INSPIRING GREAT MINDS

M.O.E

GUYANA

MINISTRY OF EDUCATION

TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING UNIT

ACTIVITY BOOK

FOR SECONDARY SCHOOLS

GRADE 9

AGRICULTURAL SCIENCE



GROW
LEARN
SUCCEED

AUTHORS:

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INSPIRE • EMPOWER • EXCEL

AGRICULTURAL SCIENCE

GRADE 9

ACTIVITY BOOK

Think Green • Grow More • Feed the Future

Welcome to Your Grade 9 Agricultural Science Activity Book!



This book is designed to take your learning beyond the textbook and into the field. Inside, you will find exciting, hands-on activities for every major topic in your curriculum. Whether you are identifying nutrient deficiencies, managing crops, calculating livestock rations, or drafting a farm budget, these exercises will help you put your knowledge into practice. Get ready to roll up your **sleeves**, dig into the data, and cultivate the practical skills every future agricultural scientist needs!

Inside You'll Discover Activities on:













- **PLANT NUTRITION & SOIL FERTILITY:** Master the sources, roles, and deficiency symptoms of major and minor nutrients, and discover the true characteristics of fertile soils.
- **CROP PRODUCTION & PROTECTION:** Study the nomenclature and economic importance of key regional crops—including Broccoli, Heliconia, Sugarcane, and Rice. Practice cultural methods, weed/pest management, and learn how to safely work with chemicals in the environment.
- **LIVESTOCK PRODUCTION (SHEEP, GOATS, & CATTLE):** Dive deep into Caribbean livestock management. Explore breeds, anatomy, digestion, reproductive terms, artificial insemination (AI), and signs of ill health.
- **ANIMAL NUTRITION & MARKETING:** Learn the science behind livestock rations, pasture grasses, and supplementary feeding (silage/hay). Wrap up by studying common diseases, livestock marketing, and specific cuts of meat.
- **APICULTURE & AQUACULTURE:** Discover the art of beekeeping (hive parts, harvesting honey, and pest control) alongside essential fish handling, processing, and storage techniques.
- **THE BUSINESS OF FARMING & RESEARCH:** Understand the roles of regional agricultural institutions, learn to create farm organizations and budgets, and build vital skills for sourcing and citing research.

SOIL IS LIFE

EXPLORE. LEARN. APPLY. GROW. LEAD. TOGETHER WE CULTIVATE A BETTER FUTURE.

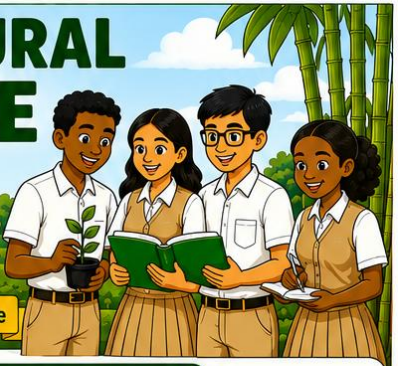
GROW TODAY SUSTAIN TOMORROW

AGRICULTURAL SCIENCE

GRADE 9

ACTIVITY BOOK

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How to Use This Book:



EXPLORE:
Read through your classroom notes first, then open to the matching activity section.

COMPLETE:
Work to complete diagrams, puzzles, data tables, and review questions.

APPLY:
Take these challenges into your school garden, farm, or local community to see the science in action!

Core Skills You Will Develop:



SCIENTIFIC OBSERVATION & DIAGNOSIS:
Identify nutrient deficiencies in plants, spot signs of ill health in livestock, and recognize common pests and diseases under field conditions.

DATA LITERACY & AGRIBUSINESS PLANNING:
Read data tables, analyze livestock rations, and develop practical farm budgets to understand the business side of farming.

HANDS-ON CROP & LIVESTOCK MANAGEMENT:
Master the step-by-step care, handling, and cultural practices required to successfully manage regional crops and livestock from production to market.

ENVIRONMENTAL SAFETY & RESOURCE STEWARDSHIP:
Learn safe guidelines for working with chemicals, managing pastures, and preserving ecosystems through sustainable apiculture and aquaculture practices.

ACADEMIC RESEARCH & SOURCING:
Build critical thinking skills by learning how to source, evaluate, and properly cite information for agricultural research projects and SBA (School-Based Assessment) preparation.

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GROW TODAY SUSTAIN TOMORROW

Topic: Plant Nutrition

Sub-topic: Definition of Term 'Plant Nutrients'

Activity 1.1: (Word Puzzle 'Unscramble the Definition'

N P K Ca Mg S Zn

Time: 5 minutes

Group Activity:
4 to 5 students per group

Resources: Word Puzzle, Scissors

Instructions:

- Print and cut out puzzle template.
- Read each puzzle piece carefully and work with your group to identify the correct order of the words.
- Arrange the pieces to form a complete and accurate definition of the term plant nutrients.
- When your group is finished, read the completed definition aloud to the class.
- The first group to correctly form the definition and read it aloud to the class wins!

Plant	nutrients	are	essential	chemical
elements	required	for	plant	growth
metabolism	and	reproduction.		

Think Like a Scientist!

Healthy plants need the right nutrients to grow, function and reproduce.

N P K Ca Mg S Zn

Topic: Plant Nutrition

Sub-topic: Importance of Nutrients in Crop Production

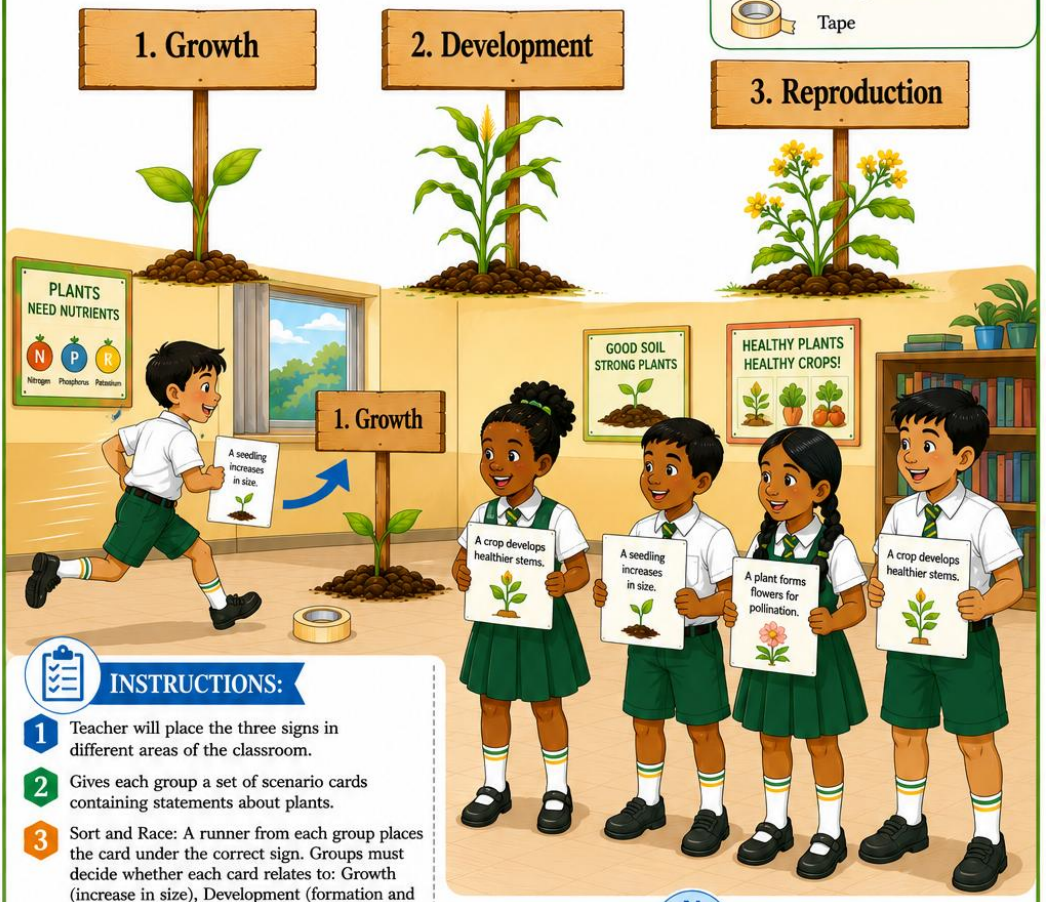
Activity 1.2: 'Nutrient Power-Up Relay Challenge'

Time: 10 minutes

Group Activity: 4 to 5 students per group

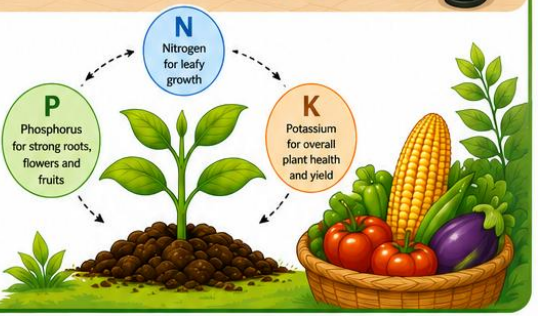
RESOURCES:

- Three large cardboard signs that state:
  1. Growth
  2. Development
  3. Reproduction
- Scenario cards:
  1. A seedling increases in size.
  2. A crop develops healthier stems.
  3. A plant forms flowers for pollination.
- Tape



INSTRUCTIONS:

1. Teacher will place the three signs in different areas of the classroom.
2. Gives each group a set of scenario cards containing statements about plants.
3. Sort and Race: A runner from each group places the card under the correct sign. Groups must decide whether each card relates to: Growth (increase in size), Development (formation and improvement of plant structures) or Reproduction (production of flowers, fruits, and seeds).
4. After all cards are placed, review the answers as a class. The group with the most correct placements wins a small prize.



DISCUSSION:

Why are nutrients important for plant growth, development and reproduction?

Topic: Plant Nutrition

Sub-topic: Carbon and Nitrogen Cycles and their Roles in Nutrient Cycling

Activity 1.3: Creation of 3D Models of the Carbon and Nitrogen Cycles

Time: 30 minutes

Group Activity: Divide class into 2 groups.

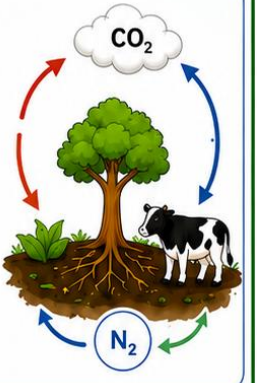


RESOURCES:

- Cardboard (base)
- Markers/colored pencils
- Glue/tape
- Scissors
- Small toy animals
- Leaves, soil samples
- Playdough
- Cotton balls for clouds/atmosphere
- String arrows showing nutrient movement
- Labels attached to each part

INSTRUCTIONS:

1. Assign each group to either Carbon Cycle or Nitrogen Cycle.
2. Students create a 3D model showing the movement of nutrients through the cycles.
3. Each group presents their model to class in 4 to 5 minutes.
4. Teacher facilitates brief question and answer session.



REFLECTION:

How does the carbon and nitrogen cycles help to recycle plant nutrients so that healthy crop production can be maintained?

DISCUSSION:

1. Why are plants, animals, and decomposers all important in the carbon and nitrogen cycles?
2. What might happen if there were no decomposers in these cycles?
3. How can farmers use this knowledge to improve soil fertility and crop yields?

★ CORE SKILLS DEVELOPED ★

CRITICAL THINKING
Analyze and understand how nutrients move in natural cycles.

TEAMWORK
Collaborate, share ideas and build models together.

ACTIVE LEARNING
Engage in hands-on activities and present with confidence.

Topic: Plant Nutrition

Sub-topic: Carbon and Nitrogen Cycles and their Roles in Nutrient Cycling

Activity 1.4: 'Pass the Nutrient' Balloon Game



Time: 10 minutes

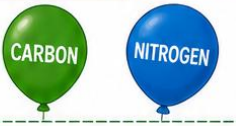
Resources: Balloons (green and blue)

Learn. Play. Understand Cycles!



INSTRUCTIONS:

1. Use two balloons:
   Green balloon = Carbon.
   Blue balloon = Nitrogen.



2. Play music while students pass balloons.

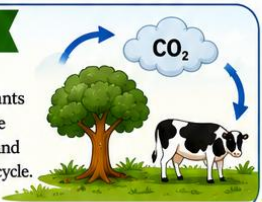


3. When music stops, the student holding the balloon explains one stage of that cycle.
   Example: 'Carbon enters plants through photosynthesis'.



FUN FACT!

Every breath you take contains carbon, and plants use it to grow! The same carbon is recycled over and over again in the carbon cycle.



TEXTBOOK REFERENCE:



Agricultural Science for CSEC Examinations.
2nd Edition.
Pages 79-80.

Topic: Plant Nutrition

Sub-topic: Sources of Nutrients in Crop Production

Activity 1.5: Examining Soil Samples & Identifying Visible Indicators of Nutrient Content and Soil Quality

Time: 15 minutes

Group Activity: 4 to 5 students per group



RESOURCES:

- Soil samples (e.g., sandy soil, clay soil, loamy soil, compost-rich soil)
- Hand lenses (if available)
- Plastic trays or paper plates
- Water (spray) bottle
- Gloves
- Observation sheet

INSTRUCTIONS:

1. Students examine each soil sample and record:
   - Color
   - Texture (smooth, rough, sticky, crumbly)
   - Moisture content
   - Presence of organic matter (roots, leaves, humus).



2. Rank each soil samples according to:
   - Most fertile
   - Moderately fertile
   - Least fertile



3. Students will predict:
   - Which soil has more nutrients?
   - Which soil may need fertilizer?



DISCUSSION:

'If you were a farmer, which soil would you choose to grow your crops and why'?



FUN FACT!

Soil is teeming with life! A teaspoon of healthy soil can contain billions of tiny organisms such as bacteria, fungi and earthworms that help break down organic matter and release nutrients for plants.



TEXTBOOK REFERENCE:

Agricultural Science for CSEC Examinations. 2nd Edition. Page 74.



Topic: Plant Nutrition

Sub-topic: Sources of Nutrients in Crop Production

Activity 1.6: Soil Testing to Determine Nutrient Composition of Soils

Time: 20 minutes



TEST 1: ORGANIC MATTER TEST (SIMPLE FLOAT TEST)

RESOURCES:

- Soil samples
- Distilled water
- Stirring rod

INSTRUCTIONS:

1. Place soil in water.



2. Stir and let settle.



3. Make Observation: Floating material = organic matter (higher nutrient levels).



TEST 2: SOIL pH TEST (USING LITMUS PAPER)

RESOURCES:

- Soil samples
- Litmus paper
- Clear jars or cups
- Distilled Water
- Stir sticks

INSTRUCTIONS:

1. Use a hand trowel to dig four to six inches below the soil surface and collect a 1/2 cup soil sample.



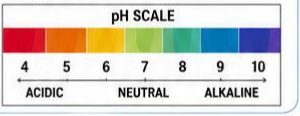
2. Mix soil with the distilled water.



3. Dip the litmus paper into the soil water solution.



4. Match the color of the litmus paper to a pH scale.



TEST 3: SOIL pH TEST (USING pH METER)

RESOURCES:

- Soil samples
- pH meter
- Clear jars or cups
- Distilled Water
- Stir sticks

INSTRUCTIONS:

1. Put equal amounts of soil and distilled water in a container.



2. Stir the mixture into a slurry and let it rest for 15 minutes.



3. Stir the mixture again for about 10 seconds.



4. Insert the pH meter, twist it, and avoid touching the bottom of the container.



5. Read the meter.



DISCUSSION:

1. Why do farmers test soil for nutrient availability before planting?
2. How does soil pH affect nutrient availability?



DID YOU KNOW?

Healthy soil is the foundation of healthy crops! Soil testing helps farmers apply the right nutrients, improve soil fertility and increase crop yields.



TEXTBOOK REFERENCE:

Agricultural Science for CSEC Examinations. 2nd Edition. Page 76.



Topic: Plant Nutrition

Sub-topic: Major and Minor Nutrients used in Crop Production

Activity 1.7: Soil Test to Identify Soil Colour

N P K Ca Mg S

Group Activity: 4 to 5 students per group | **Time:** 15 minutes





RESOURCES:

- Soil samples from different locations
- White paper or tray
- Small container or cup
- Water (optional)
- Hand lens (optional)
- Soil Color Observation Sheet
- Munsell Soil Color Chart (if available)

INSTRUCTIONS

1 Collect Soil Samples

- Remove stones, roots, and other debris.
- Take a small handful of soil from the topsoil (about 10–15 cm deep).



2 Prepare the Samples

- Remove stones, leaves, roots, and other debris.



3 Observe the Soil

- Spread each soil sample on white sheet of paper or tray.
- Observe:
  - Colour
  - Lightness or darkness
  - Uniformity



4 Compare the Samples

- Compare the colours of each sample.
- If a Munsell Soil Color Chart is available, match the soil to the closest colour.



SOIL COLOUR OBSERVATION TABLE

Sample Location	Soil Colour (Describe)	Light or Dark? (Light / Medium / Dark)	Uniformity (Uniform / Not Uniform)	Closest Match on Munsell Soil Color Chart (if available)	Notes / What the colour might indicate
Sample 1					
Sample 2					
Sample 3					

SOIL COLOUR GUIDE – WHAT IT MAY INDICATE

Black	High organic matter; very fertile
Dark Brown	Good organic matter; fertile soil
Brown	Moderate organic matter; suitable for many crops
Red	Rich in iron oxides; well-drained
Yellow	Iron present; moderate drainage
Grey	Poor drainage; waterlogged soil
White	High salts, lime, or sand; low organic matter

DISCUSSION

1. What colours did you observe in your soil samples? _____
2. Which sample appeared to have the highest organic matter? Why? _____
3. Which soil would likely have the best drainage? Why? _____
4. Which soil might be waterlogged? Why? _____
5. Why is soil colour important to farmers? _____



Textbook Reference:
Agricultural Science for CSEC Examinations. 2nd Edition.

Topic: Plant Nutrition

Sub-topic: Sources of Nutrients in Crop Production

Activity 1.8: Soil Test to Determine Textural Classes of Soil (The Feel Method)



Group Activity: 4 to 5 students per group

Time: 15 minutes

RESOURCES:

- Soil samples
- Water
- Small container or cup
- Plastic spoon or stick
- Paper towel
- Observation sheet

1 Collect a Soil Sample

- Remove stones, roots, and other debris.
- Take a small handful of soil from the topsoil (about 10–15 cm deep).



2 Moisten the Soil

- Add water a few drops at a time.
- Mix until the soil is moist but not sticky or dripping. It should have the consistency of putty.



3 Feel the Soil

- Rub the moist soil between your thumb and fingers.
- Note whether it feels:
  - Gritty – indicates a high sand content.
  - Smooth or silky – indicates a high silt content.
  - Sticky or plastic – indicates a high clay content.



4 Form a Ball

- Squeeze the moist soil into a ball.
- Observe whether it:
  - Falls apart easily (sandy soil).
  - Holds together but breaks with slight pressure (loam).
  - Holds together firmly (clay soil).



5 Make a Ribbon

- Press the soil between your thumb and forefinger to form a ribbon.
- Measure how long the ribbon becomes before breaking.
  - No ribbon – Sandy soil.
  - Short ribbon (less than 2.5 cm) – Loam or sandy loam.
  - Medium ribbon (2.5–5 cm) – Clay loam.
  - Long ribbon (more than 5 cm) – Clay or heavy clay.



FEEL OF MOIST SOIL

Gritty (Sand)	Smooth or Silky (Silt)	Sticky or Plastic (Clay)
		
Gritty texture, particles can be felt easily.	Feels smooth like flour.	Feels sticky and plastic.

BALL FORMATION

Falls Apart Easily (Sandy Soil)	Holds Together but Breaks Slightly (Loam)	Holds Together Firmly (Clay Soil)
		
Does not hold together.	Breaks with slight pressure.	Holds together firmly.

RIBBON LENGTH

No Ribbon		Sandy soil
Short Ribbon (< 2.5 cm)		Loam or sandy loam
Medium Ribbon (2.5 – 5 cm)		Clay loam
Long Ribbon (> 5 cm)		Clay or heavy clay



DISCUSSION

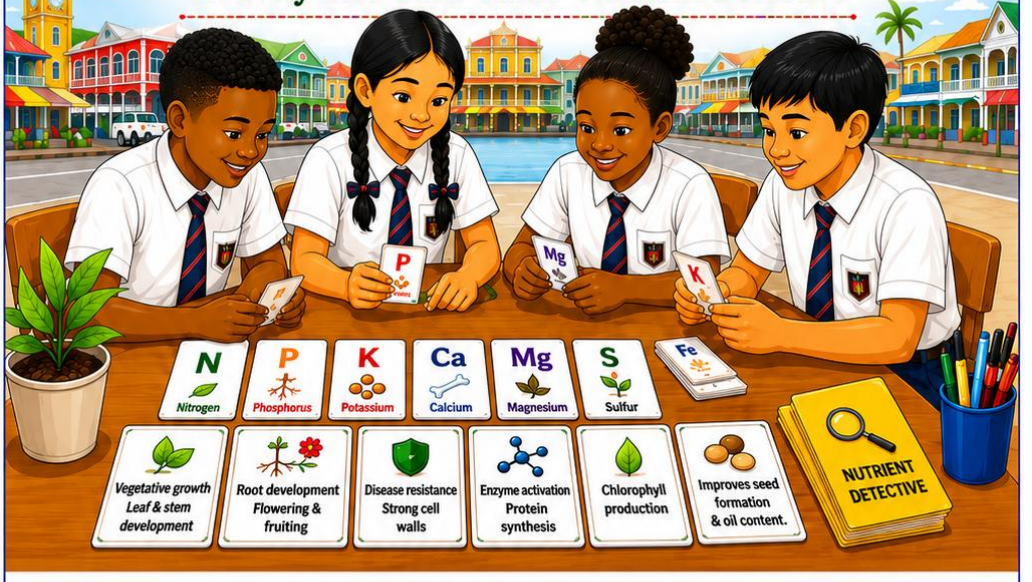
1. What does the feel of the soil tell you about its texture? .....
2. How did the ball formation help you to classify your soil? .....
3. What does the length of the ribbon indicate about the soil type? .....
4. Which soil texture (sandy, loam, or clay) do you think will hold the most water? Why? .....
5. Why is it important for farmers to know the textural class of their soil? .....

Textbook Reference:
Agricultural Science for CSEC Examinations. 2nd Edition. Page 72.

Topic: Plant Nutrition

Sub Topic: Major and Minor Nutrients used in Crop Production

Activity 2.1: Card Game 'Nutrient Detective'



RESOURCES:

- Flash cards
- Marker
- Pen



Group Activity:



4 to 5 students per group.

TIME:

10 minutes

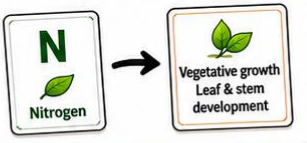


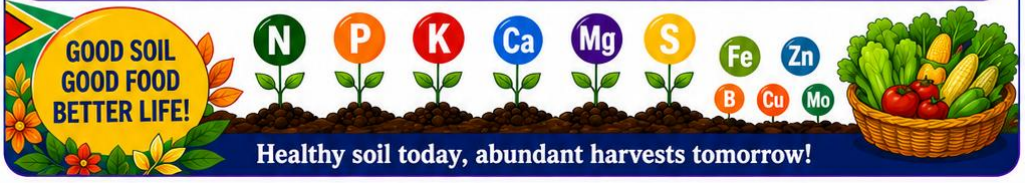
INSTRUCTIONS:

1. Identify major and minor plant nutrients and their functions.



2. Students work in small groups with two sets of cards:
   - Nutrient cards (N, P, K, Ca, Mg, S, Fe, Zn, Mn, B, Cu, Mo).
   - Function cards (example: vegetative growth).
3. Match nutrients with their correct functions (e.g., Nitrogen — vegetative growth).





Topic: Plant Nutrition

Sub Topic: Major and Minor Nutrients used in Crop Production

Activity 2.2: Role Play on Environmental Impact of Fertilizer Misuse: The Environmental Court

Roles:



Farmer



Scientist



Environmental Officer



Community Member



Fertilizer Company



Judge

Scenario:

A farm has been overusing fertilizers and this has led to:

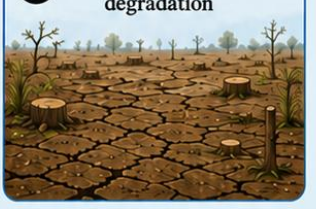
1. Water pollution



2. Loss of aquatic life



3. Soil/environmental degradation



Instructions:

1. Each role prepares arguments based on the scenario.
2. In the role play, each role presents their arguments.
3. Other participants may ask questions or give responses.
4. After all presentations, the class (as the court) discusses the case.
5. The class decides on the verdict and suggests solutions.



Time:
20 minutes

Discussion:

1. Explain the environmental impacts of fertilizer misuse.
2. Suggest sustainable nutrient management practices to protect the environment while maintaining crop productivity.

Topic: Plant Nutrition

Sub Topic: Major and Minor Nutrients used in Crop Production

Time: 20 minutes

Activity 2.3: Demonstration on the Improper use of Fertilizers (Runoff in Action)

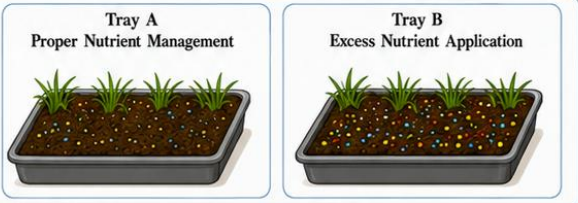
Resources:

- Two shallow trays or plastic containers
- Soil
- Grass or small plants
- Watering can or spray bottle
- Small cups or containers labeled 'river'
- Colored drink mix, powdered chalk, colored sand, or food coloring (to represent fertilizer nutrients)
- Observation worksheet



Instructions:

1. Prepare two trays/containers:
   - **Tray A:** Proper Nutrient Management: Cover with soil, add grass or small plants if available, and sprinkle a small amount of colored powder on the soil.
   - **Tray B: Excess Nutrient Application:** Cover with soil, add the same grass/plants, and sprinkle a much larger amount of colored powder.



2. Place a "river" container at the lower end of each tray to collect runoff water.



3. Tilt both trays slightly by placing a book under one end.



4. Simulate rainfall by slowly spraying the same amount of water onto each tray.



5. Make observations and compare: amount of runoff, color intensity of runoff, soil erosion, river pollution level. (Tray B is expected to produce darker runoff because more nutrients are washed away.)



Discussion:

1. What happened to the excess nutrients?
2. Did all of the fertilizer stay in the soil?
3. Where would the runoff water go in real life?



- How might fish and other aquatic organisms be affected?
- How does this relate to farmers' fertilizer practices?

Topic: Major and Minor Nutrients used in Crop Production

Sub-topic: Role of Major and Minor Nutrients used in Crop Production

Activity 2.4: Treasure Hunt

Time: 10 minutes

Resources: Clue cards, markers, pens

INSTRUCTIONS

1 **Teacher makes clue cards and hides them around the classroom.**

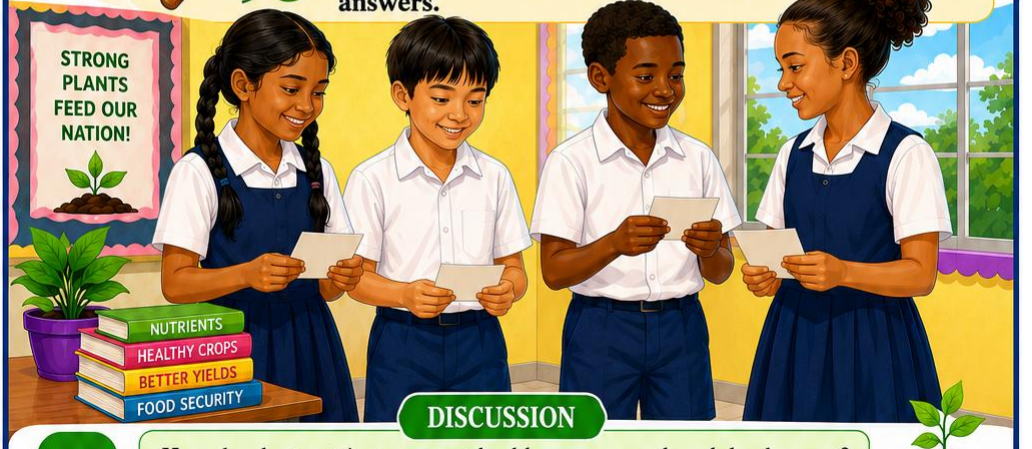
Example of clues to go on cards:

a. 'I help plants stay green'.

b. 'I encourage strong root growth'.

c. 'I am needed in small amounts but help produce chlorophyll'.

2 **Students locate clue cards, identify the nutrient and earn points for correct answers.**



DISCUSSION

How do plant nutrients support healthy crop growth and development?

Topic: Major and Minor Nutrients used in Crop Production

Sub-topic: Role of Major and Minor Nutrients used in Crop Production

Activity 2.5: Debate

Motion: 'Inorganic fertilizers are essential for successful crop production'.

Time: 20 minutes

Group Activity:
Divide class into 2 teams.

Instructions:

1. **Teacher assigns task to each team:**
   1. Proposing team (agree with motion)
   2. Opposing team (disagree with motion)
2. **Each team presents speeches including opening statements, rebuttals, and closing summaries**



Discussion: Teacher highlights that fertilizers help to replace nutrients loss and support high yields when used responsibly.

Topic: Major and Minor Nutrients used in Crop Production Cont'd

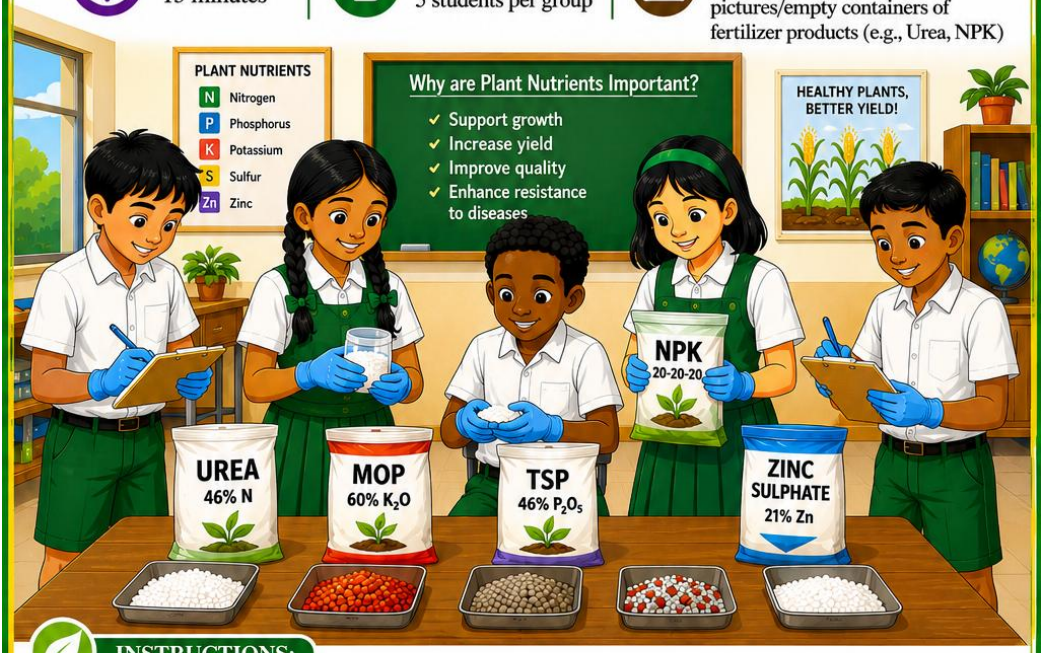
Sub-topic: Role of Major and Minor Nutrients used in Crop Production

Activity 2.6: Identification of Plant Nutrients Supplied by Inorganic Fertilizers

Time: 15 minutes

Group Activity: 5 students per group

Resources: Samples of fertilizers or pictures/empty containers of fertilizer products (e.g., Urea, NPK)



INSTRUCTIONS:

1. Place fertilizer samples or pictures/empty containers of fertilizer products at stations around the classroom.
2. Students work in groups to examine each fertilizer and record:
   - a. Fertilizer name
   - b. Nutrient(s) supplied
   - c. Whether the nutrient is major or minor
   - d. Function of the nutrient

Fertilizer Name	Nutrient(s) Supplied	Major or Minor Nutrient	Function of the Nutrient

Topic: Major and Minor Nutrients used in Crop Production Cont'd

Sub-topic: Role of Major and Minor Nutrients used in Crop Production

Activity 2.7: Testing Soil for NPK (Nitrogen, Phosphorous and Potassium)



Time: 15 minutes

Group Activity: 5 students per group

Resources:

- Soil samples from 3–4 different locations
- NPK Soil Test Kit (commercial)
- Distilled water
- Plastic spoon
- Small cups or test tubes
- Observation sheet
- Disposable gloves
- Paper towels

INSTRUCTIONS

STEP 1 — Collect Soil Samples

Collect approximately one cup of soil from different locations around the school, for example:



Label each sample.

STEP 2 — Prepare the Soil

Remove stones, roots and leaves.
Mix the soil well.
Measure the amount recommended by the soil test kit into the test container.

STEP 3 — Add Water and Test Solution

- Add the required amount of distilled water.
- Add the Nitrogen, Phosphorus or Potassium test solution according to the instructions in the kit.
- Shake or stir gently.

STEP 4 — Wait for Colour Development

Allow the reaction to occur for the recommended time (usually 5–10 minutes).
Observe the colour that develops.

STEP 5 — Compare Colours

Match the colour to the chart provided in the soil test kit.
Record whether each nutrient level is:

1. Low
2. Medium
3. High

	LOW	MEDIUM	HIGH
N			
P			
K			

STEP 6 — Compare Samples

Compare nutrient levels from each location.
Discuss which area appears to have the most fertile soil.

