.** Draw a sketch map of how they plan to prepare the starter room.
  - **b.** Identify all equipment they will install in the starter room, including drinkers, feeders, litter, heating elements, and cleaning material and equipment.
  - c. Write the procedures for installing the identified equipment in the starter room.
  - **d.** Write the procedures for disinfecting the starter room house.
- **4.** Each group will present their sketch maps and procedures.
- 5. After the presentations, convene as a large group and discuss each group's performance.

**Note:** Designs will vary, and you should encourage creativity and resourcefulness. Correct errors, especially in procedures, during the final discussion. You can refer to **1.2 Key Facts** to check for accuracy.



# Points to Remember

- You should always consider the direction of the wind when installing heating system.
- You should always conduct a proper cleaning and disinfect before installation of materials and equipment in starter room house.



**1.** Select **True** or **False** for the following statements:

#### **Answers:**

<b>True:</b> Dry cleaning, which includes removing dust and controlling insects, is the second step in the process of cleaning and disinfection.
<b>False, standard measures should always be followed:</b> During installation of materials, standard measures can sometimes be ignored.
<b>True:</b> Before installation of materials and equipment, it is mandatory to prepare them.
False, litter should always be fresh and dry to prevent moisture and diseases: Litter does not need to be fresh and can even be moist as long as you don't identify any poultry diseases.
Litter does not need to be fresh and can even be moist as long as you don't

- **2.** Complete the following sentences:
  - **a.** Before disinfecting the start room house, surfaces should be **dried**, or the disinfectant will become **diluted** and ineffective.
  - **b.** After fumigating, the doors and windows should be **closed** for **24** hours.
  - c. Water and feeding systems should be drained and cleaned between flocks.

# **①** Further Information for the Trainer

- 1. Tips for Cleaning and Disinfecting Broiler Houses: https://www.wattagnet.com/articles/26539-tips-for-cleaning-disinfecting-broiler-houses
- 2. Beak Trimming of Poultry: https://articles.extension.org/pages/66245/beak-trimming-of-poultry-in-small-and-backyard-poultry-flocks
- **3.** Poultry Farm Equipment: http://www.agritech.tnau.ac.in/expert\_system/poultry/Poultry%20Farm%20Equipment s.html
- **4.** Small Scale Poultry Production, General Management: http://www.fao.org/3/y5169e/y5169e05.htm

## **Learning Outcome 1.2: Receive chicks**



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

- a. Organize transportation for chicks
- **b.** Explain and conduct procedures for chick handling and installation
- c. Describe different records that need to be kept for chicks



Time Required: 8 hours



**Learning Methodology:** Group discussion, brainstorming, presentations, interviewing a farmer, feedback



#### **Materials Needed:**

• Standard training materials – flip chart, markers, tape, A4 paper



### **Preparation:**

- Organize a visit to a poultry farm: Arrange an interview with a farmer or another worker; ask that chick records be available for viewing.
- ☐ Prepare materials for class presentations.





- ✓ Environment and sustainability: Consider environmental factors when transporting chicks, including weather, temperature, air flow and road conditions.
- ✓ **Gender and inclusion:** Form gender balanced groups and encourage everyone to participate and present.



### **Prerequisites:**

▶ Learning Outcome 1.1: Preparation of the starter room house

### **Key Competencies:**

	Knowledge		Skills		Attitudes
	Describe factors considered when	1. Organize transportation for		1.	Forward-thinking
	organizing the transportation of chicks		chicks		
2.	Explain the procedures for handling and installing chicks	2.	Conduct chick installation	2.	Methodical
	Describe different records that need to be kept in order to meet farming standards	3.	Keep proper records of installed chicks	3.	Detail-oriented



## Steps:

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

- 1. Instruct trainees to individually brainstorm answers to the following questions found in **Topic 1.2 Task 1**:
  - a. Do you or someone you know possess chickens?
  - **b.** Where did the chickens come from?
  - **c.** Have you ever seen chickens being transported?
  - **d.** What vehicle was used? Where were the chicks kept?
  - **e.** What did you notice about how the chickens were moved from the vehicle to the farm?
- 2. After 15 minutes, tell them to share their ideas with a partner.
- **3.** Ask that anyone who owns or whose family owns chickens to please share their experience with transporting and handling chicks with the rest of the class. Inform the trainees that they will learn an overview of transporting, handling, and installing chicks. Note that their peers with relevant experience are an excellent resource.



# Problem Solving Activity

- 1. Tell trainees to turn to **Topic 1.2 Task 2** and imagine the following situations. They should discuss the questions with a partner.
  - **a.** You are transporting chicks from the Northern Province to the Southern Province. You must drive through Kigali to pick up some materials, and there is a lot of construction and traffic.
    - i. How might this affect the chicks?
    - ii. What can be done to address this situation?
  - **b.** It is a hot day and the road you are taking is made of dirt.
    - i. How might this affect the chicks?
    - ii. What can be done to make them comfortable in this situation?
  - **c.** Now, imagine you are responsible for buying feed for the chicks this season.
    - i. How do you know how much feed to buy?
    - ii. What information would be useful to know?
- 2. Share your ideas with the rest of the class.
  - **a.** Did you have similar ideas?
  - b. What are some ideas you had not considered?
  - **c.** What information would you like to know?

Possible Answers: Given that this is a Problem Solving Activity, encourage trainees to think critically about the situations. They do not need to be 100% accurate. Tell them to recall information on physical parameters and their effects on animal health from Animal **Diseases Prevention, Unit 1.** 

3. Rather than answering their questions yourself, direct trainees to 1.3 Key Facts and have them self-verify their responses.



# Guided Practice Activity

1. Separate trainees into small groups to collaborate on **Topic 1.2 Task 3** in their manuals. Read the situation out loud as a class. Trainees should then discuss each question with their group and write their ideas down.

- 2. Kamali ordered 1,200 chicks from a hatchery company and they will arrive at the in Kigali on December 20 at 9:00 PM (or 21:00). Kamali's chicken house is in Rubavu District, which is 160 kilometres from Kigali. Answer following questions:
  - **a.** How will you organize the transportation of the chicks from Kigali to Kanombe?
  - **b.** List of all the necessary materials and equipment to be used to successfully transport the chicks.
  - **c.** What are the important preparations that must be in place before the arrival of the chicks?
  - **d.** Once you have arrived at the chicken house in Rubavu, describe the steps of installing chicks in the room house.
  - **e.** Propose a list of the records to be taken for the chicks.
- **3.** Monitor the groups as they work and challenge them to give each other feedback. Correct any major errors or missing components at the end of their collaboration. Refer to **1.3 Key Facts** as needed.



# **Application Activity**

- 1. With a partner, tell trainees to brainstorm 5 questions to ask a poultry farmer about receiving chicks and write them under **Topic 1.2 Task 4** in their manuals.
- 2. Then, collect all of the questions and write them on the flipchart. Once all of the questions have been gathered, have trainees vote on the best 10 questions to ask the farmer. Everyone should have these questions written in their manuals.
- **3.** Visit a local poultry farm with the class. Two class representatives should interview the farmer or another farm worker with expertise. Trainees should write their answers to the questions in their manuals.
- **4.** Now, trainees will observe and take notes on the farm's starter room/house.
  - **a.** What equipment do you see?
  - **b.** Is it constructed according to the standards?
  - **c.** Encourage them to ask the farmer or another worker for clarification as needed.
- **5.** Finally, have trainees view the records that the farm keeps.
  - **a.** Which types of records does the farm keep?
  - **b.** How are they organized?
  - c. Ask what these records are used for.

**6.** After the visit, all for an open forum for the trainees to ask you any remaining questions they have. Answer them to the best of your ability or write them down and research the answers after class. Be sure to give them the information in the next session.

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#### Points to Remember

- Without a brooder in place, receiving chicks will not be possible.
- Adequate care and attention given to chicks during starting period will determine the health and productivity of the chicken's cycle until the old age.
- This early period is the most critical of all of the life cycles of a laying hen.



	Forr	native Assessment
1.		hich of the following equipment is needed for chick transportation:  Boxes Feed Tin Water Grass Litter
		Vehicle
		Measuring stick
		Ventilation system (air holes)
2.	Select	True or False for the following statements:  False, a thermometer is an instrument used to measure temperature: A  thermometer is an instrument used to measure the direction of wind in a chicken house.
		<b>True:</b> A brooder should be started immediately when the chicks arrive.
		<b>True:</b> Chicks are fragile and should be handled carefully and one by one from the box to the installation area.
		False, lights are sometimes used to prevent crowding and piling at night: Lights should never be used when installing chicks.

**3.** Why should farmers keep records of their chicks? Explain how some records can be used.

**Possible Answer:** Records are important ways to inform decision making, especially financial decisions. For example, feeding records can indicate how much feed should be purchased for future flocks/chicks. Preventative Activities records can be used to analyse the effectiveness of vaccines and nesting records are useful for analysing individual and overall animal health.

# • Further Information for the Trainer

- 1. Poultry Production and Record Keeping: https://ag.purdue.edu/ipia/hasil/Unit%20C%20Lesson%203%20Poultry%20Production% 20and%20Record%20Keeping%20PPT%20-%20English.pdf
- **2.** How to Transport Chickens: https://www.bentoli.com/how-to-transport-chickens-poultry-stress/

## **Learning Outcome 1.3: Distribute feed and water**

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



- **a.** Explain the weighing procedure and determine the exact quantity of feed needed according to the flock size
- b. Identify the quality and quantity of feeds according to animal need
- c. Distribute feeds and water to chicks
- **d.** Explain the uses of record keeping and compile feed records



Time Required: 7 hours



**Learning Methodology:** Brainstorming, individual and partner work, field visit, demonstration, calculations

#### **Materials Needed:**



- Standard training materials flip chart, markers, tape, A4 paper
- Measuring equipment numeric weighing balance, water basin, bucket, calculators
- Sample feed and water small quantities to demonstrate weighing procedures with



#### **Preparation:**

- ☐ Organize a visit to a local poultry farm.
- ☐ Familiarize yourself with measuring/weighing equipment and how to use it properly.

### **Cross Cutting Issues:**



- ✓ **Environment and sustainability:** Acknowledge the importance of proper distribution of feed and water on animal health.
- ✓ **Standardization culture:** Emphasize the use of proper measuring equipment to calculate feed and water amounts for optimal animal growth and health.



### **Prerequisites:**

- ▶ Learning Outcome 1.1: Prepare starter room house
- ▶ Learning Outcome 1.2: Receive chicks

### **Key Competencies:**

Knowledge	Skills	Attitudes
Identify the quality and quantity of feeds according to animal need	Weigh and distribute feeds and water to chicks	1. Accurate
2. Explain the methods of cleaning feeders and drinkers	2. Clean feeders and drinkers properly	2. Methodical
3. Describe the impacts of and procedures for record keeping	3. Conduct record keeping	3. Detail-oriented



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

- 1. Tell trainees to brainstorm responses to the following questions found in Topic 1.3 Task 1 individually:
  - a. What do chickens eat and drink?
  - **b.** Why is proper feeding and drinking distribution important?
- 2. After enough time, instruct trainees to share their ideas with a partner and discuss.
- 3. Next, trainees should share and compare their responses with the rest of the class. Facilitate a discussion on: What are important factors to consider when feeding chickens?

Encourage trainees to think of their own ideas and debate them with each other. When they have finished discussion, note or add that the number of chicks, the age of the chicks, the weight/quantity of feed or water, and the space/distribution of water are all important factors to consider.



- 1. Tell trainees to consider the factors for chicken feeding discussed in the **Getting Started**Activity. The should individually reflect and write answers to the following questions found in **Topic 1.3 Task 2**:
  - **a.** How much should we feed chickens? How do you know?
  - b. How much water do chickens need? How do you know?
- **2.** Based on their own experience and what they know about chickens, tell trainees to predict how much feed and water are needed in the following situations:
  - a. Grams of feed needed for 1 chick that is 1 week old:
  - **b.** Grams of feed needed for 900 chicks that are 1 week old:
  - c. Litres of water needed for 1 chick that is 1 week old:
  - **d.** Litres of water needed for 900 chicks that are 1 week old:
- **3.** Trainees should then share their predictions with a partner.
  - **a.** Did they predict similar amounts of feed and water?
  - **b.** Explain how they determined the amount of feed and water necessary.
  - **c.** Discuss: How will you measure these amounts of feed and water?

Answers may vary. Encourage creative and critical thinking.

- **4.** Facilitate a class discussion on their ideas and predictions with the rest of the class.
  - **a.** What information do they need to properly distribute feed and water?

**Note:** You do not need to answer all of their questions, but instead explain what information will be revealed in **1.4 Key Facts** and how this will address their questions. Also note that some information might not be addressed in this topic.

**5.** With their partners, have trainees read through **1.4 Key Facts** and verify their answers from the discussion.



## **Guided Practice Activity**

Assign trainees to a partner and tell them to consider the following scenario and complete the tasks from **Topic 1.3 Task 3**:

- 1. A modern chicken farmer has successfully received and installed 900 one-day-old chicks in a properly prepared starter room house. It's the first time for the farmer to do such a project. On the first day that she/he receives the chicks, he/she calls you for help with the following:
  - **a.** Determine the type of feed needed.

Answer: Chick starter feed

**b.** Calculate the amount of feed needed for the chicks.

Answer: Use the table in 1.4 Key Facts

Age (weeks)	Grams/day /1 chick
0-1	10

**c.** Calculate the amount of water needed for the chicks.

Answer: Use the table in 1.4 Key Facts

Age (weeks)	Water/day /100 chicks
0-1	3

$$3 unit * 9 = 27 litres of water$$

27 / 10 = 2.7 basins 
$$\rightarrow$$
 3 water basins needed, 3<sup>rd</sup> basin is filled to  $\frac{3}{4}$ 

**d.** Describe the procedures for distributing the feed and water to the chicks, including the material and equipment needed.

#### **Answer:**

Material and equipment needed: numeric weighing balance/scale, bucket or basin, water measuring tool, feed, water, feeders, waterers

- 1. Deposit the quantity of feed to weigh in the apparatus.
- 2. Using a weighing balance, weigh the appropriate quantity of needed feed according to the number of chicks received (see chart above).
- 3. Before adding feeds into feeders, clean them and throw away old feed.
- 4. Put new feed into feeders and observe how all the chicks are accessing the feed
- 5. Distribute water into the appropriate number of drinkers and observe how all the chicks are accessing the water

**e.** Explain what the farmer should do if some of the chicks do not begin to eat and drink at first.

**Answer:** For drinking, the farmer should dip the chicks' beaks into the water to show them how to drink. For eating, the farmer should try clipping up lettuce or another nutritious food and add it to the feed to get the chicks' attention.

**f.** Give instructions on proper cleaning methods.

**Answer:** The feeders and drinkers should be cleaned and disinfected regularly. Old feed and water should be removed between feeding/watering times.

- 2. The farmer is considering keeping a record of her feeding activities.
  - **a.** Why should she keep a feed record?
  - b. What information is important to record?Answers may vary and will be addressed in 1.5 Key Facts.
- **3.** Ask trainees to share their responses with the class. Tell them to compare their calculations to the predictions made in the **Problem Solving Activity**. Are they similar or completely different?
- **4.** Briefly review **1.5 Key Facts** and verify their responses to question 2.



### **Application Activity**

1. Inform trainees that they will be visiting a local poultry farm. Before visiting, they must prepare by filling in the table under **Topic 1.3 Task 4** with **criteria** for a Feed Record. Be sure that they do not write in actual numbers, only the fields in the first column and row. They may refer to **1.4 Key Facts** for guidance.

#### **Answers:**

Feed Type	Feed Weight (kg)	Feed Cost (RWF)	Other Cos	ts (RWF)
Chick Starter			Chicks	
Grower			Fuel	
Layer			Water	
Total			Total	

- 2. Visit a local poultry farm and tell trainees to ask the farmer the information needed to complete the table above. After gathering this information, they should calculate the total weight, cost of feed, and other costs.
  - a. Then, tell them to ask the farmer where they buy feed and how often they buy it.
- 3. Organise the trainees so that they can observe and/or assist the farm staff as they feed the chickens. Afterward, tell them to discuss the following questions:
  - a. What do they notice about the distribution of the feed and water?
  - **b.** What cleaning measures are taken?