Sample 1 Sample 2 Sample 3 Sample 4

SOIL NUTRIENT TESTING OBSERVATION TABLE

Sample Location	Nitrogen (Low/Medium/High)	Phosphorus (Low/Medium/High)	Potassium (Low/Medium/High)	Which nutrient is lacking?
Sample 1				
Sample 2				
Sample 3				
Sample 4				

INTERPRETATION TABLE

Nutrient	Low Level May Indicate	Importance
Nitrogen (N)	Poor leafy growth, yellow leaves	Promotes leafy growth and chlorophyll production
Phosphorus (P)	Weak roots, slow growth, purple leaves	Encourages root development, flowering and fruiting
Potassium (K)	Brown leaf edges, weak stems	Improves disease resistance, water regulation and crop quality

DID YOU KNOW? Nitrogen (N), Phosphorus (P) and Potassium (K) are the three major nutrients plants need in large amounts for healthy growth and high yields.

HEALTHY SOIL
HEALTHY CROPS
BRIGHT FUTURE

Topic: Major and Minor Nutrients used in Crop Production

Sub-topic: Characteristics of Fertile Soils

Activity 3.1: Soil Fertility Investigation 'Characteristics of Fertile Soils.'

Time: 15 minutes

Group Activity: 3 to 4 students per group



Resources:

- Soil samples from different locations
- Hand lenses (optional)
- Observation sheet
- Gloves

SOIL SAMPLES FROM DIFFERENT LOCATIONS



Sample A	Sample B	Sample C	Sample D
Garden Soil	Farm Field	Sandy Soil (Roadside)	Clay Soil (Backyard)

Instructions:

1. Students observe soil samples for visible signs of fertility.
2. Each group will collect several soil samples.
3. Students examine the samples and record observations.



OBSERVATION CHECKLIST

Characteristics of Soils	Samples			
	A	B	C	D
Dark colour				
Presence of humus				
Earthworms or insect activity				
Moisture present				
Crumbly texture				
Plant root visible				

DISCUSSION

1. Which soil sample showed the most signs of fertility? Why?
2. What characteristics make a soil fertile?
3. How do humus and earthworms improve soil fertility?
4. Why is moisture important for plant growth?
5. How can farmers improve poor soils?



Did You Know?

Fertile soil is full of life and nutrients that help plants grow strong and healthy.

Textbook Reference: Agricultural Science for CSEC Examinations. 2nd Edition. Page 81

Topic: Major and Minor Nutrients used in Crop Production

Sub-topic: Characteristics of Fertile Soils

N P K Ca Mg S



Activity 3.2: Soil Survey Video Project

Time: 15 minutes

Group Activity: 4 to 5 students per group

Resources:

- Soil samples from different locations
- Hand lenses (optional)
- Observation sheet
- Gloves

Instructions: Students will use smartphones/tablets to have video documentation of soil characteristics in different areas of the school.

1 Assign each group to a different area of the school:

- School garden
- Roadside area
- Sports field
- Ornamental plot
- Playground
- Shaded areas



2 Students record a 1 to 2 minute video showing:

- The soil location
- Visible soil characteristics
- Evidence of fertility or poor fertility
- Plant growth in the area



3 Video Guide: Students should answer:

- What does the soil look like?
- Is it dark or light in colour?
- Is organic matter present?
- Are there signs of living organisms?
- Are plants growing well here?
- Would this soil support high crop yields?



4 Groups present videos to class.



Characteristics of Soils

Colour
Dark soils are often more fertile.

Texture
Is the soil sandy, loamy or clayey?

Organic Matter
Presence of leaves, humus or decomposed material.

Living Organisms
Earthworms, insects or other small creatures.

Plant Growth
Healthy plants indicate better soil fertility.

Fertility Potential
Can this soil support high crop yields?

SOIL SAMPLES FROM DIFFERENT LOCATIONS



Topic: Major and Minor Nutrients used in Crop Production

Sub-topic: Characteristics of Fertile Soils

N P K Ca Mg S



Activity 3.3: Create Soil Fertility Map

Time: 20 minutes

Group Activity: 4 to 5 students per group

Resources:



Map of school/ school garden plot



Sticky notes (coloured)



Markers

Instructions:

1. Students will create a map of the school/school's garden plot.
2. Analyze data collected from the video survey.
3. Place coloured stickers on map of school/ school garden plot:
   - Green = Highly fertile
   - Yellow = Moderately fertile
   - Red = Poor fertility
4. Justify their ratings using evidence from observations.

A good soil map helps us understand where plants can grow best and where soil needs improvement!

EXAMPLE: SCHOOL FERTILITY MAP



Topic: Major and Minor Nutrients used in Crop Production

Sub-topic: Deficiency Symptoms of Major and Minor Nutrients in Crop Production

Activity 3.4: Create PowerPoint Presentations on Nutrient Deficiencies in Plants



Time: 20 minutes

Group Activity: 4 to 5 students per group

Resources:
Smartphones, tablets, or computers
Internet access



TASKS

1. Students research and teach others about nutrient deficiencies in plants.



2. Teacher places students in groups and assigns a major/minor nutrient to each group.



3. Students create a 5–6 slide presentation including:
   - Function of the nutrient.
   - Deficiency symptoms.
   - Images of plants with deficiency symptoms.
   - Effects on crop yield.
   - How farmers can correct the deficiency.

   Each group must include a 'Farmer Advice Slide' giving practical recommendations.



DID YOU KNOW? Even if all nutrients are present in the soil, plants may still show deficiency symptoms if the soil is too acidic, too wet, or too dry. Balanced soil conditions help plants absorb nutrients better!



Topic: Major and Minor Nutrients used in Crop Production

Sub-topic: Deficiency Symptoms of Major and Minor Nutrients in Crop Production

Activity 3.5: Debate



Time:
30 minutes



Motion:
'Growing the same crop on the same plot every year does more harm than good'.

Instructions

1. **Teacher assigns task to each team:**
   Proposing team (agree with motion)
   Opposing team (disagree with motion)
2. **Each team presents speeches including opening statements, rebuttals, and closing summaries**

Discussion



Teacher highlights how continuous cultivation often causes nutrient deficiencies and reduced crop yields.

Resources

- Agriculture Textbooks
- Plant Nutrient Deficiency Charts
- Pictures of Crop Deficiency Symptoms
- Projector / Laptop
- Note Cards or Paper

Topic: Major and Minor Nutrients used in Crop Production

Sub-topic: Deficiency Symptoms of Major and Minor Nutrients in Crop Production

Activity 3.6: 'Grow and Diagnose Experiment'

Group Activity:
4 to 5 students per group



Resources:

- Containers
- Soil
- **Seedlings** (pak choi, lettuce, corn, beans, tomato, ochro)
- Labels



Instructions:

Step 1 Students will grow plants in containers under different conditions and establish the following treatment groups:

A	B	C	D	E
Complete fertilizer	Acidic soil	No nitrogen	No phosphorous	No potassium

Step 2 Students will observe plant height, leaf colour, number of leaves, and any deficiency symptoms.

Step 3 Record all observations and findings in portfolios.



Step 4 Photograph changes throughout the experiment.



Step 5 Recommend and apply corrective amendments based on the symptoms observed.



Discussion:



Discuss and answer:

1. How did the different nutrient conditions affect plant growth?
2. What deficiency symptoms were observed in each treatment?
3. Why is balanced nutrition important for healthy crop production?
4. How can farmers correct nutrient deficiencies in their fields?



Textbook Reference:
Agricultural Science for CSEC Examinations.
2nd Edition. Pages 75 and 81.

Topic: Deficiency Symptoms of Major and Minor Nutrients used in Crop Production

Sub-topic: Using Soil Amendments to Maintain Soil Fertility

Activity 3.7: Applying Soil Amendments to Improve Soil Fertility

HEALTHY SOIL
HEALTHY CROPS
BETTER FUTURE

Time: 25 minutes | **Group Activity: 4 groups in class**



RESOURCES:

- Limestone
- Compost
- Well-rotted animal manure
- NPK fertilizer
- Soil test results from Activity 1.6 and Activity 2.7 (or labelled soil samples with known pH and NPK test results)
- Access to School's Garden plot with established crops
- Plastic spoon or scoop
- Water
- Labels
- Disposable gloves
- Observation sheet

INSTRUCTIONS:

1 STEP 1 – REVIEW SOIL TEST RESULTS:

Each group receives the soil test results from previous activities showing:

- Soil pH
- Nitrogen level
- Phosphorus level
- Potassium level

Discuss what the results indicate about the condition of the soil.

2 STEP 2 – SELECT THE CORRECT SOIL AMENDMENT TO BE APPLIED:

Based on the soil test results, choose the most appropriate amendment. Use the guide below.

SOIL CONDITION	AMENDMENT
Acidic soil (Low pH)	Limestone
Nitrogen deficiency	Nitrogen fertilizer
Phosphorus deficiency	Phosphorus fertilizer
Potassium deficiency	Potassium fertilizer
Low organic matter	Compost or well-rotted manure

3 STEP 3 – APPLY THE SOIL AMENDMENT:

- Measure the recommended amount of amendment needed.
- Evenly mix it into the soil in garden plot.
- Lightly moisten the soil with water.

4 STEP 4 – EXPLAIN YOUR DECISION:

Complete the observation sheet by recording:

- ☑ Soil problem identified
- ☑ Amendment applied
- ☑ Why the amendment was selected
- ☑ Expected improvement in soil fertility

SOIL AMENDMENT RECORD SHEET

GROUP	SOIL PROBLEM IDENTIFIED	SOIL AMENDMENT APPLIED	EXPECTED IMPROVEMENT
1			
2			
3			
4			

SOIL AMENDMENT REFERENCE GUIDE

AMENDMENT	PURPOSE
Limestone	Neutralizes soil acidity and raises soil pH
Compost	Adds organic matter and improves soil structure
Well-rotted manure	Supplies nutrients and organic matter
Nitrogen fertilizer	Promotes leafy growth
Phosphorus fertilizer	Encourages strong root growth, flowering and fruiting
Potassium fertilizer	Improves disease resistance and crop quality

Healthy soil today, Abundant harvest tomorrow!

Topic: Crop Production

Sub-topic: Nomenclature

Activity 4.1: Crop Concept Mapping and Nomenclature Check

Group Activity:
4 groups in class

Time: 20 minutes



RESOURCES

- Cardboard
- Coloured markers
- Printed photographs of the crops (Broccoli, Rice, Sugarcane, Heliconia)
- Scissors
- Glue
- Crop Information Sheet
- Agricultural Science textbook

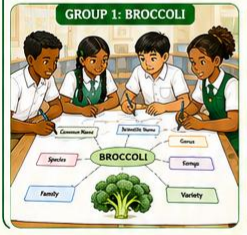
PART A: Create Crop Classification Concept Map

1 Assigns a crop to each group:

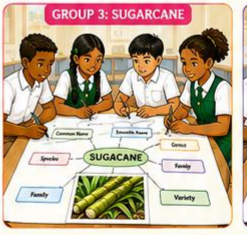
Group 1: Broccoli	Group 2: Rice	Group 3: Sugarcane	Group 4: Heliconia
			

2 Each group creates a large concept map showing:

- Common Name
- Scientific Name
- Genus
- Species
- Family
- Variety
- Picture of the crop









PART B: Scientific Nomenclature Check

Exchange concept maps with another group.
Use the checklist below to evaluate the accuracy of your classmates' work and to verify that scientific names have been written correctly.

Peer Review Checklist	Check ✓
Is the common name written correctly?	☐
Is the genus capitalized?	☐
Is the species written in lowercase?	☐
Is the scientific name italicized (or underlined if handwritten)?	☐
Is the variety written correctly?	☐
Are all facts accurate?	☐



After completing the checklist, correct any errors before displaying concept map in classroom.

Textbook Reference:
Agricultural Science for CSEC Examinations. 2nd Edition. Page 38



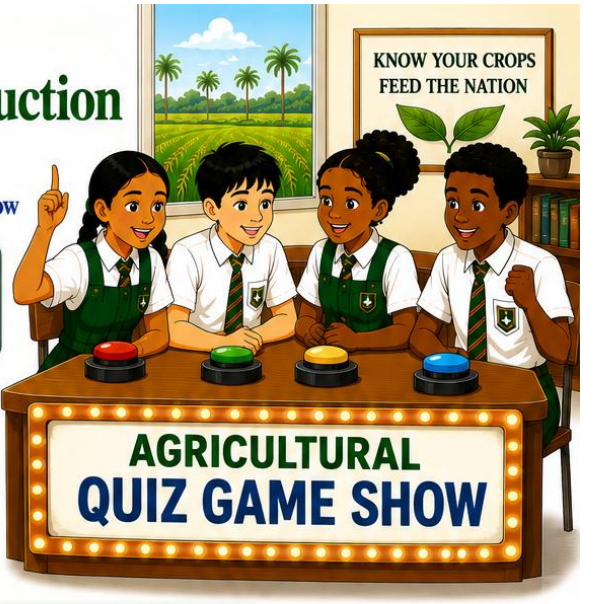
Topic: Crop Production

Sub-topic: Nomenclature

Activity 4.2: Agricultural Quiz/Game Show

Time: 15 minutes

Group Activity: Divide class into teams



RESOURCES

- Buzzer/timer
- Questions

INSTRUCTIONS

ROUND 1 — Name That Crop

Show a picture and students identify the crop.



ROUND 2 — Scientific Name Challenge

Teacher gives the common name; students provide the scientific name.



ROUND 3 — Family Match-Up

Students match crops to their families.

Tomato	Solanaceae
Cassava	Euphorbiaceae
Maize	Poaceae
Coconut	Arecaceae



ROUND 4 — Variety Experts

Students identify varieties grown in Guyana and the Caribbean.



FUN FACT!

Why are scientific names important?

Scientific names are the same all over the world. They help farmers, researchers and traders communicate clearly about crops, no matter what language they speak!



Learn the names. Know the crops. Grow the future!

Topic: Crop Production

Sub-topic: Nomenclature

Activity 4.3: Trivia Game (Jeopardy)

Time: 15 minutes

Group Activity: Divide class into teams



RESOURCES

- Buzzer/timer
- Questions/Clues

INSTRUCTIONS

1. Students choose a category and point value. Example scientific names for 20 points.
2. Teacher will act as host and read trivia questions.
3. Students 'buzz' in and respond to questions.
4. Points are awarded for every correct answer and students get to pick the next questions.
5. An incorrect answer deducts points from score and allows other players to buzz.

CATEGORIES

1. Scientific Names
2. Crop Families
3. Varieties

EXAMPLE OF A TRIVIA QUESTION

For 20 points,

'What is the scientific name of sugarcane?'

Answer:

Saccharum officinarum

CATEGORIES	10 POINTS	20 POINTS	30 POINTS	40 POINTS	50 POINTS
SCIENTIFIC NAMES	10	20	30	40	50
CROP FAMILIES	10	20	30	40	50
VARIETIES	10	20	30	40	50



NAMES CONNECT US ALL!

Scientific names are the same in every country and every language.
They help us communicate clearly about crops and share knowledge across the world.



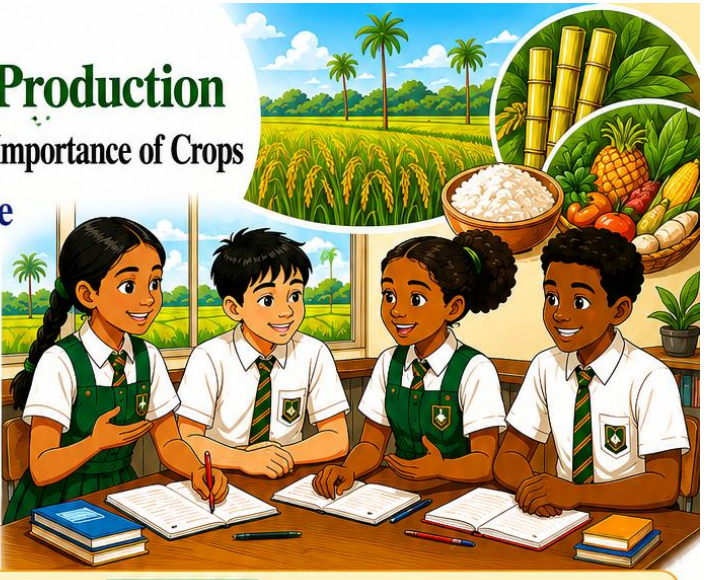


KNOW THE NAMES. RESPECT THE CROPS. GROW THE FUTURE!

Topic: Crop Production

Sub-topic: Economic Importance of Crops

Activity 4.4: Debate



Time: 30 minutes

Group Activity: Divide class into 2 teams

MOTION:

'Rice is the most economically important crop grown in Guyana.'

INSTRUCTIONS

1 Teacher assigns task to each team:



PROPOSING TEAM

Agree with the motion

VS

OPPOSING TEAM

Disagree with the motion



2 Each team presents speeches including opening statements, rebuttals, and closing summaries.



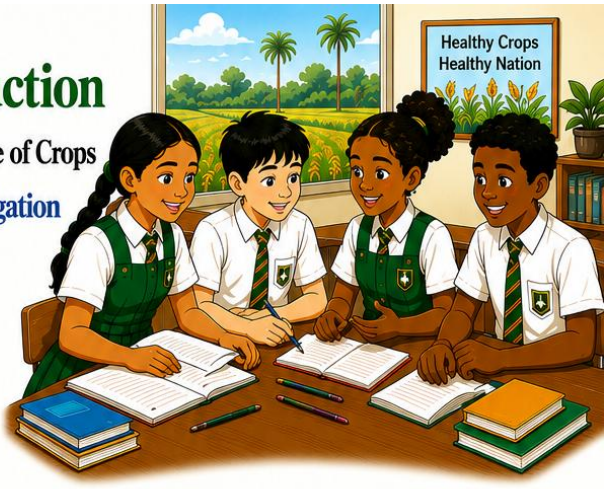
Textbook Reference:

Agricultural Science for Secondary Schools in Guyana, Book 3. Page 229

Topic: Crop Production

Sub-topic: Economic Importance of Crops

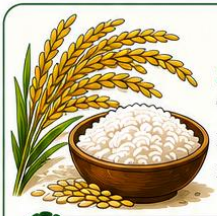
Activity 4.5: Case Study Investigation



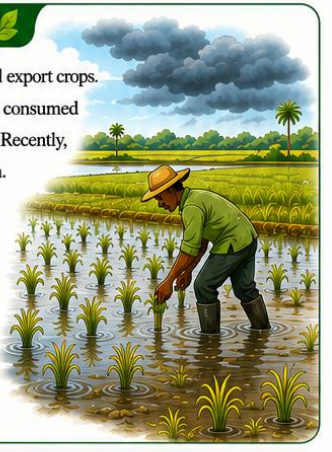
Group Activity:
Divide class into 2 groups

Instructions:
Teacher tells students that they are tasked with investigating how different crops contribute to Guyana's economy and food security.

GROUP 1 CASE STUDY



Scenario: 'Rice is one of Guyana's most important agricultural export crops. Thousands of farmers cultivate rice on the coastal plains. Rice is consumed locally and exported to countries in the Caribbean and beyond. Recently, heavy rainfall damaged several rice fields, reducing production.



INVESTIGATION QUESTIONS

1. How does rice provide income for families?
2. How does rice contribute to national economic growth?
3. How could a reduction in rice production affect food security?
4. Who might be affected if rice exports decline?
5. What strategies could farmers use to overcome flooding?

GROUP 2 CASE STUDY



Scenario: A group of farmers has started producing broccoli for supermarkets and restaurants. Consumers are becoming more interested in healthy foods.



INVESTIGATION QUESTIONS

1. How does broccoli contribute to nutrition?
2. How does local production support the economy?
3. Why might supermarkets and restaurants prefer to buy locally grown broccoli?
4. How could farmers increase their profits from broccoli cultivation?
5. Why is broccoli considered a **high value crop**?

Think Critically!
Use evidence and examples to support your answers.



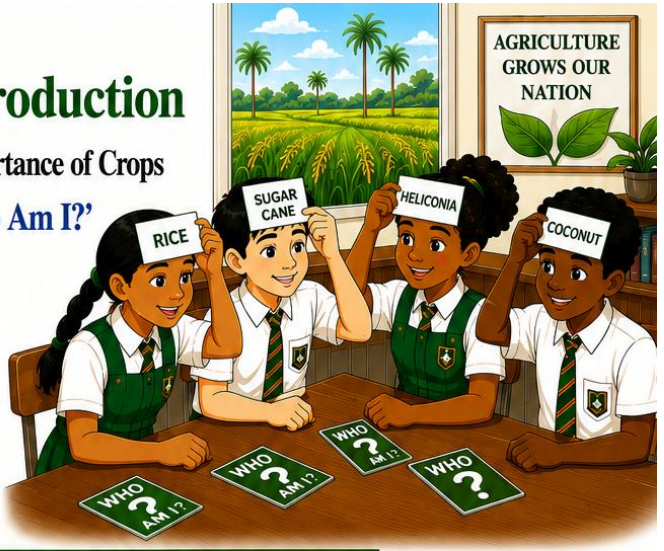
INCOME ECONOMY FOOD SECURITY SUSTAINABLE FUTURE



Topic: Crop Production

Sub-topic: Economic Importance of Crops

Activity 4.6: Game 'Who Am I?'



RESOURCES

- Timer
  10 minutes
- Clues/questions for game

INSTRUCTIONS

1 Students receive clues/questions and responds to them:



EXAMPLE 1

I feed millions of people.
I am one of Guyana's major exports.
I belong to the grass family.

Answer: Rice





EXAMPLE 2

I am used in bouquets.
I generate export earnings.
Tourists admire my colorful flowers.

Answer: Heliconia





Healthy crops, strong economy, secure future!



KNOW OUR CROPS. VALUE OUR FARMERS. BUILD OUR NATION.



Topic: Vegetable Flower Crop (Broccoli)

Sub-topic: Planting Materials

Activity 5.1: Scenario Based Investigation



GROUP ACTIVITY

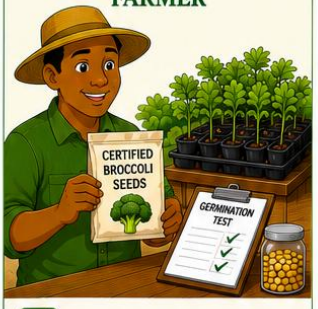
Divide class into 3 groups

TIME: 15 MINUTES

INSTRUCTIONS

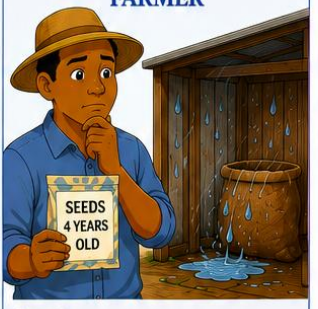
1 Teacher presents students with scenarios:

SCENARIO 1.
FARMER



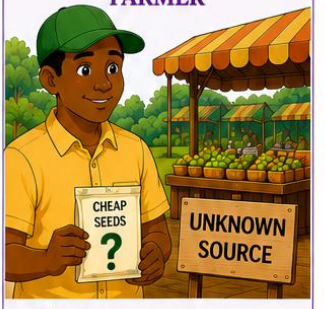
- Uses certified broccoli seeds
- Stores seeds properly
- Checks germination rate before planting

SCENARIO 2.
FARMER



- Uses leftover seeds from 4 years ago
- Stores them in a humid shed

SCENARIO 3.
FARMER



- Buys seeds from an unknown source because they are cheaper

2 Students predict and discuss:



Which farmer is most likely to have a successful crop and why?





GOOD SEEDS. GREAT RESULTS!

The right planting materials lead to healthy plants, higher yields and better income.

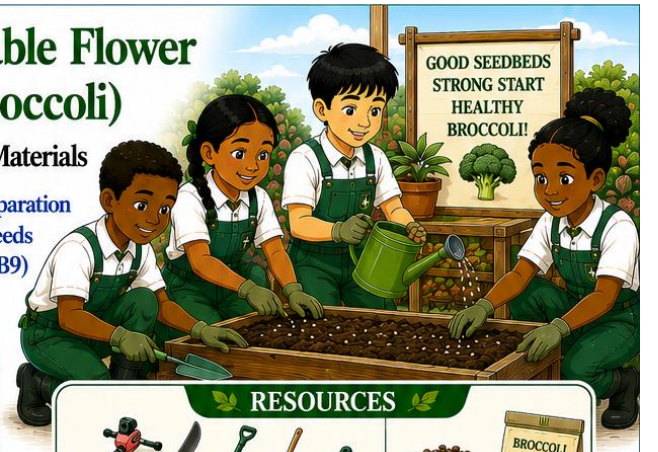


CHOOSE WISELY TODAY, HARVEST SUCCESS TOMORROW!

Topic: Vegetable Flower Crop (Broccoli)

Sub-topic: Planting Materials

Activity 5.2: Practical Activity on Preparation of Seedbeds and Sowing Seeds (Practical CSEC Skill No. B9)



GROUP ACTIVITY

4 to 5 students per group

TIME

30 minutes

RESOURCES



Farm tools and equipment (brush cutter, cutlass, garden fork, rake, hand trowel)



Broccoli seeds

INSTRUCTIONS

1 Students will prepare seedbeds by carrying out the following activities:



Brush cut the area and clear it of grass and bush



Plough with a hand tractor or garden fork



Refine the soil to a fine tilth using a rotovator, hoe or rake (chip or break up into small pieces)



Dig box drains



Level the soil and camber



Apply manure to a depth of 2-4 cm and mix into the soil



Level the soil and remove large pieces of organic matter with a rake

2 Sow broccoli seeds using appropriate method of sowing seeds.

BROADCASTING



Scatter seeds evenly over the seedbed and lightly cover.

DRILL (ROW SOWING)



Make shallow rows and place seeds in a line. Cover lightly.

TRAY SOWING (NURSERY)



Sow seeds in trays for nursery production.



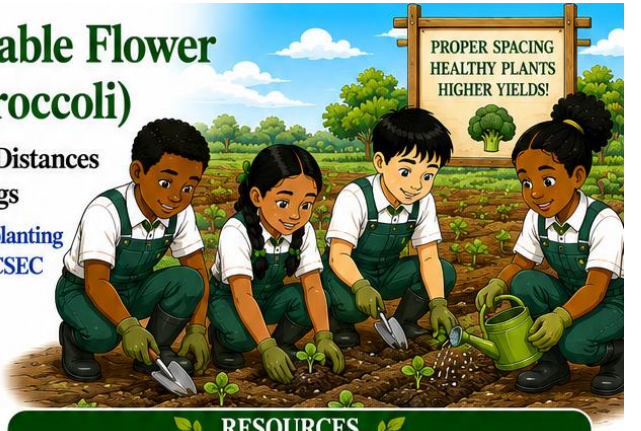
PREPARE WELL. SOW WELL. GROW WELL. HARVEST SUCCESS!



Topic: Vegetable Flower Crop (Broccoli)

Sub-topic: Planting Distances for Seedlings

Activity 5.3: Practical Activity on Transplanting and Proper Spacing (Practical CSEC Skill No. B.12)



GROUP ACTIVITY

4 to 5 students per group

TIME

30 minutes

RESOURCES

- Hand trowels
- Dibber
- Twine
- Pegs
- Measuring tape/ruler

INSTRUCTIONS

Students will transplant broccoli seedlings using appropriate spacing. The following activities should be done:

1.  Incorporation of well rotten pen manure into the soil.
2.  Line field and mark off planting distances (spacing between rows and spacing within plants in a row).
3.  Water seedlings in seed box.
4.  Gently uproot (remove) seedlings from nursery beds with a hand trowel.
5.  Place seedlings into holes made on the beds.
6.  Gently position (firm) the soil around the roots of plants.
7.  Water the transplanted seedlings.

TIP: TIME OF TRANSPLANTING

Transplant seedlings in the cool of the day—early morning or late afternoon. This reduces transplant shock and helps the seedlings establish quickly.

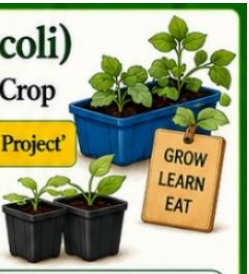




Topic: Vegetable Flower Crop (Broccoli)

Sub-topic: Alternative Methods for Cultivating the Crop

Activity 5.4: Container Gardening Challenge 'The Portable Garden Project'



Group Activity: 4 groups per class

Time: 30 minutes

RESOURCES


Plastic buckets


Plastic bottles


Plant pots


Grow bags


Potting mix


Broccoli seedlings


Labels

INSTRUCTIONS

Each group receives different containers.

Students:

1.  Prepare the growing medium.
2.  Plant one broccoli seedling.
3.  Label the container.
4.  Water correctly.
5.  Predict how the plant will grow during the course of the growing period.

GROUP 1

Container: Plastic Bucket




Large capacity, excellent for root growth and moisture retention.

GROUP 2

Container: Plastic Bottle




Lightweight and portable, good for small spaces and easy to move.

GROUP 3

Container: Plant Pot




Provides good drainage and is ideal for individual plant growth.

GROUP 4

Container: Grow Bag




Flexible and space-saving, ideal for short-term container gardening.

PREDICT THE GROWTH (DURING THE COURSE OF THE GROWING PERIOD)

Week 1 (1–2 weeks)	Week 3–4 (3–4 weeks)	Week 5–6 (5–6 weeks)	Week 7–8 (7–8 weeks)	Week 9–10 (9–10 weeks) (Maturity)
				
Seedling establishes. Small leaves appear.	More leaves develop. Plant grows taller.	Strong leafy growth. Plant becomes bushier.	Flower head begins to form.	Broccoli head is large and ready for harvest.
Prediction: _____	Prediction: _____	Prediction: _____	Prediction: _____	Prediction: _____



Note: Broccoli typically takes 8 to 10 weeks from transplanting to harvest, depending on variety and conditions.

DISCUSSION

How do you think the type of container might affect the growth of the broccoli plant?

Which alternative method do you think is the easiest to manage at home or at school? Why?

What factors will you need to control to ensure healthy broccoli growth in your container?



Textbook Reference: Agricultural Science for CSEC Examinations. 2nd Edition. Page 38



Topic: Vegetable Flower Crop (Broccoli)

Sub-topic: Alternative Methods for Cultivating the Crop

Activity 5.5: Crop Care Practical 'Crop Husbandry in Action'



Group Activity: 4 groups per class

Time: 30 minutes

RESOURCES


Established broccoli plants


Watering cans


Compost


Garden tools


Gloves

INSTRUCTIONS

Each group is assigned one broccoli plot.

Students must:

1. Inspect the plants.
2. Remove weeds.
3. Water appropriately.
4. Apply mulch.
5. Apply compost (if needed).
6. Look for insect damage.
7. Record observations.

Remember:
Healthy care today leads to strong, quality broccoli tomorrow!















DISCUSSION

Why is it important to carry out crop husbandry practices regularly?

How do these practices help to improve the growth and quality of broccoli?

What signs of poor crop care did you find during inspection, and how can they be corrected?



Topic: Vegetable Flower Crop (Broccoli)

Sub-topic: Harvesting, Post-Harvesting and Marketing

Activity 6.1: Identifying Maturity Indicators for Broccoli



GROUP ACTIVITY

4 to 5 students per group

TIME

30 minutes

RESOURCES

- Pictures of broccoli at different stages (immature, mature, over-mature)
- Real samples (if available)
- Maturity checklist

INSTRUCTIONS

1. Students act as crop inspectors and examine samples or images of broccoli and decide whether they are ready for harvest or not ready.



MATURITY INDICATORS TO IDENTIFY

- Head is compact and firm and head size is fully developed (variety-dependent)
- Buds are tight (not flowering/opening)
- Dark green color
- No yellowing or flowering

DISCUSSION QUESTIONS

1. What happens if broccoli is harvested too early or too late?



2. Why is timing important for market value?



RIGHT TIME. RIGHT QUALITY. BETTER VALUE!



Topic: Vegetable Flower Crop (Broccoli)

Sub-topic: Harvesting and Post-Harvesting Techniques

Activity 6.2: Practical Demonstrations on Harvest and Post- Harvest Techniques (Practical CSEC Skill No. B13).



GROUP ACTIVITY

4 to 5 students per group

TIME

30 minutes

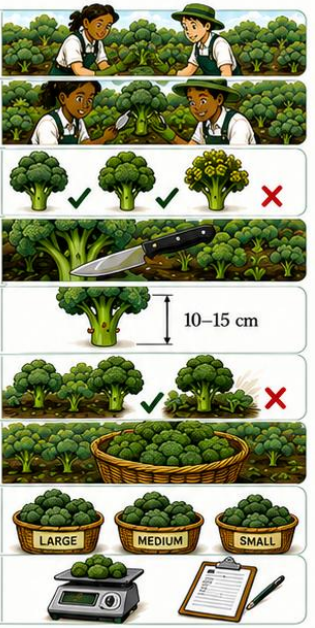
RESOURCES

- Established broccoli plants
- Watering cans
- Compost
- Garden tools
- Gloves

INSTRUCTIONS

In small groups, students will:

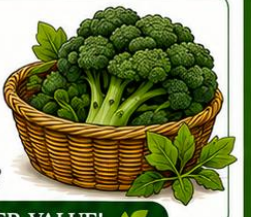
1. Harvest and assemble broccoli from the school garden.
2. Inspect broccoli heads for maturity.
3. Select only mature heads.
4. Use proper harvesting tools.
5. Cut stem 10–15 cm below head (or appropriate level).
6. Avoid damaging surrounding plants.
7. Place harvest gently in containers.
8. Sort and grade the broccoli according to size, freshness, colour, and quality.
9. Weigh each grade and record the results.



DISCUSSION



- Why is it important to harvest broccoli at the right stage of maturity?
- How does careful harvesting affect the quality and shelf life of broccoli?
- What are some common mistakes made during harvesting and how can they be avoided?
- How can proper post-harvest handling increase the market value of broccoli?



GOOD HARVEST. GOOD HANDLING. BETTER QUALITY. HIGHER VALUE!

Topic: Vegetable Flower Crop (Broccoli)

Sub-topic: Marketing Broccoli

Activity 6.3: Broccoli Brand Builders
'Brand It! Pack It! Sell It!'



Group Activity
4 to 5 students per group

Time
30 minutes

RESOURCES

- Small cardboard boxes, paper trays, paper bags, or recycled containers
- Fresh broccoli (or printed images)
- Cardboard or Bristol board
- Scissors
- Glue
- Coloured markers and pencils
- Blank label templates or sticker paper
- Decorative materials (ribbon, twine, coloured paper, biodegradable wrapping, etc.)
- Product Information Sheet

PART A – DESIGN THE PACKAGING

Imagine your group owns a vegetable business that is preparing broccoli for sale in a supermarket or farmers' market.

Design and create a creative package that:

1. Protects the broccoli during transport.
2. Keeps the broccoli fresh.
3. Is attractive to customers.
4. Is environmentally friendly where possible.
5. Is easy to carry and store.



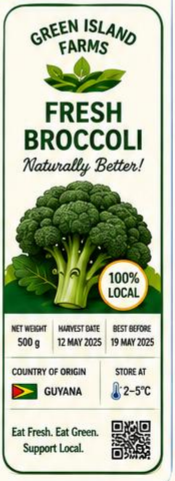
PART B – CREATE A PRODUCT LABEL

Design a professional label for your broccoli package.

Your label must include:

- Product name
- Brand name and logo
- Net weight
- Harvest date
- Best before date
- Country of origin (Guyana)
- Storage instructions
- Selling price
- One marketing slogan

(Optional: Add a QR code linking to recipes or nutritional information.)



PART C – MARKETING PITCH

Each group presents its product to the class in 2–3 minutes.

Your presentation should explain:

1. Why customers should buy your broccoli.
2. How your packaging protects the product.
3. Why your label is attractive and informative.
4. Why your design is environmentally friendly.



DISCUSSION

1 Why is attractive packaging important when selling vegetables?



Attractive packaging attracts customers, builds trust, and encourages them to buy your product.

2 How does proper packaging reduce post-harvest losses?



Without proper packaging: Damage, bruising, wilting and rot.

With proper packaging: keeps fresh longer and maintains quality.

Proper packaging prevents moisture loss and contamination, and increasing shelf life.

3 What are suitable transportation methods used for delivering broccoli to markets?



Refrigerated trucks | Well-ventilated crates | Clean and covered vehicles or boats

These methods keep broccoli fresh by maintaining cool temperatures, good ventilation and protection from damage.

GOOD DESIGN. GOOD PACKAGING. MORE SALES. HEALTHIER CUSTOMERS!

ORNAMENTAL CROP

Sub-topic: Sowing and Growing Heliconia plants

Activity: 7.1
Creating an Ornamental Garden through Practical on Propagation of Heliconia

Time:
15 minutes

Group Activity:
3 to 4 students

Resources:
potting soil, camera, pruning shears, sanitizer spray, watering can, garden gloves and plant pot.

1 Instructions: Prepare Tools and Materials

- Sharp, sterilized pruning shears or knife (clean with 1 part bleach + 9 parts water).
- Gardening gloves for safety.
- Well-draining potting mix rich in organic matter.
- Containers or planting site with good drainage.
- Watering can for consistent moisture.



2 Select a Healthy Parent Plant

- Choose a vigorous heliconia clump with multiple stems.
- Healthy rhizomes ensure strong new plants.



3 Dig Up and Expose Rhizomes

- Gently dig around the base of the plant.
- Remove excess soil to clearly see the rhizomes.



4 Divide the Rhizomes

- Identify natural division points where shoots emerge.
- Cut rhizomes into sections, ensuring each piece has at least one shoot and roots attached.
- Handle gently to avoid damage.



5 Plant the Divisions

- Place each rhizome section in a pot or directly in the ground.
- Position rhizome just below soil surface.
- Use well-draining, organic-rich soil.



6 Water and Care

- Water thoroughly after planting.
- Keep soil consistently moist but not waterlogged.
- Provide bright, indirect sunlight and warmth.
- Avoid overwatering to prevent root rot.
- Clean up work space.

NB: take photos in each step to assist in the formation of an ornamental album.



Discussion:

7. How do rhizomes store energy and help plants survive?

_____

_____

8. What are two Differences between vegetative propagation (rhizomes) and sexual propagation (seeds)?

_____

_____

_____

_____

Think Like a Scientist!

- Observe carefully at each step.
- Record your observations with photos.
- Note any changes in the plant, soil, and environment.
- Ask questions and discuss your findings.
- Use your findings to improve the growth of heliconia plants.

Observe • Learn • Grow • Beautify

ORNAMENTAL CROP (HELICONIA)

Sub-topic: Harvesting of Heliconia

Activity: 7.2
Harvesting of Heliconia through Practical to create an arrangement

Time:
20 minutes

Group Activity:
3 to 4 students

Resources:
camera, pruning shears, water, garden gloves and vase

1 Identify Mature Flowers

- Look for fully developed bracts (the colorful structures that hold the true flowers).
- Avoid cutting immature or damaged stems.
- Select stems that are upright and firm.



2 Cutting the Stem

- Hold the stem firmly near the base.
- Cut at a 45° angle about 10–15 cm above the soil line.
- Make sure the cut is clean to prevent plant stress and disease.



1 Cutting the Stem

- Hold the stem firmly near the base.
- Cut at a 45° angle about 10–15 cm above the soil line.
- Make sure the cut is clean to prevent plant stress and disease.



2 Immediate Care

- Place the cut stem directly into the bucket of water.
- Keep stems shaded to avoid wilting.
- Trim off any excess leaves that may draw water away from the bracts
- Store harvested heliconias in a cool, shaded area

NB: take pictures for each steps taken to Create a digital album using pictures taken from the ornamental garden.



Discussion:

1. How long do heliconias last compared to roses or lilies?
2. Why does cutting at an angle help water uptake?
3. How can you harvest flowers without weakening the parent plant?

Think Like a Scientist!

- Observe carefully at each step.
- Record your observations with photos.
- Note any changes in the plant or flowers.
- Ask questions and discuss your findings.
- Use your findings to improve harvesting and flower arrangement.

Observe • Learn • Grow • Beautify

Traditional Crop (Sugarcane)

Sub-topic: Structure of the Sugarcane Plant and functions of its parts

Activity 8.1: Field trip to Guysuco

Materials: Note Pad, Pencil, Camera

Task: Students will work along with peers to complete

Time: 30 minutes

Group Activity: 2 students

Resources:

1. Field site (Guysuco)
2. Sugarcane stalk samples
3. Observation guide



Instructions:

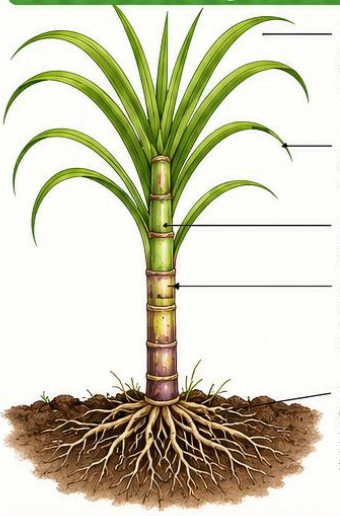
1. Identify sugarcane growth stages (planting, tillering, maturation).
2. Observe irrigation, fertilization, and pest management practices.
3. Examine tools and machinery used in sugarcane farming.
4. Provide each group with a sugarcane stalk.
5. Ask students to observe and list visible plant parts.

"I am the Sugarcane Plant" Activity

- Assign students different plant parts.
- Give students cards with plant structures and separate cards with functions.
- Allow students to identify parts of the sugar cane Example: "I am the leaf. I make food for the plant through photosynthesis."



Structure of the Sugarcane Plant



Hangman Activity





Common Name

_ _ _ _ _ _ _ _ _

Scientific Name

_ _ _ _ _ _ _ _ _ _ _

Botanical Name

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

Letters: A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Discussion:



1. What did you learn about sugarcane growth and harvesting?
2. How does sugarcane farming impact the environment and economy?
3. What sustainable practices did you observe?
4. Why is the stem the most valuable part of the sugarcane plant?
5. What would happen if the roots were damaged?
6. Why are leaves important for sugar production?
7. Which structure helps farmers propagate sugarcane?

Think Like a Scientist!

Observe

What did you see during the field trip? List at least three things.

_____

_____

_____

Question

What questions do you have about sugarcane growth or farming?

_____

_____

_____

Hypothesize

Why do you think farmers cut the sugarcane near the ground when harvesting?

_____

_____

Apply

How can what you learned today help you make better choices in the future?

_____

_____

_____

Let's value our local crops and support sustainable farming for a better future!





TOPIC:

TRADITIONAL CROP (SUGARCANE)

Sub-topic:
Preparation of Planting Materials for Planting



ACTIVITY 8.2: PLANTING OF SUGAR CANE SETTS

Materials: Sugar cane stalk (Healthy and unhealthy), flash card, cutlass, prepared planting area and marker.

Video Link: https://youtu.be/_lzWWpsdeSk

Task: Brainstorming Activity and Preparation of planting materials

Time: 30 minutes

Group Activity: 3 students

Resources: As listed on the left

BRAINSTORMING ACTIVITY

Write "What makes a sugarcane stalk suitable for planting?" on a chalk board. Show students healthy buds and damaged buds from sugarcane.

Place students in groups of three. Allow them to examine each sample and determine:

Characteristics	Healthy Buds	Pest free	Disease free	Matured stalk	Undamaged
					
					

STEPS: PREPARATION OF PLANTING MATERIALS

1 Examine the Sugarcane Stem

- Observe the sugarcane stem provided.
- Check if it is healthy, mature, and free from pests and diseases for planting.
- Identify the nodes (joints) along the stem.



2 Remove Unwanted Plant Parts

- Carefully remove any leaves attached to the stem.
- Remove any flowers or flowering structures if present.



3 Measure the Stem Sections

- Using a ruler or measuring tape, measure sections that are between 6 and 12 inches (15–30 cm) long.



4 Cut the Stem into Setts

- Cut the sugarcane stem into pieces (setts) of the measured length.
- Ensure each sett contains at least two healthy nodes (buds/eyes).



5 Inspect the Prepared Setts

Check each sett for:

- ✓ Correct length (6–12 inches)
- ✓ At least two healthy nodes
- ✓ No visible damage
- ✓ No signs of pests or disease



6 Organize the Setts

- Place the prepared setts neatly in the designated area for planting.



7 Ready for Planting

- Keep the setts in a cool, shaded place if not planted immediately.



8 Planting Site Prepared

- Ensure the planting area is well-prepared, weed-free and moist.



DISCUSSION

1. What is a sugarcane sett?
2. Why should diseased canes not be used?
3. What are two characteristics of good planting material?
4. Why is mature cane preferred?
5. Why should each sett contain at least two nodes?
6. What problems might arise if damaged setts are planted?
7. How does proper preparation of planting materials improve crop production?

THINK LIKE A SCIENTIST!

Use your observations and answers from the activity to solve the tasks below.

1. Why is it important to remove leaves and flowers before cutting setts?
2. How does the length of the sett affect its growth?
3. What could happen if setts are planted too deep or too shallow?
4. Suggest ways to store setts if planting will be delayed.

Good preparation today, sweeter harvest tomorrow!



TRADITIONAL CROP (SUGAR CANE)



Sub-topic:
Care and Management of the Crop: Weed and Weed Control

Materials:
Note pad, Camera

Video Link:
https://youtu.be/V-58hB_xtCU

Task:
Field Trip

Student Activity

ACTIVITY 9.1

1. FIELD OBSERVATION

- Walk through the sugarcane plots.
- Identify and record weed species present.
- Note their growth stage, density, and distribution.



2. CLASSIFICATION OF WEEDS

Group weeds into grasses, sedges, and broadleaf weeds.
Example:

- **Grasses:** Bermuda grass (*Cynodon dactylon*), Crabgrass (*Digitaria sanguinalis*).
- **Sedges:** Nutgrass (*Cyperus rotundus*), Yellow nutsedge (*Cyperus esculentus*).
- **Broadleaf:** Spiny amaranth (*Amaranthus spinosus*), Purslane (*Portulaca oleracea*), Morning glory (*Ipomoea spp.*).



In groups, students will observe the weed samples found.

EXAMPLES OF COMMON WEEDS IN SUGARCANE FIELDS

GRASSES



Bermuda grass (*Cynodon dactylon*)



Crabgrass (*Digitaria sanguinalis*)

SEDGES



Nutgrass (*Cyperus rotundus*)



Yellow nutsedge (*Cyperus esculentus*)

BROADLEAF WEEDS



Spiny amaranth (*Amaranthus spinosus*)



Purslane (*Portulaca oleracea*)



Morning glory (*Ipomoea spp.*)

DISCUSSION

1. What does the weed look like?
2. How might it affect sugarcane growth?
3. Have they seen it before?

RECORD OBSERVATIONS

Common Weeds Found in Sugar Estates

Common Name	Scientific Name



THINK LIKE A SCIENTIST!

Use your observations and answers from the activity to solve the tasks below.

1. Why is it important to weeds in the sugarcane field?
2. How does the density of weeds affect sugarcane yield?
3. What are some ways farmers can control weeds?
4. Why should weeds be controlled early?

Healthy fields, better cane, sweeter future!



TOPIC:

TRADITIONAL CROP (SUGAR CANE)



Sub-topic: Methods of Weeds Control

ACTIVITY 9.2

Materials:
Note pad, Camera, hoe, cutlass, garden gloves

Video Link:
https://youtu.be/V-58hB_xtCU

Task:
Field Trip/ Field Observation

Student Activity

- Walk through the sugarcane plots.
- Identify and record weed species present.

Note their growth stage, density, and distribution.

1 MECHANICAL CONTROL (PRACTICAL ACTIVITY)

- Demonstrate hand weeding or hoeing around young cane plants.
- Show how to uproot weeds completely to prevent regrowth.
- Practice inter-row cultivation using simple tools.





2 CULTURAL CONTROL

- Discuss crop rotation to reduce weed seed banks.
- Demonstrate mulching with cane trash or straw to suppress weed germination.





3 CHEMICAL CONTROL

- Explain safe use of pre-emergence herbicides (e.g., Atrazine, Simazine).
- Demonstrate calibration of a sprayer (without chemicals for safety).
- Highlight importance of applying herbicides when weeds are small (4–8 inches).





4 BIOLOGICAL & MODERN METHODS

- Introduce biological control (natural enemies of weeds).
- Discuss modern innovations like drones for precision spraying.





5 RECORD KEEPING

- Students record weed species, control methods observed, and effectiveness.
- Create a chart comparing different weed management strategies.



Examples of records to keep:

- ✅ Weed species
- ✅ Controil method used
- ✅ Date of observation
- ✅ Effectiveness (High/ Medium/Low)

WEED MANAGEMENT STRATEGIES COMPARISON

Method	Cost	Effectiveness	Labor
Mechanical			
Cultural			
Chemical			
Biological			

DISCUSSION

1. What problems will the weeds cause?
2. Which weeds might be present?
3. Which control methods would be most effective?
4. Why should weed control be done early?
5. Groups present their recommendations.

EXIT TICKET — CONCLUDING GAME: EXIT TICKET

Each student completes:

One weed I learned today is _____.

Its scientific name is _____.

One method of controlling weeds is _____.

THINK LIKE A SCIENTIST!



Use your observations and answers from the activity to solve the tasks below.

1. Why is it important to identify weeds before controlling them?
2. Which method of weed control do you think is most environmentally friendly? Why?
3. How can weed control improve sugarcane yield and quality?
4. What new technology might help farmers control weeds in the future?

Good weed control today, better sugar tomorrow!



TOPIC:

TRADITIONAL CROP (SUGAR CANE)



Sub-topic:
Care and Management of the Crop: Disease and Disease Control Measures

ACTIVITY 9.3: FIELD TRIP/ ROLE PLAY

Materials:
Note pad, Camera, hoe, cutlass, garden gloves

Video Link:
https://youtu.be/V-58hB_xtCU

Task:
Field Trip/ Field Observation

Activity Type:
Field Trip/ Role Play

1 FIELD OBSERVATION

- Walk through the sugarcane plots.
- Identify plants showing disease symptoms (yellowing leaves, spots, wilting, stunted growth).
- Record observations in notebooks.
- Take photos for later discussion.



2 CLASSIFICATION OF DISEASES

- Group diseases into categories:
  - **Fungal** (e.g., red rot *Colletotrichum falcatum*, smut *Sporisorium scitamineum*).
  - **Bacterial** (e.g., ratoon stunting disease *Leifsonia xyli*).
  - **Viral** (e.g., mosaic disease Sugarcane mosaic virus).
- Discuss symptoms and how each disease spreads.



3 PRACTICAL ACTIVITY: SAMPLING

- Collect diseased leaves or stalks for closer examination.
- Compare healthy vs. diseased samples side by side.
- Use magnifying lenses to observe fungal growth or lesions.



4 CULTURAL CONTROL MEASURES

- Demonstrate field sanitation: removing and destroying infected plant material.
- Show crop rotation and use of resistant varieties.
- Discuss importance of proper spacing to reduce humidity and disease spread.



5 MECHANICAL & PRACTICAL CONTROL

- Practice cutting and disposing of diseased stalks.
- Demonstrate cleaning of tools with disinfectant to prevent disease transfer.



6 CHEMICAL CONTROL

- Explain safe use of fungicides and bactericides.
- Demonstrate sprayer calibration (without chemicals for safety).
- Emphasize protective clothing and environmental safety.



7 BIOLOGICAL & MODERN METHODS

- Introduce biocontrol agents (e.g., *Trichoderma* fungi against red rot).
- Discuss integrated disease management (IDM) combining cultural, chemical, and biological methods.



8 RECORD KEEPING & REFLECTION

- Students record disease types, symptoms, and control measures observed.
- Create a chart comparing different diseases and their management strategies.



SCENARIO (ROLE PLAY)

A farmer notices unusual symptoms in his sugarcane field. The varying Groups act as agricultural extension officers.

1. What disease is affecting the crop?
2. What symptoms support your diagnosis?
3. What control measures should the farmer use?





DISCUSSION

1. Which methods are most sustainable and effective?
2. Which disease was most common?
3. What symptoms were easiest to identify?
4. What control methods were being used?
5. How can disease outbreaks be prevented?





THINK LIKE A SCIENTIST!

Use your observations and answers from the activity to solve the tasks below.

1. Why is it important to identify diseases early in sugarcane?
2. How do different control methods work together to manage diseases?
3. What might happen if diseased plants are not removed from the field?
4. Suggest one biological method that can help control sugarcane diseases.



Healthy cane, healthy future!



TRADITIONAL CROP (SUGAR CANE)



Sub-topic:
Harvesting

ACTIVITY 10.1

Materials:
Bundling ropes, collection baskets, transport carts, Sharp cutlasses/machetes, knives, protective clothing

Video Link:
https://youtu.be/lUXQh-UPfjE
https://youtu.be/LL2pc8SP_So
https://youtu.be/QABiEb9xvFc

Task:
Field Trip / Field Observation

Activity Type:
Field Trip / Practical Activity

1 PREPARATION

- Safety briefing



2 FIELD OBSERVATION

- Walk through the cane field to identify mature stalks ready for harvest.
- Signs of maturity:
  - Brown, dry lower leaves.
  - Firm stalks with high sugar content.
  - Uniform height and thickness.



3 PRACTICAL ACTIVITY: CUTTING

- Demonstrate manual cutting:
  - Hold stalk firmly.
  - Cut close to the ground at a slant to avoid damaging roots.
- Show mechanical harvesting (if available):
  - Observe how machines cut, strip leaves, and load canes.





4 CLEANING & BUNDLING

- Strip off excess leaves and tops.
- Bundle stalks together for easier transport.
- Practice tying bundles with rope or stacking neatly.





5 TRANSPORT & COLLECTION

- Load bundles onto carts or trucks.
- Discuss safe handling to avoid injury.
- Observe how harvested cane is transported to mills.





6 POST-HARVEST CARE

- Demonstrate cleaning and sharpening tools after use.
- Discuss importance of timely transport to mills (sugar content declines if delayed).
- Highlight field sanitation: removing debris to reduce pests and diseases.







DISCUSSION

1. Why sugarcane must be processed quickly after harvest?
2. Differences between manual and mechanical harvesting.
3. What are the economic importance of sugarcane in Guyana?
4. What are some Safety challenges faced by cane cutters?



THINK LIKE A SCIENTIST!

Use your observations and answers from the activity to solve the tasks below.

1. What signs show that sugarcane is ready for harvest?
2. Why is it important to cut the cane close to the ground at a slant?
3. How does timely transport to the mill affect the quality of sugar?
4. Suggest two ways farmers can stay safe during harvesting.



Harvest smart, work safe, deliver sweet results!



TOPIC:

TRADITIONAL CROP (SUGAR CANE)



Sub-topic:
Processing and Marketing of Harvested Product (Sugarcane)

ACTIVITY 10.2

Materials:
Bundling ropes, collection baskets, transport carts, Sharp cutlasses/ machetes, knives, protective clothing, camera

Video Links:
https://youtu.be/IUXQh-UPfjE
https://youtu.be/LL2pc8SP_So
https://youtu.be/QABiEb9xvFc

Time:
30 minutes

Group Activity:
4 students

Field Observation & Documentation

ACTIVITY TITLE: "FROM CANE TO CRYSTAL"



Objective: Help students understand agro-processing and value addition.

STEPS FOR STUDENTS:

1 Bring Small Sugarcane Stalks



- Bring small sugarcane stalks (or substitute with celery for demonstration).

2 Extract Juice



- Use a hand-crusher prototype to extract juice.

3 Heat the Juice



- Heat juice in a safe lab setup to evaporate water.

4 Observe Crystallization



- Observe crystallization (can simulate with sugar solution if cane unavailable).

5 Discuss By-products



Molasses (Thick Syrup) **Ethanol** (Biofuel) **Bagasse** (Fibrous Waste)

- Discuss by-products: molasses (thick syrup), ethanol (biofuel), bagasse (fibrous waste).

6 Present Findings



- Present findings in groups, highlighting sustainability and economic importance.

THE JOURNEY OF SUGARCANE: FROM FIELD TO MARKET



1. GROWING
Healthy crops in the field

2. HARVESTING
Cutting mature cane

3. TRANSPORT
Transporting cane to the mill

4. PROCESSING
Crushing, clarifying and evaporating

5. SUGAR PRODUCTION
Sugar crystals produced

6. MARKETING
Sugar and by-products reach the market

DISCUSSION



1. Should sugarcane primarily be used to produce sugar and food products, given global demand for sweeteners?

2. Can ethanol from sugarcane significantly reduce greenhouse gas emissions compared to fossil fuels?



THINK LIKE A SCIENTIST!

Use your observations and answers from the activity to solve the tasks below.

1. Why is value addition important for sugarcane farmers?

2. How does processing sugarcane increase its economic value?

3. What are two benefits of using bagasse and molasses as by-products?

4. Suggest one way sugarcane processing can be made more sustainable.



Smart processing today, sweeter tomorrow!

Traditional Crop (Sugar Cane)

Sub-topic: Processing and Marketing of Harvested Product (Sugarcane)

Time: 30 minutes

Group Activity: 4 students

Materials: Bundling ropes, collection baskets, transport carts, sharp cutlasses/machetes, knives, protective clothing, camera

Video Links:
https://youtu.be/lUXQh-UPfjE
https://youtu.be/LL2pc85P_So
https://youtu.be/QABiEb9xvFc

Activity 11: Harvesting and Handling

Objective: To demonstrate proper harvesting, collection and transport of sugarcane.

Tasks for Students:

1. Identify mature sugarcane in the field.
2. Use sharp cutlasses/machetes to cut cane at the base.
3. Remove leaves and unwanted tops.
4. Bundle the stalks properly using bundling ropes.
5. Place bundles in collection baskets or on transport carts.
6. Transport the cane to the collection point safely.



Key Points to Observe:

- **Safety** — wear proper protective clothing
- **Quality** — select healthy, disease-free stalks
- **Handling** — avoid damage to stalks
- **Cleanliness** — keep cane clean and free from soil



From the field to the collection point – handle with care!

Activity 11.1: "From Cane to Crystal"

Objective: Help students understand agro-processing and value addition.

Steps for Students:

1. Bring small sugarcane stalks (or substitute with celery for demonstration).
2. Use a hand-crusher prototype to extract juice.
3. Heat juice in a safe lab setup to evaporate water.
4. Observe crystallization (can simulate with sugar solution if cane unavailable).
5. Discuss by-products: molasses (thick syrup), ethanol (biofuel), bagasse (fibrous waste).
6. Present findings in groups, highlighting sustainability and economic importance.



Discussion

1. Should sugarcane primarily be used to produce sugar and food products, given global demand for sweeteners?



2. Can ethanol from sugarcane significantly reduce greenhouse gas emissions compared to fossil fuels?



Think Like a Scientist!

Observe
What did you see during the activities? List at least three things.

Question
What questions do you have about sugarcane processing or marketing?

Hypothesize
What do you think would happen if the cane is not processed quickly after harvesting?

Apply
How can what you learned today help farmers and communities in the future?

Adding Value Today for a Sweeter Tomorrow!

Traditional Crop (Sugar Cane)

Sub-topic: Processing and Marketing of Harvested Product (Sugarcane)

Time: 30 minutes

Group Activity: 4 students

Materials: Bundling ropes, collection baskets, transport carts, sharp cutlasses/machetes, knives, protective clothing, camera

Video Links:
- https://youtu.be/lUXQh-UPfjE
- https://youtu.be/LL2pc85P_So
- https://youtu.be/QABiEb9xvFc

Activity 11.2: Marketing of Sugarcane Products

Objective: To analyze how sugarcane products are marketed and the importance of value addition.

Tasks for Students:

1. Identify different products made from sugarcane (sugar, molasses, ethanol, bagasse, rum, animal feed, etc.).
2. Research local and international markets for sugarcane products.
3. Identify packaging, labeling, and branding techniques used to attract consumers.
4. Compare prices of at least three sugarcane products in your local market.
5. Discuss the challenges and opportunities in marketing sugarcane products.
6. Create an advertisement (poster, jingle, or slogan) for a sugarcane product.



Sugarcane Value Chain



Common Sugarcane Products and Their Uses

Product	Description	Uses
Sugar	Crystals made from cane juice.	Food sweetener, baking, beverages.
Molasses	Thick syrup left after sugar crystallization.	Baking, animal feed, fermentation.
Ethanol	Alcohol produced from cane juice.	Biofuel, sanitizers, industrial use.
Bagasse	Fibrous residue after juice extraction.	Bioenergy, paper production, compost.
Rum	Alcoholic drink made from sugarcane juice.	Beverage industry, tourism.
Animal Feed	Cane tops, leaves or by-products used as feed.	Nutrition for livestock.

Market Investigation

Complete the table below by checking prices in your local market.

Product	Unit Size	Price (GD$)	Where Sold

Create Your Advertisement!

Design a poster, slogan, or jingle to promote your chosen sugarcane product.



Be Creative!
Make it colorful, catchy and inspiring!

Discussion

1. What are the advantages of adding value to sugarcane before marketing?

2. How can farmers and businesses improve the marketing of sugarcane products in Guyana?



Think Like a Scientist!

Observe	Question	Hypothesize	Apply
What did you observe about how sugarcane products are packaged and sold? List at least three things.	What questions do you have about the marketing of sugarcane products?	How do you think value-added products can increase farmers' income?	How can what you learned today help support sustainable farming and local economies?

Smart Farming. Smart Processing. Smart Marketing.
Turning Cane into Value for a Better Future!

Traditional Crop (Rice)

Sub-topic: Care and Management of the Crop: Weed and Weed Control

Time: 40 minutes

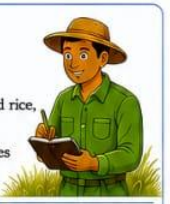
Group Activity: Four to five persons in a group

Resources: Camera, note book, gloves and pen



Activity 12.1

1 Instruction: Field Observation



- Visit a local rice farm.
- Observe common weeds such as duckweed, red rice, and birdseed grass.
- Interview farmers about weed control challenges and record findings.

Common Weeds in Rice Fields



Duckweed
Floating weed that covers the water surface and blocks sunlight and oxygen.



Red Rice
Looks like rice but competes strongly for nutrients, water and space.



Birdseed Grass
Grows fast and reduces rice yield by competing for nutrients, water and sunlight.

2 Weed Control Demonstration

- Practice manual weeding under supervision.
- Observe mechanical tools and discuss chemical control precautions.
- Note advantages and disadvantages of each method.

Manual Control



- ✓ Environmentally friendly
- ✓ Low cost
- ✗ Labor intensive
- ✗ Time consuming

Mechanical Control



- ✓ Faster and efficient
- ✓ Covers large area
- ✗ High initial cost
- ✗ Requires maintenance

Chemical Control



- ✓ Effective against many weeds
- ✓ Saves labor
- ✗ Risk of pollution
- ✗ Can affect non-target organisms

3 Data Collection

- Document weed types, density, and effects on crop growth.
- Take photos or sketches for later use in the flyer.







Data Collection Table – Field Trip Observations

Date: _____

Location/Farm: _____

Group Members: _____

Weed Observed	Location in Field (e.g., edge, center)	Density (Low / Medium / High)	Effect on Rice Crop	Photo / Sketch Taken (✓)	Notes / Comments

Additional Observations / Farmer Interview Notes:

_____

_____

_____

_____

Reflection & Discussion



1. Which weed control method is most sustainable? Explain your answer.

   _____

2. How can technology help reduce labor and environmental harm?

   _____

3. What role can students play in promoting sustainable farming?

   _____

Think Like a Scientist!

Observe
What did you observe about the weeds in the rice field? List at least three things.

_____

_____

_____

Question
What questions do you still have about weed control in rice farming?

_____

_____

_____

Hypothesize
Why do you think some weeds are more difficult to control than others?

_____

_____

_____

Apply
How can what you learned today be applied to help farmers and the environment?

_____

_____

_____

Healthy Fields. Healthy Harvests. Healthy Future!

CREATIVE TASK

WEED ISSUES IN RICE FIELDS — THREATS TO A HEALTHY HARVEST

Sub-topic: Care and Management of the Crop:
Weed and Weed Control

Time: 30 minutes

Group Activity: Four to five persons in a group

Resources: Camera, note book, gloves and pen

Activity 12.2

INSTRUCTIONS: Make a Flyer

Use drawings, photos, or digital design tools.

Include:

- Common weeds and their effects on rice yield.
- Challenges of manual, mechanical, and chemical control.
- Environmental and economic impacts.
- A call to action: **"Support Sustainable Solutions for Farmers!"**

Display flyers on the school notice board or share digitally to raise awareness.



DESIGN YOUR FLYER HERE

REFLECTION & DISCUSSION

1. Which weed control method is most sustainable? Why?



2. How can technology help reduce labor and environmental harm?



3. What role can students play in promoting sustainable farming?



THINK LIKE A SCIENTIST!

Observe	Question	Hypothesize	Apply
What did you notice about the weeds in rice fields?	What questions do you have about weed control in rice farming?	What do you think causes weeds to grow and reduce rice yield?	How can what you learned today help farmers and the environment?

Healthy Fields. Healthy Harvests. Healthy Future!

Traditional Crop (Rice)

Sub-topic: Care and Management of the Crop:
Disease and Disease Control Measures

Time: 40 minutes

Group Activity: Four to five persons in a group

Resources: camera, note book, gloves and pen



Activity 13.1

Major Diseases affecting Rice

1. Blasts

Casual agents, symptoms, and methods of disease control of the above-named disease.

Casual Agent	Symptoms	Methods of Disease Control
		
• Caused by the fungus *Magnaporthe oryzae*. • Survives on crop residues and spreads by wind, rain and infected seeds.	• Spindle-shaped spots on leaves (grey center with brown edges). • Neck blast on panicles causes empty grains. • Severe infection leads to leaf death and yield loss.	• Use resistant rice varieties. • Use clean, certified seeds. • Practice crop rotation and field sanitation. • Apply appropriate fungicides as recommended. • Maintain proper water and nutrient management.

Field Trip to Rice Farm

- Observe rice plants affected by diseases.
- Identify visible symptoms (spots, discoloration, stunted growth).
- Interview farmers about common diseases and control methods.
- Record observations and take photos for classroom analysis.



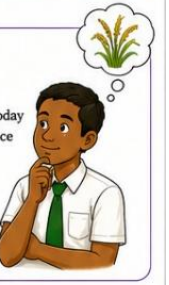
Think Like a Scientist!

Observe
What did you observe about the diseased rice plants?

Question
What questions do you have about rice diseases and how they spread?

Hypothesize
What do you think causes rice diseases and how can they be controlled?

Apply
How can what you learned today help farmers protect their rice crops and increase yield?



Healthy Fields, Healthy Harvests, Healthy Future!

TRADITIONAL CROP (RICE)

Sub-topic: Care and Management of the Crop: Disease and Disease Control Measures



Activity 13.2

Time: 40 minutes

Group Activity: 4–5 persons in a group

Resources: camera, note book, gloves and pen

1. Drone Demonstration

- Watch a demonstration of drones capturing aerial imagery of rice fields.
- Discuss how drones help detect disease outbreaks early.
- Analyze sample drone images to locate affected areas.

What to Look For in Drone Images

- Discolored or irregular patches
- Stunted growth areas
- Uneven plant density
- Water stress zones
- Signs of disease spread



Record Your Observations

Image No.	Location/Area Observed	What You See (Symptoms or Signs)	Possible Disease Indication	How Serious? (Low/Medium/High)	Notes / Sketch
1					
2					
3					

2. Lab/School Demonstration

- Examine diseased rice leaves under magnification.
- Identify fungal growth and discuss how infection spreads.
- Compare healthy vs. infected samples.







Observation Table

Sample No.	Type of Sample (Healthy/Infected)	What You See (Color, Spots, Lesions, etc.)	Signs of Fungal Growth?	How Might This Disease Spread?	Notes / Sketch
1					
2					
3					

Reflection Questions

1. What are the most common signs of rice blast?
2. How can farmers prevent disease outbreaks?
3. What are the pros and cons of using drones for crop monitoring?
4. How can students contribute to agricultural awareness?

Think Like a Scientist!

- **Observe carefully** – Look closely at details.
- **Ask questions** – Wonder why things happen.
- **Collect evidence** – Use tools and record your findings.
- **Analyze information** – Look for patterns and meaning.
- **Draw conclusions** – What can you learn?
- **Apply your knowledge** – Use what you learn to make a positive impact!