- Chick Starter is the only feed reserved to chicks.
- Quality and quantity are two important factors for successful chick-raising.
- If your chicks were vaccinated for coccidiosis, you should give them non-medicated feed.
- Never add new feeds to the old ones. This is the same for water distribution. Fresh feed and water are important to poultry health.



# Formative Assessment

**1.** Select **True** or **False** for the following statements:

### **Answers:**

- ☐ False, chicks need to eat starter feed: Chicks can eat any type of feed as long as the quantity is enough.
- ☐ False, the number of chicks and their age determine the quantities of feed and water to be distributed: The number of chicks and the season determine the quantities of feed and water to be distributed.
- ☐ True: The amount of feed and water needed increases as chicks get older.

#### **2.** Fill in the table below:

### Answers in bold:

Age in	Number	Quantity of feed needed	Quantity of water needed
days	of chicks		
4	100	10 g/1 chick	3 unit/100 chicks
		1 chick * 100 = 100 chicks	100 chicks * 1 = 100 chicks
		10 g * 100 = 1,000 g = <b>1 kg</b>	3 unit * 1 = 3 litres
11	300	20 g/1 chick	10 unit/100 chicks
		1 chick * 300 = 300 chicks	100 chicks * 3 = 300 chicks
		20 g * 300 = 6,000 g = <b>6 kg</b>	10 unit * 3 = <b>30 litres</b>
20	450	20 g/1 chick	10 unit/100 chicks
		1 chick * 450 = 450 chicks	100 chicks * 4.5 = 450 chicks
		20 g * 450 = 9,000 g = <b>9 kg</b>	10 unit * 4.5 = <b>45 litres</b>
30	200	30 g/1 chick	20 litres/100 chicks
		1 chick * 150 = 150 chicks	100 chicks * 2 = 200 chicks
		30 g * 150 = 4,500 g = <b>4.5 kg</b>	20 litres * 2 = <b>40 litres</b>

- **3.** Complete the following sentences:
  - a. Keeping records can help make financial decisions in the future.
  - a. Before distributing feeds to chicks, you should remove/dispose of old feed.
  - **b.** Quality and quantity are two important factors for successful chick-raising.

# **1** Further Information for the Trainer

- Poultry Chicks and Brooding: https://www.altdesign.com/poultry-chicks-brooding/
- 2. Record Keeping: https://farmergiantblog.wordpress.com/2016/02/24/record-keeping/
- **3.** How to Care for Day Old Chicks: https://www.theselfsufficienthomeacre.com/2014/03/how-to-care-for-day-old-chicks.html

## **Learning Outcome 1.4: Monitor physical parameters**



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

- **a.** Determine and apply adequate light intensity in the chick houses
- **b.** Determine and explain the impact of humidity and temperature levels on chicks
- **c.** Monitor ventilation and carbon dioxide levels in chick houses



Time Required: 7 hours



**Learning Methodology:** Brainstorming, individual and group work, field visit, making assessments

#### **Materials Needed:**



- Standard training materials flip chart, markers, tape, A4 paper
- **Measurement tools** Thermometer, hygrometer, photometer, carbon dioxide meter/sensor, barometer



### **Preparation:**

- ☐ Organize visit to a poultry farm.
- ☐ Familiarize yourself with the measurement tools and how to use them.

### **Cross Cutting Issues:**



- ✓ Environment and sustainability: Explain the relationship between the physical parameters and the environment, especially during different agricultural seasons.
- ✓ **Standardization culture:** Emphasize the use of proper measuring tools in order to monitor physical parameters.

### **Prerequisites:**



- Learning Outcomes 1.1-1.3
- Animal Shelters
- Animal Disease Prevention

### **Key Competencies:**

Knowledge	Skills	Attitudes	
<b>1.</b> Describe the importance and factors	1. Monitor ventilation and lighting in the chick	1. Diligent	
of ventilation and light	house and interpret		
intensity in the chicken	influencing factors		
house			
2. Determine and explain	2. Monitor and adjust 2. Persistent		
the impact of humidity	humidity and		
and temperature levels	temperature levels in		
on chicks	the chicken house		
3. Explain the impacts of	3. Determine the level of	3. Proactive	
carbon dioxide and how	carbon dioxide and set		
to detect it	the needed level in the		
	chicken house		



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

- 1. Tell students to discuss the following questions found in **Topic 1.4 Task 1** with a partner:
  - **a.** What are the main agricultural seasons in Rwanda?
  - **b.** What are characteristics of each season?
  - c. What is the impact of each season on agriculture?
  - **d.** What impacts do you observe on livestock activities?
  - e. What do you think the impacts are on chicken farming?

**Answers may vary**. Push students to think critically based on their own experiences.

**2.** Now, ask them to recall the four physical parameters used in animal shelters from previous modules:

**Answers:** Lighting, temperature, ventilation, humidity

**3.** How do you think the agricultural seasons affect the physical parameters?

**Answers may vary**. Encourage an open and creative discussion based on prior knowledge and experiences.



# Problem Solving Activity

1. Trainees will now complete the matching activity under Topic 1.4 Task 2 in their manuals. They should draw a line between the tool, its photo, and what it measures.

### **Answers:**

Barometer: Measures air pressure



Thermometer: Measures heat intensity



Photometer: Measures light intensity



Hygrometer: Measures amount of water vapour in the air



Carbon dioxide meter/sensor: Measures gas levels



- 2. With a partner, tell trainees to discuss the following questions using what they already know about physical parameters and poultry health:
  - **a.** What happens to chickens when there are high temperatures?
  - **b.** What happens to chickens when there is high humidity?
  - c. What happens to chickens when there is too much lighting?
  - **d.** What happens to chickens when there is not enough ventilation?

**Answers may vary** depending on how well they are able to access prior knowledge. Generally, the responses should be: Birds become stressed (heat stress, appetite loss, etc.) when physical parameters are too high or too low. Animal health is negatively affected.

- 3. Now, tell trainees to consider gases in the air. Do they know any types of gases? What could happen to chickens if there are harmful gases in the air? **Answers may vary**, but note to the trainees that in this topic we will be discussing carbon dioxide specifically.
- 4. Facilitate a class discussion on their responses and ideas. Encourage quieter students to participate, especially because this discussion is based upon prior knowledge.
- **5.** Read through **1.6 Key Facts** together. Tell trainees to:
  - ✓ Check or tick information that the discussed and predicted correctly from the activity.
  - Star new information that they may need to review further.



# Guided Practice Activity

1. Separate the trainees into small groups and tell them to consider the following scenario from **Topic 1.4 Task 3**. They should use **1.6 Key Facts** for guidance.

Mr. Senkoko is a new chicken farmer located in Bugesera District. After completing the installation of chicks and raising them until the 9th week of age, he observed some abnormal behaviour of the chicks and decided to call upon a qualified expert.

The expert noticed some abnormalities related to physical parameters and decided to monitor each of them using measurement tools. The table below shows what he found during his research.

Physical Parameter	Standard Rate	Findings	Effects on Chicks
Temperature	30 -32 °C	37.7°C	Heat stress, see 1.6 Key Facts
Humidity	50-70%	95%	Heat stress, see 1.6 Key Facts Moisture in food which prevents eating
Light intensity	20 lux	31%	Tiredness, cannibalism, immune responses, leg abnormalities and even death
Carbon dioxide	< 1%	6%	Maybe nothing yet, but continued increase will lead to death
Air pressure	65%	31%	Poor ventilation/air flow, heat stress, high moisture/humidity—chicks won't eat feed

- **2.** With their group, trainees should complete the following tasks:
  - **a.** Name the tool used by the expert to measure each physical parameter.

#### **Answers:**

■ Temperature: **Thermometer** 

Humidity: Hygrometer

■ Light intensity: **Photometer** 

Carbon dioxide: Carbon dioxide meter/sensor

Air Pressure: Barometer

**b.** Fill in the last column of the table, Effects on Chicks, based on the findings and compared to the standard rate.

Answers may vary. See italicized suggestion in the chart above.

**3.** Discuss and write the factors that increase or decrease each of the physical parameters.

### **Possible Answers:**

- Temperature: Sunlight, lack of ventilation, high humidity
- Humidity: Lack of ventilation, rain, temperature
- Lighting: Sunlight, windows, doors, orientation of building, artificial lights
- Carbon dioxide: Presence or disposal of faecal matter
- Ventilation: Air flow, wind, orientation of the building, open/closed doors and windows, fans, air direction, location (hill, valley)



Organise a visit to a local poultry farm with your class. Confirm that the farmer or another worker is available to give a tour and that that they trainees have permission to assess the environment in order to practice their monitoring skills for this learning outcome.

- 1. Separate the trainees into five groups. Assign each group a physical parameter. Direct them to Topic 1.4 Task 4 in their manuals.
- 2. Instruct each group to assess their assigned parameter using the appropriate measuring tools. Fill in the table (sample below).
- 3. Then, instruct the trainees to rotate to a new parameter and monitor again. Continue rotating the groups until they have monitored each parameter and filled in the entire table. Offer help as needed.

Physical	Done well	Needs improvement	Suggestion for correction
Parameter			
Lighting			
Ventilation			
Humidity			
Temperature			
Carbon dioxide			

**4.** With their groups, tell trainees to write a report on their findings and submit it to you for review. Review and give feedback in the next session.



# Points to Remember

- Physical parameters may harm or end the lives of chicks if not monitored and controlled properly.
- Interpretation of chicks' wellbeing is important as the most changes come from abnormal physical parameters.
- Any excess is bad, try to always refer to standard rates.



- 1. Select **True** or **False** for the following statements:
  - a. False, the instrument used to measure temperature is a thermometer. A hygrometer I used to measure humidity: The instrument used to measure temperature is a hygrometer.
  - **b.** False, physical parameters are essential to animal health: The physical parameters are not a big problem when feeding and watering are well done.
  - **c. True:** Good lighting increases chick activity.
  - d. False, there are other gases present, but CO<sub>2</sub> poses a threat the animal health if the concentration is too high: Carbon dioxide is the only gas present in chicken houses.
- **2.** Complete the following sentences:
  - a. Carbon dioxide is a chemical compound that can be harmful in high quantities.
  - **b.** Physical parameters may **harm** the lives of chicks if they are not monitored and controlled properly.
  - **c.** The effects of heat stress include **reduced** eating, increased **water** consumption, reduced growth rate, and disturbances in **reproduction**.

Circle the correct answer for each statement:

- **3.** The term ventilation refers to
  - a. Air movement to stabilize air flow in chick house.
  - **b.** The way chicken house supplies fresh air that is essential to sustain life.
  - **c.** A building orientation and site features to control air.
- 4. The recommended light intensity is
  - a. 20 lux during the post-hatch stage
  - **b.** 22 lux after one week
  - **c.** 20 lux during old age
- 5. Intermittent lighting is the
  - **a.** lowering of light intensity
  - **b.** change of light in darkness
  - c. alternating of short light and dark periods

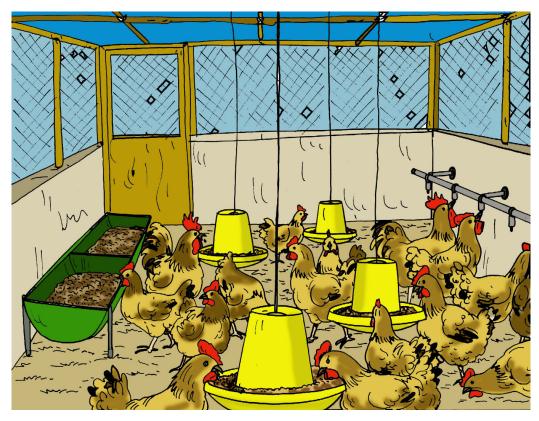


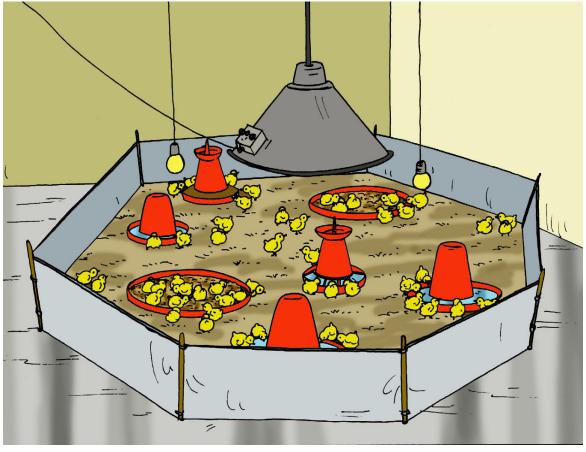
- 1. Ask trainees to re-take the self-assessment at the beginning of the unit. They should then fill in the table in the Trainee's Manual to identify their areas of strength, areas for improvement and actions to take to improve.
- 2. Discuss trainees' results with them. Identify any areas that are giving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

## • Further Information for the Trainer

**1.** Poultry Housing and Management: https://www.intechopen.com/online-first/poultry-housing-and-management

# **Learning Unit 2: Raise layers**





#### **Learning Outcomes**

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

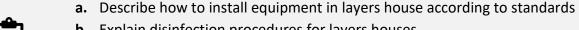
- **2.1** Prepare layers house
- 2.2 Receive layers
- **2.3** Distribute Feed and water
- **2.4** Monitor physical parameters
- **2.5** Ensure eggs quality

### **Learning Unit 2 Self-Assessment**

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

### **Learning Outcome 2.1: Prepare layers house**

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





- **b.** Explain disinfection procedures for layers houses
- **c.** Establish physical parameters in layers house
- d. Identify quality litter and calculate the quantity needed



Time Required: 6 hours



**Learning Methodology:** Brainstorming, presentation, partner discussions, group work, field visit, observations with note-taking



#### **Materials Needed:**

- Standard training materials flip chart, markers, tape, A4 paper
- Sample photos (optional) additional photos of equipment and litter



#### **Preparation:**

- Organize a field visit to a local poultry farm.
- ☐ Research and download additional photos of equipment and litter (optional).

#### **Cross Cutting Issues:**



- ✓ **Environment and sustainability:** Demonstrate how environmental factors influence physical parameters and therefore animal health.
- ✓ **Standardization culture:** Install equipment according to standards to ensure and maintain animal health.



#### Prerequisites:

▶ Learning Unit 1: Raise starters

#### **Key Competencies:**

Knowledge	S	kills	Attitudes
1. Describe different	· ·	· ·	Accurate
of equipment in la	'	ouses according	
house	to standa	arus	
2. Explain disinfection procedures for lay house	'''	sinfection 2. les to layers	Diligent
3. Identify standards arrangement of linarrangement physical parameters	ter physical	parameters g to standards	Detail-oriented



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

- 1. Assign each trainee a partner. Tell them to turn to Topic 2.1 Task 1 in their manuals and debate: What came first, the chicken or the egg? Encourage them to have fun with this question. It should make the class lively and energetic.
- 2. Ask trainees to share their ideas with the class. Encourage continued debate.
- **3.** Then, instruct trainees to brainstorm responses to the following questions individually:
  - **a.** Where do eggs come from?
  - **b.** What type of birds lay eggs?
  - **c.** What equipment and materials do you think chickens need to lay eggs?
- **4.** Discuss your responses with your partner. Your answers will be verified during this topic.

**Answers may vary, but correct any major errors.** Eggs come from "layer" chickens. Tell trainees that **question c** will be addressed in this topic.



## Problem Solving Activity

1. Ask trainees to turn to **Topic 1.2 Task 2** and recall the equipment needed in the starter house from Topic 1.1. What do chicks use to eat and drink?

**Answer:** Feeders and drinkers

2. Explain to trainees that layers also use this equipment to eat and drink and there are several different types. With a partner, tell trainees to try to match the feeder and drinker type to its image.

#### **Answers:**

- 1 D 5 - A 2 – C 6 - F
- 3 E 7 - H
- 4 G 8 - B
- 3. Direct trainees to 2.1 Key Facts and do the following as they read the facts individually:
  - ✓ Check or tick the information that is the same for starters.
  - Star any information that is new or different from starters.



## Guided Practice Activity

1. Instruct trainees to work through the following scenario from Topic 2.1 Task 3 and questions in small groups. They should write down their answers and be prepared to present them to the rest of the class. Encourage them to refer to 2.1 Key Facts and ask you for clarification.

After starting a chicken farming project, Mrs. Karemera is going to receive layers from the nearby farmer who raises chicks. Today, Mrs. Karemera wants to start preparing the house that will host the 500 layers. In order to maximize the chance of success, he calls you as an expert in poultry farming and wants you to help select a feeder and drinker he should use.

- **a.** Make a list of the different types of feeders she can use.
- **b.** Draw a picture of each type of feeder to illustrate what it looks like to Mrs. Karemera.
- **c.** Explain how each feeder works and recommend one type to her.
- **d.** Explain how this type of feeder must be installed.

- **e.** Make a list of the different types of drinkers she can use.
- **f.** Draw a picture of each type of drinker to illustrate what it looks like to Mrs. Karemera.
- g. Explain how each drinker works and recommend one type to her.
- **h.** Explain how this type of drinker must be installed.
- 2. Trainees should now present their recommendations to Mrs. Karemera using the flipchart. Make sure each group member speaks during the presentation. After the presentation, other class members should ask the group questions, which they must answer.

**Answers may (and should) vary.** Any of the types of feeders and drinkers are permissible as long as the groups can defend and explain their choices. Make sure that other trainees ask questions to create more critical thinking opportunities.

- **3.** Facilitate a class discuss on the role of disinfection in the preparing the layers house.
  - **a.** Do they think it is similar or different from disinfecting the chicks starter room house? Why?

**Answers may vary.** Encourage critical thinking. Ultimately, yes the processes are very similar because cleanliness is essential to all animal health.

**4.** Are there any other materials or equipment you think are needed in a layer house?

**Answers may vary.** Refer them to **2.2 Key Facts** to learn about disinfection procedures, litter, and physical parameters.



## **Application Activity**

- 1. Before visiting a local poultry farm, tell trainees to complete the following tasks from **Topic 2.1 Task 4** in their manuals with a partner. Monitor their discussions and correct major errors.
  - **a.** Discuss: Are the disinfection processes similar or different for chicks and layers? Explain the similarities and/or differences.

**Answer:** They are similar. Both involve dry cleaning (removing dirt), wet cleaning (washing), and disinfecting (spraying or fumigation).

**b.** Brainstorm: Where can litter be found in your community? How do you know if it is good quality?

**Answers may vary.** Suggest ideas if needed.

**c.** Calculate: If the poultry house floor is 6 metres by 11 metres and you want to cover it with 10 cm of litter, how much litter do you need in m<sup>3</sup>?

#### Answer:

```
Litter needed = volume = area of floor * depth of litter

Area of floor = L * W = 6 m * 11 m = 66 m

Depth of litter = 10 cm = 0.1 m (must change units to metres)

Litter needed = 66 m * 0.1 m = 6.6 m<sup>3</sup>
```

- **2.** Visit a local poultry farm with your class. Confirm that the farmer will be available to answer questions. Upon arriving, tell trainees to observe the following materials and equipment and take notes on how they are installed or arranged:
  - **a.** Feeders
  - **b.** Drinkers
  - c. Nests
  - **d.** Perches
  - e. Litter
- **3.** Now, instruct trainees to ask the farmer or another worker about the physical parameters in the layer house. How do they monitor the temperature, ventilation, lighting, and humidity?
- **4.** Encourage trainees to ask any other questions they have about preparing the layers house.
- **5.** Collect and review the notes trainees took during the field visit. Ensure they are all participating and engaging with the material.



#### Points to Remember

- For layers, any housing problems may alter the productivity if it is not addressed or controlled.
- Every excess is bad, whether it is too much or too little. It is always important to refer to the standards.
- One mistake in house preparation house can harm layers all over their lifecycles.



#### **Formative Assessment**

- **1.** Select **True** or **False** for the following statements:
  - **a. True:** Lighting in the layer house affects the rate of sexual maturation and egg production.
  - **b. True:** Nests should not be situated in a secure, shady secluded place out of the sun, lined with fresh litter and kept clean
  - c. False, linear feeders are a single line and can be accessed by birds from both sides: Linear feeders are in a circular form and can be hanging.
  - **d.** False, quality and quantity are both important for animal health: The quality of litter is not important as long as you have enough to cover the floor.
- 2. What are the 5 steps for disinfecting the layer house?
  - 1. Dry Cleaning
  - 2. Wet Cleaning
  - 3. Drying
  - 4. Repairs
  - 5. Disinfecting
- **3.** What are the effects of high temperatures on layers? What causes these high temperatures?

**Answer:** High temperatures cause heat stress which negatively impact poultry health and productivity. It can be caused by over-crowding, lack of water, and heat absorption by the walls of the building.

**4.** What are nests and perches used for?

**Answer:** Nests are the space where chickens (layers) lay their eggs. Perches are elevated spaces where birds can sleep, observe, sit, and avoid predators at night.

## **①** Further Information for the Trainer

- **1.** Poultry Farming Equipment and Their Uses: http://ecochickspoultry.com/a-list-of-poultry-farming-equipments-and-their-uses/
- 2. Cleaning and Disinfecting Your Poultry House: https://smallfarms.cornell.edu/2014/04/cleaning-and-disinfecting-your-poultry-house/
- **3.** Poultry litter: http://www.poultryhub.org/production/husbandry-management/housing-environment/poultry-litter/
- **4.** Poultry Housing and Management in Developing Countries: http://www.fao.org/3/a-al734e.pdf

#### **Learning Outcome 2.2: Receive layers**



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

- a. Describe appropriate transportation and preparation for pullets
- **b.** Explain the procedure of installing pullets in layers house
- **c.** Identify proper handling, health maintenance, and record keeping techniques



Time Required: 6 hours



**Learning Methodology:** Brainstorming, individual and group work, field visit, presentation, feedback, observations and note-taking



#### **Materials Needed:**

• Standard training materials – flip chart, markers, tape, A4 paper



#### **Preparation:**

Organize a visit to a local poultry farm, preferably one with layers that have been recently transported or pullets that will be transported soon.

#### **Cross Cutting Issues:**



- ✓ **Gender and inclusivity**: Consider gender balance when assigning groups and partners between trainees.
- ✓ **Standardization culture:** Emphasize the importance of keeping records to make-long term decisions and stay organized.



#### **Prerequisites:**

- ▶ Learning Unit 1: Raise starters
- ▶ Learning Outcome 2.1: Prepare layers house

#### **Key Competencies:**

	Knowledge		Skills		Attitudes
1.	Describe appropriate transportation and preparation for pullets	1.	Organize transportation and prepare for pullets	1.	Forward-thinking
2.	Identify proper handling, health maintenance, and record keeping techniques	2.	Carefully handle, check health, and keep records for pullets	2.	Attentive
3.	Explain the procedure of installing pullets in layers house	3.	Install pullets in layers house	3.	Methodical



#### Steps

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

- 1. Tell trainees to think back to Topic 1.2: Receive chicks. Instruct them to individually brainstorm responses to the following questions found in **Topic 2.2 Task 1** in their manuals:
  - **a.** What equipment was needed to transport chicks?
  - **b.** Do you think layers require the same equipment? Why or why not?
  - **c.** What factors were considered for transporting chicks?
  - **d.** Do you think the same considerations exist for layers? Why or why not?
- **2.** After enough time, tell trainees to share their answers with a partner. They should compare their ideas and explain their reasoning.

**Answers may vary.** You may need to prompt trainees with content from the previous Learning Unit. Encourage an open discussion and correct major errors. They will learn the full answers in this Learning Outcome.

## Problem Solving Activity

- Assign trainees to a partner and tell them to consider the following questions from Topic
   Task 2:
  - **a.** What are pullets?
  - **b.** How are they different from chicks?
  - **c.** How are they different from layers?
- **2.** Verify their answers.

**Answers:** Pullets are young hens that have not yet started to lay eggs. They are full grown. Chicks are not full grown yet. Layers are hens who are currently laying eggs.

- **3.** Tell trainees to continue discussing with their partner:
  - **a.** What is the proper way to handle a fully-grown bird? Demonstrate how to do this using an item in the classroom.
  - **b.** What could happen if a bird is handled incorrectly?
- **4.** Invite three volunteers to demonstrate their bird handling techniques to the full class. Facilitate a class vote on which method is the best.

**Techniques may vary.** Do not give the correct method yet, but ask volunteers questions about why they chose certain method and what the problems might be.

- **5.** Tell trainees to once again discuss with their partner:
  - a. Why is it important to assess animal health before transporting?
  - **b.** Why is it important to assess animal health after transporting?
  - c. What kind of information should you collect and record about incoming animals?
- **6.** Discuss the responses to **Question 5** with the rest of the class. Encourage trainees to share and debate their ideas.
- **7.** After the discussion, refer trainees to **2.3 Key Facts**. Note that it is important to assess health before transporting because sick chickens should not be transported. It is important to assess health after transporting because birds may have been injured or stressed in transit and need medical attention upon arriving. Ideas for record keeping information might include health, diseases, vaccinations given, any abnormalities.



#### **Guided Practice Activity**

Separate trainees into small groups. Tell them to consider the scenario from Topic 2.2
 Task 3 and discuss the questions that follow. They should write their responses to the questions.

As a trained poultry farmer, after raising and brooding chicks, you receive a purchasing order from a newly interested farmer who wants to produce and sell eggs. The farmer orders 500 hundred pullets of 8 weeks of age. He has already performed all the appropriate preparations. He asks you to help transport the pullets to his farm and help him with their installation in the prepared house. The farmer needs you to demonstrate this process while teaching him so that he can do it by himself next time. To begin, help him by answering these questions:

a. What are the main factors to consider while transporting pullets?

**Possible Answers:** distance, climate, age and health status of chickens, number of chickens being transported, arrangement of crates/equipment in the vehicle

**b.** How can I organize a transport so that I get good results?

**Possible Answers:** Divide flocks into small groups and arrange them in crates; remove sharp edges or other dangerous material from entering the crates; allow for ventilation; give birds enough space; make sure facilities are prepared before you arrive

**c.** What are the steps to follow during installation of pullets?

**Answer:** Check and record health status; load; transport; unload. Specifically, for unloading, chickens should have access to food and water as soon as they arrive and the space should already be disinfected.

**d.** Should I check to see if the pullets are healthy? Why?

**Answer:** Yes! Sick or injured birds cannot be transported to begin with. If birds become sick or injured during transportation, they need to be separated and treated immediately to prevent their death and/or the spread of disease.

e. Should I keep records? Where do I start and where do I end up?

**Answer:** Yes! Records are essential for farm management. As seen in previous topics, they help farms make decisions in the future, such as when to administer vaccines.

- **2.** Instruct groups to develop a presentation of their advice to the farmer. Make sure each person has an opportunity to speak.
- **3.** Facilitate presentations. Allow the class to give feedback on any missed details or requirements.



## Application Activity

Organise a visit a local poultry farm, preferably one that has transported layers to or from the farm.

1. Tell trainees to ask the farmer or another worker about how they conduct these 5 activities: preparation of the layer house, transportation, handling, installation, record keeping. They should then fill in their answers in the chart from **Topic 2.2 Task 4** under "Finding on field visit."

Activity	Finding on field visit	Compare to Key Facts and class discussions
Preparation		
Transportation		
Handling		
Installation		
Record		
Keeping		

- **2.** Then, tell trainees to observe the area where the chicks and/or layers are kept. They should add any additional notes and observations to the "Finding on field visit" sections.
- **3.** Now, tell trainees to add in their own comparison of what was taught in the Key Facts and class discussions to what the farmer or their staff has said.
  - **a.** Are the processes the same?
  - **b.** Are they different? How? What does the farmer do differently?
- **4.** Finally, have the class ask the farmer or another worker to explain some of the differences they have observed. They should note the explanations.



# Points to Remember

- **DO NOT:** Carry chickens by their head, neck, wings or tail; transport birds in bags; transport birds with their legs tied; transport birds in the boot or trunk of a car; mix different species of chicken in a single crate/cage during transport.
- Source pullets from suppliers that are near the laying facility to minimize transportation time.



- **1.** Complete the following sentences:
  - a. It is preferred to load pullets late in the afternoon and transport at night when it's cooler and darker outside.
  - **b.** Never mix different **species** of chickens in a single crate during transport.
  - c. The layer house should already be thoroughly cleaned and disinfected before unloading begins.
  - d. Record keeping is essential to poultry management and should be kept every day.
- 2. Madam Muhoza is farmer willing to start her business of chicken farming at Huye District, Southern Province. Recently she ordered 600 pullets of six weeks old from a supplier company located in Rulindo District, Northern Province. Give some tips for transporting, handling, and installing the pullets in her layer house.
  - **a.** Transportation:

Possible Answers: Minimize stress factors; proper ventilation; travel at night; use plastic crates; separate by species; remove sharp edges or other harmful objects; give birds enough space; load in late afternoon

**b.** Handling:

Possible Answers: Pick birds up by their legs and hold down wings so that they don't flap; carefully inspect for injuries before and after transportation

**c.** Installing:

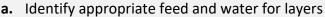
Possible Answers: Unload as soon as possible at the destination; space should already be cleaned and disinfected; preferably in the early morning; unload into an enclosed pen or cage; give food and water immediately

## **①** Further Information for the Trainer

- **1.** Layer Poultry Farming: https://www.growelagrovet.com/layer-poultry-farming/
- **2.** Transport of Livestock: http://www.fao.org/3/x6909e/x6909e08.htm

## **Learning Outcome 2.3: Distribute feed and water**

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





- **b.** Calculate the appropriate quantities of feed and water needed based on the number of layers
- **c.** Explain how to clean feeders and drinkers
- **d.** Distribute feed and water according to requirements
- e. Keep records to measure effectiveness of feeding system



Time Required: 6 hours



**Learning Methodology:** Brainstorming, projects, group work, field visit, predictions, calculations

#### **Materials Needed:**



- Standard training materials flip chart, markers, tape, A4 paper
- Sample measuring equipment weighing scale, water basin, calculators
- Sample feed and water quantities some feed and water

#### **Preparation:**

- ☐ Organize a field visit to local poultry farm.
- ☐ Familiarize yourself with how to use measuring equipment.

#### **Cross Cutting Issues:**



- ✓ **Gender and inclusivity**: Consider gender balance while forming groups. Encourage both genders to participate during class discussions.
- ✓ **Environment and sustainability**: Emphasize how the environment affects animal health (especially temperature) and why it is important to provide high quality and adequate feed and water based on the environment.

#### **Prerequisites:**



- Animal Diseases Prevention
- ▶ Learning Unit 1: Raise chicks
- ▶ Learning Outcomes 2.1 and 2.2

#### **Key Competencies:**

	Knowledge		Skills	Attitudes
1.	Identify appropriate feed and water for layers	1.	Select high quality feeds and water for optimal animal health	1. Attentive
2.	Determine the appropriate quantities of feed and water for chickens	2.	Calculate the quantities of feed and water needed based on the number of chickens	2. Accurate
3.	Explain methods of cleaning feeding equipment and record keeping	3.	Properly clean feeding equipment and keep records to ensure animal health	3. Methodical



### **Steps**:

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

- Instruct trainees to brainstorm responses to the questions from Topic 2.3 Task 1 individually:
  - **a.** What are nutrition and malnutrition? What do you think they are?
  - **b.** Have you ever seen a person or animal suffering from malnutrition problems?
  - **c.** What do you think about a chicken with malnutrition problems?
  - **d.** What do you think causes malnutrition in chickens?
  - **e.** What can you do to prevent your chickens from malnutrition and its consequences?
- 2. Tell trainees to share their ideas with a partner. They should explain their reasoning.
- **3.** Facilitate a class discussion on nutrition and its relationship to raising chickens with the rest of the class. Remind trainees of the nutritional and metabolic diseases covered in Animal Diseases Prevention to guide your discussion.