Healthy Rice Fields • Healthy Farmers • Sustainable Future

GROW RICE, GROW LIFE!

Topic: Traditional Crop (Rice)

Sub-topic: Care and Management of the Crop: Disease and Disease Control Measures

Activity 13.3

Time: 40 minutes

Group Activity: 4–5 persons in a group

Resources: camera, note book, gloves and pen

4. Group Discussion

- Debate: "Is technology the best solution for disease control in agriculture?"
- Share insights from field and drone observations.
- Propose sustainable disease management strategies.



5. Awareness Flyer Creation

- Students design a flyer titled ***"Protect Our Rice Fields: Stop the Spread of Blast!"***
- Include:
  - Causes and symptoms of rice blast.
  - Prevention and control measures.
  - Role of technology in disease detection.
  - A call to action for sustainable farming practices.
- Display flyers around school or community centers.



Reflection Questions

1. What are the most common signs of rice blast?
2. How can farmers prevent disease outbreaks?
3. What are the pros and cons of using drones for crop monitoring?
4. How can students contribute to agricultural awareness?

Think Like a Scientist!

Observe carefully, ask questions, collect evidence, analyze information and draw conclusions. Science helps us understand problems and find better solutions for our crops and our planet!

Smart Farmers. Healthy Crops. Sustainable Future.

TRADITIONAL CROP (RICE)

Sub-topic: Harvesting of Rice

Time: 40 minutes

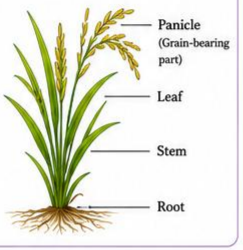
Group Activity: Four to five persons in a group

Resources: camera, note book, gloves and pen

Activity 14.1: Interactive Student Activity – Harvesting & Processing Rice

STEP 1: IDENTIFY PARTS OF THE RICE PLANT

- Draw and label the external structure of the rice plant.
- Highlight the panicle (grain-bearing part) as the main portion harvested.
- Discuss why only certain parts are harvested while others (like straw) are used differently.



STEP 2: RECOGNIZE SIGNS OF MATURITY

- Observe rice plants in the field or through images.
- Identify maturity indicators:
  - ☑ **Grains turn golden yellow.**
  - ☑ **Moisture content decreases.**
  - ☑ **Panicles bend due to grain weight.**
- Students compare immature vs. mature samples.



STEP 3: LEARN HARVESTING PROCEDURES

- Teacher demonstration or video showing cutting, bundling, and transporting rice stalks.
- Discuss safety and timing in harvesting.



1. Cutting 2. Bundling 3. Transporting

TIP: Wear gloves and use tools carefully. Harvest at the right time for best yield and quality.

STEP 4: SELECT TOOLS AND MACHINERY

- Show traditional tools (sickle, knife) and modern machinery (combine harvester).
- Students match tools to farm sizes (small-scale vs. large-scale).
- Debate: **"Is mechanization always better than manual harvesting?"**



Combine Harvester

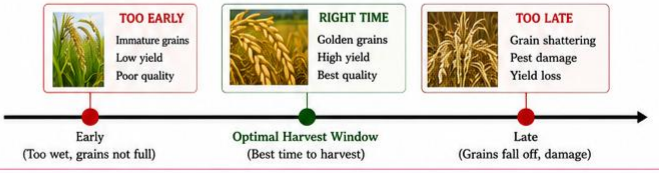
MATCH THE TOOLS TO FARM SIZE	
Small-scale farm (family farm)	_____
Large-scale farm (commercial farm)	_____



Debate: "Is mechanization always better than manual harvesting?"

STEP 5: APPRECIATE TIMING

- Discuss consequences of early harvesting (immature grains) vs. late harvesting (shattering, pest damage).
- Students create a timeline chart showing optimal harvest window.



THINK LIKE A SCIENTIST!

Observe
What did you observe about rice plants and harvesting today?

Question
What questions do you have about harvesting and processing rice?

Hypothesize
What do you think is the best time to harvest rice and why?

Apply
How can what you learned today help improve rice farming in your community?



Healthy Fields, Healthy Harvests, Healthy Future!

TRADITIONAL CROP (RICE)

Processing and Marketing of Harvested Product (Rice)

Activity 14.2

Time: 40 minutes

Resources: camera, note book, gloves and pen

Group Activity four to five persons in a group

Step 5: Appreciate timing

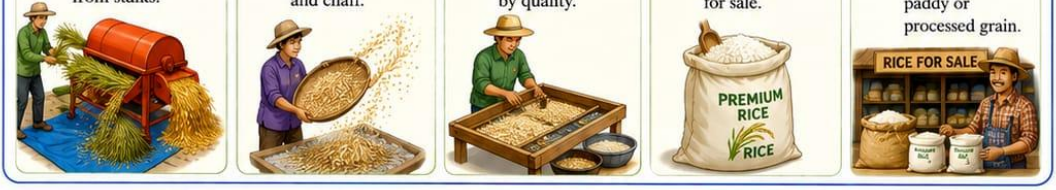
- Discuss consequences of early harvesting (immature grains) vs. late harvesting (shattering, pest damage).
- Students create a timeline chart showing optimal harvest window.



PROCESSING & MARKETING STEPS

After harvesting, students explore the post-harvest chain:

1. **Threshing –** separating grains from stalks.
2. **Winnowing –** removing husks and chaff.
3. **Grading –** sorting grains by quality.
4. **Bagging –** packaging rice for sale.
5. **Marketing –** selling rice as paddy or processed grain.



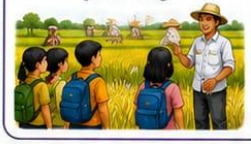
EQUIPMENT USED:



Combine harvester | Paddy hullers | Paddy separators | Polishers | – | – | –

STUDENT TASK

Field Trip: Visit a rice farm to observe harvesting and processing.



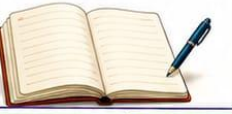
Hands-on Demo: Practice threshing and winnowing using small samples.



Creative Output: Design a poster or flyer showing the rice harvesting and processing cycle.



Reflection: Write a short report on why harvesting at the right time is critical for yield and quality.



THINK LIKE A SCIENTIST!

- ★ What changes do you observe in rice plants as they mature?
- ★ How does harvest timing affect the amount and quality of rice?
- ★ What could happen to farmers if they harvest too early or too late?
- ★ How can science and proper equipment help improve rice production?



TOPIC:

Cultural Practices associated with Crop Production

Field trips and on farm training on cultural practices associated with crop production.

ACTIVITY 15.1

Prepare an instruction sheet for student activity: Weed removal from the school's garden plot. PowerPoint presentations on weeds, pest, and disease control measures.

TIME
40 minutes

GROUP ACTIVITY
Four to five persons in a group

GROUP RESOURCES
Camera, note book, gloves and pen

STUDENT ACTIVITY: WEED REMOVAL FROM THE SCHOOL'S GARDEN PLOT

1. **PREPARE**
   Put on gloves and gather the needed tools.



2. **OBSERVE & IDENTIFY**
   Walk around the garden plot. Identify and note the types of weeds present.



3. **REMOVE WEEDS**
   Uproot weeds by hand or use hand tools. Remove the entire root to prevent regrowth.



4. **DISPOSE PROPERLY**
   Place weeds in a designated area or compost pit. Do not compost weeds with seeds.



5. **CARE FOR THE CROP**
   Loosen soil around crops if needed. Add mulch to suppress new weed growth.



6. **CLEAN UP**
   Return tools to their proper place. Wash hands and tools. Take photos for your activity report.





Take a photo at each step for your activity album!

RESOURCES

- Field trips to farms to observe plants affected by weeds, pests, and diseases
- Pen, notebook
- Small garden hand tools
- Knapsack sprayer
- Access to the school's garden plot and shade house
- Farm tools
- Mulch materials (dry grass)
- Agrochemicals (Pesticides)
- Drip or sprinkler irrigation systems










WHAT DID WE OBSERVE?

List the types of weeds, pests or diseases you observed.

1. _____
2. _____
3. _____
4. _____



MY REFLECTION

What did you learn from removing weeds and caring for crops?

_____
_____
_____



FIELD TRIP FINDINGS

What are two things you learned during the field trip?

1. _____
2. _____



ASSESSMENT

Assessment of student's ability to demonstrate cultural practices associated with crop production.

Teacher's Comments: _____

Score: ☆ ☆ ☆ ☆ ☆



Assessment of students' reports based on field trips.

Teacher's Comments: _____

Score: ☆ ☆ ☆ ☆ ☆



THINK LIKE A SCIENTIST!



OBSERVE
What types of weeds were most common in the garden plot?

QUESTION
Why do weeds compete with crops for nutrients?

INVESTIGATE
How does mulch help in controlling weeds?

SHARE
How will you apply what you learned to improve our garden?

Great scientists observe, ask, learn, and apply!

Take care of the crops today for a better tomorrow!



Control Methods for Weeds, Pests, and Diseases affecting Crops



ACTIVITY 15.2

GROUP ACTIVITY
4 to 5 students per group

TIME
40 minutes

VIDEO LINKS
1. https://youtu.be/LskAiyrOvgA
2. https://www.youtube.com/shorts/w5RUUjEIAjc?feature=share

1. IMPORTANCE OF PLANT PROTECTION

- Food security
- Yield improvement
- Crop quality

2. CLASSIFICATION OF PLANT DISEASES

Fungal	Powdery Mildew, Fusarium Wilt, Root Rot.	
Bacterial	Bacterial Blight, Leaf Spot, Wilt.	
Viral	Mosaic Disease.	
Nematode	Nematode infestations.	

3. COMMON CROP PESTS



Aphids | Leaf Miners | Beetles

Thrips | White Flies | Fruit Flies

GROUP ORGANIZATION

- Groups of 4–5 students.
- Roles:
  - Collector (captures pests) _____
  - Recorder (notes observations) _____
  - Photographer (documents process) _____
  - Presenter (shares findings) _____

RESOURCES

- Garden plot access
- Hand tools, gloves, insect nets, specimen jars
- Camera, notebook, pens
- Mounting boards, pins, labels, magnifying glass
- Shade house for observation



ACTIVITY STEPS

1 Introduction (5 min)
Brief discussion on importance of plant protection.

2 Field Observation (10 min)
Walk through garden plot to identify weeds, pests, and disease symptoms.

3 Pest Capture & Mounting (15 min)
- Use insect nets and jars to collect pests (aphids, beetles, thrips, etc.).
- Mount specimens on boards using pins.
- Label each specimen with pest name, crop affected, and damage type.

4 Group Reflection & Presentation (10 min)
- Share findings on diseases and pests.
- Discuss control measures (cultural, mechanical, chemical, biological).

FIELD OBSERVATION RECORD

Organism Observed	Crop Affected	Symptoms / Damage Seen	Sketch / Photo Taken

PEST MOUNTING RECORD

Pest Name	Crop Affected	Type of Damage

GROUP REFLECTION

1. Which pest was most common during your observation? _____
2. Which disease symptom was easiest to identify? _____
3. Suggest one control method for the pest or disease observed. _____



ASSESSMENT RUBRIC

Criteria	Excellent (4)	Good (3)	Fair (2)	Needs Improvement (1)
Practical Skills (Capture & Mounting)				
Knowledge/Application (Classification)				
Presentation (Clarity & Accuracy)				
Observation Notes (Detail in Documentation)				
TOTAL SCORE				/16

Teacher's Comments: _____

Score: _____ /16

THINK LIKE A SCIENTIST!

OBSERVE
What did you observe in your garden plot?

QUESTION
What questions do you have about the pests or diseases you found?

INVESTIGATE
Which method of control would be most effective and why?

PREDICT
What might happen if pests and diseases are not controlled?

COMMUNICATE
How will you share your findings to help others protect their crops?

TOPIC:

MAJOR PESTS AND DISEASES AFFECTING CROPS

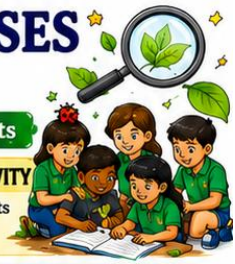
ACTIVITY 15.3

Sub-topic: Signs and Symptoms of Diseases of Crop Plants

TIME 40 minutes

VIDEO LINK https://youtu.be/AVSs-EkYTCc

GROUP ACTIVITY 4 to 5 students per group



TYPES OF DISEASES (SIGNS & SYMPTOMS)

FUNGAL	BACTERIAL	VIRAL	NEMATODE
Powdery mildew, rust, leaf spots, root rot	Bacterial blight, leaf spot, wilt	Mosaic pattern, leaf distortion, yellowing	Root galls, stunting, yellowing






COMMON CROP PESTS





Aphids | Leaf Miners | Beetles





Thrips | White Flies | Fruit Flies

ACTIVITY STEPS

1 Warm-Up Game (5 min)
- "Symptom Match": Teacher shows plant leaves with yellowing, wilting, or spots. Students shout out the likely disease type (fungal, bacterial, viral, nematode).



2 Field Observation (10 min)
- Groups explore the garden plot.
- Find plants with visible damage.
- Record symptoms and pest activity in notebooks.



3 Pest Capture & Mounting (15 min)
- Use nets/jars to collect insects (aphids, beetles, thrips, etc.).
- Mount specimens on boards.
- Label mouthparts (biting, chewing, piercing, sucking).
- Display insects with damaged plant parts.



Mouthparts
☐ Biting
☐ Chewing
☐ Piercing
☐ Sucking

4 Control Method Challenge (5 min)
- Each group picks one pest or disease.
- Propose a control method: biological, mechanical, cultural, resistant variety, or agrochemical.
- Quick presentations to the class.



5 Wrap-up Quiz (5 min)
- Fun rapid-fire questions.
- Earn points for correct answers!



RESOURCES

- ☑ Garden plot access
- ☑ Hand tools, gloves, insect nets, specimen jars
- ☑ Camera, notebook, pens
- ☑ Mounting boards, pins, labels, magnifying glass
- ☑ Shade house for observation



MOUTH PARTS OF INSECTS

Biting	Chewing	Piercing	Sucking



STUDENT RESPONSE AREAS

A. Field Observation Record

Plant Observed	Symptoms (Signs of Disease)	Likely Disease Type	Pest Activity Seen	Drawing/Photo (Sketch)

B. Mounting & Pest Record

Pest Name	Mouthpart Type	Crop Affected	Type of Damage (Describe)	Sketch

C. Our Control Method Choice

Pest/Disease chosen: _____

Control method we propose: _____

_____



D. Group Reflection

1. What was the most interesting pest or disease you found? _____
2. What signs helped you identify it? _____
3. Which control method was your group's choice? Why? _____



ASSESSMENT RUBRIC

CRITERIA	Excellent (4)	Good (3)	Fair (2)	Needs Improvement (1)
Practical Skills (Capturing & Mounting)				
Knowledge (Identification)				
Creativity (Control Method)				
Presentation (Clarity & Display)				
TOTAL SCORE				/16

TEACHER'S COMMENTS

_____

_____

_____

_____

Score: _____ /16



THINK LIKE A SCIENTIST!

OBSERVE What signs did you see on the plants?

INVESTIGATE What caused the damage?

EXPLAIN How does this pest or disease affect the crop?

APPLY What control method will you use and why?

WORKING WITH CHEMICALS IN THE ENVIRONMENT

Sub-topic: Safety Precautions to follow when using Agrochemicals

ACTIVITY 16.1

GROUP ACTIVITY
4 to 5 students per group

TIME
40 minutes

VIDEO LINKS
1. https://youtu.be/r9x33zkLdKA
2. https://youtu.be/9tcpvM7gYPA

SAFETY FIRST!
Safe You, Safe Others, Healthy Crops!

MATERIALS AND EQUIPMENT

- Gloves
- Goggles
- Boots
- Overalls
- Masks
- Knapasck Sprayer
- Agrochemicals (for demonstration, use water or safe substitutes)
- Graduated Cylinder
- Measuring Cup
- Labels and Markers
- Notebook and Pen

GROUP ROLES

ROLE	STUDENT NAME
PPE Inspector	
Recorder	
Equipment Operator	
Safety Officer	
Presenter	

ACTIVITY STEPS

1 Introduction (5 min)

Teacher explains safety precautions:
- PPE
- Correct equipment
- Preparation area
- Following instructions
- Proper training

What are the key safety points discussed?

1. _____
2. _____
3. _____
4. _____
5. _____

2 Protective Gear Demonstration (5 min)

Students dress in PPE. Discuss the importance of each item.

- Gloves: _____
- Goggles: _____
- Boots: _____
- Overalls: _____
- Mask: _____

Why is PPE important?

_____

3 Agrochemical Preparation (10 min)

- Read labels and measure accurately.
- Demonstrate mixing with water (safe substitute).
- Ensure compatibility and proper labeling.

Safety Checklist
- ☐ Read label carefully
- ☐ Measure accurately
- ☐ Use clean equipment
- ☐ Mix safely
- ☐ Label container
- ☐ Work in ventilated area

Record Your Observations

Task	Completed (✓)
Read label	
Measured correctly	
Mixed safely	
Labeled container	

4 Knapasck Sprayer Operation (15 min)

Follow the steps in order:
- ◯ Wear protective gear.
- ◯ Calibrate sprayer.
- ◯ Fill tank with water.
- ◯ Measure and add required chemical substitute.
- ◯ Mix solution and spray on designated plot.

Which step do you think is most important? Why?

_____

5 Wrap-Up Reflection (5 min)

Groups discuss challenges and importance of safety.

Present findings to class.

What did your group learn today?

_____

SAFETY HAZARD HUNT

Circle the unsafe actions.

- Spraying without gloves
- Reading labels before mixing
- Wearing goggles
- Eating while handling chemicals
- Washing hands after spraying
- Spraying against the wind

GROUP REFLECTION

1. What challenges did your group encounter?
2. Why is safety important when working with agrochemicals?
3. What would happen if PPE was not used?

QUICK QUIZ

1. Name two items of PPE.
2. Why should labels be read before mixing?
3. What is the purpose of calibrating a sprayer?
4. Why should chemicals be measured accurately?
5. What should you do after spraying?

THINK LIKE A SCIENTIST!

OBSERVE
What safety practices did you observe during today's activity?

INVESTIGATE
How can agrochemicals affect people and the environment if used incorrectly?

PREDICT
What might happen if too much chemical is applied to crops?

APPLY
List one safety rule you will always follow when using agrochemicals.

ASSESSMENT RUBRIC

CRITERIA	Excellent (4)	Good (3)	Fair (2)	Needs Improvement (1)
PPE Use				
Measuring Accuracy				
Sprayer Operation				
Safety Awareness				
Group Participation				
TOTAL SCORE				/20

TEACHER'S COMMENTS

_____

SCORE: _____/20

Be Safe, Be Smart, Protect Life and Crops!

TOPIC: WORKING WITH CHEMICALS IN THE ENVIRONMENT

Sub-topic: Disposing of Waste Agrochemicals and their Containers

ACTIVITY 16.2

GROUP ACTIVITY
4 to 5 students per group

TIME
40 minutes

VIDEO LINKS
1. https://youtu.be/w-Q75Yspw4
2. https://youtu.be/rU8-1YYigUc

DID YOU KNOW?
Improper disposal of agrochemical waste can harm people, animals, and the environment!

MATERIALS AND EQUIPMENT

- Gloves
- Goggles
- Boots
- Masks
- Empty Pesticide Containers
- Knapsack Sprayer
- Water (Safe Substitute)
- Labels, Markers
- Poster Paper, Computers for Flyer Design
- Camera and Notebook

SAFETY REMINDERS

- ☑ Always wear PPE when handling containers.
- ☑ Never reuse pesticide containers.
- ☑ Follow local laws and guidelines for disposal.
- ☑ Protect water sources, soil, and living things.
- ☑ Ask for help if you are unsure.

GROUP ROLES (Choose your role)

	Name
Safety Officer	
Recorder	
Photographer	
Presenter	
Designer	

PART 1: PRACTICAL DEMONSTRATION (15 min)

Container Rinsing and Disposal Steps – Practice and Observe

1. Wear gloves and empty contents into sprayer.
2. Fill container 1/5 full with water.
3. Shake container for 30 seconds.
4. Drain rinse water into sprayer.
5. Repeat rinse twice more, shaking in different directions.
6. Rinse outside of container.
7. Render container unusable (puncture or crush).
8. Reinforce rule: Never reuse pesticide containers.

Reflection Question: Why is it important to follow all these steps?

PART 2: FIELD TRIP (10 min)

Visit a farm or facility to observe real-world disposal methods. Take notes and photos of practices such as:

Burning · Burying · Recycling · Triple-Rinsing · Collection Programs

Method Observed	Description	Benefits	Concerns

What did you learn during the field trip?

_____

_____

_____

PART 3: DEBATE SESSION (5 min)

Groups debate the following disposal methods. Present advantages and disadvantages.

Debate Topic	Advantages	Disadvantages
Burning vs. Recycling		
Burying vs. Triple-rinsing		
Community collection programs vs. individual disposal		

PART 4: DESIGN PROJECT (5 min)

Design a safe disposal facility or program. Focus on:

- Environmental protection
- Human health and safety
- Practicality for farmers



Sketch your design here:

PART 5: CREATIVE COMMUNICATION (5 min)

Create a flyer/poster showing safe disposal steps.

Your flyer must include:

- ☑ PPE use
- ☑ Triple-rinsing steps
- ☑ Rendering containers unusable
- ☑ Environmental benefits



Sketch your flyer/poster idea here:

OBSERVATION NOTES

List key points observed during the field trip.

1. _____
2. _____
4. _____
5. _____

ASSESSMENT RUBRIC

Criteria	Excellent (4)	Good (3)	Fair (2)	Needs Improvement (1)
Participation & Teamwork				
Safety Practices				
Practical Skills (Rinsing & Handling)				
Understanding of Creativity (Design & Flyer)				
Presentation & Communication				

TOTAL SCORE /20

TEACHER'S COMMENTS

_____

_____

_____

SCORE: _____ /20

Safe Disposal Today, A Cleaner Tomorrow!

WORKING WITH CHEMICALS IN THE ENVIRONMENT

Sub-topic: Safe Periods for Harvesting Crops after Using Agrochemicals

ACTIVITY 16.3

GROUP ACTIVITY
4 to 5 students per group

TIME
40 minutes

VIDEO LINKS
1. https://youtu.be/_w-Q75Yspw4
2. https://youtu.be/rU8-1YYjgUc

DID YOU KNOW?
PHI (Pre-Harvest Interval) is the minimum number of days you must wait after applying pesticides before harvesting.

MATERIALS

- PPE: gloves, boots, masks
- Access to school garden plot or nearby farms
- Notebook, pens, camera
- Sample crop plants (with and without agrochemical treatment)
- Poster paper, markers, computers for flyer design

WHAT IS PHI?

PHI (Pre-Harvest Interval) is the minimum number of days between the last application of a pesticide and the harvest of crops.

It ensures food safety by reducing harmful chemical residues.

PHI Days

PART 1: INTRODUCTION (5 min)

- Teacher explains PHI: the minimum days between pesticide application and harvest.
- Discuss why harvesting too early can leave harmful residues.

WHY IS PHI IMPORTANT?

PART 2: FIELD INSPECTION (10 min)

Visit a farm or school plot. Observe crops for signs of agrochemical misuse.

- Damage to nearby crops
- Residue on leaves or fruits
- Harvesting before PHI is complete

RECORD YOUR FINDINGS
(Notes & Photos)

Observation	Possible Problem Identified	Photo Taken (✓)

PART 3: RESEARCH & REFLECTION (10 min)

Groups research environmental effects of pesticide runoff.

- Water contamination
- Soil degradation
- Harm to beneficial organisms

OUR GROUP NOTES

What did you learn? _____

PART 4: DEBATE SESSION (5 min)

Groups debate the following topics.

1. "Is strict enforcement of PHI more important than farmer flexibility?"
2. "Should communities adopt organic alternatives to reduce runoff?"

OUR GROUP POSITION

We support: _____

Reasons:

- _____
- _____
- _____

PART 5: CREATIVE COMMUNICATION (10 min)

Design a flyer or poster showing:

- Safe harvesting intervals (PHI)
- Dangers of misuse
- Environmental protection tips
- Use PPE and follow safe practices

DRAW / SKETCH YOUR FLYER OR POSTER IDEA HERE

THINK LIKE A SCIENTIST!

OBSERVE	QUESTION	INVESTIGATE	APPLY	PREDICT
What signs of agrochemical misuse did you observe during the field visit?	Why is it risky to harvest crops before the PHI is complete?	How can agrochemical runoff affect water sources and living organisms?	What actions can farmers and communities take to ensure safe harvesting and protect the environment?	What might happen if PHI is ignored for a long time?

GROUP SELF-ASSESSMENT

Rate your group's teamwork and participation.

Participation	☆ ☆ ☆ ☆ ☆
Cooperation	☆ ☆ ☆ ☆ ☆
Understanding	☆ ☆ ☆ ☆ ☆
Total Stars:	_____/15

SAFE TODAY, HEALTHY TOMORROW!

Topic: Sheep, Goat and Cattle Production in Guyana and the Caribbean

Sub-topic: Terminologies used in Sheep, Goat and Cattle Production in Guyana and the Caribbean

Activity 17.1: Map It, Match It, Bingo!

Group Activity: 4 to 5 students per group

Time: 30 Minutes



B	I	N	G	O
Calf	Ram	Weaning	Kid	Buck
Boë	Milk	Fomb	Buck	Hay
Heifer	Pasture	★	Dam	Pen
Wool	Searing	Gertening	Re-product.	Herd

PART A: CREATE LIVESTOCK CLASSIFICATION CONCEPT MAP

RESOURCES



Cardboard, Markers



INSTRUCTIONS

1. Teacher demonstrates by drawing a concept map on board and explains how each term connects.
2. Assigns an animal to each group:
   - Group 1: Cattle
   - Group 2: Sheep
   - Group 3: Goats
3. Each group creates a large concept map showing the information in table.

Animal	Common Group Name	Family	Genus	Species
Cattle 	Bovine	Bovidae	Bos	1. *Bos taurus* (European cattle) 2. *Bos indicus* (Zebu cattle)
	Ovine	Bovidae	Ovis	1. *Ovis aries*
Sheep 	Caprine	Bovidae	Capra	2. *Capra hircus*

PART B: LIVESTOCK VOCABULARY BINGO

RESOURCES



Bingo cards, tokens

INSTRUCTIONS

1. Teacher prepares Bingo cards containing livestock terms.
2. Reads definitions aloud.
3. Students cover the correct term.
4. First student to complete a row calls "Bingo!"

EXAMPLES OF BINGO CARDS

B	I	N	G	O
Calf	Ram	Milk	Weaning	Buck
Heifer	Wool	Pen	Boë	Boë
Hay	★	Pasture	Buck	Pasture
Weaning	Herd	By-product.	Caprine	By-product.
Herd	Yard	Fomb	Searing	Re-product.

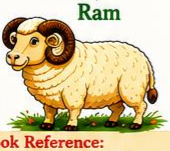


EXAMPLES OF DEFINITIONS AND TERMS

1. "A young goat." → **Kid**



2. "A mature male sheep." → **Ram**

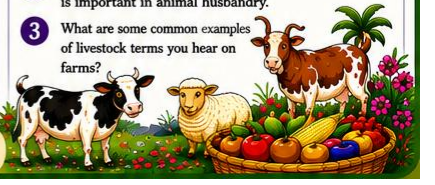


3. "The process of separating young animals from their mother's milk." → **Weaning**



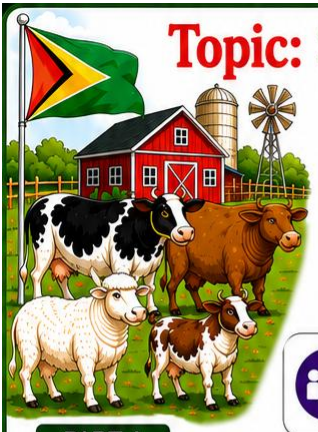
DISCUSSION

1. Why is classification important in livestock production?
2. Explain why accurate terminology is important in animal husbandry.
3. What are some common examples of livestock terms you hear on farms?



Textbook Reference:
Agricultural Science Book 3:
A Course for Secondary Schools in the Caribbean, 3rd Edition.

Topic: Sheep, Goat and Cattle Production in Guyana and the Caribbean

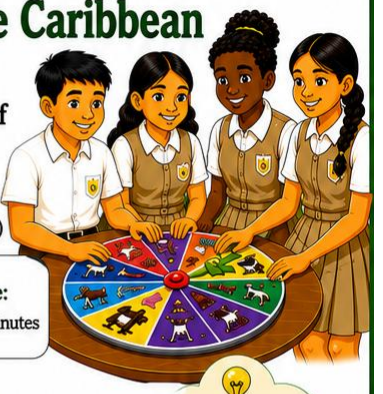


Sub-topic:

External Positions and Parts of Sheep, Goats, and Cattle

Activity 17.2:

Spin the Wheel (Spin, Point and Explain)



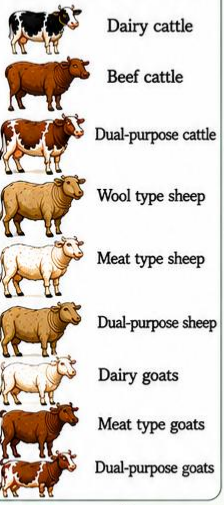
Group Activity: 4 to 5 students per group

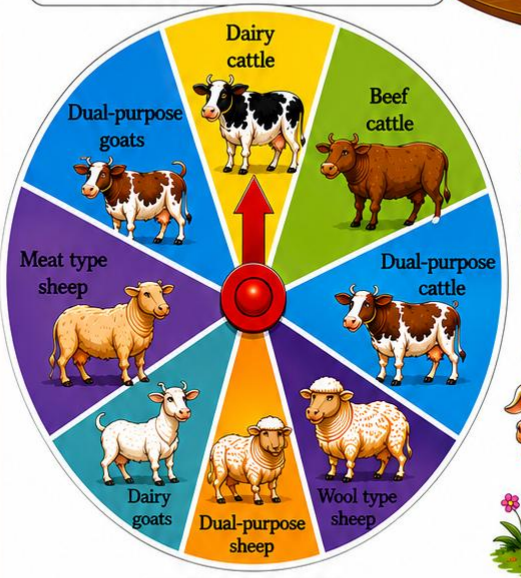
Time: 20 minutes

PART A

RESOURCES:

Spinner wheel divided into:





FUN FACT!

Did you know? Goats were one of the first animals domesticated by humans—over 10,000 years ago!



INSTRUCTIONS



Spinner Wheel

TEACHER:

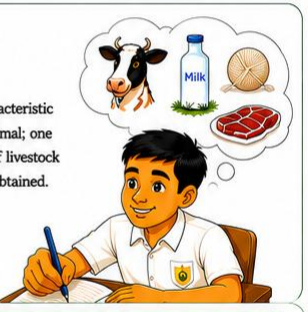
1. Open browser
2. Search for word wall and create a login
3. Click on create activity then on spin the wheel
4. Include activity title (Spin the Wheel)
5. Choose simple wheel
6. Input the types of sheep, goats and cattle (click on add item to include additional information)
7. Click done, start and spin it to play



STUDENTS:

1. Spin the wheel.
2. Describe one characteristic of each type of animal; one use of each type of livestock and one product obtained.

Wordwall



DISCUSSION



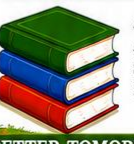
Why is it important for farmers to understand the functions of external body parts of livestock animals and know the positions of these parts?

DID YOU KNOW?

Cattle can have best friends and get stressed when separated!



TEXTBOOK REFERENCE



Agricultural Science Book 3: A Course for Secondary Schools in the Caribbean, 3rd Edition.



LEARN! UNDERSTAND! APPLY! – KNOWLEDGE TODAY, BETTER TOMORROW!

Topic: Sheep, Goat and Cattle Production in Guyana and the Caribbean

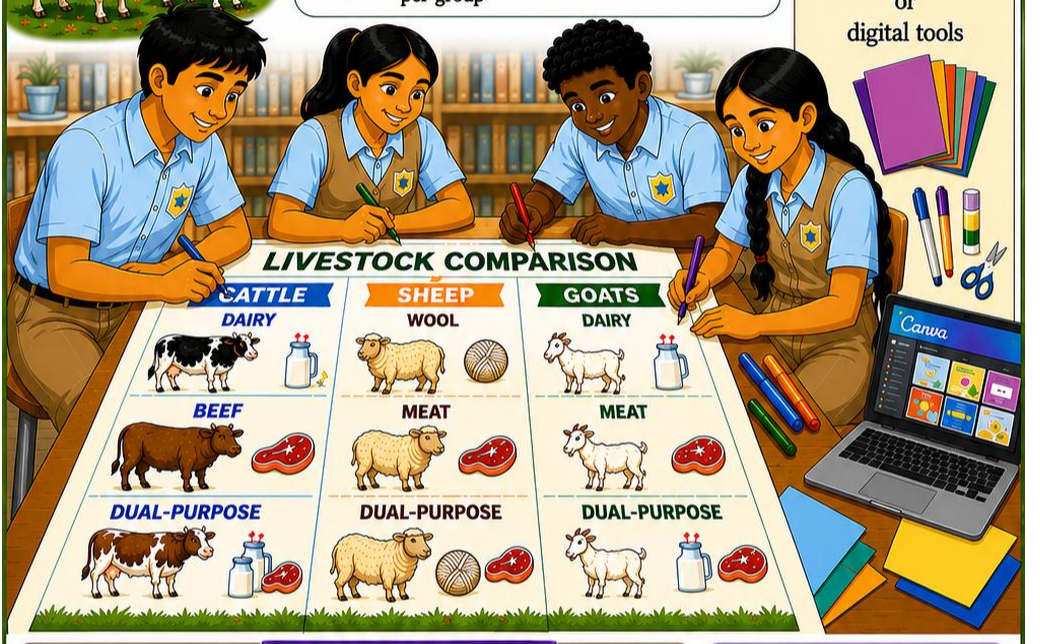
Sub-topic: Types of Sheep, Goats and Cattle

Activity 17.3: Create a Livestock Infographic

Group Activity: 4 to 5 students per group

Time: 30 Minutes

RESOURCES: Color cardboard or digital tools



INSTRUCTIONS

1. Students create an infographic comparing:
   - Dairy, beef, and dual-purpose cattle
   - Wool, meat, and dual-purpose sheep
   - Dairy, meat, and dual-purpose goats
2. Include pictures, icons, and key facts.