- **1.** Separate trainees into small groups. Tell them to recall Unit 1: Raise chicks, Topic 4: Distribute Feed and Water. They should apply their knowledge from raising chicks to raising layers while answering the questions found in **Topic 2.3 Task 2** in their manuals.
  - a. How do you know how much feed and water to provide to layers?
  - **b.** Does the quantity of feed and water increase, decrease, or stay the same when the number of layers increases?
  - **c.** What materials do you need to calculate the amount of feed and water needed?
  - **d.** Based on the chart below, predict that amount of water needed for 100 chickens that are 3 weeks old:

Water For 100 Chickens				
Age Daily Water space (weeks) consumption (m)				
0 - 1	3	0.7		
2 - 4		1.0		
4 - 9	20	1.5		

**2.** Facilitate a class discussion based on the groups' ideas. Encourage trainees to challenge each other's ideas, basing their information from Unit 1, Topic 4. After they have discussed the questions thoroughly, reveal the correct answers.

**Answers:** The amount of feed and water depends on the age and quantity of birds. The quantity of feed and water increases as the number of layers increases. To calculate quantities, you need a weighing scale, a water basin, and a calculator (can use phone). Their predictions for the table should be between 4-19 litres.

**3.** Now, with their group members, tell trainees to consider what they know about animal health.

They should predict answers to these questions:

- **a.** What are important factors when considering which feed and water to provide to your chickens?
- **b.** How can you assess the quality of feed and water?

- **c.** What might happen if your chickens are given poor quality feed and water, or if the feeders and drinkers are not cleaned properly?
- **4.** Facilitate a discussion on prevention methods to avoid chicken malnutrition with the class.

Add the following points, referring to **2.4 Key Facts:** Important factors to consider are the quality and quantity of the feed and water. The quality can be assessed by observing the colour, smell, and taste. Look for signs of contamination and check ingredients for nutrient composition.

If chickens are given poor quality feed and water, they risk contracting a nutritional and metabolic disease, which decreases their energy and production. They may also become dehydrated. Any of these may lead to death.



# Guided Practice Activity

1. Assign trainees into small groups. Instruct them to read through the following scenario from **Topic 2.3 Task 3** in their manuals and discuss the questions.

After completing a training on entrepreneurship, Miss Mukamana got a sponsorship from the government through the Business Development Fund (BDF).

The funder asked her to present a business plan of the project she wishes to do. She chose a chicken farming project, raising 2000 layers. She has drafted the business plan, but she is missing the feeding part.

She decided to call you for an assistance to complete the plan. She needs your help answering the following questions:

- **a.** How can I identify good quality feed and water for the chickens?
- **b.** How much feed and water do I need for the number of layers I have?
- c. How much space should be between each feeder and drinker for the layers?
- **d.** How will I clean the feeders and drinkers?
- e. What information should I include in my records?

#### **Answers:**

A – Identify good quality feed and water using physical and chemical evaluations. Physical evaluations involve observing the colour, smell, weight, and ingredients of the feed, as well as the colour, taste, and odour of the water. Chemical evaluations require a closer look at bacteria or microbes in the feed or water, which indicate contamination, or poor quality feed.

**B** – For 2000 layers, **240-260 kg of feed** and **1000 litres of water** is needed per day. Use the charts/tables in **2.4 Key Facts**.

If 12-13 kg is needed for 100 layers, multiply by 20 for 2000 layers.

12-13 \* 20 = 240-260 kg per day for 2000 layers.

If 50 litres of water are needed for 100 layers, multiple by 20 for 2000 layers. 50 \* 20 = 1000 litres of water per day for 2000 layers.

**C** – According to the chart in **2.4 Key Facts**, 13 metres is needed between each feeder and 2.5 metres is needed between each drinker.

**D** – They should be cleaned by removing them from the chicken house, removing all of the old or leftover feed and water. Cleaning using water and soap. Then disinfecting using a nontoxic disinfectant. Dry them, in the sunshine if desired, and replace according the spacing standards.

**E** - Records should include daily feed and water consumption, body weight, egg quality, egg production.

- 2. After completing the project document, Mukamana received the funds and started the project. Now you are preparing to visit her at her farm. At the same time, the school where you were trained wants you to guide other new trainees based on the success story of Mukamana.
  - **a.** Tell trainees to collaborate with their group members to write a manual for distributing feed and water to layers.
  - **b.** Emphasize that they should use their own words. Do NOT re-write the exact information from **2.4 Key Facts**. They should determine the most important information. They may feel free to add any additional knowledge they have from their own experiences.
  - **c.** Remind trainees to address the questions above, including quality of feed and water, quantity of feed and water, equipment and/or tools needed, record keeping, and cleaning procedures.
- 3. Trainees must submit their manuals to you for review. After reviewing the document, give feedback including areas for improvement. Be sure that trainees have addressed all of the questions and answers above as well as overall instructions based on 2.4 Key Facts. Monitor that they are rephrasing the information and not copying it directly from the Key Facts.



Organise a visit to a local poultry farm with your class. Confirm that the farmer will be available to give a tour and answer questions.

- 1. Using the available materials and equipment, instruct trainees to practice the following in small groups and with the assistance of the farmer, other workers, and yourself:
  - a. Identify feed and water sources.
  - **b.** Clean the feeders and drinkers.
  - c. Weigh feeds and measure the quantity of water needed according to the number of layers.
  - d. Distribute feeds and water.
  - **e.** Observe farm records and take records on egg quality and production.
- 2. Then, encourage trainees to ask the farmer or another worker any questions they have about distributing feed and water to layers.
- **3.** After the field visit, facilitate a class discussion on their experiences.
  - a. What did they learn?
  - **b.** What surprised them?
  - c. What information would they still like to know?
- **4.** Follow up on any questions or missing information in the next session.



## Points to Remember

- Never re-distribute leftover water and feeds.
- Always check the way feeds are stored and verify if there are not contaminated before distribution.
- Always check the packaging to ensure chickens are receiving the correct type of feed based on their age.



#### Answers

- 1. Circle the correct answer for the following questions:
  - 1. Which of these is NOT recorded to measure effective feeding:
    - a. Body weight
    - **b.** Egg quality
    - c. Shelter construction
    - d. Egg production
  - 2. Water should be distributed and/or available:
    - a. Once per day
    - **b.** Twice per day
    - c. Only at night
    - d. At all times
  - **3.** Which of these is NOT assessed during a physical evaluation of feed:
    - a. Weight, colour, and smell
    - **b.** The type of feed (i.e. grower or layer feed)
    - c. If there is any contamination
    - d. Presence of bacteria or microbes
- **2.** Select **True** or **False** for the following statements:
  - a. True: Access to feed minimizes aggression, poor body condition, and injuries.
  - **b.** False, the quantities increase: The quantity of feed and water stays the same when the number of birds increases.
  - **c. False, it cannot be redistributed and should be removed:** Leftover or old feed can be redistributed to birds without any problems.
  - **d.** True: Feeders and drinkers should be drained, cleaned and disinfected regularly.
- **3.** Complete the following sentences:
  - **a.** In warmer temperatures, the quantity of **water** consumption increases.
  - **b.** Contamination of water is indicated by the presence of **bacteria** or other microbes.
  - c. Water helps regulate body temperature, digest food, and eliminate wastes.

## • Further Information for the Trainer

**1.** Raising Chickens for Egg Production: https://poultry.extension.org/articles/poultry-management/raising-chickens-for-egg-production/

### **Learning Outcome 2.4: Monitor physical parameters**

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



- **a.** Explain the impact of ventilation, temperature, lighting, and humidity on poultry health
- **b.** Monitor and adjust ventilation, temperature, lighting, and humidity in layers houses
- **c.** Detect harmful gases and adjust them in houses



Time Required: 6 hours



**Learning Methodology:** Brainstorming, field visit, individual and group work, assessment

#### **Materials Needed:**



- Standard training materials flip chart, markers, tape, A4 paper
- **Samples measuring tools** thermometer, barometer, hygrometer, carbon dioxide meter, photometer

#### **Preparation:**

- ☐ Organize a field visit to a local poultry farm.
- ☐ Familiarize yourself with measurement tools in advance.

#### **Cross Cutting Issues:**



- ✓ **Environment and sustainability:** Acknowledge how the environment affects physical parameters and how the parameter, in turn, affect poultry health.
- ✓ **Standardization culture:** Use standard tools to measure and record physical parameters.



#### **Prerequisites:**

- Animal Diseases Prevention
- ▶ Learning Unit 1: Raise chicks

#### **Key Competencies:**

Knowledge	Skills	Attitudes
1. Describe the importance and factors of ventilation and light intensity in the layer house	Monitor ventilation and lighting in the layer house and interpret influencing factors	1. Diligent
2. Determine and explain the impact of humidity and temperature levels on layers	2. Monitor and adjust humidity and temperature levels in the layer house	2. Persistent
3. Explain the impacts of carbon dioxide and how to detect it	3. Determine the level of carbon dioxide and set the needed level in the layer house	3. Proactive



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

1. Tell trainees to individually recall the physical parameters monitored in the chick house from Unit 1. What were they? What tools do we use to measure them? Have trainees write their responses in the chart under **Topic 2.4 Task 1** in their manuals.

Physical Parameter	Measurement Tool
1. Ventilation	1. Barometer
2. Lighting	2. Photometer
3. Humidity	3. Hygrometer
4. Temperature	4. Thermometer
5. Carbon dioxide	5. Carbon dioxide meter/sensor

- **2.** Verify their answers to question 1. Then instruct them to discuss with a partner:
  - **a.** What are the impacts of physical parameters on chicks' health?
  - **b.** Do you think they are the same for layers?
  - **c.** Why or why not?

**Answers may vary.** Note that extremes of any parameter (too hot, too cold, too humid, not enough ventilation) will have negative impacts on animal health. At the end of the discussion, you may reveal that, yes, this is the same for chicks as for layers.



- **1.** Tell trainees to consider the importance of air quality by performing the task and discussing the questions from **Topic 2.4 Task 2** with a partner:
  - **a.** Try to stop breathing for 2 minutes.
  - **b.** What happens?
  - **c.** What factors make it difficult for you to breathe?
  - **d.** Why is clean, fresh air important for human health?
  - e. Why do you think it is also important for chicken health?
  - **f.** What factors make it difficult for chickens to breathe?
  - g. How do you know if a chicken is having difficulty breathing?

**Answers may vary.** Generally, trainees should touch on the concepts that it is difficult to breath when there is a lot of moisture or dust/dryness in the air. Clean, fresh air allows for growth and production. You might know if a chicken is having trouble breathing if they show abnormal behaviours or change their body positions. They may also pant or sneeze/cough.

- 2. Using what you know from Topic 1.4: Monitor physical parameters in a chick starter house, how do you think we can monitor the physical parameters in a layer house? Possible Answers:
  - 1. Ventilation: Smell of ammonia, dry or wetness of litter, feeling or absence of fresh air
  - 2. Lighting: Cannibalistic or feather pecking behaviour, exposure to direct sunlight
  - **3.** Humidity: Moist or wet litter, chickens panting/breathing loudly or with difficulty; visible moisture such as on or around heaters
  - **4.** Temperature: Observe abnormal chicken behaviour, huddling (cold stress), panting (heat stress), increased or decreased feed intake
  - **5.** Carbon Dioxide: Difficult to monitor without meter/sensor because it cannot be smelled.
- **3.** Have trainees read through **2.5 Key Facts** with a partner and discuss the different between the physical parameters for starters and layers.



# Guided Practice Activity

- 1. Separate trainees into small groups and tell them to read the scenario from Topic 2.4 **Task 3** and respond to the questions. Refer them to **2.5 Key Facts** as needed.
  - Mr. Mukiza is a farmer raising 6,000 layers installed in 6 consecutive rooms. After one month, he observed some abnormal signs from the reports compiled from the record keeping books. Here are some of the signs:
  - **a.** Difficulty breathing for approximately ¾ of the layers most of time during the middle of the day.
  - **b.** The presence of an unusual, bad smell during morning that increases gradually throughout the day.
  - c. Decreased feed and water consumption.
  - **d.** Some cases of cannibalism.
- 2. Mr Mukiza thinks these abnormalities are linked with physical parameters in the farm, but he is not able to solve the problem. Now he calls you, a trained expert, to help him answer the following questions:
  - **a.** Which physical parameters could be affecting the birds in each situation? How do you know?

#### **Possible Answers:**

Situation	Parameter	Reasoning/Evidence
i.	Ventilation	Insufficient ventilation does not allow fresh air into
	Carbon dioxide	the house which is needed for healthy breathing
		Presence of CO <sub>2</sub> affects respiratory system of birds
ii.	Ventilation	Insufficient ventilation allows gases such as ammonia to remain in the house
iii.	Temperature	Feed intake decreases when the temperature is too high/hot
iv.	Lighting	Feather pecking and cannibalism can result from too intense of lighting

**b.** Going forward, how can he monitor:

#### **Possible Answers:**

the ventilation system?

Ventilation affects temperature, humidity, and gases. If you notice any of these parameters as abnormal, it is likely related to ventilation.

ii. the light intensity?

Observe abnormal animal behaviours, especially cannibalism or feather pecking. Check to see if the house is directly exposed to sunlight or intense brightness.

iii. the temperature?

Observe chicken behaviours, such as body position, huddling, and panting. Also note changes in feed intake.

iv. carbon dioxide and levels of other gases?
It is possible to smell some harmful gases, but to monitor CO<sub>2</sub> he must use a meter/sensor. Be sure to remove manure/faeces to prevent harmful gases from concentrating the air.



## Application Activity

Organise a visit to a local poultry farm. Confirm that the farmer will be available to answer questions.

- 1. Separate the trainees into 5 groups and assign each group to a physical parameter.
- 2. Instruct trainees to use the table in **Topic 2.4 Task 4** to monitor and assess their assigned parameter. Is it too high or too low? Are the chickens comfortable? Then, trainees should add suggestions for improving the state of this parameter at the farm.
- **3.** After sufficient time, rotate the groups to a new parameter. Repeat until they have observed all 5 parameters and the table is completed.

Physical Parameter	Assessment	Suggestions for Improvement
Ventilation		
Lighting		
Temperature		
Humidity		
Carbon Dioxide/Gases		

**4.** Encourage trainees to ask the farmer or another worker any remaining questions they have about monitoring physical parameters in a layer house.



- Ventilation is the key factor that differentiate the chicken house from the other houses.
- Carbon dioxide cannot be detected by odour or by smell and it is deadly in high concentrations.



## Formative Assessment

- **1.** Select **True** or **False** for the following statements:
  - a. False, carbon dioxide cannot be detected by smell: Both the ammonia and dioxide carbon can be detected by smell.
  - b. True: A good ventilation system is an effective way to eliminate harmful gases in the layers houses.
  - c. False, layers have a constant body temperature: Layers' body temperatures change frequently.
- **2.** Complete the following sentences:
  - **a. Humidity** can be produced by water vapour from heaters and chickens breathing.
  - **b.** A **photometer** is used to measure and record light intensities on a regular basis.
  - **c.** When experiencing **cold** stress, birds tend to huddle together.
  - d. Cannibalism and feather pecking can sometimes be stopped by reducing light.
- **3.** What are two factors that influence physical parameters?

Possible Answers: Local climate, space/construction of shelter, flock size, management system

## **(i)** Further Information for the Trainer

1. Climate in Poultry Houses: http://www.poultryhub.org/production/husbandrymanagement/housing-environment/climate-in-poultry-houses/

### **Learning Outcome 2.5: Ensure egg quality**

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



- **a.** Describe the criteria for grading eggs according to standards
- **b.** Describe techniques for storing eggs according to standards
- **c.** Explain the advantages of grading and packaging eggs according to standards
- **d.** Describe the methods of collecting and packaging eggs



Time Required: 6 hours



**Learning Methodology:** Brainstorming, discussion, individual and group work, field visit, interviewing

#### **Materials Needed:**



- Standard training materials flip chart, markers, tape, A4 paper
- Sample eggs (if possible) AA, A, B, and inedible eggs to test for quality
- Sample grading tools bucket of water, candle

#### **Preparation:**

- Organize a visit to a local shop that sells eggs. Ensure that the store owner or manager will be there to answer questions.
- ☐ Find eggs of various grades to show to the class as samples.

#### **Cross Cutting Issues:**



- ✓ **Environment and sustainability**: Demonstrate the interconnectedness between the environment, animal health, and egg quality.
- ✓ **Standardization culture:** Use the grading scale to determine the quality of the egg. Emphasize the advantage of having standardized quality throughout the world.



#### **Prerequisites:**

Learning Unit 2, Outcomes 1-4



## **Key Competencies:**

Knowledge	Skills	Attitudes
1. Describe factors for	1. Grade eggs according to	1. Detail-oriented
grading eggs according to standards	standards	
2. Explain the techniques for storing eggs according to standards	2. Store eggs according to standards	2. Attentive
3. Describe methods of collecting and packaging eggs	<b>3.</b> Package and collect eggs according to standards	3. Methodical



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

- **1.** Refer trainees to **Topic 2.5 Task 1** in their manuals. Instruct trainees to imagine and consider the following questions individually:
  - **a.** Have you ever cooked an egg before to eat?

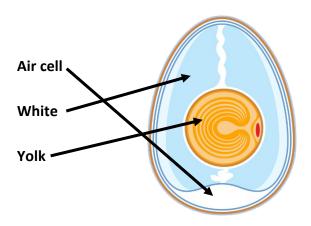
- **b.** What did it look like outside and inside?
- **c.** Where did you buy it from and where was it being stored?
- 2. After sufficient reflection time, tell them to share their ideas with a partner.
- **3.** Now they should continue discussing with their partner: How do you know the difference between a good egg and a bad egg? Explain.
- **4.** Monitor their discussions and encourage them to think critically. Prompt and guide them as needed.



#### ) Problem Solving Activity

1. Tell trainees to complete the first two exercises from **Topic 2.5 Task 2** individually. First, they must identify the parts of an egg<sup>1</sup> by drawing a line from the term to its location in the egg.

#### **Answers:**



**2.** Put the following egg processes in the correct order:

**Answers.** This exercise is a challenge because storage can come before AND after packaging. This is because the eggs may be stored, then transported (packaged), then stored again. Accept both responses from trainees as long as they can defend their answer.

- 1. Collection
- 2. Grading

<sup>&</sup>lt;sup>1</sup> Png Wing. (n.d.). *Chicken eggshell anatomy bird egg* [Illustration]. <a href="https://www.pngwing.com/en/free-png-nhoxc">https://www.pngwing.com/en/free-png-nhoxc</a>

- 3. Storage
- **4.** Packaging
- **5.** Storage
- **3.** Verify the trainees' responses using the answers above.
- 4. Separate the trainees into small groups and tell them to discuss: Why do you think it's important to grade, or assess the quality, of eggs before selling them?
  - **a.** What are the advantages of grading?
  - **b.** What are the risks of not grading?
- 5. Now, tell them to consider with their groups: How do you think we can assess the quality of the *inside* of an egg (without breaking it open)? Be creative!
- 6. Facilitate a class discussion to questions 4 and 5 may vary. Encourage creativity and critical thinking. You may guide the discussions and prompt the trainees so that they participate more.
- **7.** Direct them to **2.6 Key Facts** to verify their answers.



# Guided Practice Activity

1. In their small groups, tell trainees to read the scenario from Topic 2.5 Task 3 and discuss responses to Mr. Mukiza's questions:

Mr. Mukiza is now in the production phase. His chickens are producing well. However, Mr. Mukiza's farm is located a bit far from the big market. For this reason, before supplying his clients, he first collects eggs from the farm, stores them, grades them, and transports them.

During this process, he has observed some financial and egg losses. Mr Mukiza wants now to hire you to help solve the problem.

He asks you the following:

**a.** What are the techniques for packaging eggs?

**Answers:** Eggs may be placed in cardboard or plastic trays and packed in boxes or crates; or they may be packed into firm baskets or crates with rice husks, wheat husks, and/or chopped straw

**b.** Is it necessary to grade eggs? If yes, what are the advantages?

**Answers:** Yes, it is highly recommended to grade eggs. Having a common grading scale and system creates quality standardization throughout the world. It also reduces waste, confusion, and uncertainty when purchasing eggs.

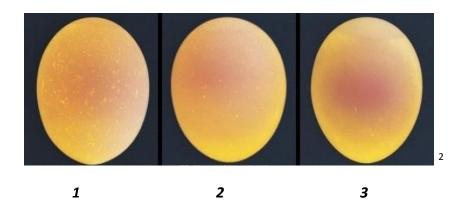
**c.** What factors should be considered when storing eggs?

**Answers:** Temperature, humidity, space/room, cleaning, and removal of raw and cracked eggs.

- **2.** Ask groups to share their response with as much detail as possible. Give feedback on their ideas and note the correct answers (above) as needed.
- 3. Now, tell trainees to consider the following with their groups:

Mr. Mukiza shows you some of his eggs.

**a.** Determine which grade the eggs are based on the yolks:



 Outline slightly defined Grade: AA

2. Outline well defined Grade: A

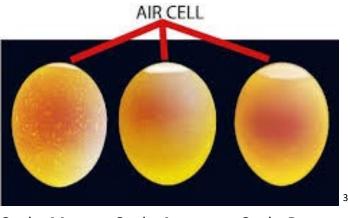
**3.** Outline clearly visible

Grade: B

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<sup>&</sup>lt;sup>2</sup> User:EricT\_CulinaryLore. (2018, March 4). *How do they decide whether an egg is grade AA, A, or B?* Culinary Lore. <a href="https://culinarylore.com/food-science:how-is-the-quality-of-eggs-determined/">https://culinarylore.com/food-science:how-is-the-quality-of-eggs-determined/</a>

**b.** Determine which grade the eggs are based on the air cells:



Grade: AA Grade: A Grade: B

- **4.** Explain that most of Mr. Mukiza's eggs are good quality. So why is he experiencing so many losses?
  - **a.** Consider how he is storing and packaging the eggs.

**Possible Answers:** His packaging and storing may not meet the standards. He should monitor the temperature and humidity of the room where he stores the eggs. He should also be aware of the risks of wet cleaning and from now on dry clean only. As for packaging, he may not be packaging the eggs securely enough which is causing them to break.

**5.** Facilitate a class discussion about questions 3 and 4. After the discussion, verify the correct answers for question 3 and note the possible answers to question 4 (above).

# Application Activity

Organise a visit a local shop that sells eggs with your class. Confirm that the seller will be available to answer questions.

- 1. Instruct trainees to observe how the eggs are stored.
- 2. Select representatives from the class to ask the seller the following questions. Everyone should write the responses in the chart under **Topic 2.4 Task 4**. Then, the class should add three of their own questions at the end.

<sup>&</sup>lt;sup>3</sup> User:EricT\_CulinaryLore. (2018, March 4). *How do they decide whether an egg is grade AA, A, or B?* Culinary Lore. https://culinarylore.com/food-science:how-is-the-quality-of-eggs-determined/

Question	Answer
Where do your eggs come from?	
When did you receive these eggs?	
How were the eggs transported to you?	
How were they packaged?	
Do you test the quality of the eggs	
before buying them? If yes, how?	
What advice do you have for grading,	
storing, and packaging eggs?	



- Eggs are fragile and can get quickly contaminated. They need special attention.
- A contaminated egg is very dangerous to human life.

# Formative Assessment

1. Identify and describe the two methods for grading eggs.

#### **Answers:**

- 1. Candling: Inspect an egg with a beam of light, preferably a candle to assess the interior qualities, such as the yolk, air cell, and white.
- 2. Water Test: Place eggs in a bucket or basin of water and see which ones float. Fresh eggs will sink to the bottom. Old eggs will float.
- 2. What are two factors that describe an AA Grade quality egg?

Possible Answers: Air cell is ½ cm or less in depth; egg white is clear and firm; yolk outline is slightly defined; there are no blood or meat spots.

**3.** Complete the following sentences:

#### **Answers:**

- **a.** Be careful when wet cleaning eggs, because washing them with water removes the layer that protects from **bacteria** and keeps **moisture** inside.
- **b.** If eggs must be stored in hot weather, you should transport them to the market at least every **third** day.
- **c.** Eggs should be collected **frequently** to prevent them from becoming damaged, dirty, or eaten.

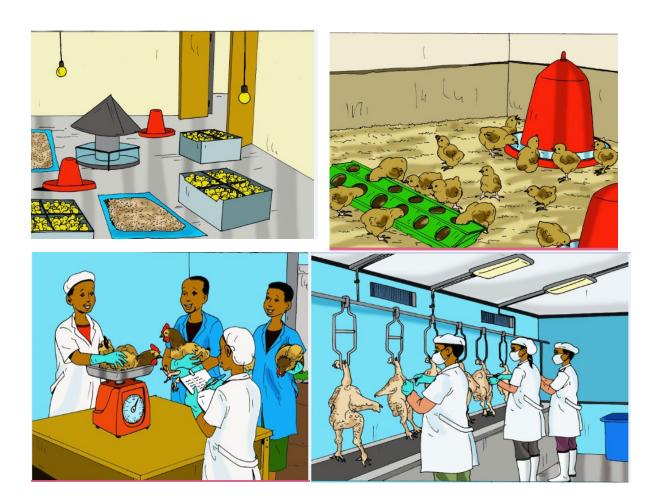
# Self-Reflection

- 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 difficulty and plan to give additional support as needed. For example, use class time before you begin the next learning outcome to go through commonly identified difficult concepts.

### • Further Information for the Trainer

- 1. Egg Production (FAO): http://www.fao.org/3/y4628e/y4628e03.htm
- 2. Egg Marketing (FAO): http://www.fao.org/3/y5169e/y5169e0a.htm
- **3.** Egg packaging, transport, and storage (FAO): http://www.fao.org/3/Y4628E/y4628e05.htm

# **Learning Unit 3: Raise broilers poultry**



#### **Learning Outcomes**

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

- **3.1** Prepare Broilers house
- 3.2 Receive Broilers
- **3.3** Distribute Feed and water
- **3.4** Monitor physical parameters
- 3.5 Perform slaughtering

### **Learning Unit 3 Self-Assessment**

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

### **Learning Outcome 3.1: Prepare broilers house**



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

- **a.** Describe the installation process of equipment in broilers house.
- **b.** Explain the disinfection process of broilers house.
- c. Explain litter management in broilers house.
- **d.** Establish physical parameters in broilers house.



Time Required: 6 hours



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



#### **Materials Needed:**

• Standard training materials – flip chart, markers, tape, A4 paper



#### **Preparation:**

Organize a field visit to a local poultry farm with broiler chickens.

#### **Cross Cutting Issues:**



- ✓ **Standardization culture**: Emphasize the importance of complying with standards for equipment installation and physical parameters to ensure animal health and production.
- ✓ **Environment and sustainability**: Explain the interconnected relationship between the environment, the physical parameters, and animal health.



#### **Prerequisites:**

- Animal Diseases Prevention
- ▶ Learning Unit 1 and 2

#### **Key Competencies:**

	Knowledge		Skills		Attitudes
1.	Describe the installation	1.	Install materials and	1.	Methodical
	process of equipment in		equipment in		
	broilers house		broilers		
2.	Explain the disinfection	2.	Disinfect broilers	2.	Proactive
	process of broilers house		house		
3.	Explain litter and	3.	Establish physical	3.	Detail-oriented
	physical parameter		parameters and		
	management in broilers		manage litter in		
	house		broilers house		



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

- 1. Remind trainees that they have learned how to raise starter chicks and egg layer hens so far. Tell them to individually consider the questions found in **Topic 3.1 Task 1** in their manuals:
  - a. What is the age and purpose of starter chicks?
  - **b.** What is the age and purpose of layers?
- **2.** Inform trainees that this unit is about broiler chickens. Tell them to tick which statements they think are true about broilers:

#### **Answers:**

- Broiler chickens are raised for their meat.Broiler chickens are raised for their eggs.
- ☐ Broiler chickens are typically slaughtered at 10 weeks of age
- ☐ Broiler chickens are typically slaughtered at 6 to 7 weeks of age
- Broilers are females only.
- □ Broilers are males and females.
- **3.** Verify their answers to questions 1 and 2.
- **4.** Instruct trainees to discuss the questions with a partner.
  - a. Where do you find chicken meat to eat in your community?
  - **b.** Where does the meat come from?



- 1. Inform trainees that they will now explore the differences between layers and broilers. Using what they have learned about layers and what they may already know about broilers, tell them to turn to **Topic 3.1 Task 2** and discuss with a partner:
  - a. Do you think broilers use the same equipment as layers? Why or why not?
  - **b.** Do you think the disinfection process for broiler houses is the same as for layer houses? Why or why not?
  - **c.** Do you think the physical parameters are the same for broilers and layers? Why or why not?
- **2.** Now, tell trainees to brainstorm with their partners: What do you think are the key differences between broilers and layers? Consider their sex, age, and purpose.
- **3.** Facilitate a discussion on their ideas and predictions. After the discussion, confirm that the equipment, processes, and parameters are the same for layer and broiler chickens. Inform them that the key differences are:
  - Layers are females only; broilers and males and females
  - Layers lay eggs from 18 to 19 weeks of age onward; broilers are slaughtered at around 6 weeks of age
  - Layers raised for their eggs; broilers are raised for their meat
- **4.** Finally, have trainees review proper disinfection techniques based on their prior knowledge.
  - **a.** Put the steps for disinfection in the correct order:

#### Answers.

- **1. Dry cleaning**: Sweeping and removing dirt or dust
- Wet cleaning: Soaking, washing, rinsing
- **3. Drying**: Mopping and ventilating
- **4. Repairing**: Fixing structural problems
- Disinfecting: Spraying or fumigating
- **b.** Why is it important to properly clean and disinfect broiler houses? **Answers:** To improve/maintain animal health and reduce the risk of diseases
- **5.** Verify their answers using **3.1 Key Facts** and the answers above.



# Guided Practice Activity

1. Assign trainees to small groups and tell them to read the scenario and write answers to the questions from **Topic 3.1 Task 3**.

Abahujintambwe is a cooperative raising broilers for market production. They want to recruit an expert to help them in supervise and implement their project. Suppose that you are recruited and assigned to prepare first the house, which will receive 4,500 broiler chicks that will be 3 weeks old when they arrive. They will arrive in 2.5 weeks. They want you to supervise on the following:

**a.** What equipment is needed?

Answers: feeders, drinkers, perches, nests, litter, cleaning tools and products

**b.** How should the equipment be installed?

Answers: 5 cm between feeders and 2.5 cm between drinkers. It should be cleaned and disinfected before installation. Nests should be in a secure, shady area. Perches should be built horizontally and parallel to the wall.

c. When should the house be disinfected?

**Answers:** Within the next 3-4 days, i.e. 2 weeks before the chickens arrive.

**d.** Explain the 5 steps for disinfection:

#### Answers (See 3.1 Key Facts):

#### 1. Dry Cleaning

- o Remove dust and dirt from floors, equipment, perches, and walls by sweeping and wiping
- Remove feed, water, and litter

#### 2. Wet Cleaning

- Soaking: Completely cover with water until remaining dirt becomes soft
- Washing: Use detergent and brush to remove all dirt; use water at high pressure
- Rinsing: Removes remaining detergent

#### 3. Drying

- Mop water from floor
- Open windows and doors to ventilate
- Use fan if possible

#### 4. Repairs

Fix any problems with the building, such as holes where predators can enter

#### 5. Disinfecting

- Apply disinfectant by spraying or fumigating
- Dilute according to manufacturer's instructions

**e.** What other factors should be considered when preparing a broiler house? What other material is needed?

**Answers:** Physical parameters should be considered, including temperature, ventilation, lighting, and humidity. Litter material, if that has not been mentioned already.

**2.** Tell groups to compare their responses to the other groups and then verify them.



## **Application Activity**

Organise a visit to a local poultry farm with broiler chickens.

1. Instruct trainees to assess the equipment and parameters in the broiler house using the table from **Topic 3.1 Task 4**. They should ask the farmer or another work for help as needed.