FUN FACT!

Sheep can recognize over 50 different faces of other sheep and remember them for years!

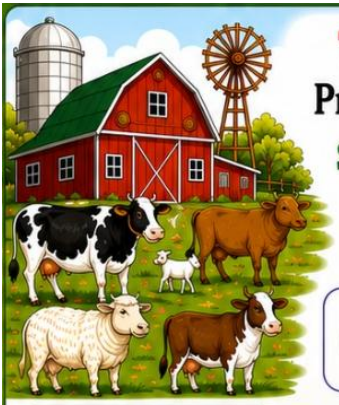
DISCUSSION

1. What is meant by the term "type" of livestock?
2. How do the products from these animals benefit our communities?
3. Which type of livestock would be most suitable for your community? Why?

TEXTBOOK REFERENCE

Agricultural Science Book 3: A Course for Secondary Schools in the Caribbean, 3rd Edition.

FARMERS TODAY, FEEDING TOMORROW!



Topic: Sheep, Goat and Cattle Production in Guyana and the Caribbean

Sub-topic: Breeds of Sheep, Goats and Cattle

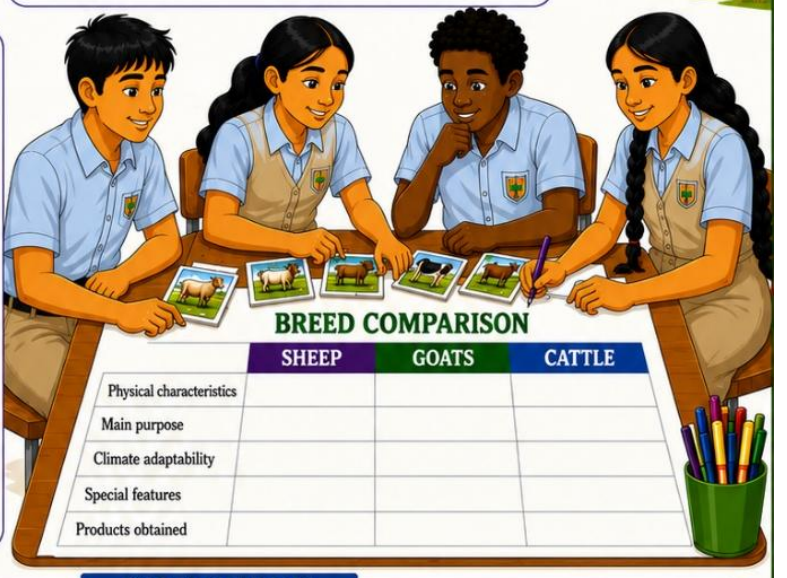
Activity 18.1: Compare and Contrast Breeds of Sheep, Goats and Cattle

Group Activity: 4 to 5 students per group

Time: 30 Minutes

RESOURCES:

1. Breed picture cards or printed photographs
2. Breed information sheets
3. Chart paper
4. Markers
5. Glue or tape
6. Comparison worksheet (optional)



BREED COMPARISON

	SHEEP	GOATS	CATTLE
Physical characteristics			
Main purpose			
Climate adaptability			
Special features			
Products obtained			

INSTRUCTIONS

1. Provide each group with pictures and information cards for the following breeds:

SHEEP


Barbados Black Belly


West African–Merino


Black-head Persian

CATTLE


Holstein


Jersey


Jamaican Hope

GOATS


British Alpine


Anglo-Nubian


Saanen


Toggenburg

Topic: Sheep, Goat and Cattle Production in Guyana and the Caribbean

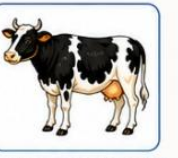
Sub-topic: Breeds of Sheep, Goats and Cattle

Activity 18.1: Compare and Contrast Breeds of Sheep, Goats and Cattle

INSTRUCTIONS

2 Each group selects one sheep breed, one goat breed, and one cattle breed to compare.





3 Using cardboard, students create a comparison table showing:

- Physical characteristics
- Main purpose
- Climate adaptability
- Special features
- Products obtained

4 Groups present their findings to the class and explain:

- Similarities among the breeds
- Differences among the breeds
- Which breed they would choose for farming in Guyana and why?



DISCUSSION

1. Why is it important to compare different breeds of sheep, goats and cattle?
2. What factors should farmers consider when choosing a breed for farming in Guyana?
3. How do the main purposes of these breeds meet the needs of farmers and consumers?
4. How does climate affect the production and performance of these breeds?
5. What are some challenges farmers might face when raising these breeds?

FUN FACT!

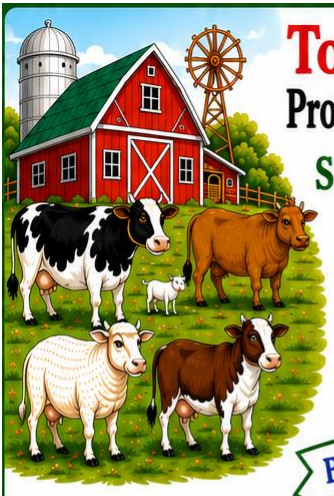


Goats have rectangular pupils that give them a wide panoramic view of their surroundings—almost 320 to 340 degrees!
This helps them spot predators from almost any direction!

TEXTBOOK REFERENCE



Agricultural Science Book 3: A Course for Secondary Schools in the Caribbean, 3rd Edition.



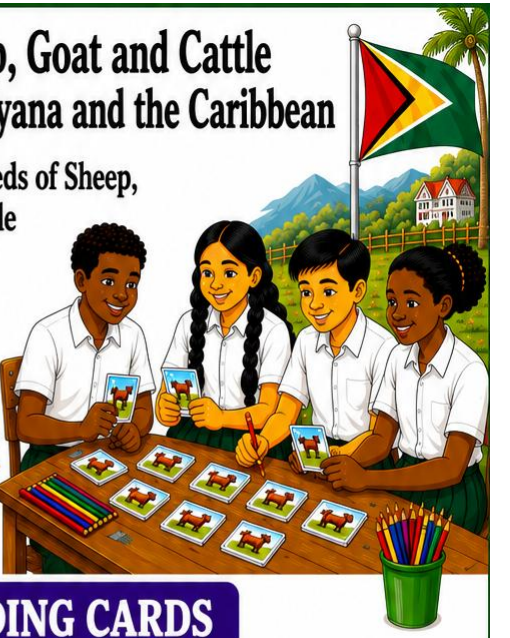
Topic: Sheep, Goat and Cattle Production in Guyana and the Caribbean

Sub-topic: Breeds of Sheep, Goats and Cattle

Activity 18.2:

Breed It!
Brand It!
Sell It!





PART A: LIVESTOCK TRADING CARDS

Individual Activity | Time: 20 minutes

RESOURCES

1. Index cards



2. Coloured pencils



3. Pictures of breeds of sheep, goats, cattle



INSTRUCTIONS

1. Students design trading cards for each breed of livestock. Cards should include:
   - Picture of breed
   - Origin
   - Characteristics
   - Products
   - Interesting fact
2. Students trade cards and quiz one another.

EXAMPLE OF TRADING CARD

JERSEY CATTLE



Origin: Jersey Island, Channel Islands

Characteristics: Light brown; small to medium size; docile; high milk fat

Products: Milk, beef

Interesting fact: Jersey cows produce milk that is rich in butterfat – great for cheese and butter!

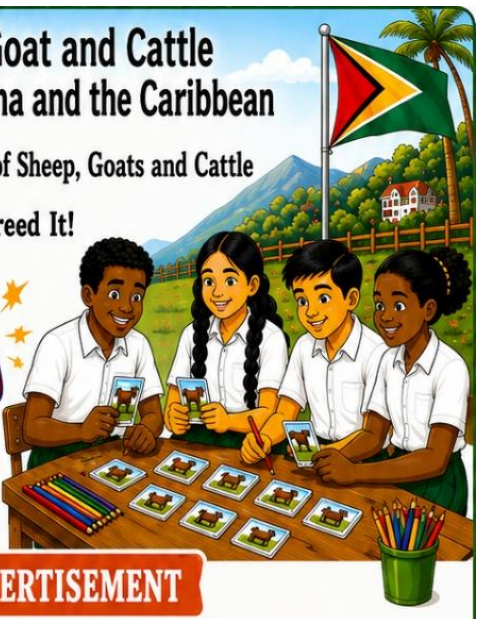
TOPIC: Sheep, Goat and Cattle Production in Guyana and the Caribbean

SUB-TOPIC: Breeds of Sheep, Goats and Cattle

ACTIVITY 18.2: Breed It!







PART B: CREATE A LIVESTOCK ADVERTISEMENT

Group Activity: 4 to 5 students per group | **Time:** 20 Minutes

RESOURCES


Chart paper


Markers


Coloured pencils


Glue or tape


Magazines or printed pictures (optional)


Scissors (optional)

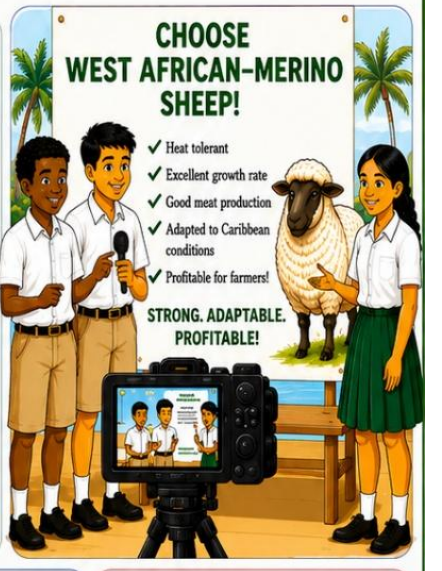
INSTRUCTIONS

1. Groups create an advertisement persuading farmers to choose a breed of sheep, goat or cattle.

Include:

- Breed characteristics
- Advantages
- Purpose
- Why it suits Caribbean conditions

2. Groups present their advertisements as TV commercials.



FUN FACT!

Cows have nearly 360° vision! They can see almost all around them except for a small blind spot right in front of their nose.



DISCUSSION

1. Why is it important to know the characteristics of different breeds of sheep, goat and cattle?
2. How do climate and environment in the Caribbean influence the breeds we choose to raise?



TEXTBOOK REFERENCE



Agricultural Science Book 3: A Course for Secondary Schools in the Caribbean, 3rd Edition.

Topic: Sheep, Goat and Cattle Production in Guyana and the Caribbean

Sub-topic: External Positions and Parts of Sheep, Goats, and Cattle

Activity 19.1: External Body Part Challenge "Pinpoint the Part"



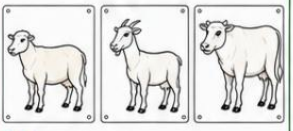


Group Activity: 4 to 5 students per group

Time: 25 minutes

RESOURCES

1. Large posters of sheep, goat, and cattle outlines

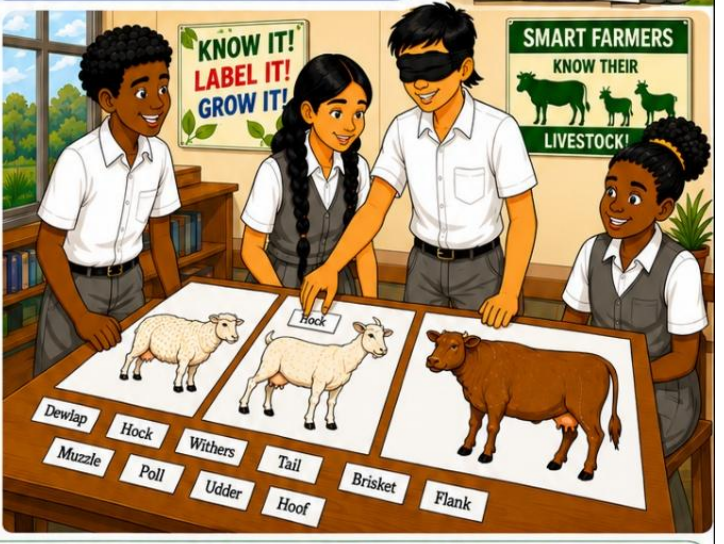


2. Labels of body parts

Muzzle	Poll	Withers
Brisket	Dewlap	Flank
Udder	Hock	Hoof
	Tail	

3. Tape
4. Blindfold (optional)





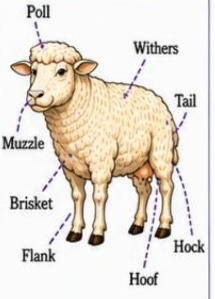
INSTRUCTIONS

1. Provide labels such as:

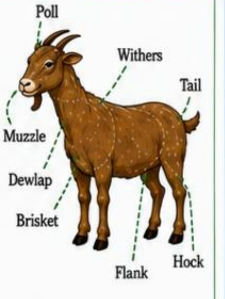
Muzzle	Poll	Withers
Brisket	Dewlap	Flank
Udder	Hock	Hoof
	Tail	

2. Students take turns placing the labels on the correct body part.
3. Teams earn points for correct placement.

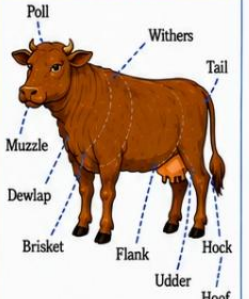
SHEEP



GOAT



CATTLE



DISCUSSION

Why is it important for farmers to know the external parts of livestock?



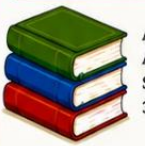
Understanding body parts helps farmers care for animals properly, detect problems early, and improve productivity.

FUN FACT!

A cow's nose print is unique, just like human fingerprints! No two cows have the same pattern.



TEXTBOOK REFERENCE



Agricultural Science Book 3: A Course for Secondary Schools in the Caribbean, 3rd Edition.



Topic: Sheep, Goat and Cattle Production in Guyana and the Caribbean

Sub-topic: External Positions and Parts of Sheep, Goats, and Cattle

Activity 19.2: Spin the Wheel (Spin, Point and Explain)



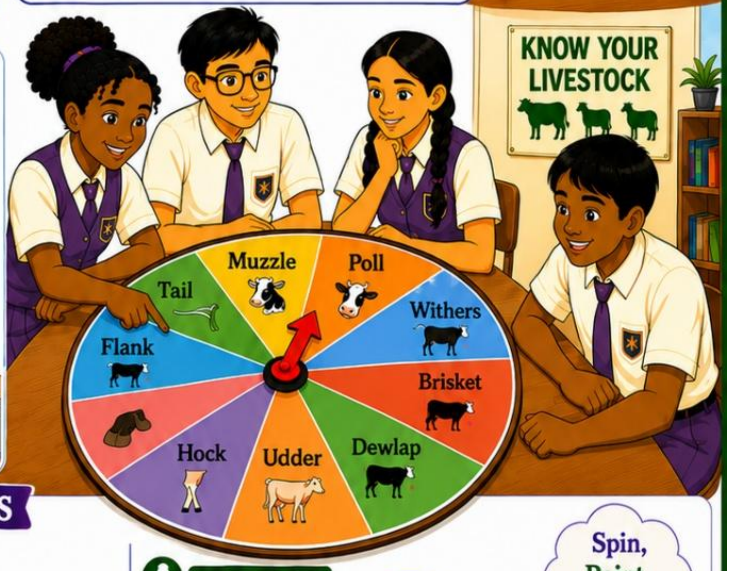
Group Activity: 4 to 5 students per group

Time: 20 minutes

RESOURCES

1. Spinner with external body parts of cattle, sheep and goats





INSTRUCTIONS

TEACHER:

1. Open browser
2. Search for word wall and create a login
3. Click on create activity then on spin the wheel
4. Include activity title (Spin the Wheel: External Body Parts)
5. Choose simple wheel
6. Input the names of external body parts (click on add item to include additional body parts)
7. Click done, start and spin it to play



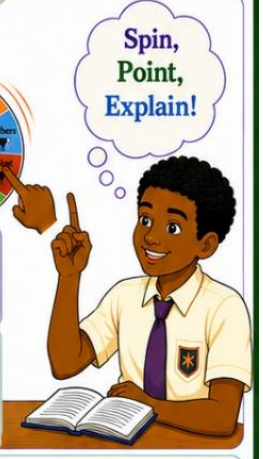
Wordwall

STUDENTS:

1. Spin the wheel.

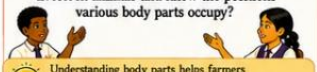


2. State:
   - Function of body part (example the udder produces, stores, and secretes milk to nourish calves.)
   - Position on the animal's body that the external parts occupy (dorsal, ventral, anterior, posterior, lateral, medial)



DISCUSSION

Why is it important for farmers to understand the functions of external body parts of livestock animals and know the positions various body parts occupy?

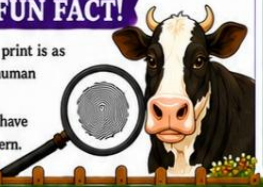


Understanding body parts helps farmers make better management decisions, improve animal health and welfare, increase productivity and ensure safety.

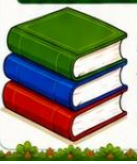
FUN FACT!

A cow's nose print is as unique as a human fingerprint!

No two cows have the same pattern.



TEXTBOOK REFERENCE



Agricultural Science Book 3: A Course for Secondary Schools in the Caribbean, 3rd Edition.

Topic: Sheep, Goat and Cattle Production in Guyana and the Caribbean

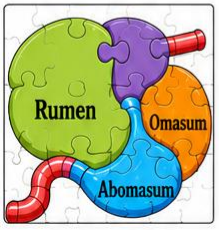
Sub-topic: Digestion in Sheep, Goats and Cattle

Activity 20.1: Ruminant Stomach Puzzle Challenge

Group Activity: 4 to 5 students per group

Time: 20 minutes

RESOURCES:

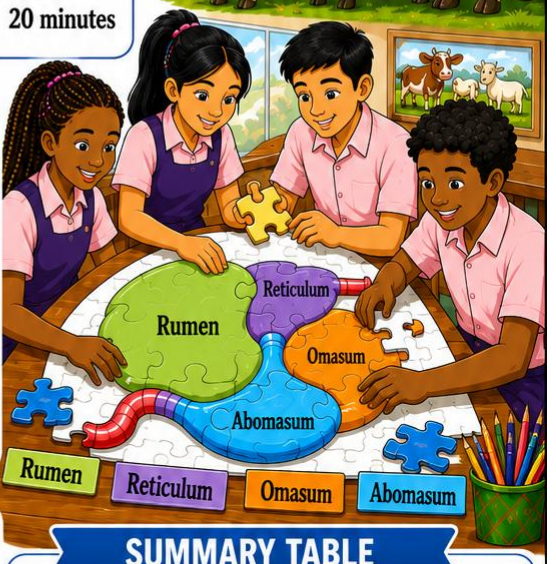


Puzzle of the ruminant stomach

- Rumen
- Reticulum
- Omasum
- Abomasum

Labels

Scissors



INSTRUCTIONS:

1. Print and cut the puzzle.
2. Groups assemble the ruminant stomach puzzle.
3. Label the compartments.
4. Write one function of each compartment.
5. First group to finish wins.

SUMMARY TABLE

COMPARTMENT OF RUMINANT STOMACH	FUNCTION
Rumen	Fermentation and digestion of cellulose by microbes
Reticulum	Forms cud and traps foreign materials
Omasum	Absorbs water and nutrients
Abomasum	Digests food using enzymes and acids

DISCUSSION

1. Discuss how each compartment helps the animal to get energy from grass and other feed.
2. Why is the ruminant stomach so important for sheep, goats and cattle?



FUN FACT!

A cow can spend **6 to 8 hours** a day chewing its cud! That's almost a third of its time just re-chewing food for better digestion.



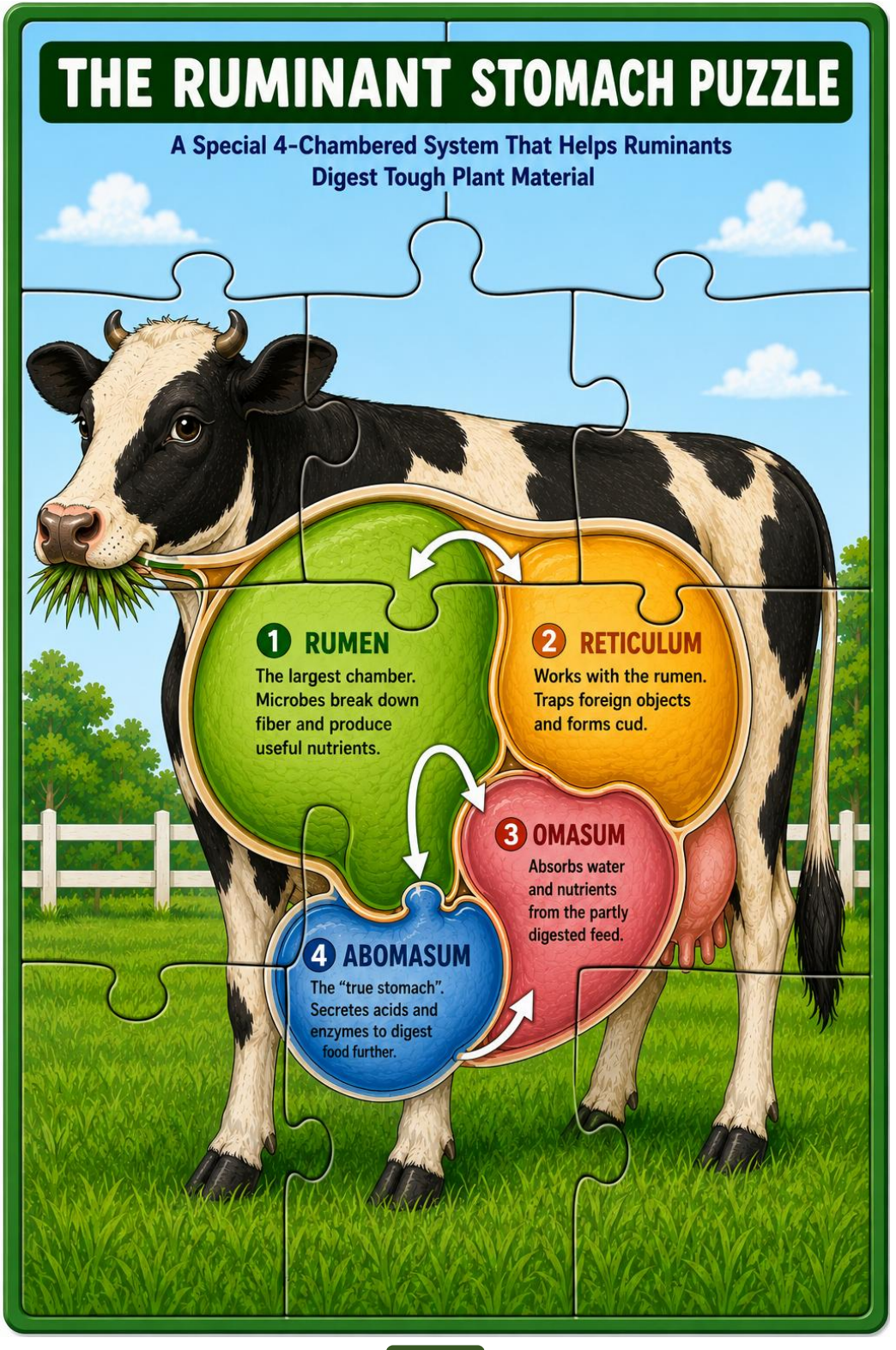
TEXTBOOK REFERENCE:



Agricultural Science Book 3: A Course for Secondary Schools in the Caribbean, 3rd Edition.

THE RUMINANT STOMACH PUZZLE

A Special 4-Chambered System That Helps Ruminants Digest Tough Plant Material



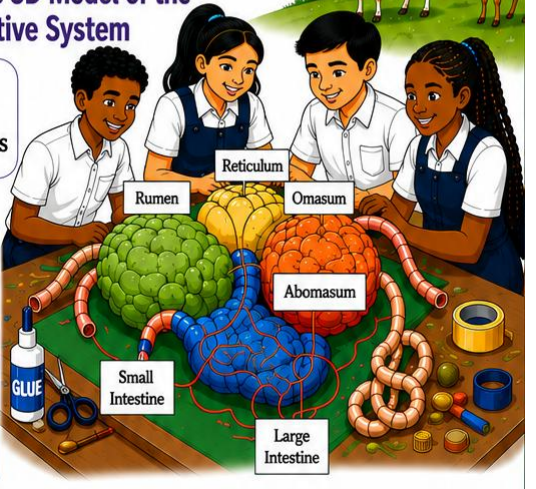
Topic: Sheep, Goat and Cattle Production in Guyana and the Caribbean

Sub-topic: Digestion in Sheep, Goats and Cattle

Activity 20.2: Create 3D Model of the Ruminant Digestive System

Group Activity: 4 to 5 students per group

Time: 45 minutes



RESOURCES

1. Labels (index cards, both picks, markers)
2. Glue
3. Arrows
4. Cardboard or foam board (base)
5. Balloons
6. Clay or play dough
7. Recycled materials (plastic bottles, paper, egg cartons)
8. String or yarn
9. Glue or tape
10. Markers or paint
11. Scissors

INSTRUCTIONS

Groups will create a large 3D model showing:

1. The four compartments of the stomach of a ruminant
2. Food movement
3. Digestive functions

STEP 1: PLAN THE LAYOUT

1. Draw a rough sketch of the ruminant digestive system on paper.
2. Decide where each digestive organ will be placed on the base.
3. Ensure there is enough space for all four stomach compartments and labels.

STEP 3: ADD OTHER DIGESTIVE ORGANS

Create and attach:

- Mouth (where food enters)
- Esophagus (tube connecting the mouth to the stomach)
- Small intestine (long coiled structure made from string or yarn)
- Large intestine (thicker coiled structure leading to the rectum)

STEP 2: CREATE THE FOUR STOMACH COMPARTMENTS

Construct the four compartments using balloons, clay, or recycled materials.

1. **Rumen** – Make the largest compartment using a large balloon or ball of clay. Place it on the left side of the model.
   Label: Rumen
   Function: Fermentation and breakdown of fibre by microorganisms.
2. **Reticulum** – Create a small pouch-like structure attached to the rumen.
   Label: Reticulum
   Function: Forms cud and traps foreign materials.
3. **Omasum** – Use folded cardboard or clay to represent the many folds ("pages") of the omasum.
   Label: Omasum
   Function: Absorbs water and nutrients.
4. **Abomasum** – Create an elongated or curved shape using clay or a balloon.
   Label: Abomasum
   Function: The true stomach where enzymes digest food.

Topic: Sheep, Goat and Cattle Production in Guyana and the Caribbean

Sub-topic: Digestion in Sheep, Goats and Cattle

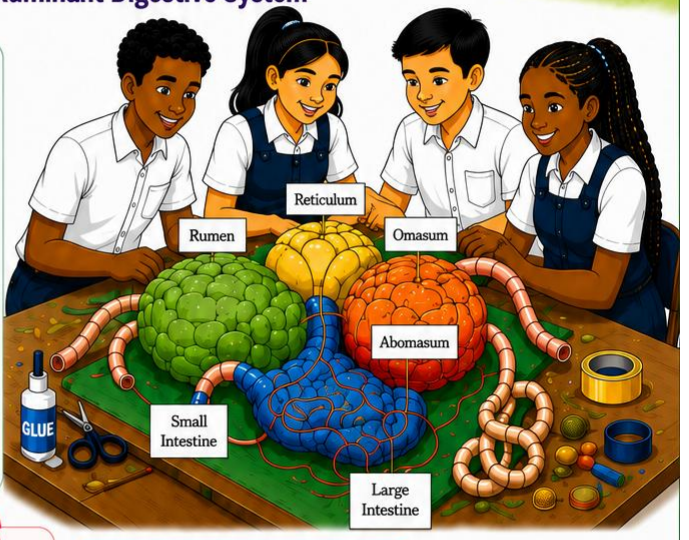
Activity 20.2: Create 3D Model of the Ruminant Digestive System

STEP 4: SHOW FOOD MOVEMENT

1. Use arrows made from paper or markers to show the path of food:

   Mouth → Esophagus → Rumen → Reticulum → Omasum → Abomasum → Small Intestine → Large Intestine

2. Use different colors to distinguish:
   - First swallowing (green)
   - Regurgitation (yellow)
   - Final digestion (blue)



STEP 5: LABEL EACH STRUCTURE

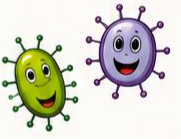
Attach labels to:

Mouth	Esophagus	Rumen
Reticulum	Omasum	Abomasum
Small Intestine	Large intestine	

Include a brief function on each label.

STEP 6: DECORATE THE MODEL

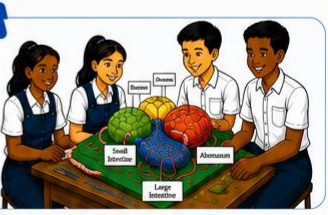
1. Colour-code each stomach compartment.
2. Add drawings of microorganisms in the rumen.
3. Include arrows showing cud movement.
4. Make the model neat and attractive.



STEP 7: PRESENT THE MODEL

Each group will explain:

1. The order in which food moves through the digestive system.
2. The function of each stomach compartment.
3. The process and importance of rumination.



DISCUSSION



1. Why is it important for ruminants to have four stomach compartments?
2. How does rumination help in the digestion of plant material?
3. What would happen if one of the stomach compartments does not function properly?

SUGGESTED COLOUR KEY

1. Rumen – Green
2. Reticulum – Yellow
3. Omasum – Orange
4. Abomasum – Red
5. Intestines – Blue



FUN FACT!

A cow can chew cud for 6–8 hours each day, helping it digest tough plant materials efficiently!



TEXTBOOK REFERENCE:
Agricultural Science Book 3: A Course for Secondary Schools in the Caribbean, 3rd Edition.

Topic: Sheep, Goat and Cattle Production in Guyana and the Caribbean

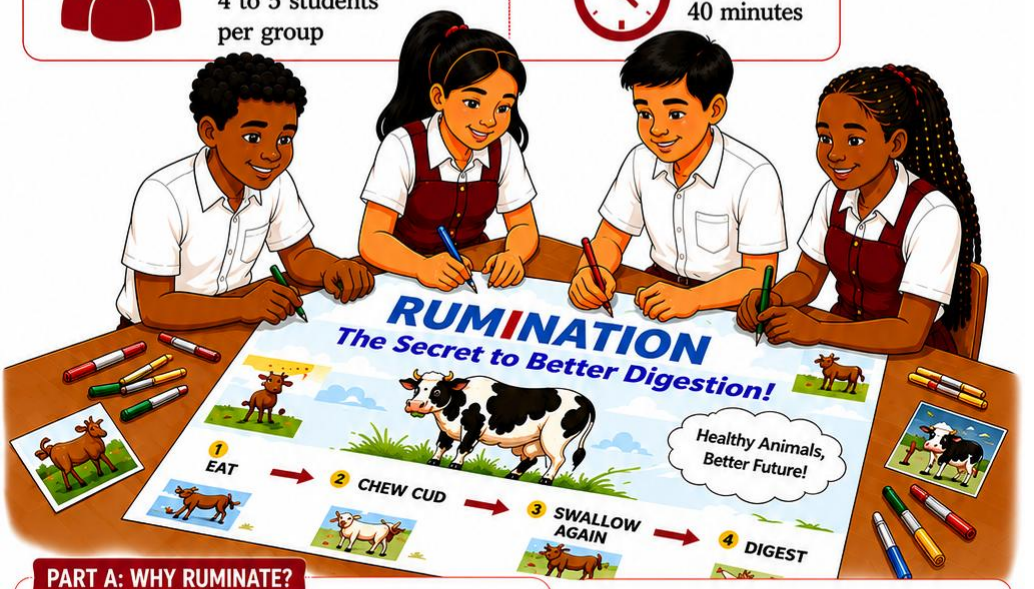
Sub-topic: Digestion in Sheep, Goats and Cattle

Activity 20.3: Ruminate and Create Jingle and Poster Competition



Group Activity: 4 to 5 students per group

Time: 40 minutes



PART A: WHY RUMINATE?

POSTER COMPETITION

RESOURCES

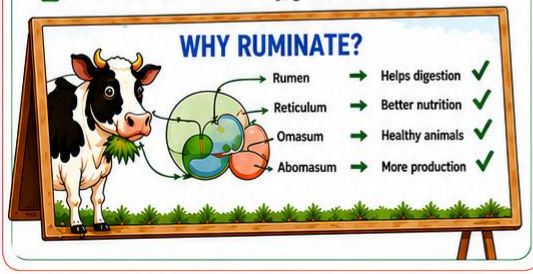
1. Cardboard
2. Markers
3. Pictures of ruminants



INSTRUCTIONS

Groups create a poster explaining:

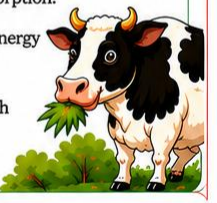
1. The process of rumination
2. The importance of rumination
3. Benefits of rumination to sheep, goats, and cattle



SUGGESTED POINTS FOR POSTERS

Rumination:

1. Allows animals to digest fibrous feeds such as grass.
2. Allows efficient use of roughage.
3. Improves nutrient absorption.
4. Helps animals obtain energy from cellulose.
5. Supports animal growth and production.