Item	Assessment/Measurement	Meets Standards? Yes or No
Temperature		
Humidity		
Lighting		
Ventilation		
Litter		
Feeders		
Drinkers	·	
Perches		
Nests		

2. Confirm that all trainees have completed the table before leaving.



#### Points to Remember

- The local breeds of Rwandan poultry are called "Inyarwanda."
- Exotic broiler breeds in Rwanda care Cobb 500 and Hubbard.
- Rwanda's weather conditions are good for broilers.



1. Name the 4 different types of feeders and 4 different types of drinkers.

#### **Answers:**

Feeders	Drinkers
1. Automatic	<ol> <li>Pan and Jar/Manual</li> </ol>
2. Linear	2. Water Basin
3. Circular	3. Automatic Bell
4. Grit Box	4. Nipple Drinker

2. Explain how moisture forms in litter and its effects.

**Answer:** Moisture in litter and the house increases due to water in bird faeces, which leads to ammonia production. Excessive ammonia causes stress and decreases feed intake and growth rates. High moisture levels may also cause lameness, disinclination to move, and weight loss.

**3.** Select the correct answer for each question:

#### **Answers:**

- **1.** Broiler manure/faeces should be not removed and does not have any impact on the presence of gases in the broiler house.
  - **a.** True
  - b. False: Manure should be removed and adds gases to the house.
- 2. Litter is raked regularly because....
  - a. it smells bad and makes the broilers uncomfortable
  - b. it needs to be dried in order to reduce gases
- 3. Artificial lighting beyond the hours of natural light will...
  - a. increase feed intake and improve growth rates
  - **b.** increase feed intake and maintain growth rates
  - **c.** decrease feed intake and maintain growth rates
- **4.** The place for birds to sit, sleep, observe, and avoid predators at night are called:
  - **a.** Nests
  - b. Perches
  - c. Cages

## **①** Further Information for the Trainer

- 1. Integrate Poultry Commercial Production (FAO): http://www.fao.org/3/a-y4991e.pdf
- 2. Poultry in Rwanda: file:///C:/Users/grace/Downloads/Poultry+in+Rwanda%20(1).pdf
- **3.** Cleaning and Disinfecting your Poultry House: https://smallfarms.cornell.edu/2014/04/cleaning-and-disinfecting-your-poultry-house/
- **4.** Poultry Farming Equipment and Their Uses: http://ecochickspoultry.com/a-list-of-poultry-farming-equipments-and-their-uses/

### **Learning Outcome 3.2: Receive broilers**

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



- **a.** Organize transportation of broiler chickens
- **b.** Identify and maintain broiler handling and health checking procedures
- **c.** Describe broiler installation practices
- **d.** Follow and recognize the importance of record keeping procedures



Time Required: 6 hours



Learning Methodology: Brainstorming, field visit, interview



#### **Materials Needed:**

• Standard training materials – flip chart, markers, tape, A4 paper



#### **Preparation:**

☐ Organise a visit to a local poultry farm with broiler chickens.

#### **Cross Cutting Issues:**



- ✓ **Environment and sustainability:** Acknowledge the environmental impact of transporting and raising broilers.
- ✓ **Gender and inclusion:** Consider gender balance when forming groups for Task 3.



#### **Prerequisites:**

- ▶ Learning Unit 1
- ▶ Learning Unit 2

#### **Key Competencies:**

	Knowledge		Skills		Attitudes
1.	Describe best practices for organizing transportation of broilers	1.	Organize transportation of broilers to broiler house	1.	Proactive
2.	Identify how to handle broilers and check their health	2.	Maintain broiler health by handling and checking them appropriately	2.	Detail-oriented
3.	Describe broiler installation and record keeping procedures	3.	Follow installation and record keeping procedures	3.	Diligent



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

- 1. Ask students to individually brainstorm answers to the following questions found in **Topic 3.1 Task 1** of their manuals. They should use knowledge from previous units:
  - **a.** What are some tips or best practices for transporting chicks and layers?
  - **b.** What are factors to consider for installing chicks and layers?
- **2.** Tell trainees to compare and discuss their responses with a partner.
- 3. Then ask volunteers to share the key points of their discussions with the rest of the class. Clarify any errors or misunderstandings.

Possible Answers: Check the health of the birds before and after handling; properly secure the birds for transport; consider physical parameters (temperature, humidity, lighting, and ventilation)

4. Ask trainees if or how they think these practices and factors will apply to receiving broilers. Without revealing too much information, note that they will recognize much of the information in this topic from previous units.



# Problem Solving Activity

Ask trainees to turn to **Topic 3.2 Task 2** in their manuals. Tell them to answer the questions and complete the tasks with a partner:

1. Given that broilers are raised for slaughtering, how often do you think they are transported during their lives?

Answer: Broilers are transported twice in their lives—as day-old chicks to the farm and as adult to the slaughterhouse.

2. Which body parts do you think are important to observe when checking the health of broiler chickens?

**Answer:** Several answers possible, including wings, eyes, nose, and mouth.

3. Based on previous units, why is record keeping important? Answer: Record keeping helps make decisions in the long-term based on past experiences. It also indicates chicken health, growth and performance, and vaccine effectiveness.

- **4.** Read through **3.3 Key Facts** and do the following:
  - ✓ Check or tick information that is the same as chicks and layers
  - o Circle information that is different from chicks and layers
  - Star information that is interesting or that you want to learn more about
- 5. Encourage trainees to verify their responses to question 1-3 based on 3.3 Key Facts. Add or correct information using the **Answers** written above.



# Guided Practice Activity

Ask trainees to look at **Topic 3.2 Task 3** in their trainer manuals.

Tell them to recall the case study of the Abahujintambwe cooperative from Topic 3.1 and consider the following:

Their project is now at the phase of receiving broiler chicks at the farm. They call you again for assistance. At farm they ask you to help them answer the following questions. Write your responses below with the help of your group members and **3.3 Key Facts**.

1. How are the broilers chicks transported? How should be physical parameters be put in place?

**Answers:** They are transported using a vehicle with a controlled temperature between 24 and 26 C. They are placed in modules with holes for good ventilation and

immunized with spray vaccines. The relative humidity should be between 60 and 65%.

2. What information should be collected and recorded during intake? Why?

**Answers:** The chicks' exact age, the number of birds originally, the number of deaths in the transportation process, the number of sales of birds, the type of feed issues, the vaccines/medicines administrated, and any other notes.

It is important to collect this information to refer to as the birds grow. Records over time can show bird growth and performance as well as profit and losses of the farm.

**3.** What five factors of the broiler chicks' health should be observed? What should be done if birds are injured or sick?

**Answers:** Eyes, nose, mouth, wings, activity level should be observed. Based on previous knowledge, if birds are sick or injured, they should be separated and treated immediately.



## **Application Activity**

Organise a visit to a local poultry farm with broilers. Confirm that the farmer will be available to answer questions about the transportation and installation processes.

Direct trainees to **Topic 3.2 Task 4** in their manuals.

1. Tell trainees to interview the farmer about best practices for transporting and installing broilers at the farm. They will write his responses in the table below. They should each add one of their own questions to the table as well.

Questions	Answers
Where do you receive broilers from?	
How do you handle the broilers as soon as they arrive?	
What methods do you use to check the broilers' health? What do you observe?	

What information do you record when broilers arrive? Why?	
What do you want to improve about your process for receiving broilers?	
Your Question:	

- **2.** After the visit, facilitate a class discussion on their experience, addressing the following questions:
  - a. What did you learn?
  - **b.** What information from the farmer surprised you?
  - c. What would you do differently?



#### Points to Remember

- Remember that transportation-related injuries and death lower farm profits.
- Given that the life cycle of broiler is very short, you should be sure to control all the physical parameters and transportation practices as best you can.



#### Formative Assessment

#### **Answers:**

- **1.** Write answers to the following:
  - **a.** What are two of the consequences of flock thinning?
    - 1. Suddenly lowers temperature
    - 2. Causes stress
  - **b.** Name two health factors and what signs indicate illness or injury.

<b>Health Factor</b>	Signs of illness or injury
Eyes	Eyelids showing, discharge, swelling, unclear/foggy
Nose	Discharge, stuffed

Mouth	Breathing with mouth opened (except in very hot
	temperatures)
Wings	Drooping, twisted
Activity level	Low activity, stillness during the daylight hours

- **2.** Write **True** or **False** for the following statements:
  - a. False, the temperature should be warmer in the first few weeks and then gradually lowered: The temperature of chicks remains the same from the day they are received through growth.
  - **b. True:** Broiler chicks are sprayed with immunization spray as they are loaded into the modules for transportation.
  - c. False, they are transported twice in their lives (to the farm to be raised and to the slaughterhouse to be slaughtered): Broilers are transported only once in their lives.
  - **d. False, the broiler house needs to be disinfected between flocks:** The broiler house does not need to be disinfected before the chicks arrive.

## **①** Further Information for the Trainer

- 1. Signs of a Healthy Chicken: https://www.dummies.com/home-garden/hobby-farming/raising-chickens/9-signs-of-a-healthy-chicken/
- 2. Flock Thinning to be Banned: https://thepoultrysite.com/news/2015/12/flock-thinning-to-be-banned-on-rspca-assured-farms

### **Learning Outcome 3.3: Distribute feed and water**

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



- a. Identify suitable feeds for broilers.
- b. Determine adequate quantity feeds for broilers.
- c. Clean feeders and drinkers for broilers.
- d. Distribute appropriate feed to broilers.
- e. Maintain feed records for broilers.



Time Required: 6 hours



**Learning Methodology:** Brainstorming, discussion, demonstration, field visit, interview, individual and group work



#### **Materials Needed:**

• Standard training materials – flip chart, markers, tape, A4 paper



#### **Preparation:**

Organise a visit to a local poultry farm.

#### **Cross Cutting Issues:**



- ✓ Gender and inclusion: Consider gender balance when forming groups for presentations.
- ✓ **Standardisation culture:** Emphasise the need to select and measure feeds according to the type and quantity needed for optimal broiler health and growth.



#### **Prerequisites:**

- Unit 1: Raise starters
- Unit 2: Raise layers
- ▶ Learning Outcomes 3.1 and 3.2

#### **Key Competencies:**

Knowledge	Skills	Attitudes
Identify suitable feeds     for broilers	<ol> <li>Assess the quality of feeds for broilers</li> </ol>	1. Detail-oriented
2. Determine adequate quantity feeds for broilers	2. Calculate and weigh feed quantities	2. Accurate
3. Explain how to distribute feed and water to broilers	3. Distribute feed and water to broilers according to farming standards	3. Methodical



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

- 1. Direct trainees to **Topic 3.3 Task 1** in their manuals. With a partner, ask them to discuss the Rwandan expression: *Umudiho uva mu itako*, which translates to "A real good dancer's step comes from the thigh." They should also answers the following questions:
  - a. What does this expression mean?
  - **b.** Why is applied to a dancer?
  - c. How does it relate to chicken production?
  - **d.** What do you expect to learn in this topic?
- **2.** Ask trainees to share their ideas with the class. Encourage creative thinking and clarify what they can expect to learn from this topic, using the objectives above.

# Problem Solving Activity

- **1.** Tell trainees to turn to **Topic 3.3 Task 2** in their manuals. Ask them to recall what they know about feed distribution for layers. Individually, they should predict answers to the following questions:
  - a. Do you think broilers eat more or less than layers?

**Answer:** More

**b.** Why?

**Answer:** Because they are being raised for their meat and must intake a large amount of protein and other nutrients.

- **c.** What are the three types of feed?
- **d.** How do you know which type of feed to give a chicken?
- **2.** Instruct trainees to share their responses with a partner and compare their answers. Do not correct their responses at this time.
- 3. Then, have trainees discuss the following with their partner:
  - **a.** What are the potential impacts of distributing the wrong type of feed to a chicken?
  - **b.** Why is record keeping important? What can we use records for?
  - c. How you know how much feed to provide to the flock? How can you calculate it?
- **4.** Ask volunteers to share the key points of their discussions with the rest of the class.
- **5.** As a class, read through **3.4 Key Facts**:
  - ✓ Check or tick information that you correctly predicted from question 1 and 3.
  - Circle information that is new.
  - Star information you find interesting or important.
- **6.** Verify their responses to questions 1 and 3 using **3.4 Key Facts** and the **Possible Answers** above.



### Guided Practice Activity

- 1. Direct the trainees to **Topic 3.3 Task 3** in their manuals. Instruct them to assess the given scenario and respond to the question in small groups, using **3.4 Key Facts** for guidance:
  - Mr. Manasseh is a broilers farmer. He is going to bringing 30 one day old chicks to the farm. He wants to make a provision of feeds that will last 2 weeks. Respond to the following questions:
  - **a.** What kind of feed will he buy and what are the necessary feed components? **Answer:** Starter feed; 3,000 ME/kg; 23% crude protein
  - **b.** How much feed will he need to buy for the first two weeks? **Answer**:

First 6 weeks = 4.5 kg per bird per week

<u>Given kg of feed</u> = <u>Total kg of feed needed</u> Given number of birds Total number of birds

- **c.** After two weeks how will he know if chicks are adequately fed? **Answer:** Based on records of growth that have been kept.
- 2. Ask trainees to compile their responses into a presentation. With their groups, tell them to present their advice to Mr. Manasseh to the class. They should explain their reasoning and calculations. They should also cite information from 3.4 Key Facts or other sources, as needed.
- **3.** After all groups have presented, give feedback and verify the correct responses.



### **Application Activity**

Organise a visit a local poultry farm with broilers. Confirm that the farmer will be available to answer questions and demonstrate how to distribute feed and/or water to the broilers. Ask if it is possible for the trainees to assist him or her in this process as well.

**1.** Ask trainees to turn to **Topic 3.3 Task 4** in their manuals. Tell them to begin by asking the farmer the following questions, plus one of their own questions:

Questions	Answers
Where do you buy your feed	
from?	
How often do you feed the	
broilers?	
What are the challenges	
with feed and water	
distribution?	
Your Question:	

**2.** Instruct trainees to observe the farmer as he or she demonstrates how to distribute the feed and water to the broiler chickens.

- 3. Assign trainees into small groups and tell them to work together to distribute feed and water to the broiler chickens. They should measure the quantities needed.
- **4.** After the visit, facilitate a class reflection and discussion:
  - **a.** What did you learn?
  - **b.** What are ways to address the challenges with feed and water distribution that the farmer mentioned?
  - **c.** What other questions do you have?



# Points to Remember

- During feeding and watering, the birds should be disturbed as little as possible.
- Feeding and watering should be done at the same time every day to minimize stress.
- Poor physical feed quality will have a negative impact on broiler performance.



**1.** Circle the correct answer to the following questions:

#### **Answers:**

- 1. How often should feed be distributed?
  - a. Three to four times per day.
  - b. Twice per day.
  - c. Once per day.
- 2. What type of feed should a broiler that is 14 weeks old receive?
  - a. Starter feed
  - b. Grower feed
  - c. Finisher feed
- 3. Which of the following is NOT useful information to record to improve financial decisions in the long-term?
  - a. Feed cost
  - b. Kg of feed distributed per day and week
  - c. Colour of vehicle that delivered the feed
- 2. Write answers to the following:
  - **a.** Why is it important to clean feeders and drinkers?

Answer: To prevent the existence and spread of diseases, such as bacteria and

#### viruses

**b.** Why is it important to select good quality feed?

Answer: To optimize chicken growth

**c.** Why is it important to keep records of feed intake?

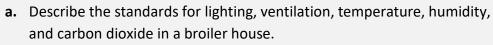
**Answer:** To make financial and feeding decisions in the long-term

### **1** Further Information for the Trainer

- **1.** Card, L. & Neisheim, M. 1982. Chicken production. Philadelphia, Lea & Febiger. Feltwell, R. and Fox, S. 1988. Practical chicken feeding. London, Faber & Faber.
- 2. www.lfl.mu
- **3.** Feeding Broilers: https://images.agri-profocus.nl/upload/16021\_day\_3\_Joost\_PUM\_Feeding\_Broilers\_Zambia1479378305. pdf

### **Learning Outcome 3.4: Monitor Physical Parameters**

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





- **b.** Monitor and regulate lighting, ventilation, temperature, humidity, and carbon dioxide in a broiler house.
- **c.** Describe the importance and potential impacts of monitoring the physical parameters of a broiler house.