TIPS FOR CREATING POSTER



Topic: Sheep, Goat and Cattle Production in Guyana and the Caribbean

Sub-topic: Digestion in Sheep, Goats and Cattle

Activity 20.3: Ruminate and Create Jingle and Poster Competition



Group Activity:
4 to 5 students per group

Time:
40 minutes



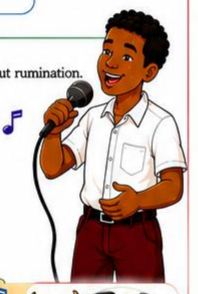
PART B: RUMINATION JINGLE

RESOURCES

1. Paper for writing jingles
2. Pens

INSTRUCTIONS

1. Groups compose a short jingle, rap, or song about rumination.
2. The jingle should include:
   - The stages of rumination
   - Why rumination is important
   - The role of microbes in digestion
3. Groups perform their jingle while presenting their poster to the class.



EXAMPLE:

"Eat it quick, don't delay,
Send it back to chew today!
Rumen, reticulum on the go,
Better digestion helps us grow!"

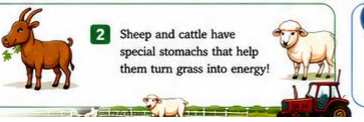


TIPS FOR CREATING JINGLE

1. **Keep it short and catchy.**
   Use simple words and a repeating phrase or chorus.
2. **Include key facts.**
   Mention the stages of rumination, why it's important, and the role of microbes.
3. **Use rhythm and rhyme.**
   Make it fun to sing or rap by using rhyming words and a good beat.
4. **Be creative!**
   Add actions, sounds, or a dance to make your jingle exciting.
5. **Practice and perform with pride.**
   Speak or sing clearly and with confidence.

FUN FACTS!

1. Goats are excellent browsers and can eat over 50 different types of plants!
2. Sheep and cattle have special stomachs that help them turn grass into energy!



TEXTBOOK REFERENCE:

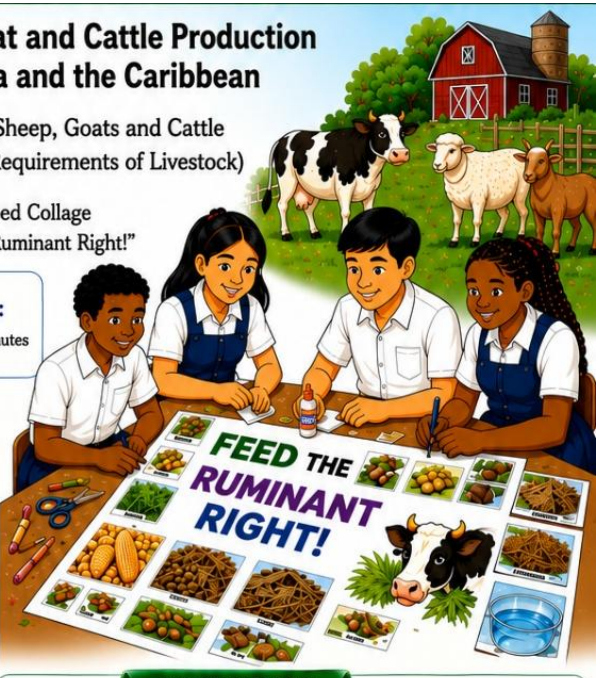
Agricultural Science Book 3: A Course for Secondary Schools in the Caribbean, 3rd Edition.



Topic: Sheep, Goat and Cattle Production in Guyana and the Caribbean

Sub-topic: Digestion in Sheep, Goats and Cattle (Nutritional Requirements of Livestock)

Activity 20.4: Create a Feed Collage "Feed the Ruminant Right!"



Group Activity: 4 to 5 students per group

Time: 30 minutes

RESOURCES

1. Chart paper (cardboard)
2. Scissors
3. Glue
4. Markers or coloured pencils
5. Ruler
6. Pictures or samples of livestock feed materials:
   - Grass
   - Legumes (e.g. kudzu, stylo)
   - Hay
   - Corn
   - Bran
   - Molasses
   - Salt lick
   - Mineral blocks
   - Clean water
   - Commercial feed

INSTRUCTIONS

TEACHER:

1. Gather pictures or samples of various feeds fed to ruminants.
2. Prepare labels for the nutrient groups: Carbohydrates, Protein, Fats, Minerals, Vitamins, Water
3. Display or review the functions of each nutrient before the activity.

STUDENTS:

Step 1: Create the Collage Layout: divide the chart paper into six sections:

1. Carbohydrates
2. Protein
3. Fats
4. Minerals
5. Vitamins
6. Water

Alternatively, students can draw a large sheep, goat, or cow in the center and arrange the nutrients around it.

Step 2: Sort and Paste Feed Pictures: cut out or use pictures provided and place them under the correct nutrient section.

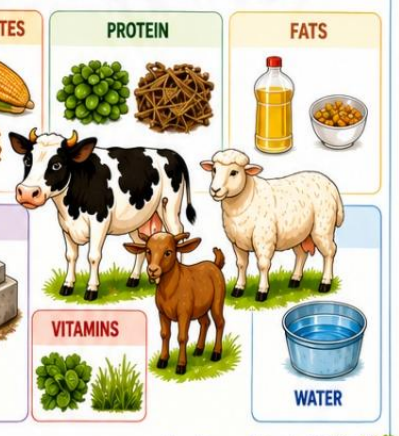
Example:

Nutrient	Feed Sources
Carbohydrates	Grass, corn, molasses, bran
Protein	Legumes, commercial feed
Minerals	Salt lick, mineral block
Fats	Soyabean oil
Vitamins	Green forage, fresh pasture
Water	Clean drinking water

Step 3: Identify the Functions: under each nutrient, students write its function.

Example:

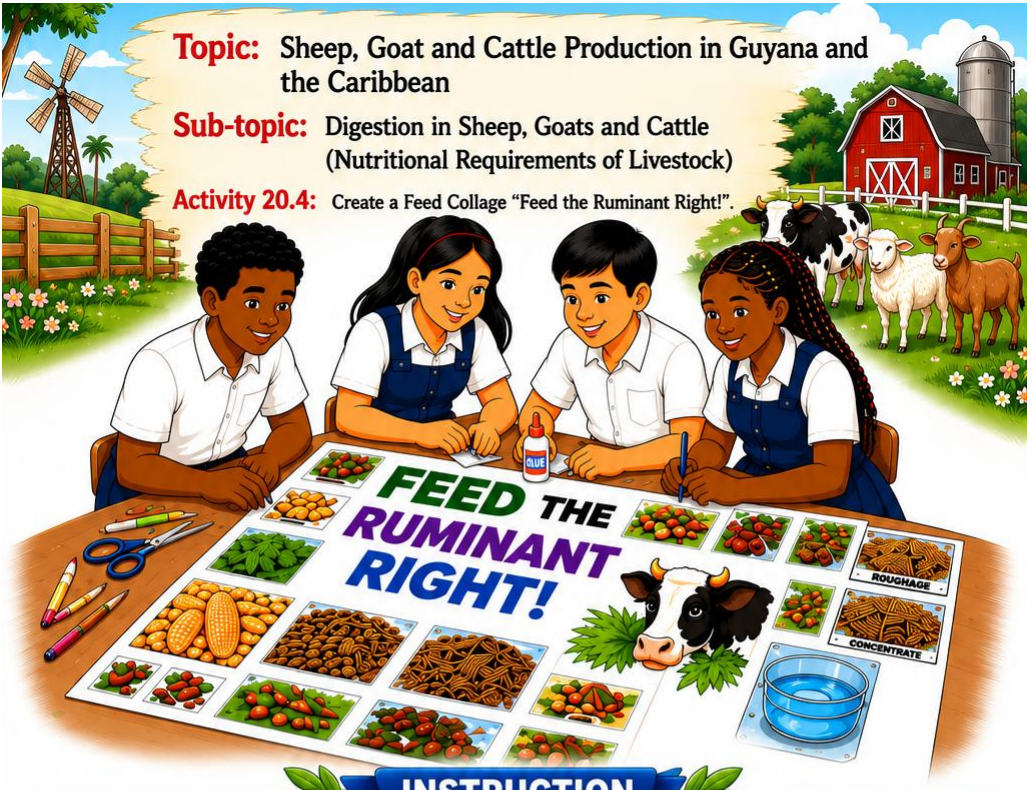
Nutrient	Function
Carbohydrates	Provides energy for movement and growth
Protein	Builds muscles and repairs tissues
Fats	Lowers metabolic heat production during digestion, reducing heat stress
Minerals	Strengthens bones and teeth
Vitamins	Maintains health and body functions
Water	Aids digestion and nutrient transport



Topic: Sheep, Goat and Cattle Production in Guyana and the Caribbean

Sub-topic: Digestion in Sheep, Goats and Cattle (Nutritional Requirements of Livestock)

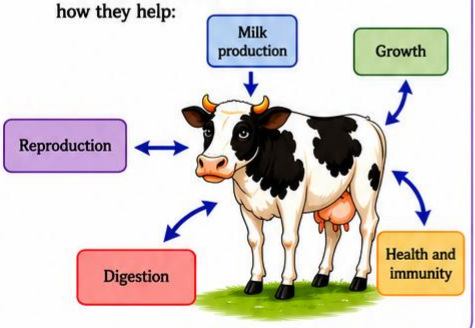
Activity 20.4: Create a Feed Collage "Feed the Ruminant Right!".



INSTRUCTION

4 ADD ANIMAL CONNECTIONS.

Draw arrows from nutrients to the animal and explain how they help:



5 CREATE A SLOGAN.

Each group creates a catchy slogan for their collage.

Example: 'Healthy Feed, Healthy Herd!'



DISCUSSION



Discuss how balanced nutrition improves growth, milk production, reproduction, health and productivity of ruminants.

TIPS FOR CREATING COLLAGE

1. Use clear, bright pictures.
2. Label each nutrient section clearly.
3. Write short, neat captions.
4. Be creative and colourful.
5. Work together and share ideas.



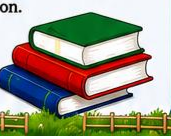
FUN FACT!

Ruminants can eat tough plant materials like grass because of the microbes in their rumen that break down fibre!



TEXTBOOK REFERENCE

Agricultural Science Book 3: A Course for Secondary Schools in the Caribbean, 3rd Edition.

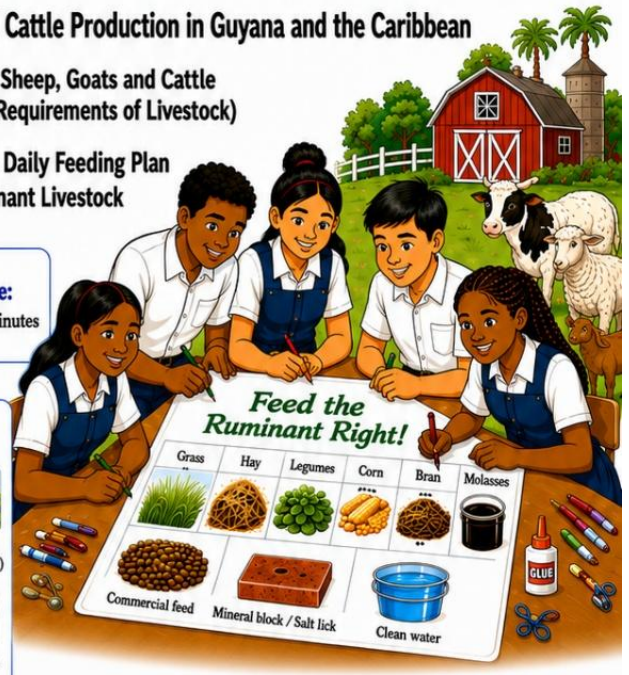




Topic: Sheep, Goat and Cattle Production in Guyana and the Caribbean

Sub-topic: Digestion in Sheep, Goats and Cattle (Nutritional Requirements of Livestock)

Activity 20.5: Design a Daily Feeding Plan for Ruminant Livestock



Group Activity: 4 to 5 students per group

Time: 30 minutes

RESOURCES

1. Chart paper or feeding plan worksheet
2. Markers
3. Feed information cards
4. Ruler
5. Glue (optional)
6. Feed Samples/Pictures:



PART A – INSTRUCTIONS

1 STEP 1: ASSIGN AN ANIMAL

Each group is assigned an animal at a different developmental stage.

Examples:



2 STEP 2: DETERMINE NUTRITIONAL NEEDS

Groups discuss the nutrients their animal needs most.

Examples:

Animal	Important Nutrients Needed
Dairy Cow	Carbohydrates, protein, water, minerals
Pregnant Ewe	Protein, minerals, vitamins
Growing Kid Goat	Protein, carbohydrates, minerals
Beef Cattle	Carbohydrates, protein
Lactating Doe	Protein, water, minerals

3 STEP 3: SELECT FEEDS

Groups choose feeds that supply the required nutrients.

Feed Guide

Feed	Nutrient Supplied
Grass	Carbohydrates, vitamins
Hay	Fibre, carbohydrates
Legumes	Protein
Corn	Carbohydrates
Bran	Carbohydrates
Molasses	Carbohydrates
Mineral block	Minerals
Water	Water
Commercial feed	Protein and Carbohydrates

4 STEP 4: CREATE A DAILY FEEDING SCHEDULE

Groups design a feeding timetable.

Sample Feeding Plan for a Dairy Cow

Time	Feed	Nutrient Supplied
Morning	Fresh pasture grass	carbohydrates, vitamins
Morning	Commercial concentrate	Protein, carbohydrates
Afternoon	Hay	Fibre, carbohydrates
Evening	Legumes	Protein
All day	Water and mineral block	Water, minerals

5 STEP 5: EXPLAIN THEIR CHOICES



Groups answer:

1. Why did you choose these feeds?
2. Which nutrients are provided?
3. What could happen if one nutrient is missing?

6 STEP 6: PRESENTATION

Groups present their feeding plan to the class.

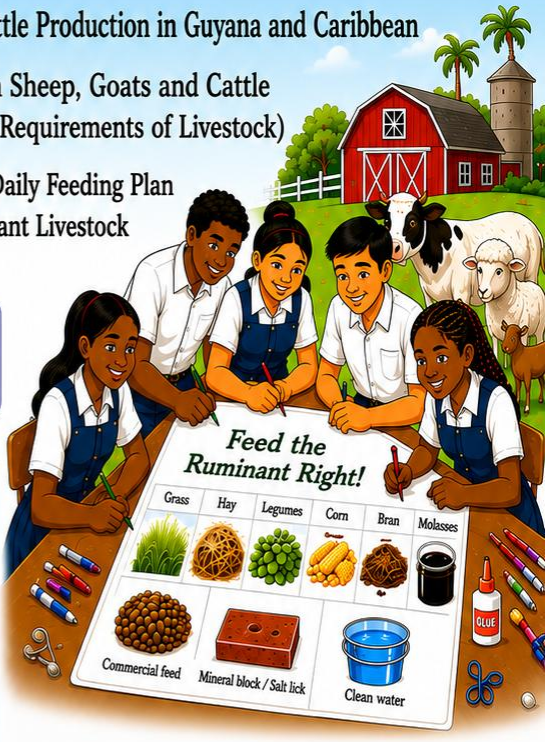
They should explain:



Topic: Sheep, Goat and Cattle Production in Guyana and Caribbean

Sub-topic: Digestion in Sheep, Goats and Cattle (Nutritional Requirements of Livestock)

Activity 20.5: Design a Daily Feeding Plan for Ruminant Livestock



Group Activity: 4 to 5 students per group

Time: 30 minutes

RESOURCES

1. Chart paper or feeding plan worksheet
2. Markers
3. Feed information cards
   - Grass
   - Carbohydrates
   - Energy
4. Ruler
5. Glue (optional)
6. Feed Samples/Pictures:
   - Fresh grass or pasture
   - Hay
   - Legumes (e.g., kudzu)
   - Corn
   - Rice bran or wheat bran
   - Molasses
   - Commercial feed
   - Salt lick/ mineral block
   - Clean water

PART B – CHALLENGE CARDS

Teacher gives groups a challenge such as:

1. Your area is experiencing drought. What feed alternatives can be used?
2. Your dairy cow's milk production has decreased. How would you improve the diet?
3. Feed prices have increased. Suggest cheaper local feed sources.

DISCUSSION QUESTIONS

1. Why do different animals require different diets?
2. Why should clean water always be available?
3. How does proper feeding improve livestock production?

FUN FACT!

The microbes in a ruminant's rumen work better when the animal is fed a balanced diet containing all the essential nutrients!

TEXTBOOK REFERENCE

Agricultural Science Book 3: A Course for Secondary Schools in the Caribbean, 3rd Edition.

Topic: Sheep, Goat and Cattle Production in Guyana and the Caribbean

Sub-topic: Definition and Terms used in Reproduction in Sheep, Goats and Cattle Production



Activity 21.1: Wordsearch Puzzle

Pair Activity | **Time: 20 minutes**

RESOURCES

1. Wordsearch puzzle
2. Pens

INSTRUCTIONS

1. Students will find reproduction terms used in sheep, goat and cattle production.
2. The first pair to complete the puzzle correctly wins.

KEY TERMS TO COVER

1. Reproduction
2. Fertilization
3. Gestation
4. Puberty
5. Estrus (Heat)
6. Ovulation
7. Mating
8. Parturition
9. Lactation
10. Weaning
11. Breeding
12. Artificial Insemination (AI)
13. Conception
14. Pregnancy
15. Castration

WORDSEARCH PUZZLE

R	E	P	R	O	D	U	C	T	I	O	N	X
F	E	R	T	I	L	I	Z	A	T	I	O	N
G	E	S	T	A	T	I	O	N	B	V	C	P
P	U	B	E	R	T	Y	E	S	T	R	U	S
O	V	U	L	A	T	I	O	N	M	A	T	I
P	A	R	T	U	R	I	T	I	O	N	L	A
L	A	C	T	A	T	I	O	N	W	E	A	N
B	R	E	E	D	I	N	G	A	I	N	S	E
C	O	N	C	E	P	T	I	O	N	R	G	M
P	R	E	G	N	A	N	C	Y	T	H	I	N
C	A	S	T	R	A	T	I	O	N	Z	Q	X

These terms are essential for understanding the reproductive processes that contribute to successful breeding and the maintenance of healthy livestock.



DISCUSSION

1. Why is reproduction important in sheep, goat and cattle production?
2. How do these reproductive processes contribute to successful breeding?
3. What are some good reproduction practices farmers should follow?
4. How can poor reproduction management affect livestock productivity?



FUN FACT!

A cow's gestation period is about **9 months**—just like humans!



TEXTBOOK REFERENCE



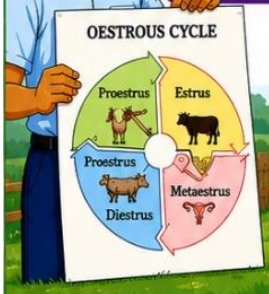
Agricultural Science Book 3: A Course for Secondary Schools in the Caribbean, 3rd Edition.

GOOD REPRODUCTION PRACTICES TODAY, STRONG AND PRODUCTIVE HERDS TOMORROW!

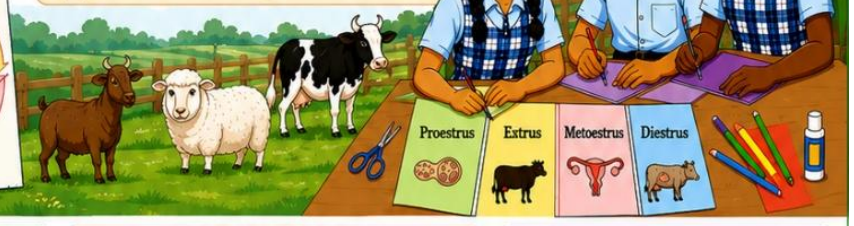
Topic: Sheep, Goat and Cattle Production in Guyana and the Caribbean

Sub-topic: Definition and Terms used in Reproduction in Sheep, Goats and Cattle Production

Activity 21.2: Oestrous Cycle Foldable and Comparison Chart



Pair Activity | Time: 20 minutes



RESOURCES

- Colour cardboard
- Markers or coloured pencils
- Ruler
- Scissors
- Glue
- Reference sheets or textbooks

INSTRUCTIONS

Part A: Create an Oestrous Cycle Foldable

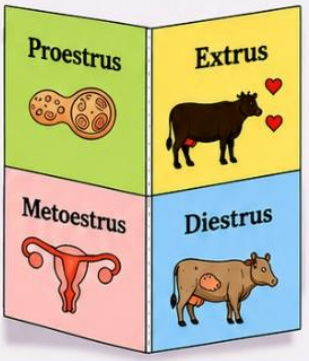
1. Fold cardboard into four equal sections.
2. Label each flap with one stage of the oestrous cycle:

Proestrus | Extrus | Metoestrus | Diestrus

3. Under each flap, write:

- A definition of the stage
- What happens during the stage
- A simple drawing or symbol representing the stage

HOW YOUR FOLDABLE SHOULD LOOK



Stage	What Happens?
Proestrus	Follicles develop and hormones prepare the animal for heat.
Estrus	The female is in heat, receptive to mating, and ovulation occurs.
Metoestrus	The corpus luteum forms after ovulation.
Diestrus	Pregnancy may occur or the cycle begins again if fertilization does not occur.

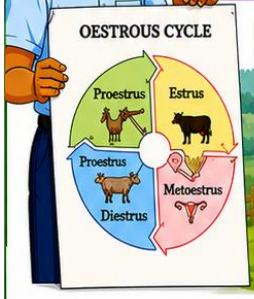


KNOW THE CYCLE, IMPROVE BREEDING, BUILD A STRONGER FUTURE!

Topic: Sheep, Goat and Cattle Production in Guyana and the Caribbean

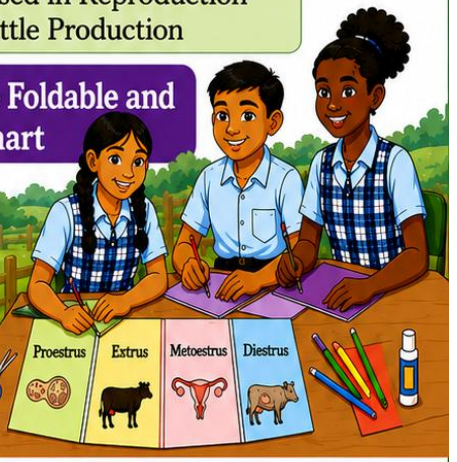
Sub-topic: Definition and Terms used in Reproduction in Sheep, Goats and Cattle Production

Activity 21.2: Oestrous Cycle Foldable and Comparison Chart



Group Activity: 4 to 5 students per group

Time: 35 minutes



INSTRUCTIONS

Part B: Compare the Oestrous Cycles

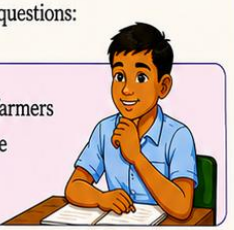
1. On the back of the foldable, create a comparison chart.

Animal	Average Cycle Length	Signs of Heat
Sheep	18–21 days	Tail wagging, seeking males, restlessness
Goat	18–21 days	Bleating, tail wagging, swollen vulva
Cattle	21 days	Mounting, standing heat, mucus discharge

Part C: Analyze and Discuss

Groups answer the following questions:

1. Why is it important for farmers to know the length of the oestrous cycle?



2. During which stage should breeding occur?





FUN FACT!

A cow's oestrous (heat) cycle is about **21 days**, but she shows heat for only **12–18 hours!**



TEXTBOOK REFERENCE

Agricultural Science Book 3: A Course for Secondary Schools in the Caribbean, 3rd Edition.

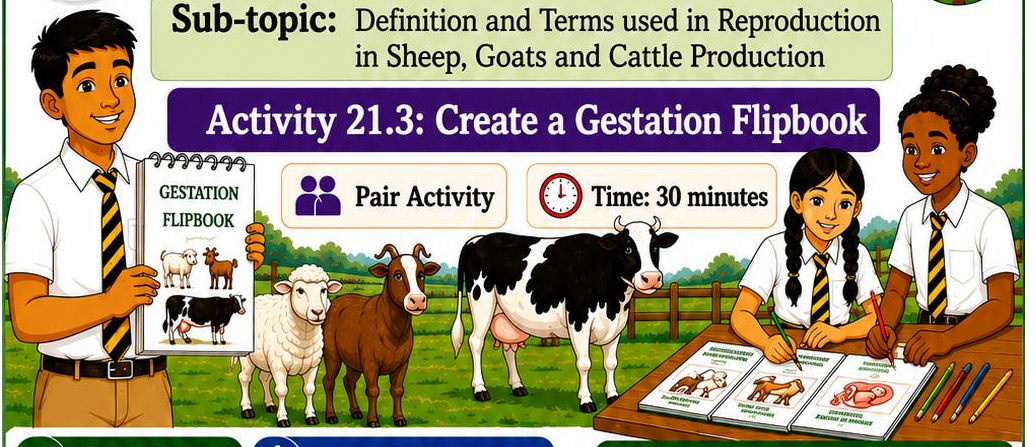


KNOW THE CYCLE, IMPROVE BREEDING, BUILD A STRONGER FUTURE!

Topic: Sheep, Goat and Cattle Production in Guyana and the Caribbean

Sub-topic: Definition and Terms used in Reproduction in Sheep, Goats and Cattle Production

Activity 21.3: Create a Gestation Flipbook



RESOURCES

- 4–6 sheets of paper or cardboard
- Stapler or glue
- Coloured pencils or markers
- Scissors
- Ruler
- Reference sheets or textbooks
- Pictures, stickers or symbols

INSTRUCTIONS

1. Students create a flipbook outlining:
   - Definition for gestation.
   - Gestation periods of sheep, goats, and cattle.
   - The stages of gestation and the changes that occur during each stage (Early Gestation, Mid Gestation and Late Gestation)
   - The Birth process (Parturition)
2. Colour-code each stage:
   - Early = Green
   - Mid = Yellow
   - Late = Red
3. Add arrows showing fetal development.
4. Include pictures, stickers or symbols.

YOUR FLIPBOOK COULD LOOK LIKE THIS!

WHAT IS GESTATION?

Gestation is the period of pregnancy from conception to birth.

DEFINITION

GESTATION PERIOD

- **Sheep:** 145–147 days (5 months)
- **Goat:** 150–152 days (5 months)
- **Cattle:** 280–282 days (9 months)

PERIOD

STAGES OF GESTATION

EARLY (0–1/3)	MID (1/3–2/3)	LATE (2/3–BIRTH)
Embryo develops. Organs begin to form.	Fetus grows rapidly. Body systems develop.	Fetus grows larger and prepares for birth.

STAGES

BIRTH PROCESS (PARTURITION)

The animal goes into labour and gives birth to the young.

BIRTH

EXAMPLE: FETAL DEVELOPMENT (USE ARROWS)

SHEEP	→ → → → →
GOAT	→ → → → →
CATTLE	→ → → → →

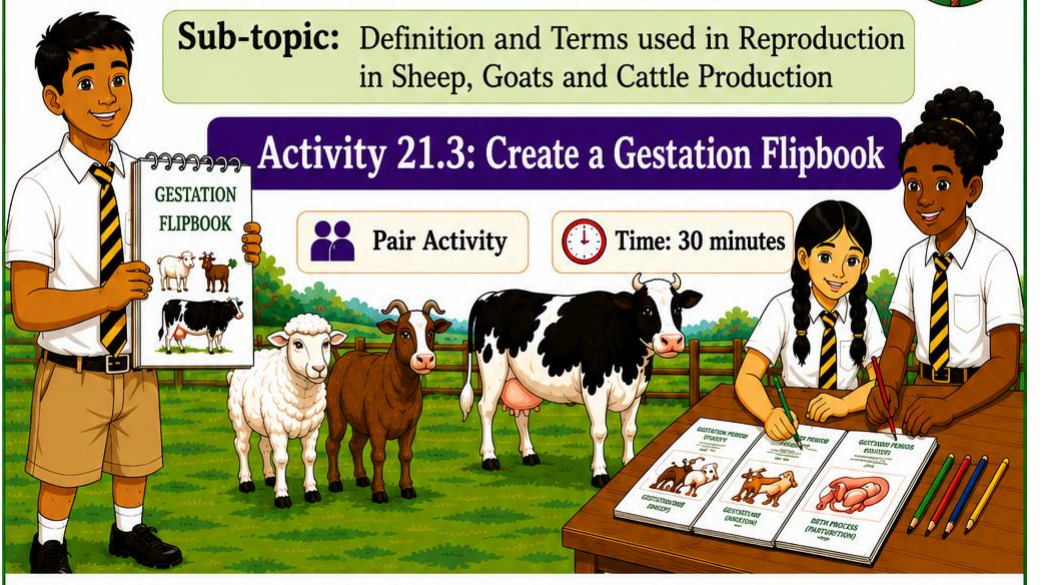
UNDERSTAND GESTATION, PLAN AHEAD, AND RAISE HEALTHY GENERATIONS!

Topic: Sheep, Goat and Cattle Production in Guyana and the Caribbean

Sub-topic: Definition and Terms used in Reproduction in Sheep, Goats and Cattle Production

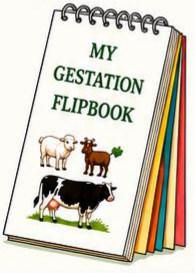
Activity 21.3: Create a Gestation Flipbook

Pair Activity | **Time: 30 minutes**



TIPS FOR CREATING YOUR FLIPBOOK

- Use simple drawings or pictures.
- Keep pages neat and colourful.
- Number your pages in order.
- Use tabs or headings for each section.
- Punch holes on the left and use a ring or staple so pages can flip easily.

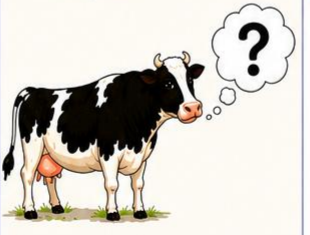


DISCUSSION

1. Why is nutrition important during pregnancy?

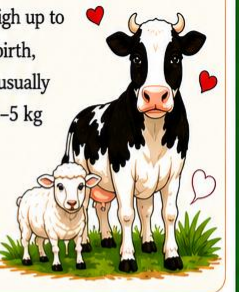


2. Why do cattle have longer gestation periods than sheep and goats?



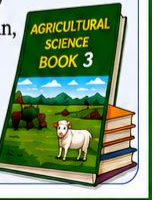
FUN FACT!

A calf can weigh up to 45–50 kg at birth, while a lamb usually weighs only 3–5 kg at birth!



TEXTBOOK REFERENCE

Agricultural Science Book 3: A Course for Secondary Schools in the Caribbean, 3rd Edition.



UNDERSTAND GESTATION, PLAN AHEAD, AND RAISE HEALTHY GENERATIONS!

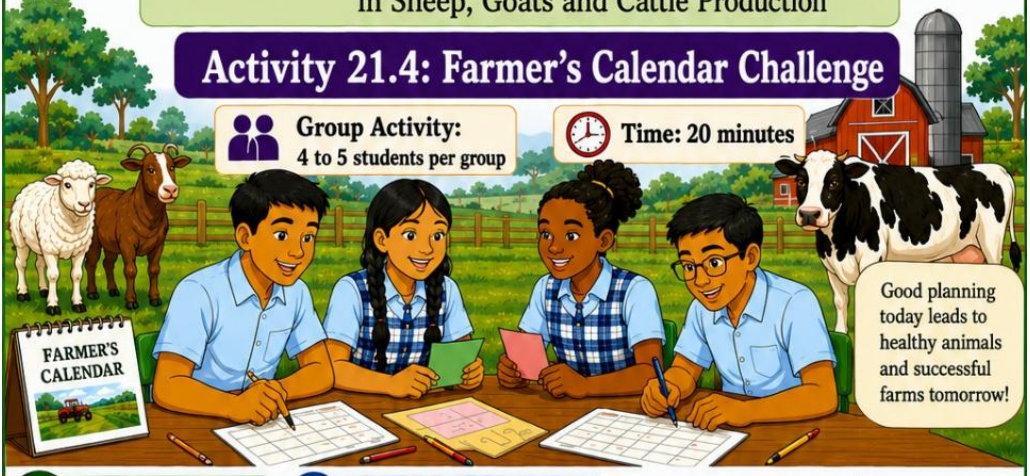
Topic: Sheep, Goat and Cattle Production in Guyana and the Caribbean

Sub-topic: Definition and Terms used in Reproduction in Sheep, Goats and Cattle Production

Activity 21.4: Farmer's Calendar Challenge

Group Activity: 4 to 5 students per group

Time: 20 minutes



RESOURCES

1. Calendar sheets



2. Scenario cards



INSTRUCTIONS

1. Groups receive scenarios such as:
   - A ewe was mated on 1 January, 2026.
   - A dairy cow was successfully bred on 15 February 2026.
   - A doe (female goat) was bred on 25 April 2026.
2. Students estimate the expected date of lambing/kidding/calving using the gestation period.

PLAN TODAY, PREPARE TOMORROW!

Animal	Expected Date of Birth

GESTATION PERIOD REFERENCE

Animal	Gestation Period	Approximate (months)	Days
Sheep	approximately 145–147 days	5 months	145–147 days
Goat	approximately 150–152 days	5 months	150–152 days
Cattle	approximately 280–282 days	9 months	280–282 days

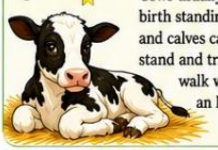


DISCUSSION

1. Why is it important for farmers to predict dates for when animals are expected to give birth?

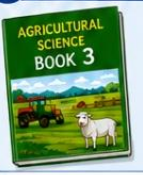


FUN FACT!



Cows usually give birth standing up, and calves can often stand and try to walk within an hour!

TEXTBOOK REFERENCE



Agricultural Science Book 3: A Course for Secondary Schools in the Caribbean, 3rd Edition.

Topic: Sheep, Goat and Cattle Production in Guyana and the Caribbean

Sub-topic: Mating in Cattle Production

Activity 22.1: Debate on Natural Mating and Artificial Insemination



INSTRUCTIONS

1. Teacher assigns task to each team: Proposing team (agree with motion). Opposing team (disagree with motion).
2. Each team presents speeches including opening statements, rebuttals, and closing summaries.
3. Class votes for the most convincing argument.

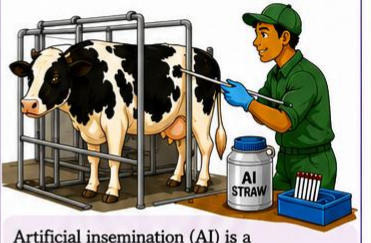


NATURAL MATING



Natural mating is the traditional reproductive process where a male animal directly mounts and copulates with a receptive female to deposit sperm naturally.