Time Required: 6 hours



**Learning Methodology:** Brainstorming, discussion, presentation, interview, field visit

#### **Materials Needed:**



- Standard training materials flip chart, markers, tape, A4 paper
- **Sample measurement tools** thermometer, hygrometer, barometer, carbon dioxide meter, photometer



#### **Preparation:**

- Organise a field visit to a poultry farmer with broilers.
- ☐ Familiarize yourself with the measurement tools.

#### **Cross Cutting Issues:**



- ✓ **Environment and sustainability:** Discuss the relationship between the environment, physical parameters, and animal health/growth.
- ✓ **Standardization culture:** Emphasize the use of standard tools to measure and monitor physical parameters.

#### **Prerequisites:**



- Unit 1: Raise starters
- ▶ Unit 2: Raise layers
- ▶ Topics 3.1-3.3

### **Key Competencies:**

Knowledge	Skills	Attitudes
<ol> <li>Describe the standards for lighting and ventilation in the broiler house</li> </ol>	<ol> <li>Monitor lighting and ventilation in the broiler house</li> </ol>	1. Forward-thinking
2. Describe the standards for temperature and humidity in the broiler house	2. Regulate temperature and humidity levels in the broiler house	2. Detail-oriented
3. Describe the standards for carbon dioxide levels in the broiler house	3. Detect and monitor carbon dioxide in the broiler house	3. Methodical



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

**1.** Ask trainees to turn to **Topic 3.4 Task 1** in the manuals. Tell them to fill in the rest of the chart individually based on previous units and topics:

#### **Answers in** *italics*:

Physical Parameter	Measurement Tool	Importance
Temperature	Thermometer	Prevent heat stress
Ventilation	Barometer	Removes excessive moisture,
		gases, and dust from the air
Lighting	Photometer	Allows extended time to feed
		beyond daylight hours
Humidity	Hygrometer	Cause litter to become wet and
		mouldy, which birds will not eat
Carbon Dioxide	Carbon dioxide meter	High levels can kill birds

- **2.** After they have completed the table, tell trainees to compare their answers with a partner.
- **3.** Verify their answers using the key above.



1. Direct trainees to **Topic 3.4 Task 2** in their workbooks. Tell them to recall what they know about physical parameters in poultry farm from Units 1 and 2. With a partner, they should discuss: What are the potential negative impacts of....

#### **Possible Answers:**

- a. too high temperatures/too much heat?Heat stress which makes breathing more difficult
- b. too much moisture in the poultry house?Litter becomes wet and mouldy, so that the birds will not eat it
- c. not enough lighting?Birds do not eat enough (because they can't see the feed)
- d. over 30% carbon dioxide levels?
  Death/fatality
- **2.** Ask volunteers to share their ideas with the rest of the class. Correct them and suggest the **Possible Answers** from above if they are not already mentioned.
- **3.** As a class, discuss the relationship between the environment and physical parameters. Encourage a thoughtful discussion with critical thinking.
  - **a.** What is their relationship?
  - **b.** How do they influence each other?
  - c. Why is it important to use sustainable environmental practices on the farm?
- **4.** With the class, read through **3.5 Key Facts**. While they read, trainees should:
  - Star ways to monitor each physical parameter
  - Circle the standards for each parameter in a broiler house
  - + Add any additional information you know based on previous knowledge and experience.



### **Guided Practice Activity**

**1.** Tell trainees to turn to **Topic 3.4 Task 3** in their manuals and read the following scenario. Tell them to complete the tasks in small groups:

Miss Ganza is a farmer who recently began a broilers production project. She just bought and installed the first lot of 1,500 broilers. She plans to maximize their growth rate and productivity by optimizing the design of the broiler house.

- **a.** Design a broiler house for Miss Ganza. Include arrangements for establishing and controlling lighting, ventilation, temperature, humidity, and carbon dioxide levels.
- **b.** Write a letter to Miss Ganza describing the ideal settings for each physical parameter and how she should monitor them.
- **c.** Use **3.5 Key Facts** to guide you.
- **2.** Have groups present their designs to the rest of the class. Allow the audience to ask a few questions afterward for the presenters to answer.
- **3.** Give feedback to each group and tell them to adjust their designs and letters accordingly.

**Answers:** Designs will vary but should be based on **3.5 Key Facts** as well as past experiences at field visits. The letter should be based on **3.5 Key Facts**.

**4.** Ask trainees to resubmit the final version of their work to you for a final review.



## **Application Activity**

Organise a visit to a local poultry farm with broilers. Confirm that the trainees may tour the broiler house and that the farmer is available to answer questions.

1. At the farm, instruct trainees to observe the physical parameters present and note what they see in the chart under **Topic 3.4 Task 4** in their manuals. This may include the design, the equipment used, or other controls.

<b>Physical Parameter</b>	Observation
Lighting	
Ventilation	
Humidity	
Temperature	
Carbon Dioxide	

**2.** Then, tell trainees to ask the farmer for best practices for each physical parameter. They should write the answers in the chart (sample below):

<b>Physical Parameter</b>	Best Practices
Lighting	
Ventilation	

Humidity	
Temperature	
Carbon Dioxide	



- Too much or too little—the extremes—of any parameter will result in decreased growth rates.
- Always refer to proven standards.



# Formative Assessment

Complete the following sentences:

#### **Answers:**

- 1. Over-lighting may lead to: decreased growth rate, decreased food intake, increased mortality, and/or decreased broiler welfare.
- 2. You can adjust ventilation in the broiler house by using fans and opening doors and windows to circulate fresh air.
- 3. Carbon dioxide can kill birds at high levels.

Write 1-2 sentence answers to the following:

#### **Answers:**

- 1. How does evaporative cooling affect humidity? Evaporative cooling increases humidity by adding water into the air.
- **2.** What is the purpose of artificial lighting? Artificial lighting allows birds to eat for more hours in a day (beyond daylight), which increases growth.
- **3.** What are the consequences of poor ventilation?

Poor ventilation can result in high levels of harmful gases, such as carbon dioxide and ammonia, as well as excess heat, moisture, and dust in the broiler house.

# **(i)** Further Information for the Trainer

- 1. Air Velocity Management for Optimum Broiler Performance: https://thepoultrysite.com/articles/air-velocity-management-for-optimum-broilerperformance
- **2.** Lighting for Broilers: http://en.aviagen.com/assets/Uploads/RossTechLightingforBroilers.pdf

### **Learning Outcome 3.5: Perform slaughtering**

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



- a. Explain steps for slaughtering.
- **b.** Describe the different methods for stunning chickens.
- **c.** Describe the methods of storing chicken meat.
- **d.** Explain the factors for meat transportation.



Time Required: 6 hours



Learning Methodology: Brainstorming, discussion, field visit, interview

#### **Materials Needed**



• Standard training materials – flip chart, markers, tape, A4 paper



#### **Preparation:**

☐ Organise a visit to a local slaughterhouse.

#### **Cross Cutting Issues:**



- ✓ **Peace and values**: Explain that animal welfare demonstrates peace and values because it treats animals in a compassionate way.
- ✓ **Standardization culture:** Recommend that chickens are slaughtered in a routine, standardized way to ensure uniformity for consumers.



#### **Prerequisites:**

▶ Topics 3.1-3.4

#### **Key Competencies:**

	Knowledge		Skills		Attitudes
1.	Explain the different slaughtering techniques	1.	Supervise the slaughtering process	1.	Being Rapid
2.	Describe the methods for storing chicken meat	2.	Store meat according to standards	2.	Detail-oriented
3.	Explain the factors for meat transportation	3.	Organize adequate meat transport	3.	Commitment



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

- **1.** Ask trainees to turn to **Topic 3.5 Task 1** and discuss the following questions with a partner:
  - a. What is the purpose of broilers?Answer: To be raised and slaughtered for their meat.
  - **b.** Have you ever killed a chicken or seen someone killed a chicken?
  - **c.** If yes, explain the process and the precautions you should take when killing a chicken.
- **2.** Encourage trainees to share their ideas and experiences with the class. Verify their answers to part a.
- **3.** With the class, discuss:
  - **a.** How do you think the process of killing a single chicken applies to small-scale poultry farming?
  - **b.** How does the process change?
  - **c.** What stays the same?

**Note** that the process becomes standardised so that slaughtering can be more efficient and chicken meat is uniform.



Direct trainees to **Topic 3.5 Task 2** in their manuals. Explain to them that animal welfare is preserving the well-being of animals. This means meeting their physical and mental needs, such as providing enough feed and minimizing the amount of pain and discomfort they experience.

- 1. In small groups, have trainees discuss the following:
  - Answers may vary. Encourage an open discussion. The information will be revealed in 3.6 Key Facts.
  - **a.** Why is animal welfare important?
  - **b.** How can we preserve the welfare for broilers in the slaughtering process?
- 2. Ask trainees to share and compare their ideas with the class.

**3.** Then, tell trainees to try to put the following steps of the slaughtering process in the correct order. **Answers below.** 

Chilling	Plucking	Stun aı	nd kill	Washing	Transport
Evi	sceration	Scalding	Pack	kaging	Washing

1. Transport	6. Evisceration
2. Stun and kill	7. Washing
3. Scalding	8. Chilling
4. Plucking	9. Packaging
5. Washing	

- **4.** Instruct trainees to read through **3.6 Key Facts** and do the following with a partner:
  - **a.** Verify your answers to question 3 (see above)
  - **b.** Identify the three methods for stunning and why the practice of stunning is used. **Answer:** Electric, gas, and percussion methods. Stunning is used to preserve animal welfare—so that the chickens are unconscious and do not feel pain during the slaughtering process.
  - **c.** Identify two additional processes that may occur after slaughtering. **Answer:** Deboning and cutting.
  - **d.** Explain what you think the biggest challenge for transportation is. **Possible Answers:** Securing a temperature-controlled/cooled vehicle or managing to travel short distances.
- **5.** Ask trainees to share and discuss their responses with the rest of the class. Verify their answers at the end using the **Answers** above.



## **Guided Practice Activity**

**1.** Ask trainees to turn to **Topic 3.5 Task 3** in their manuals and recall Miss Ganza's broiler project from **Topic 3.4**.

She now wants to build her own slaughterhouse. Before gathering the funds, she wants to draft a project and needs key technical information on slaughtering techniques. Help

Miss Ganza by writing answers the following questions with your small group. Use **3.6 Key Facts** to guide you.

- **a.** What are the main steps in the broilers slaughtering process? **Answer:** See **3.6 Key Facts**.
- **b.** Which stunning method do you recommend to Miss Ganza? Why? **Answers may vary.** Any answer is acceptable if the trainees can defend it. However, electrical is the best responses because the other two (gas and percussion) require equipment that is not easily available.
- What are important factors to consider when transporting chicken meat?
   Answer: Length of the drive, temperature-controlled/cooled vehicle, secured packaging.
- **2.** For now, Miss Ganza only wants to sell the main parts of the chicken, such as the wings and legs. She also has a lot of trays and clear/plastic film in her storage.
- a. Which of the second processes will she need to go through?Answer: Cutting (because she only wants the main parts of the chicken)
- b. Which packaging method do you recommend she uses?Answer: Over-wrapping (because she already has the tray and film materials)
- **3.** Ask trainees to discuss their recommendations to Miss Ganza as a class. Confirm or correct their answers using the **Answers** above.

# Application Activity

Organise a visit to a local slaughterhouse with your class. This may involve some travel, so you will need to coordinate the transportation for the visit. Confirm that a professional at the slaughterhouse will be available to give a tour and answer questions.

- 1. Tour the area and tell trainees to observe where the different steps of the slaughtering process take place. Direct them to **Topic 3.5 Task 4** in their manuals.
  - **a.** Identify the stunning method used:
  - **b.** Identify any second processes used:
  - **c.** Identify the packaging method used:
- **2.** Have trainees interview the farmer using the following questions, plus one of their own:

Questions Answers
-------------------

What is the most challenging part of the slaughtering	
process in your opinion?	
What measures do you take	
to preserve animal welfare?	
Where do you transport the	
chickens/meat to or from?	
What are the challenges of	
transportation?	
Your Question:	

- **3.** After the visit, lead a discussion with your class:
  - a. What did you learn?
  - **b.** What surprised you?
  - c. What information do you still need to know about slaughtering broilers? Note: Answer any questions or research the information they still want to know and follow-up in the next session.



# Points to Remember

- Clean and disinfect stunning tools and equipment before and after using.
- Fresh meat should be transported to the market or store within two days of slaughtering.
- Chilling meat slows the growth of bacteria and lengthens "shelf life," or the amount of time the meat is fresh enough to eat.



Choose the correct answer for the following questions:

#### **Answers:**

- 1. Which of the following is NOT one of the uses of packaging meat?
  - **a.** Confines for packing into larger containers
  - **b.** Preserves the product

- c. Removes bones
- d. Protects from physical damage
- 2. Which stunning method makes the bird unconscious by giving it a concussion?
  - a. Gas method
  - **b.** Electric method
  - c. Percussion method
- 3. Which process slows bacteria growth and lengthens shelf-life?
  - a. Deboning
  - b. Chilling
  - c. Evisceration
  - **d.** Transportation

#### Complete the following sentences:

- 1. Frozen meat can be transported all over the world, whereas fresh meat must be brought to the market or store within two days.
- 2. Chicken welfare ensures that chickens are treated with the minimum amount of pain, discomfort, fear, and distress.
- **3.** Do not feed birds for **four** hours before slaughtering so that their bodies are empty and their faeces are **dry**.

# 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 difficulty and plan to give additional support as needed. For example, use class time before you begin the next learning outcome to go through commonly identified difficult concepts.

### **①** Further Information for the Trainer

- **1.** Operation of Small-Scale Poultry Processing Plants: http://www.fao.org/3/t0561e/T0561E03.htm
- 2. Slaughter of Livestock:
  - http://www.fao.org/3/x6909e/x6909e09.htm#b8-Percussion%20stunning
- **3.** Stunning Methods: https://www.hsa.org.uk/stunning-and-slaughter-electrical-stunning/use

**4.** Meat Inspection Procedures: http://www.fao.org/3/t0756e/T0756E01.htm



#### **Integrated situation**

#### Resources

Hakizimana is a chicken farmer located in Bugesera District, Mayange Sector, Gitagata Cell. He has a contract to supply 1,000 eggs per day and 1500 kg of broiler meat every 3 months to a hotel in Nyamata town. However, his current production is low in terms of quantity and quality. You are called upon as skilled chicken farmer to help him increase his egg and broiler production in order to satisfy the market. You are needed to evaluate his chicken farming

Within 4 hours your tasks are:

■ Evaluate the starters rearing, layers rearing, and broilers rearing

activities and advise him so that he can honour the contract.