ARTIFICIAL INSEMINATION (AI)



Artificial insemination (AI) is a controlled, man-made technique where semen is collected from a male animal and inserted into the female animal's reproductive tract.

DISCUSSION



Why might farmers use both natural mating and artificial insemination in cattle production?

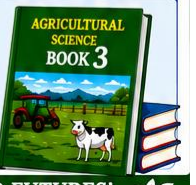
FUN FACT!

Some top dairy bulls can father thousands of calves through artificial insemination!



TEXTBOOK REFERENCE

Agricultural Science Book 3: A Course for Secondary Schools in the Caribbean, 3rd Edition.



KNOW THE OPTIONS. STRONGER DECISIONS. BETTER HERDS. BRIGHTER FUTURES!

Topic: Sheep, Goat and Cattle Production in Guyana and the Caribbean

Sub-topic: Mating in Cattle Production

Activity 22.2: Semen Collection and Storage Simulation

Group Activity: 4 to 5 students per group | **Time: 30 minutes**

RESOURCES:



Drinking straws (represent semen straws)



Cooler or bucket labeled "Liquid Nitrogen Tank"



Labels and markers



Gloves

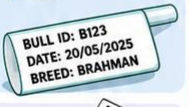


INSTRUCTIONS:

1. Teacher demonstrates how semen is collected and stored (without going into inappropriate detail).



2. Students label straws with:
   Bull ID
   Date of collection
   Breed



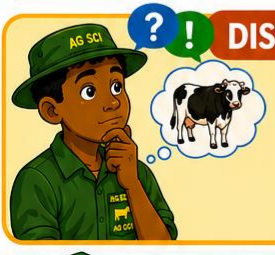
3. Place straws into the "liquid nitrogen tank."



4. Students discuss why semen must be stored at very low temperatures.



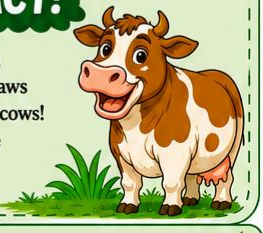
DISCUSSION



Why is proper semen storage important in cattle breeding programmes?

FUN FACT!

A single bull ejaculate can produce enough semen straws to inseminate 100 or more cows! Proper storage helps make good genetics available to more farmers.



TEXTBOOK REFERENCE:
Agricultural Science Book 3: A Course for Secondary Schools in the Caribbean, 3rd Edition. Page 22.2

TOPIC: SHEEP, GOAT AND CATTLE PRODUCTION IN GUYANA AND THE CARIBBEAN

SUB-TOPIC: Artificial Insemination (AI) in Sheep, Goats, and Cattle

ACTIVITY 22.3: AI Equipment Scavenger Hunt

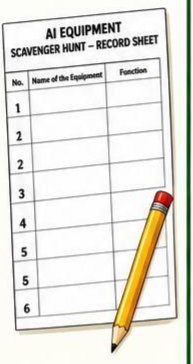
Group Activity: 4 to 5 students per group | **Time: 25 minutes**

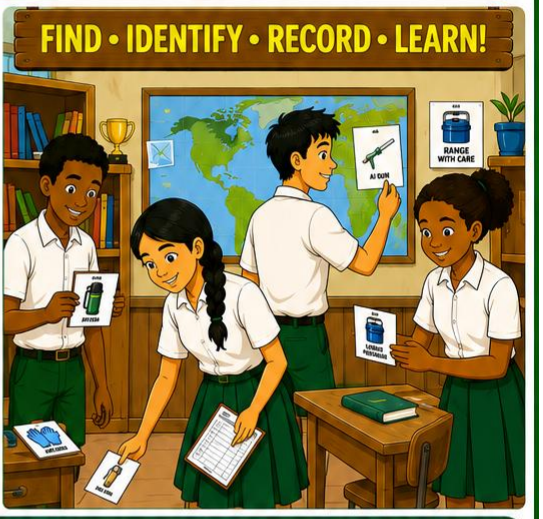
RESOURCES:

1. Picture cards with AI equipment (hidden around the classroom)



2. Record sheet





INSTRUCTIONS:

1. Hide picture cards with AI equipment around the classroom.
2. Students search for the cards and record:
   - Name of the equipment
   - Function
   - Category: Storage or Insemination Tool

AI EQUIPMENT SCAVENGER HUNT – RECORD SHEET

No.	Name of the Equipment	Function	Category (Storage or Insemination Tool)
1			
2			
3			
4			
5			
6			

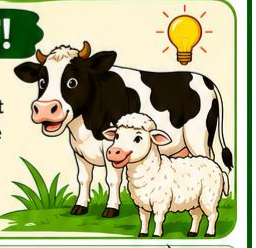
DISCUSSION



Why is it important to use the correct tools and equipment during artificial insemination?

FUN FACT!

AI allows top-quality males to father many offspring in different farms without leaving their home farm. This improves genetics distribution and increases food production in the country!



TEXTBOOK REFERENCE:
Agricultural Science Book 3: A Course for Secondary Schools in the Caribbean, 3rd Edition.

TOPIC: SHEEP, GOAT AND CATTLE PRODUCTION IN GUYANA AND THE CARIBBEAN

SUB-TOPIC: Artificial Insemination (AI) in Sheep, Goats, and Cattle

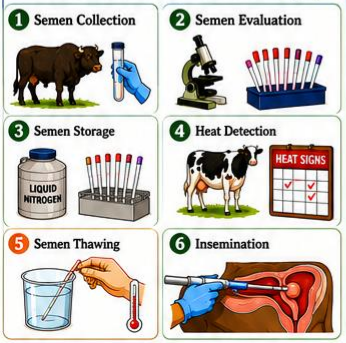
ACTIVITY 22.4: Roll and Explain Dice Game

Pair Activity | **Time: 20 minutes**

RESOURCES

1. Dice

STEPS IN ARTIFICIAL INSEMINATION (AI)



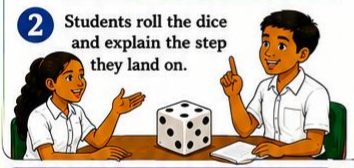
2. Chart with steps in AI

INSTRUCTIONS

1. Assign numbers to AI steps:

Number	AI Step
1	Semen Collection
2	Semen Evaluation
3	Semen Storage
4	Heat Detection
5	Semen Thawing
6	Insemination

2. Students roll the dice and explain the step they land on.



STEPS IN ARTIFICIAL INSEMINATION (AI)

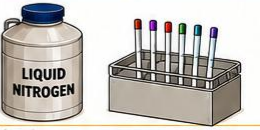
1 Semen Collection
Semen is collected from a superior bull.



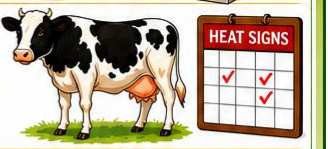
2 Semen Evaluation
Semen is examined and frozen in straws.



3 Semen Storage
Semen is stored in liquid nitrogen tanks until needed.



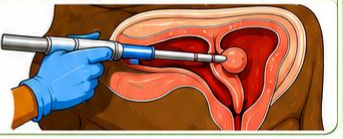
4 Heat Detection
The female is observed for signs of heat (standing to be mounted, restlessness, swollen vulva, etc.).



5 Semen Thawing
The straw of semen is thawed in warm water.



6 Insemination
The semen is inserted into the cow's uterus using an AI gun.



DISCUSSION

1. How does proper semen evaluation (Step 2) affect the success rate of artificial insemination?
2. Why is accurate heat detection (Step 4) critical before insemination, and what signs help you identify it?



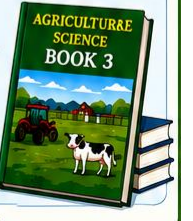
DID YOU KNOW?

Heat detection is the key to successful insemination! Cows show heat signs for about 12 to 18 hours, but the best time to inseminate is 12 hours after the start of standing heat.



TEXTBOOK REFERENCE

Agricultural Science Book 3: A Course for Secondary Schools in the Caribbean, 3rd Edition.



LEARN TODAY, LEAD TOMORROW, FEED OUR FUTURE!

TOPIC: SHEEP, GOAT AND CATTLE PRODUCTION IN GUYANA AND THE CARIBBEAN

Sub-topic: Artificial Insemination (AI) in Sheep, Goats, and Cattle

Activity 22.5: Brochure on Artificial Insemination 'Ready, Set, Breed!'

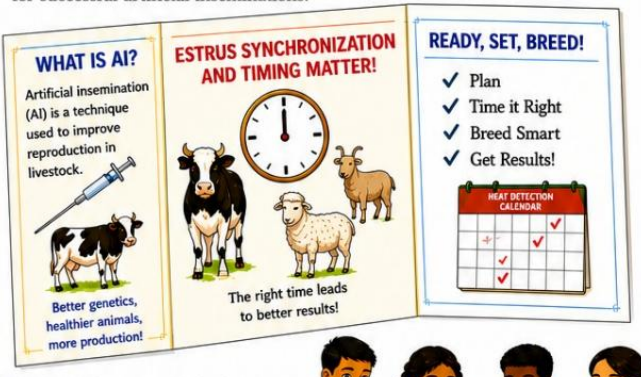
Pair Activity | Time: 30 minutes

RESOURCES

1. Paper (folded into a brochure)
2. Markers or coloured pencils
3. Rulers
4. Pictures
5. Textbook/ reference notes

INSTRUCTIONS

1. Create a brochure outlining the importance of estrus synchronization and proper timing for successful artificial inseminations.



2. Display brochures around the classroom and allow students to walk around, read, and vote for:
   - Most Informative Brochure
   - Most Creative Brochure
   - Best Use of Illustrations

OESTROUS SYNCHRONIZATION

1. Allows animals to come into heat at the same time.
2. Makes AI easier to manage.
3. Saves labour and time.

PROPER TIMING

1. Increases fertilization rates.
2. Improves chances of pregnancy.
3. Prevents wasted semen.

DISCUSSION

1. Why is timing important for successful AI?
2. Would you recommend AI to a farmer? Why or why not?

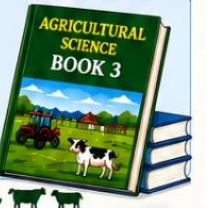
DID YOU KNOW?

Semen is stored in liquid nitrogen at approximately −196°C.



TEXTBOOK REFERENCE

Agricultural Science Book 3: A Course for Secondary Schools in the Caribbean, 3rd Edition.



LEARN TODAY, LEAD TOMORROW, FEED OUR FUTURE!

TOPIC: SHEEP, GOAT AND CATTLE PRODUCTION IN GUYANA AND THE CARIBBEAN

Sub-topic: Artificial Insemination (AI) in Sheep, Goats, and Cattle

Activity 22.6: Advantages vs. Disadvantages Sort Race

Group Activity: 4 to 5 students per group

Time: 20 minutes

RESOURCES

1. Advantage cards (made with index cards)
2. Disadvantage cards (made with index cards)
3. Two labeled baskets or charts (labelled pros and cons)

PROS CONS

ADVANTAGES TO WRITE ON CARDS

1. Improves genetics
2. Reduces disease spread
3. No need to keep a breeding male
4. Semen can be transported easily
5. Allows use of superior sires

DISADVANTAGES TO WRITE ON CARDS

1. Requires skilled technicians
2. Equipment can be costly
3. Precise timing is required
4. Semen must be stored properly

INSTRUCTION

1. Teams race to sort cards into the correct category (advantage or disadvantage).



DISCUSSION

1. What are the biggest advantages of using AI in cattle, sheep, or goat production?
2. What are the main disadvantages of AI, and how can farmers overcome them?

DID YOU KNOW?

The Pros and Cons of AI

PROS

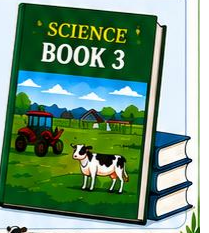
AI improves genetics, reduces disease spread, saves space and costs, and allows farmers to use top-quality sires from anywhere.

CONS

AI requires skill, proper timing, special equipment, and careful semen handling and storage.

TEXTBOOK REFERENCE

Agricultural Science Book 3: A Course for Secondary Schools in the Caribbean, 3rd Edition.



LEARN TODAY, LEAD TOMORROW, FEED OUR FUTURE!

Topic: Sheep, Goat and Cattle Production in Guyana and the Caribbean

Sub-topic: Parturition in Sheep, Goats and Cattle

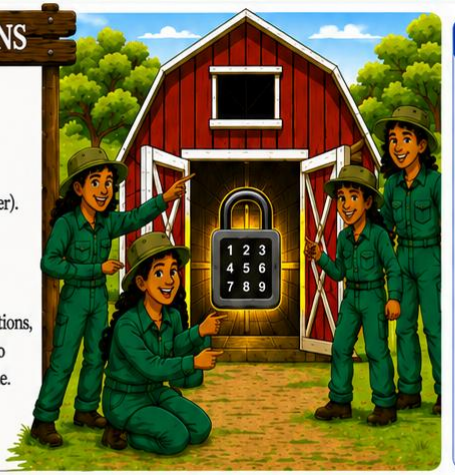
Activity 23.1: Escape the Barn Challenge

Group Activity: 4 to 5 students per group | Time: 30 minutes

RESOURCES

- Lock cards or clue cards
- Picture cards showing signs of parturition
- Envelope for each station
- Record sheet
- Sheep, goat and cattle picture cards
- Small prize (optional)

INSTRUCTIONS



1. Set up 4 stations around the classroom.
2. Each station provides a clue (such as a number).
3. Groups rotate through stations.
4. After completing all stations, groups use their clues to solve the final barn code.

STATION 1: MATCH THE BIRTH TERMS

Challenge: Match each animal with the correct term used for giving birth.

Animal	Birth Term
Cow	Lambing
Sheep	Kidding
Goat	Calving

Clue Earned: Teacher gives students the first code number: **4**

STATION 2: UNSCRAMBLE THE WORDS

Challenge: Unscramble the birth terms.

1. VCALNIG → Calving
2. MBLAING → Lambing
3. IDDKNIG → Kidding

Clue Earned: Teacher gives the second code number: **7**

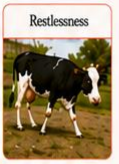


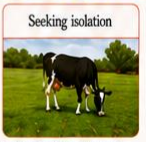
STATION 3: SIGNS OF PARTURITION DETECTIVE

Challenge: Students examine picture cards showing signs of parturition.











Students identify each sign.

Clue Earned: Teacher gives the second code number: **2**

STATION 4: FARMER EMERGENCY CARDS

Challenge: Read the scenario and answer question.

Example

"A ewe keeps lying down and standing up. She is restless and separating from the flock."

Questions:

1. What animal is this?
2. What is the birth term?
3. Name two signs of parturition.

Answers:

1. Sheep
2. Lambing
3. Restlessness and isolation.

Clue Earned: Teacher gives the second code number: **9**

Topic: Sheep, Goat and Cattle Production in Guyana and the Caribbean

Sub-topic: Parturition in Sheep, Goats and Cattle

Activity 23.1: Escape the Barn Challenge

Group Activity: 4 to 5 students per group

Time: 30 minutes

RESOURCES

Lock cards or clue cards	Picture cards showing signs of parturition	Envelope for each station	Record sheet	Sheep, goat and cattle picture cards	Small prize (optionall)

FINAL ESCAPE CHALLENGE

Students combine the clues:

4 - 7 - 2 - 9

This unlocks the barn door.

DISCUSSION

Why is it important to recognize signs of parturition?

- Helps farmers prepare for birth and provide assistance if needed.
- Prevents complications and protects the mother and offspring.
- Improves health, safety and productivity of the animals.

FUN FACT!

A cow licks her calf after birth to clean it, stimulate breathing, and strengthen their bond.

TEXTBOOK REFERENCE:

Agricultural Science Book 3: A Course for Secondary Schools in the Caribbean, 3rd Edition.

Topic: Sheep, Goat and Cattle Production in Guyana and the Caribbean

Sub-topic: Parturition in Sheep, Goats and Cattle

Activity 23.2: Create a Farmer's Guide Poster

Group Activity: 4 to 5 students per group | Time: 30 minutes

RESOURCES

1. Cardboard
2. Markers
3. Pictures

INSTRUCTIONS

1. Students design a poster titled Ready for Birth: Tips for a Healthy Start 'Stages of Parturition and Care of Mother and Young After Birth'
2. Include: Three stages of parturition
3. Illustrations
4. Five care practices for mother and young

KEY CONTENT TO REINFORCE

STAGES OF PARTURITION

1. Stage 1 – Preparation and Cervical Dilation
   - Restlessness
   - Swollen vulva
   - Mucus discharge



2. Stage 2 – Delivery of the Young
   - Strong contractions
   - Birth occurs



3. Stage 3 – Expulsion of Placenta
   - Afterbirth is expelled



CARE OF MOTHER AFTER PARTURITION

- ✅ Provide clean water and feed
- ✅ Observe for retained placenta or illness
- ✅ Keep housing clean and dry
- ✅ Monitor milk production



CARE OF YOUNG AFTER PARTURITION

- ✅ Clear mucus from nose and mouth
- ✅ Dry the newborn if necessary
- ✅ Disinfect navel cord with iodine
- ✅ Ensure colostrum intake
- ✅ Keep warm and protected
- ✅ Monitor for weakness or illness



DISCUSSION



DID YOU KNOW?

A healthy newborn calf should stand and suckle within the first hour of birth!



FUN FACT!

Goat kids can recognise their mother's voice just a few hours after birth!



TEXTBOOK REFERENCE:

Agricultural Science Book 3: A Course for Secondary Schools in the Caribbean, 3rd Edition.

Topic: Sources of Foods

Sub-topic: Feed

Activity 24.1: Understanding Livestock Feeds



Group Activity:
4 to 5 students per group

Time:
40 minutes

Resources:



Feed Samples



Note Book



Food Safe Gloves



Pens
(Pes (Use Symbols)

Instructions:

1 Step 1: Basal feeds

I. Define basal feeds and explain their role as the primary energy source in livestock diets.

II. Identify common basal feeds for cattle, sheep, and goats.

III. Students collect samples such as pasture grass, hay, or silage.

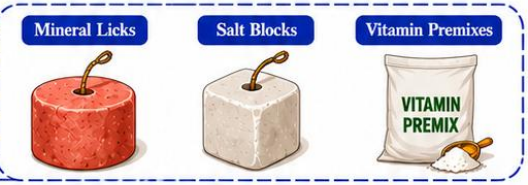


2 Step 2: Supplements

I. Explain supplements as feed components added to balance deficiencies in basal diets.

II. Provide examples for each species.

III. Students collect mineral licks, salt blocks, or vitamin premixes.

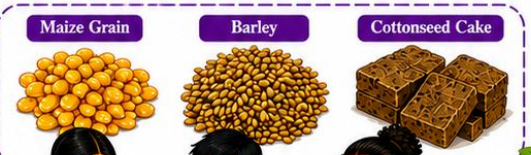


3 Step 3: Concentrates

I. Describe concentrates as high-energy or high-protein feeds given in smaller quantities.

II. Provide examples for cattle, sheep, and goats.

III. Students collect samples like maize grain, barley, or cottonseed cake.

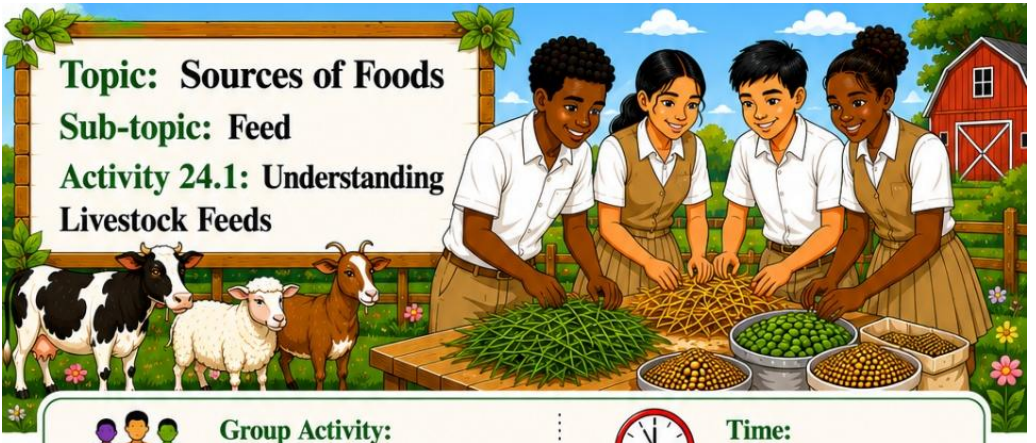




Topic: Sources of Foods

Sub-topic: Feed

Activity 24.1: Understanding Livestock Feeds



Group Activity:
4 to 5 students per group

Time:
30 minutes

Resources:



Feed Samples



Note Book



Food Safe Gloves



Pens
(Use Symbols)

Instructions:

4 Step 4: Comparison activity

I. Create a table comparing basal feeds, supplements, and concentrates across species.

II. Students display their collected samples alongside the table for visual comparison.

Comparison of Livestock Feeds Across Species

Feed Type	Cattle	Sheep	Goats
Basal Feeds			
Supplements			
Concentrates			



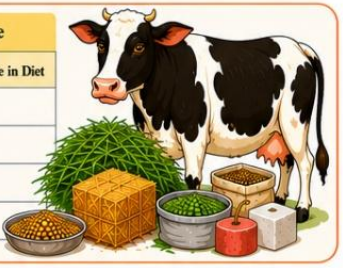
5 Step 5: Application exercise

I. Design a balanced ration for one species (e.g., dairy cattle) using basal feeds, supplements, and concentrates.

II. Students explain why each feed type is included, showing their collected samples as part of the ration plan.

Sample Ration Plan: Dairy Cattle

Feed Type	Feed Item	Amount (kg)	Purpose in Diet
Basal Feed			
Supplement			
Concentrate			
Total			



Discussion



1. Compare the different feed types and their roles in livestock diets.
2. Why is it important to provide a balanced ration?
3. How do the needs of livestock differ across species?
4. What would happen if one type of feed was missing from the ration?
5. Share your group's ration plan and reasoning with the class.



Textbook Reference: Agricultural Science Book 3: A Course for Secondary Schools in the Caribbean, 3rd Edition.

Topic: Sources of Food

Sub-topic: Importance of Feed

Activity 24.2: Debate and Feed Comparison Challenge



Group Activity: 2 teams in class

Time: 30 minutes

RESOURCES


Pen


Markers


Cardboard


Pictures of livestock feed

PART A: FEED COMPARISON

Complete the table comparing types of livestock feed.

Type of Feed	Basal Feeds	Concentrates	Supplements
Description			
Examples			
Nutrient content			
Importance			
Advantages			
Disadvantages			
Species of animal feed can be fed to			

PART B: DEBATE

Motion: 'Basal feeds alone are not sufficient for maintaining healthy and productive livestock; they are cheap and abundant but may lack protein.'

1. Teacher assigns task to each team: Proposing team (agree with motion). Opposing team (disagree with motion)
2. Each team presents speeches including opening statements, rebuttals, and closing summaries

PROPOSING TEAM (AGREE)





OPPOSING TEAM (DISAGREE)





Textbook Reference: Agricultural Science for Secondary Schools in Guyana Book 3.





Topic: Livestock ration

Sub-topic: Types of ration

Activity 25.1: Feed Investigation and Ration Classification Challenge



Activity: 4 to 5 students per group

Time: 30 minutes

Resources: Feed Samples (hay, maize, cotton seed, molasses etc)

FEED SAMPLES



Hay



Maize



Cotton seed



Molasses



Wheat bran



Feed pellets

INSTRUCTIONS

PART A: Feed Sample Observation

1. Observe each feed sample carefully.
2. Describe the colour, texture, smell and appearance.
3. Classify each feed into a ration type by putting a ✓ in the correct column below. (A feed may fit into more than one type.)

Feed Sample Observation Table

Feed Sample	Appearance (Colour, Texture, Smell)	Ration Type (✓)			Notes
		Balanced Ration	Maintenance Ration	Production Ration	
Hay					
Maize					
Cotton seed					
Molasses					
Wheat bran					
Feed pellets					

PART B: Feed Chart Creation

1. Using your knowledge and the feed samples, design a chart or table that describes the three types of ration.
2. Include the purpose, target animals, main components, examples of feeds and benefits for each type of ration.

Types of Ration Chart

Description	Balanced Ration	Maintenance Ration	Production Ration
Purpose			
Target Animals			
Main Components			
Examples of Feed			
Benefits			



THINK LIKE A SCIENTIST!

- Why do different animals need different types of ration?
- How does the right ration improve the health and productivity of livestock?
- What could happen if animals are fed the wrong type of ration?
- How can farmers decide which ration type is best for their animals?



Textbook Reference: Agricultural Science Book 3

Grade 9

Topic: Sources of Foods

Sub-topic: Characteristics of A Ration

Activity 25.2: Build the Best Ration

GOOD FEED HEALTHY ANIMALS!

Group Activity: 4 students per group

Time: 40 minutes

Resources:

Ingredient cards (Each card should include basic information: bulk, palatability, fibre content, flavour, etc), Note book, Pen, Feed Samples such as hay, corn, molasses, bran, silage, etc.).



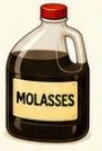
Ingredient Cards


Note Book


Pen


Hay


Corn



Molasses


Bran


Silage

Instructions:

1 Step 1: Group Work

I. Divide students into small groups.

II. Assign each group an animal (cow, goat, sheep, poultry, etc.).

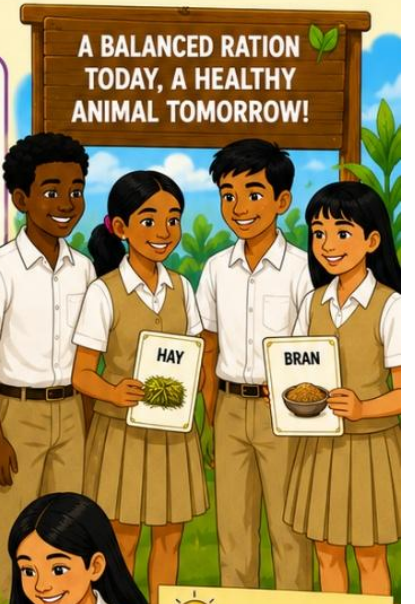


2 Step 2: Ration Ingredients

I. Provide a set of "ingredient cards" (real feed examples like hay, corn, molasses, bran, silage, etc.).

II. Each card should include basic info: bulk, palatability, fibre content, flavour, etc.







PLAN IT! BUILD IT! FEED IT! SUCCEED!

DID YOU KNOW?

A good ration provides energy, builds the body, keeps animals healthy, and improves production!

Grade 9

TOPIC: Sources of Foods

SUB-TOPIC: Characteristics of A Ration

ACTIVITY 25.2: Build the Best Ration

Group Activity: 4 students per group

Time: 40 minutes

INSTRUCTIONS

3 Step 3: Build the Ration

I. Each group must design a ration for their assigned animal by selecting cards.

II. They must explain how their ration meets the following qualities:

III. **Bulk:** Is the amount sufficient but not excessive?

IV. **Palatability:** Will the animal enjoy eating it?

V. **Familiarity:** Are new foods introduced gradually?

VI. **Binding Effect:** Does it prevent loose stools?

VII. **Laxative Effect:** Does it help digestion and prevent constipation?

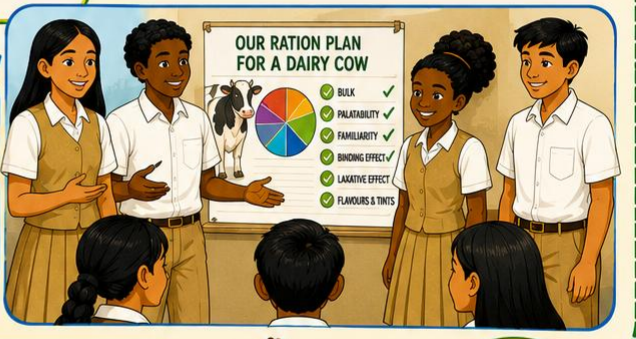
VIII. **Flavours and Tints:** Does it add variety and appeal?



4 Step 4: Presentation

I. Each group presents their ration to the class.

II. They must justify why their ration is balanced and how it meets the six characteristics.



Textbook Reference:

Agricultural Science Book 3: A Course for Secondary Schools in the Caribbean, 3rd Edition.

FEED RIGHT, RACE AHEAD!

GOOD RATION, BETTER RESULTS!

Topic: Pasture Grasses

Sub-Topic: Important Pasture Grasses and Legumes

Activity 25.3: Pasture Grasses/Legumes Spy Hunt and Photo Album Challenge

GROUP ACTIVITY: 4 students per group

TIME: 40 minutes

RESOURCES: Magnifying glass, Notebook, Pen (use symbols)

MISSION: Become a Pasture Grass/Legume Detective!

INSTRUCTIONS: PART A: PASTURE GRASS/LEGUME SPY HUNT GAME

Play a spy game to locate pasture grasses and legumes based on clues given.

1. Your teacher will provide clue cards.
2. Use the clues to locate and identify different pasture grasses and legumes around your school's compound.

SOME IMPORTANT PASTURE GRASSES



SOME LEGUMES GROWN IN THE CARIBBEAN



SPY CLUE CARDS

CLUE #1
"I am tall and often used for cutting and feeding cattle."

CLUE #2
"I spread quickly and form a dense carpet on the ground."

CLUE #3
"I thrive in wet conditions and swampy areas."

CLUE #4
"I help improve soil fertility through nitrogen fixation."

BE CURIOUS
BE OBSERVANT
BE A PASTURE DETECTIVE!

EXPLORE • OBSERVE • IDENTIFY • RECORD • MAKE A DIFFERENCE

Every discovery helps build a better pasture for a stronger tomorrow!

Topic: Pasture grasses

Sub-topic: Important Pasture Grasses and Legumes

Activity 25.3: Pasture Grasses/Legumes Spy Hunt and Photo Album Challenge



RESOURCES:


Note book


Gloves


Pen


Ziploc bags


Scissors


Sticky notes for labels


Cardboard


Markers


Digital tools

INSTRUCTIONS: **PART B: PASTURE SPECIMEN/ PHOTO ALBUM CHALLENGE**

1. Collect specimens of pasture grasses and legumes and create a photo album from a nearby pasture or field.
2. Take clear, close-up digital photos of the whole plant, the leaf/stem attachment, and the seed head or flower.
3. Carefully clip a small section of the plant (leaf and flower) and place it in a plant press (or between heavy books) lined with wax paper and blotting paper.
4. Create a photo album (using physical scrapbooks, Google Slides, or Canva). For each specimen, you must include:



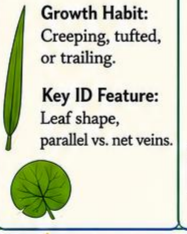
1 Plant Name:
Common Name and Scientific Name.



2 Classification:
Grass or Legume.



3 Plant Profile:



Growth Habit: Creeping, tufted, or trailing.

Key ID Feature: Leaf shape, parallel vs. net veins.

4 Photographs/ Pressings:
Paste or upload the photographs or pressed specimens.

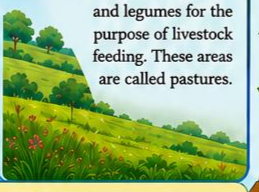


5 Livestock Value:
Is it highly palatable, and does it fix nitrogen into the soil?



DID YOU KNOW?


Grasses form the cheapest and most abundant source of food for ruminants.


There are areas specially cultivated with grasses and legumes for the purpose of livestock feeding. These areas are called pastures.


Legumes are now widely cultivated as pure stands or mixed with pasture grasses, where they help to improve soil fertility through the action of nitrogen-fixing bacteria.





EXPLORE! IDENTIFY! LEARN! MAKE A DIFFERENCE!



TEXTBOOK REFERENCE:
Agricultural Science for CSEC Examinations. 2nd Edition.

BE A PASTURE DETECTIVE TODAY – BETTER PASTURES, BETTER LIVESTOCK, BETTER FUTURE!

Topic: Supplementary Feeding Methods (Silage and Hay)

Sub-topic: Silage and Its importance

Activity 25.4: Silage Making



Group Activity: 4 students per group

Time: 40 minutes

Resources:

 Chopped forage (elephant grass, maize, or sorghum)	 Plastic bucket or container with lid	 Heavy-duty plastic bag	 Gloves	 Wooden stick or pestle	 Measuring cup	 Molasses (optional)	 Observation sheet	 Pen	 Digital device (optional)

Instructions:

1 Chop the forage into pieces about 2–5 cm long.



2 Sprinkle a small amount of diluted molasses over the chopped forage.



3 Place the forage into the plastic bag or bucket in layers.



4 Compress each layer firmly using your hands (wearing gloves) or a wooden stick to remove as much air as possible.



5 Seal the container tightly to create anaerobic (air-free) conditions.



6 Label your container with:

I. Group Name
II. Date Packed
III. Type of Forage



Discussion questions

1. Why must air be removed from silage?
2. Why should forage be chopped before packing?
3. What happens if too much water is present?
4. Why is silage useful during the dry season?
5. Name two crops that can be used to make silage.





Textbook Reference:
Agricultural Science for CSEC Examinations. 2nd Edition.



Topic: Supplementary Feeding Methods (Silage and Hay)

Sub-topic: The Process of Making Hay

Activity 25.5: Hay Making

Group Activity: 4 students per group | **Time: 40 minutes**

RESOURCES



- Fresh grass or legumes (Pangola grass, Guinea grass, Bermuda grass, or Centro)



- Scissors or cutlass (teacher supervised)



- Gloves



- Basket or container



- Clean tarpaulin, plastic sheet, or drying rack



- Thermometer (optional)



- Observation sheet



- Pen



- Digital device (optional)



INSTRUCTIONS

1. **Mow and Harvest the Forage:** Cut healthy pasture grass or legumes before they become too mature (before flowering).



2. **Wilting:** Spread the forage in a thin layer on a clean tarpaulin or drying rack under the sun.