- ✓ Protective equipment
- ✓ Brooder
  - o **Drinkers**
  - Feeders
  - Litters
  - Heating elements
  - o Debeaker
- ✓ Thermometer
- Cleaning material and equipment
- ✓ Disinfection material and equipment
- ✓ Litter
- ✓ Light equipment

# **Assessment Criterion 1: Quality of Process**

Checklist	Sco	ore	
	Yes	No	
Indicator 1: Equipment is installed properly			
✓ Brooder			
✓ Waterer			
✓ Feeder			
✓ Litter			
✓ Heating elements			
✓ Debeakers			
Indicator 2: Starter room is disinfected properly			
✓ Establishment of plan			
✓ Control of insects			
✓ Removing of dust			
✓ Pre-spraying			
✓ Removing of equipment			
✓ Removing and disposing of litter			
✓ Washing			
✓ Cleaning water and feeding system			
✓ Fumigation			
Indicator 3: Litter is set up properly			
✓ Type of litter			
✓ Quality			
Indicator 4: Physical parameters are established properly			
✓ Temperature			
✓ Relative humidity			
✓ Air composition			
✓ Air speed and air movement (ventilation)			
✓ Light			
Indicator 5: Transport is organised			
Indicator 6: Chicks are handled carefully			
Indicator 7: Chicks are installed properly			
✓ Check chicks' health			
Indicator 8: Record keeping is recorded in accordance with farming standards			
✓ Feeding form			
✓ Preventative activities form			
✓ Nesting record			
Indicator 9: Feeds are identified according to animal needs	Indicator 9: Feeds are identified according to animal needs		
✓ Quality of feeds			
✓ Quantity			
Indicator 10: Feeds are accurately weighed			

/ Food consumention consuling to ago	
✓ Feed consumption according to age	
Indicator 11: Drinkers and feeders are cleaned	<u> </u>
✓ Cleaning-feeders and drinkers	
Indicator 12: Feeds are distributed properly	
✓ Quantity calculation according to age and number	
Indicator 13: Water is properly distributed	
Indicator14: Record keeping is performed	
✓ Record keeping	
Indicator 15: Ventilation is monitored	
✓ Air direction	
✓ Air pressure	
Indicator 16: Light is monitored	
✓ Light intensity	
Indicator 17: Temperature is monitored	
✓ Temperature required	
Indicator 18: Humidity is monitored	
✓ Humidity required	
Indicator 19: Equipment is installed properly	
✓ Feeders	
✓ Drinkers	
✓ Nest boxes	
✓ Perches/ Roost	
Indicator 20: Layers rooms are disinfected properly	
✓ Dry cleaning	
✓ Wet cleaning	
✓ Drying	
✓ Disinfecting	
Indicator 21: Litter is arranged properly	
Indicator 22: Physical parameters are established	
✓ Temperature	
✓ Ventilation	
✓ Lighting	
Indicator 23: Transport of pullet future layers is organized	
Indicator 24: Pullets' future layers house is disinfected	
Indicator 25: Records are kept	
Indicator 26: Eggs are graded properly	
✓ Exterior quality	
Shell colour	
o Shell shape	
Soundness of shell	
Shell cleanliness	
✓ Interior quality	
o Air cell	
J 1.11 CC11	
o Yolk	

o White		
Indicator 27: Eggs are properly stored		
✓ Eggs cleaning		
✓ Temperature control		
✓ Humidity control		
✓ Freezing raw eggs		
✓ Cracked eggs		
Indicator 28: Eggs are well packaged		
✓ Simple basket		
Filler tray		
Indicator 29: Equipment are well installed		
✓ Feeders		
✓ Drinkers		
✓ Perches/Roost		
Indicator 30: Broiler room is well disinfected		
✓ Dry cleaning		
✓ Wet cleaning		
✓ Drying		
✓ Disinfecting		
Indicator 31: Litter is set up		
✓ Litter Quality		
✓ Quantity		
Indicator 32: Proper establishment of physical parameters according to broiler	standar	ds
✓ Temperature		
✓ Ventilation		
✓ Lighting		
Indicator 33: Transport is organised		
Indicator 34: Pullets future broiler house is well disinfected		
Indicator 35: Broilers handling is well done		
✓ Handling and checking pullets		
Indicator 36: Pullets are installed		
Indicator 37: Record keeping is well done		
Indicator 38: Broilers feeds are identified		
✓ Quality of feeds		
✓ Quantity		
Indicator 39: Broilers feeds are weighed		
✓ Feed consumption /age		
Indicator 40: Drinkers and feeders are well cleaned		
✓ Cleaning feeders and drinkers		
Indicator 41: Feeds are properly distributed		
✓ Quantity calculation		
Indicator 42: Water is correctly distributed		
Indicator 43: Record keeping is well done		
✓ Record keeping		

Inc	dicator 44: Ventilation is properly monitored	
✓	Air direction	
✓	Air pressure	
	dicator 45: Light is correctly monitored	
	Light intensity	
Inc	dicator 46: Temperature is correctly monitored	
✓	Temperature	
Inc	dicator 47: Humidity is properly monitored	
✓	Humidity	
Inc	dicator 48: Carbon dioxide is monitored	
✓	Detection of carbon dioxide	
Inc	dicator 49: Slaughtering techniques are correctly applied	
✓	Chicken welfare	
✓	Methods of stunning	
	Electrical method	
	o Gas method	
	o Percussive method	
✓	Slaughtering process	
	o Evisceration	
	Cleaning and chilling	
✓	Second processing	
	o Cutting	
	o Deboning	
	dicator 50: Storage is well done	
	Packaging of broilers meat	
✓	Storage of broiler meat	
	dicator 52: Transportation is properly done	
Ol	bservation	

## **Assessment Criterion 2: Quality of product**

	Checklist	Score	
		Yes	No
Ind	icator 1: Evaluation of starters rearing is well done		
✓	Starter room house is well prepared		
✓	Chicks are well received		
✓	Feed and water are well distributed		
✓	Physical parameters are well monitored		
Ind	icator 2: Evaluation of layers rearing is well done		
✓	Layers room house is well prepared		
✓	Layers are well received		
✓	Feed and water are well distributed		
✓	Physical parameters are well monitored		
Ind	icator 3: Evaluation of broilers rearing is well done		
✓	Broiler room is well prepared		
✓	Broilers are well received		
✓	Feed and water are well distributed		
✓	Physical parameters are well monitored		
Ind	icator 4: Advice is well given		
✓	Advice on rearing starters is well given		
✓	Advice on rearing layers is well given		
✓	Advice on rearing broilers is well given		
Ob	servation		

### **Assessment Criterion 3: Relevance**

Checklist	Sco	re
	Yes	No
Indicator 1: Installation of chicks are done properly		
Indicator 2: Weighing of feeds is done accurately		
Indicator 3: Feed distribution is done properly		
Indicator 4: Physical parameters are established properly		
Indicator 5: Eggs collection is done well		
Observation		

### **Assessment Criterion 4: Safety**

Checklist		Score	
	Yes	No	
Indicator 1: PPE are worn correctly			
Indicator 2: Waste are disposed properly			
Indicator 3: Materials and equipment are manipulated well			
Observation			

#### **REFERENCES**

- Aviagen.https://en.aviagen.com/
- Bentoli. (n.d.). *4 tips for how to transport chickens and minimize the chances of poultry stress*. https://www.bentoli.com/how-to-transport-chickens-poultry-stress/
- Chambers, P. G., & Grandin, T. (2001). *Guidelines for humane handling, transport and slaughter of livestock: Chapter 6: Transport of livestock*. Food and Agriculture Organization of the United Nations. <a href="https://www.fao.org/3/x6909e/x6909e08.htm">https://www.fao.org/3/x6909e/x6909e08.htm</a>
- Chambers, P. G., & Grandin, T. (2001). *Guidelines for humane handling, transport and slaughter of livestock: Chapter 7: Slaughter of livestock*. Food and Agriculture Organization of the United Nations. <a href="https://www.fao.org/3/x6909e/x6909e09.htm#b8-Percussion%20stunning">https://www.fao.org/3/x6909e/x6909e09.htm#b8-Percussion%20stunning</a>
- Clements, M. (2016, April 19). *10 tips for cleaning, disinfecting broiler houses*. WATT Ag

  Net. <a href="https://www.wattagnet.com/articles/26539-tips-for-cleaning-disinfecting-broiler-houses">https://www.wattagnet.com/articles/26539-tips-for-cleaning-disinfecting-broiler-houses</a>

  houses
- College of Agriculture & Natural Resources, Michigan State University. (n.d.). *Poultry record book: Kent County youth* 
  - fair. https://www.canr.msu.edu/uploads/234/41592/Poultry\_Record\_Book.pdf
- Darre, M. (2014, April 7). *Cleaning and disinfecting your poultry house*. Cornell College of Agriculture and Life Sciences: Small Farms Program. <a href="https://smallfarms.cornell.edu/2014/04/cleaning-and-disinfecting-your-poultry-house/">https://smallfarms.cornell.edu/2014/04/cleaning-and-disinfecting-your-poultry-house/</a>
- Eco Chicks Poultry. (n.d.). A list of poultry farming equipment and their

  uses. <a href="https://ecochickspoultry.com/a-list-of-poultry-farming-equipments-and-their-uses/">https://ecochickspoultry.com/a-list-of-poultry-farming-equipments-and-their-uses/</a>
- Editor. (2019, October 22). *Record keeping: An important poultry farming tool*. Conversion Feeds

  Limited. https://conversionfeeds.com/record-keeping-an-important-poultry-farming-tool/

- Farm Animal Welfare Compendium. (2019, December 16). *The life of: Broiler chickens*. Compassion in World Farming. <a href="https://www.ciwf.org.uk/media/5235306/The-life-of-Broiler-chickens.pdf">https://www.ciwf.org.uk/media/5235306/The-life-of-Broiler-chickens.pdf</a>
- Food and Agriculture Organization of the United Nations. (2003). *Egg marketing: A guide for the*production and sale of eggs: Chapter 1: Egg

  production. <a href="https://www.fao.org/3/y4628e/y4628e03.htm">https://www.fao.org/3/y4628e/y4628e03.htm</a>
- Food and Agriculture Organization of the United Nations. (2003). *Egg marketing: A guide for the*production and sale of eggs: Chapter 3 Egg packaging, transport and

  storage. <a href="https://www.fao.org/3/Y4628E/y4628e05.htm">https://www.fao.org/3/Y4628E/y4628e05.htm</a>
- Food and Agriculture Organization of the United Nations. (n.d.). *Slaughtering process* [Flow chart]. <a href="http://www.fao.org/3/y4392e/y4392e2h.gif">http://www.fao.org/3/y4392e/y4392e2h.gif</a>
- Glatz, P., & Pym, R. (n.d.). *Poultry housing and management in developing countries*. Food and Agriculture Organization of the United Nations. <a href="https://www.fao.org/3/a-al734e.pdf">https://www.fao.org/3/a-al734e.pdf</a>
- Growel Agrovet Private Limited. (2015, March 10). Layer poultry farming guide for beginners. https://www.growelagrovet.com/layer-poultry-farming/
- Herenda, D., Chambers, P. G., Ettriqui, A., Seneviratna, P., & Da Silva, T. J. (2000). *Manual on meat inspection for developing countries: Chapter 1: Meat inspection procedures*. Food and Agriculture Organization of the United
- Humane Slaughter Association. (n.d.). Use of electrical stunning

Nations. <a href="https://www.fao.org/3/t0756e/T0756E01.htm">https://www.fao.org/3/t0756e/T0756E01.htm</a>

- equipment. https://www.hsa.org.uk/stunning-and-slaughter-electrical-stunning/use
- Karimi, M. (2019, July 24). 5 tips to successfully manage poultry house ammonia levels.

  Biomin. <a href="https://www.biomin.net/science-hub/5-tips-to-successfully-manage-poultry-house-ammonia-levels/">https://www.biomin.net/science-hub/5-tips-to-successfully-manage-poultry-house-ammonia-levels/</a>

- Linden, J. (2014, August 8). *Air velocity management for optimum broiler performance*. The Poultry Site. <a href="https://thepoultrysite.com/articles/air-velocity-management-for-optimum-broiler-performance">https://thepoultrysite.com/articles/air-velocity-management-for-optimum-broiler-performance</a>
- Lombardo, L. (n.d.). *How to care for day old chicks*. The Self Sufficient

  HomeAcre. <a href="https://www.theselfsufficienthomeacre.com/2014/03/how-to-care-for-day-old-chicks.html">https://www.theselfsufficienthomeacre.com/2014/03/how-to-care-for-day-old-chicks.html</a>
- Mitchell, A. (2015, December 1). Flock thinning to be banned on RSPCA assured farms. The Poultry Site. <a href="https://thepoultrysite.com/news/2015/12/flock-thinning-to-be-banned-on-rspca-assured-farms">https://thepoultrysite.com/news/2015/12/flock-thinning-to-be-banned-on-rspca-assured-farms</a>
- Oloyo, A., & Ojerinde, A. (2019, February 26). *Poultry housing and management*. In Tech

  Open. <a href="https://www.intechopen.com/online-first/poultry-housing-and-management">https://www.intechopen.com/online-first/poultry-housing-and-management</a>
- Pescatore, T., Jacob, J., & Cantor, A. (2011, February). *Grading table eggs*. University of Kentucky College of
  - Agriculture. <a href="https://www.extension.iastate.edu/story/sites/www.extension.iastate.edu/file">https://www.extension.iastate.edu/story/sites/www.extension.iastate.edu/file</a> s/story/4-Hprojects/Poultry/1%20Grading\_table\_eggs.pdf
- Png Wing. (n.d.). *Chicken eggshell anatomy bird*egg [Illustration]. https://www.pngwing.com/en/free-png-nhoxc
- Poultry Hub. (n.d.). *Climate in poultry houses*. <a href="https://www.poultryhub.org/production/husbandry-management/housing-environment/climate-in-poultry-houses/">https://www.poultryhub.org/production/husbandry-management/housing-environment/climate-in-poultry-houses/</a>
- Poultry Hub. (n.d.). *Poultry litter*. <a href="https://www.poultryhub.org/production/husbandrymanagement/housing-environment/poultry-litter/">https://www.poultryhub.org/production/husbandry-management/housing-environment/poultry-litter/</a>
- PUM: Netherlands senior experts. (n.d.). *Feed broilers*. AgriProFocus. <a href="https://images.agri-profocus.nl/upload/16021">https://images.agri-profocus.nl/upload/16021</a> day 3 Joost PUM Feeding Broilers Zambia1479378305.pdf

- Purdue Agriculture. (n.d.). *Unit C: Field*records. <a href="https://ag.purdue.edu/ipia/hasil/Unit%20C%20Lesson%203%20Poultry%20Product">https://ag.purdue.edu/ipia/hasil/Unit%20C%20Lesson%203%20Poultry%20Product</a>
  ion%20and%20Record%20Keeping%20PPT%20-%20English.pdf
- Sandilands, V., & Hocking, P. M. (2010). *Alternative systems for poultry: Health, welfare and productivity*. CABI.
- Schwean-Lardner, K., & Classen, H. (2010). *Ross Tech: Lighting for broilers*.

  Aviagen. https://en.aviagen.com/assets/Uploads/RossTechLightingforBroilers.pdf
- Silverside, D., & Jones, M. (1992). Small-scale poultry processing: Chapter 3: Operation of small scale poultry processing plants. Food and Agriculture Organization of the United

  Nations. <a href="https://www.fao.org/3/t0561e/T0561E03.htm">https://www.fao.org/3/t0561e/T0561E03.htm</a>
- Small-scale poultry production. (n.d.). Home | Food and Agriculture Organization of the United Nations. https://www.fao.org/3/y5169e/y5169e05.htm
- Sonaiya, E. B. (2004). *Small-scale poultry production: Chapter 9: Marketing*. Food and Agriculture

  Organization of the United Nations. <a href="https://www.fao.org/3/y5169e/y5169e0a.htm">https://www.fao.org/3/y5169e/y5169e0a.htm</a>
- Sonaiya, E. B., & J Swan, S. E. (2004). *Small-scale poultry production: Chapter 4: General management*. Food and Agriculture Organization of the United

  Nations. <a href="https://www.fao.org/3/y5169e/y5169e05.htm">https://www.fao.org/3/y5169e/y5169e05.htm</a>
- Tamil Nadu Agricultural University (TNAU). (n.d.). *Poultry farm*equipments. <a href="https://www.agritech.tnau.ac.in/expert\_system/poultry/Poultry%20Farm%20">https://www.agritech.tnau.ac.in/expert\_system/poultry/Poultry%20Farm%20</a>

  Equipments.html
- User:EricT\_CulinaryLore. (2018, March 4). How do they decide whether an egg is grade AA, A, or B? Culinary Lore. <a href="https://culinarylore.com/food-science:how-is-the-quality-of-eggs-determined/">https://culinarylore.com/food-science:how-is-the-quality-of-eggs-determined/</a>

Willis, K., & Ludlow, R. T. (n.d.). 9 signs of a healthy chicken.

Dummies.com. <a href="https://www.dummies.com/home-garden/hobby-farming/raising-">https://www.dummies.com/home-garden/hobby-farming/raising-</a>

chickens/9-signs-of-a-healthy-chicken/