3. **Tedding/Turn the Forage:** Turn the forage several times during the day so that it dries evenly on all sides. Test the forage by bending the stems. Properly dried hay should feel dry and snap easily without being brittle.



4. **Raking:** Gather the dried grass into rows (windrows) for easier baling.



5. **Baling:** Compress the dried grass into bales for easy handling and storage.



6. **Collect and Store:** Gather the dried hay and place it into clean sacks or containers. Store it in a cool, dry place away from rain and moisture.

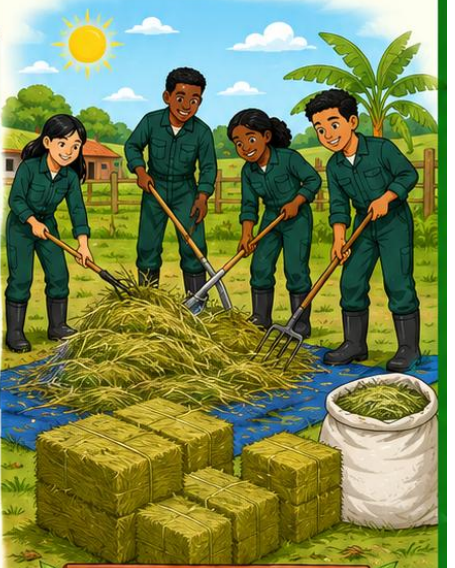


7. **Label Your Hay**
   I. Group Name II. Date Prepared III. Type of Forage



8. **Feeding:** Feed the hay to livestock when fresh grass is unavailable.





DISCUSSION QUESTIONS

1. Why must hay be completely dry before storage?
2. State two advantages of making hay for livestock.
3. Name two grasses or legumes that can be used to make hay.





Textbook Reference:
Agricultural Science for CSEC Examinations. 2nd Edition.



Topic: Common Pests and Diseases affecting Sheep, Goats and Cattle

Sub-topic: Diseases affecting Sheep, Goats and Cattle

Activity 26.1: Create a Poster for a Disease Awareness Campaign



Group Activity: 5 groups

Time: 40 minutes

RESOURCES



Cardboard



Markers



Pictures of diseased animals

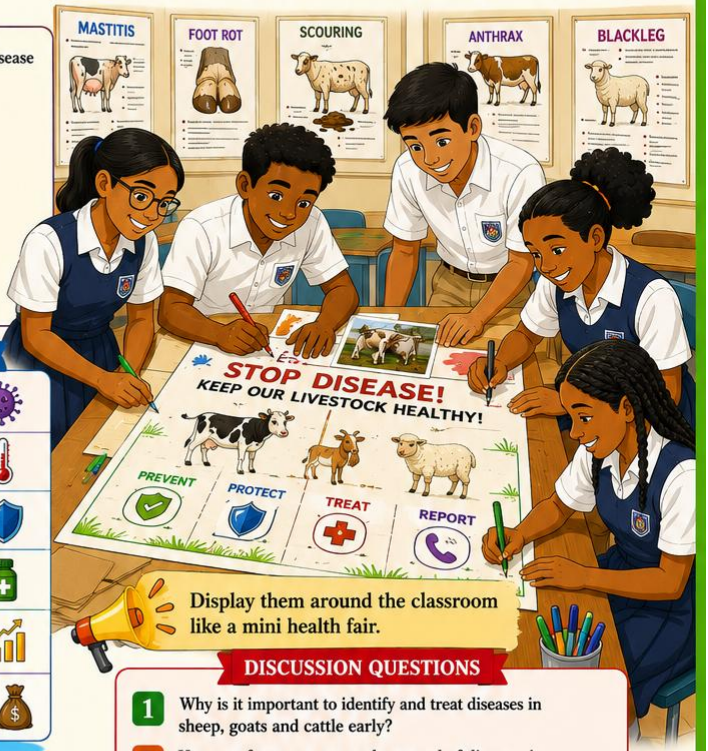


Digital tools and devices (optional)

INSTRUCTIONS

Groups design posters about a specific disease (e.g.,

1. Mastitis
2. Foot rot
3. Scouring
4. Anthrax
5. Blackleg



POSTERS SHOULD INCLUDE:

1. Causes of diseases
2. Signs/symptoms
3. Prevention/control measures
4. Treatment
5. Impact of pests and diseases on sheep, goat and production.
6. Economic challenges farmers face during pest and disease outbreaks.

Display them around the classroom like a mini health fair.

DISCUSSION QUESTIONS

1. Why is it important to identify and treat diseases in sheep, goats and cattle early?
2. How can farmers prevent the spread of diseases in their herds?
3. What impact do livestock diseases have on food supply and the economy?
4. How can posters and awareness campaigns help farmers and their communities?



HEALTHY ANIMALS, HEALTHY FARMS, STRONG COMMUNITIES!

Textbook Reference:
Agricultural Science for Secondary Schools in Guyana Book 3. Pages 86-93



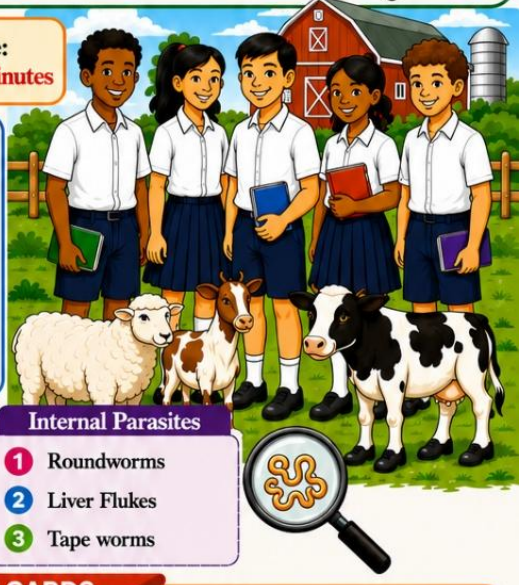
Topic: Common Pests and Diseases affecting Sheep, Goats and Cattle

Sub-topic: Internal and External Parasites affecting Sheep, Goats and Cattle

Activity 26.2: Parasite Puzzle Challenge

Group Activity: 5 students per group

Time: 40 minutes



Resources: (Use Symbols)

Puzzle Cards with: names of internal and external parasites; symptoms; damages caused and how it spreads causes.

Note Book

Pens



External Parasites

1. Ticks
2. Tsetse fly
3. Biting flies

Internal Parasites

1. Roundworms
2. Liver Flukes
3. Tape worms

PUZZLE CARDS

PARASITE (NAME)	SYMPTOMS	DAMAGES CAUSED	HOW IT SPREADS (CAUSES)
Ticks	Skin irritation, scratching, hair loss, wounds, weakness, anaemia	Loss of blood, poor growth, reduced milk and meat production, damage to hides	Attach to animals while grazing, in bushes, tall grass or through contaminated pens
Tsetse fly	Fever, weakness, swelling, anaemia, weight loss	Transmits diseases like trypanosomiasis (nagana), death, reduced productivity	Bite of infected tsetse fly, common in bushy and wet areas
Roundworms	Diarrhoea, poor growth, pot belly, loss of appetite	Poor weight gain, reduced milk production, can cause death in young animals	Ingesting parasite eggs from contaminated pasture, feed or water
Liver Flukes	Anaemia, weakness, swollen belly, jaundice, bottle jaw	Liver damage, reduced growth and milk production, condemnation of liver	Ingesting infected snails on pasture, in water or wet areas



1. Prepare or print and cut out puzzle cards with: names of internal and external parasites; symptoms; damages caused and how it spreads causes.
2. Students must match internal and external parasites cards with symptoms cards, damages caused and how it spreads cards.



DID YOU KNOW?

Farmers face serious economic challenges during pest and disease outbreaks in sheep, goats, and cattle, leading to lower production, higher costs and loss of income.

Textbook Reference: Agricultural Science for Secondary Schools in Guyana Book 3. Pages 86-93

Topic: Common Pests and Diseases affecting Sheep, Goats and Cattle

Sub-topic: Methods of Controlling Pests and Diseases

Activity 27.1: Jeopardy Game 'Parasite Control Challenge'



Group Activity: 5 students per group

Time: 40 minutes



PARASITE CONTROL CHALLENGE!

RESOURCES

- Jeopardy game board (printed poster, PowerPoint, Google Slides, or whiteboard version)
- Question and answer cards organized by category and point value
- Scoreboard (whiteboard, chart paper, or printed score sheet)
- Team name cards
- Notebooks
- Pens or pencils
- Timer or stopwatch
- Bell, buzzer, or small bell (optional, for answering)
- Marker pens (if using a whiteboard)



INSTRUCTIONS

1 Step 1: Create a Jeopardy board with categories based on control methods:



DRENCHES	ORAL PELLETS	MEDICATION IN WATER	MEDICATION IN FEED
10	10	10	10
20	20	20	20
30	30	30	30
40	40	40	40

2 Step 2: Prepare questions of increasing difficulty (10, 20, 30, 40 points). Examples:



- **Drenches – 10 points:** "What is the method of giving liquid medicine orally to animals?"
- **Oral Pellets – 20 points:** "Why are oral pellets considered easier for farmers to administer?"
- **Medication in Water – 30 points:** "What is one advantage of dissolving medicine in drinking water?"
- **Medication in Feed – 40 points:** "What risk exists when mixing medicine into feed?"

3 Step 3: Gameplay



Divide students into teams.

Teams pick a category and point value.

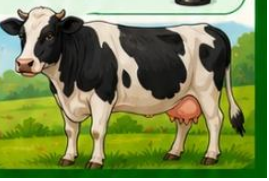
Teacher reads the clue, and students must respond in Jeopardy format: "What is...?"

Correct answers earn points; incorrect answers lose points.





Work Together, Think Smart, Control Parasites, Keep Animals Healthy!



Topic: Common Pests and Diseases affecting Sheep, Goats and Cattle

Sub-topic: Methods of Controlling Pests and Diseases

Activity 27.1: Jeopardy Game 'Parasite Control Challenge'





Group Activity: 5 students per group

Time: 40 minutes

4 FINAL JEOPARDY



Pose a big-picture question:

Which method of parasite control ensures all animals receive the correct dose, and why?





Teams wager points before answering.



5 REFLECTION

After the game, discuss:

- Which methods are most effective in practice.



- How cost, ease of use, and accuracy affect farmers' choices.



- The importance of preventing resistance by rotating treatments.



JEOPARDY GAME BOARD (EXAMPLE)

DRENCHES	ORAL PELLETS	MEDICATION IN WATER	MEDICATION IN FEED
10	10	10	10
20	20	20	20
30	30	30	30
40	40	40	40



DID YOU KNOW?

Using the right parasite control method at the right time keeps animals healthy, productive and profitable!



KEY TAKEAWAY

Smart farmers choose the best method, follow correct procedures, and rotate treatments to keep parasites under control and animals thriving!



TEXTBOOK REFERENCE:
Agricultural Science for Secondary Schools in Guyana Book 3. Pages 86-93

Topic: Common Pests and Diseases affecting Sheep, Goats and Cattle

Sub-topic: Methods of Controlling Pests and Diseases

Activity 27.2: Debate

Group Activity: 2 teams in class

Time: 30 minutes



RESOURCES

- Motion statement
- Notebooks
- Pens
- Timer
- Bell (optional)
- Notes

MOTION

> ‘Effective parasite control is a shared responsibility between farmers, veterinarians, and the government.’

INSTRUCTIONS

1. Teacher assigns task to each team:
   - Proposing team (agree with motion)
   - Opposing team (disagree with motion)



2. Each team presents speeches including opening statements, rebuttals, and closing summaries.



3. Class votes for the most convincing argument.



EACH TEAM WILL



Argue about the cost of sprays, dips, and dusting, and the impact of parasites on productivity.



Emphasize on correct application methods, animal safety, and preventing resistance.



Discuss regulations, subsidies for treatments, and public awareness campaigns.

DID YOU KNOW? Good parasite control leads to healthier animals, higher productivity, and increased profits for farmers!



TEXTBOOK REFERENCE: Agricultural Science for Secondary Schools in Guyana Book 3. Pages

Topic: Preparation and Marketing of Livestock

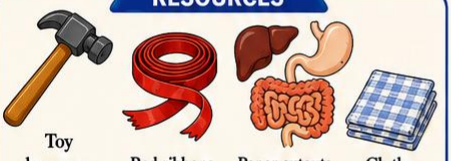
Sub-topic: The Stages in Meat Preparation

Activity 28.1: Role Play

Group Activity: 4 to 5 students per group

Time: 30 minutes

RESOURCES



- Toy hammer (or sound effect)
- Red ribbons (paper strips)
- Paper cutouts (internal organs)
- Cloths (for cleaning)

PURPOSE

To understand the stages in meat preparation and their importance for food safety, quality, and consumer health.

STEP 1: ROLE PLAY – THE STAGES IN MEAT PREPARATION

Assign groups of students to act out each stage in the process of meat preparation:

1 SLAUGHTER



Demonstrate stunning (pretend with props like a toy hammer or sound effect).

2 BLEEDING



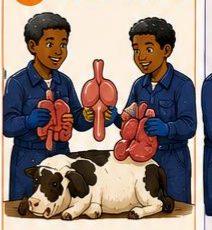
Use red ribbons or paper strips to symbolize blood removal.

3 SKINNING



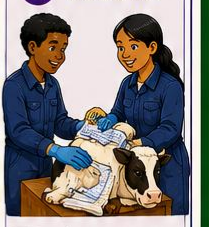
Show how hides are removed (students can mime peeling).

4 EVISCERATING



Pretend to remove internal organs using paper cutouts.

5 CLEANING



Wipe down props or "carcasses" with cloths to symbolize hygiene.

Each group presents their stage, explaining why it is important for food safety and quality.

STEP 2: MEAT MARKET CONNECTION

Students can race to match livestock with the correct meat name, reinforcing vocabulary.



LIVESTOCK	NAME OF MEAT
Cattle	Beef
Pig	Pork
Sheep	Mutton
Goat	Chevon
Fowl	Chicken

DID YOU KNOW?

Proper meat preparation keeps meat safe to eat, improves quality, and protects consumers from diseases.



TEXTBOOK REFERENCE: Agricultural Science for Secondary Schools in Guyana Book 3.



Topic: Preparation and Marketing of Livestock

Sub-topic: Steps in Slaughtering a Broiler Bird

Activity 28.2: Step-by-Step Broiler Processing (Slaughter and Dress Broilers)



Individual Activity | **Time: 40 minutes**

RESOURCES



INSTRUCTIONS

1 STEP 1: PREPARATION

1. Gather all necessary equipment (sharp knife, clean water, container, gloves, disinfectant).
2. Ensure the work area is clean and hygienic.





2 STEP 2: RESTRAIN THE CHICKEN

1. Hold the chicken securely and calmly to reduce stress.
2. Place it in a restraining cone if available.





TIP!

Handle birds gently and quietly to minimize stress and improve meat quality.

3 STEP 3: STUNNING (WHERE PRACTICED)

1. Render the bird unconscious before slaughter using an approved humane method.



Humane handling ensures animal welfare and better product quality.

4 STEP 4: BLEEDING (KILLING)

1. Cut the neck with a sharp knife.
2. Allow the bird to bleed completely (about 1–3 minutes).







Allow the bird to bleed completely (about 1–3 minutes).



Topic: Preparation and Marketing of Livestock

Sub-topic: Steps in Slaughtering a Broiler Bird

Activity 28.2: Step-by-Step Broiler Processing (Slaughter and Dress Broilers)



Individual Activity | **Time: 40 minutes**

RESOURCES


Live chicken


Sharp knives


Apron


Killing cones


Knives


Hot water



Thermometer


Gloves


Packaging bags


Buckets


Tubs

5 STEP 5: SCALDING

1. Immerse the bird in hot water (approximately 60–65°C) for 30–60 seconds to loosen the feathers.



Why it's important

Scalding loosens the feathers, making them easier to remove without damaging the skin.

6 STEP 6: PLUCKING (DEFEATHERING)

1. Remove the feathers by hand or with a mechanical plucking machine.



TIP!

Pluck as soon as possible after scalding for best results.

7 STEP 7: REMOVING THE HEAD AND FEET (OPTIONAL)

1. Cut off the head and remove the feet at the hock joint if required.



TIP!

Removing the head and feet helps improve the appearance and makes packaging neater.

8 STEP 8: EVISCERATION

1. Make a careful incision near the vent (cloaca).
2. Remove the internal organs without puncturing the intestines or gall bladder.
3. Separate edible organs (heart, liver, and gizzard) if they are to be kept.



Food Safety Reminder

Handle organs carefully and keep the work area clean to prevent contamination.

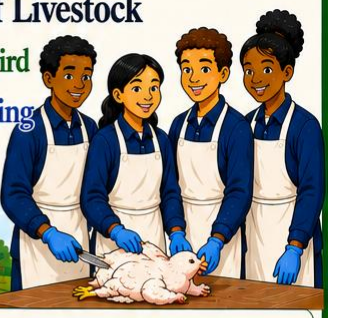
GOOD HYGIENE + CAREFUL HANDLING = SAFE, QUALITY CHICKEN



Topic: Preparation and Marketing of Livestock

Sub-topic: Steps in Slaughtering a Broiler Bird

Activity 28.2: Step-by-Step Broiler Processing (Slaughter and Dress Broilers)



Individual Activity | **Time: 40 minutes**

RESOURCES



Live chicken | Sharp knives | Apron | Killing cones | Knives | Hot water | Thermometer | Gloves | Packaging bags | Buckets | Tubs

9 STEP 9: WASHING

1. Wash the carcass thoroughly with clean, potable water to remove blood and debris.



TIP!

Clean water equals clean, safe meat!



10 STEP 10: CHILLING

1. Place the carcass in ice water or refrigerate immediately to reduce its temperature and maintain meat quality.



TIP!

Chilling quickly helps prevent bacteria growth and keeps the meat fresh and tasty!



11 STEP 11: PACKAGING AND STORAGE

1. Drain excess water.
2. Package the chicken in clean food-grade bags or containers.
3. Refrigerate (0–4°C) or freeze (−18°C) until use.



TIP!

Proper packaging and storage keep your chicken safe and high quality for longer!

DISCUSSION

1. Why is it important to use clean water and equipment during chicken processing?
2. What could happen if the chicken is not bleeded properly?
3. How does scalding and plucking affect the quality of the chicken?
4. Why is chilling and proper storage very important after slaughter?



GOOD HYGIENE + CAREFUL HANDLING = SAFE, QUALITY CHICKEN

Textbook Reference: Agricultural Science for Secondary Schools in Guyana Book 3



Topic: Preparation and Marketing of Livestock

Sub-topic: Different Methods of Preserving Meat

Activity 29.1: Meat Preservation Lab



Group Activity: 5 groups in class

Time: 40 minutes

RESOURCES

- Salt (for curing)
- Sugar (optional, for curing mixtures)
- Fresh meat samples or demonstration pieces
- Spices (optional)
- Drying rack or mesh tray
- Electric fan or food dehydrator (if available)
- Smoking box/ smoker or model smoker
- Hardwood chips or sawdust (for smoking)
- Glass canning jars with lids
- Large pot or pressure canner (demonstration only)
- Refrigerator or cooler with ice packs
- Food thermometer
- Disposable gloves
- Cutting board and knife
- Soap, sanitizer, and paper towels

1 STEP 1

Divide the class into five groups, each representing one meat preservation method:

1. Curing
2. Drying
3. Smoking
4. Canning
5. Refrigeration



2 STEP 2

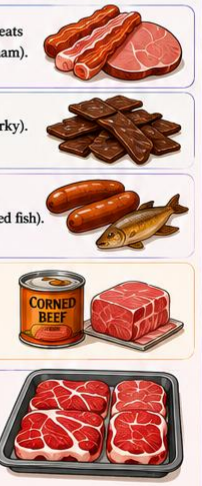
Each group demonstrates their method of meat preservation using safe substitutes:

1. **Curing:** Use salt or sugar on pieces of fruit/vegetables to show how moisture is drawn out.
2. **Drying:** Show dried fruits (raisins, apple slices) as an analogy for dried meat.
3. **Smoking:** Use incense sticks or a smoke machine to illustrate how smoke adds flavor and preservation.
4. **Canning:** Show a sealed jar of fruit/ vegetables and explain how heating destroys bacteria.
5. **Refrigeration:** Compare fresh fruit kept at room temperature vs. in a cooler bag with ice packs.

3 STEP 3

Visual Learning. Show images of:

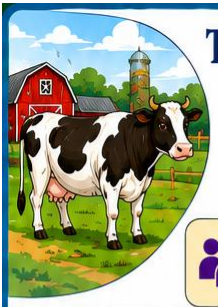
1. Salted/cured meats (like bacon or ham).
2. Dried meats (jerky).
3. Smoked meats (sausages, smoked fish).
4. Canned meats (corned beef).
5. Refrigerated fresh cuts.



DISCUSSION

1. Why is it important to preserve meat properly?
2. Which preservation method do you think is best for long-term storage? Why?
3. What are some advantages and disadvantages of each method?
4. Which preservation method would be most practical in your community and why?
5. How does proper meat preservation improve food safety and reduce waste?

Textbook Reference: Agricultural Science for Secondary Schools in Guyana Book 3.



Topic: Preparation and Marketing of Livestock

Sub-topic: Preparation of Milk

Activity 29.2: Milk from Cow to Cup



Group Activity: 4 to 5 students per group

Time: 40 minutes

RESOURCES



Milk cartons


Clear bottles/jar


Thermometer


Kettle to hot water


Markers


Colour cardboard


Raw milk



Pasteurized milk



UHT milk

Pictures of raw milk, pasteurized milk, UHT milk

1 STEP 1: DEFINITION OF MILK

I Begin with a short discussion: Milk is a nutritious white liquid produced by mammary glands, rich in proteins, fats, carbohydrates, vitamins, and minerals.



DID YOU KNOW?

Milk is often called a complete food because it contains many essential nutrients!



II Students can brainstorm different animals that produce milk (cow, goat, sheep) and list popular uses.


Cow


Goat


Sheep

Popular uses of milk


Drinking milk · Cheese · Yogurt · Butter · Ice cream

2 STEP 2: MILKING PROCESS DEMONSTRATION

I Role-play: One student acts as the farmer, another as the cow (using a glove filled with water to simulate udders).



Remember!

Milk is safe and healthy when it is collected and handled hygienically.

II Demonstrate milking in a clean, calm, and hygienic environment.



GOOD HYGIENE = SAFE MILK = HEALTHY PEOPLE!

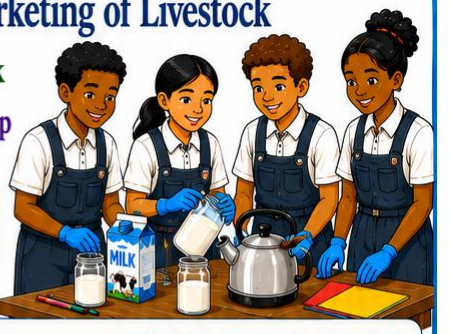
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Topic: Preparation and Marketing of Livestock

Sub-topic: Preparation of Milk

Activity 29.2: Milk from Cow to Cup



Group Activity: 4 to 5 students per group

Time: 40 minutes

RESOURCES



Milk cartons


Clear bottles/jar


Thermometer


Kettle to hot water


Markers


Colour cardboard


Raw milk



Pasteurized milk



UHT milk

Pictures of raw milk, pasteurized milk, UHT milk

STEP 3 PROCESSING METHODS

Divide students into groups, each demonstrating one method of preserving milk:

1 PASTEURIZATION

Heat water in a kettle to ~72°C (simulate heating milk).

Explain how this kills harmful bacteria without changing flavor.



Kills harmful bacteria while keeping milk safe and tasty.

2 ULTRA-HIGH TEMPERATURE (UHT)

Use a thermometer to show very high heat (~135°C for a few seconds).

Show packaged sterile containers (juice boxes as props).



Very high heat for a short time makes milk safe and shelf-stable without refrigeration.

3 STERILIZATION

Milk is heated to a higher temperature than pasteurization for a longer time.

Kills all microorganisms.



Ensures complete destruction of all microorgansions for maximum safety.

4 HOMOGENIZATION

Fat globules are broken down, so the cream does not separate.

Gives milk a smooth, even texture.



Breaks fat into tiny particles so milk stays uniform and looks creamy.

DISCUSSION



? Which method of preserving milk is safest and most cost-effective?

.....

.....



? Why is hygiene critical to prevent contamination?

.....

.....



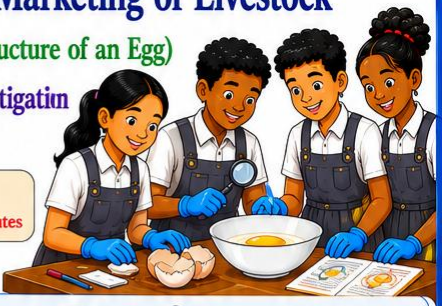
Textbook Reference: Agricultural Science for Secondary Schools in Guyana Book 3.



Topic: Preparation and Marketing of Livestock

Sub-topic: Preparation of Egg (Structure of an Egg)

Activity 29.3: Egg Anatomy Investigatin 'Crack It and Discover!'



Group Activity: 4 to 5 students per group

Time: 40 minutes

RESOURCES

- Fresh hen's eggs (1–2 per group)
- White bowls or plates
- Hand lens or magnifying glass (optional)
- Butter knife or spoon
- Disposable gloves
- Paper towels
- Observation worksheet
- Pen/Pencil
- Diagram of the structure of a hen's egg

INSTRUCTIONS

1 STEP 1: OBSERVE THE WHOLE EGG



Without cracking the egg, observe and record:

i. Shape _____
ii. Colour _____
iii. Texture of the shell _____
iv. Approximate size _____

2 STEP 2: CRACK THE EGG



i. Carefully crack the egg into a clean white bowl.
ii. Observe the different parts without breaking the yolk.

3 STEP 3: IDENTIFY THE PARTS OF THE EGG

Using the labelled diagram of the egg, identify and label the following structures:

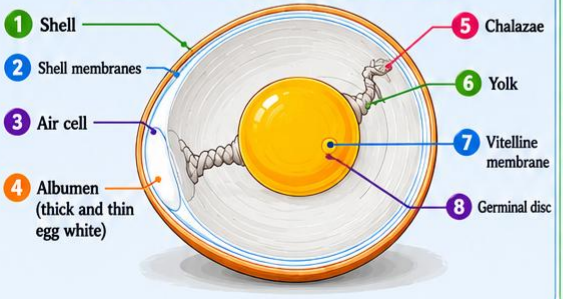
1. Shell
2. Shell membranes
3. Air cell
4. Albumen (thick and thin egg white)
5. Chalazae
6. Yolk
7. Vitelline membrane
8. Germinal disc

4 STEP 4: INVESTIGATE THE FUNCTION OF EACH PART

Complete the table below.

Structure	Function
Shell	
Shell membranes	
Air cell	
Albumen	
Chalazae	
Yolk	
Vitelline membrane	
Germinal disc	

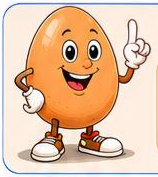
LABELLED DIAGRAM OF A HEN'S EGG



DISCUSSION

1. Which part of the egg protects it from bacteria?
2. Why is the chalaza important?
3. Which part provides most of the nutrients for the developing chick?
4. Why does the air cell become larger as an egg ages?





FUN FACT!

Eggs are one of the most complete natural foods — they contain protein, vitamins, minerals, and healthy fats that help us grow strong and stay healthy!





Textbook Reference: Agricultural Science for Secondary Schools in Guyana Book 3.



Topic: Preparation and Marketing of Livestock
Sub-topic: Preparation of Eggs
Activity 29.4: Egg Grading and Quality Inspection Challenge

Group Activity: 4 to 5 students per group | **Time:** 40 minutes

RESOURCES:


Eggs of different sizes and quality (or plastic/ model eggs)


Egg cartons or trays


Egg grading scale (Jiffy-Way)


Egg candler (or flashlight for candling)


Disposable gloves


Paper towels



Observation/ recording sheet


Pen/Pencil

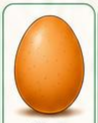
INSTRUCTIONS

1 Step 1: Exterior Quality Inspection

Students examine each egg and record:


Shell cleanliness


Cracks or damage


Shell shape


Shell texture



2 Step 2: Egg Grading by Size

Students:


Clean eggs

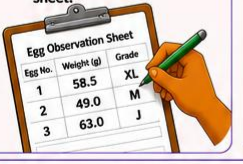

Sort


Grade using egg grading scale to weigh each egg and classify each into one of the following grades:



Peewee (1.25 oz / 35 g)	Small (1.5 oz / 43 g)	Medium (1.75 oz / 50 g)	Large (2.0 oz / 57 g)	Extra Large (2.25 oz / (64 g)	Jumbo (2.5 oz / 71 g)

4 Record the weight and grade on the observation sheet.



5 Pack eggs onto trays.



USDA EGG WEIGHT CHART

Size / Weight Class	Minimum Weight per Single Egg
Jumbo	2.5 oz (71 g)
Extra-Large	2.25 oz (64 g)
Large	2.0 oz (57 g)
Medium	1.75 oz (50 g)
Small	1.5 oz (43 g)
Peewee	1.25 oz (35 g)

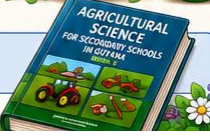
DID YOU KNOW?

Egg grading ensures consumers get quality eggs and helps farmers earn better prices!



TEXTBOOK REFERENCE

Agricultural Science for Secondary Schools in Guyana Book 3.



Topic: Preparation and Marketing of Livestock

Sub-topic: Preparation of Eggs

Activity 29.5: Candling Test-Checking the Internal Quality of Eggs



Group Activity: 4 to 5 students per group

Time: 40 minutes

Resources

- Eggs of different ages and quality
- Egg candler (or flashlight for candling)
- Observation/ recording sheet
- Pen/Pencil
- Darkened room or shaded area

Instructions

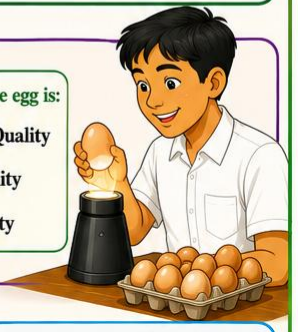


Use a candler or flashlight in a dark area to observe:

1. Size of the air cell
2. Position of the yolk
3. Thickness and clarity of the albumen (egg white)
4. Presence of blood spots or cracks

Decide whether the egg is:

1. Excellent Quality
2. Good Quality
3. Poor Quality



Steps

1 Prepare the Candling Area

i. Dim the classroom lights or move to a dark area.

ii. Turn on the egg candler or flashlight.

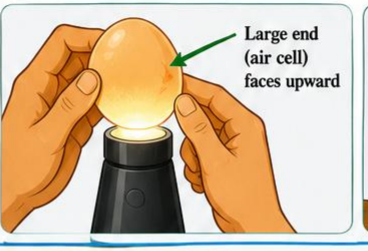


2 Hold the Egg Correctly

i. Hold the egg with the large end (air cell) facing upward.

ii. Place the large end directly over the light source.

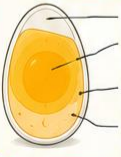
iii. Gently rotate the egg from side to side while observing the inside.



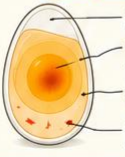


What You Are Looking For Inside the Egg

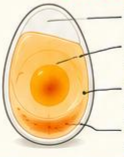
Excellent Quality



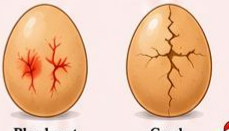
Good Quality



Poor Quality



Examples of Defects to Watch For



Remember! Candling helps you choose high-quality eggs for sale and ensures customer satisfaction.

GOOD EGGS. BETTER QUALITY BETTER PROFITS



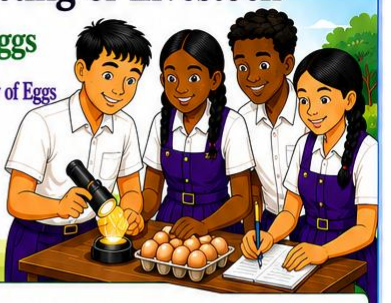
Textbook Reference: Agricultural Science for Secondary Schools in Guyana Book 3.

Topic: Preparation and Marketing of Livestock

Sub-topic: Preparation of Eggs

Activity 29.5: Candling Test-Checking the Internal Quality of Eggs





Group Activity: 4 to 5 students per group

Time: 40 minutes

RESOURCES

- Eggs of different ages and quality
- Egg candler (or flashlight for candling)
- Observation/ recording sheet
- Pen/Pencil
- Darkened room or shaded area

STEPS

3 Observe the Following Features

A. Air Cell

Look for the air space at the large end of the egg.



Small air cell → Very fresh egg

Medium air cell → Good quality egg

Large air cell → Older egg

B. Yolk

Observe how the yolk appears.

A good-quality egg has:



- Round yolk
- Yolk stays near the centre
- Yolk moves only slightly when rotated

Poor-quality eggs have:



- Flattened yolk
- Yolk moves freely inside
- Yolk may be difficult to keep centered

C. Albumen (Egg White)

Although not fully visible, students can judge the thickness indirectly.

Good-quality eggs usually have:



- Thick albumen
- Little movement of the yolk

Poor-quality eggs usually have:



- Thin, watery albumen
- Excessive movement of the yolk

D. Shell Defects

Look for:



Hairline cracks

Thin shell areas

Weak spots

Cracked eggs should not be marketed.

E. Blood Spots or Meat Spots

Observe for:



Small blood spots

Dark spots

Unusual shadows

Eggs with large blood or meat spots should be rejected for sale.

DECIDE THE QUALITY

Excellent Quality

Small air cell
Firm, centered yolk
Thick albumen
No defects

Good Quality

Medium air cell
Yolk mostly centered
Moderate albumen
Little or no defects

Poor Quality

Large air cell
Yolk not centered
Thin albumen
Defects present

Textbook Reference: Agricultural Science for Secondary Schools in Guyana Book 3.

Topic: Preparation and Marketing of Livestock

Sub-topic: Preparation of Eggs

Activity 29.6: Egg Preservation and Storage

Group Activity: 4 to 5 students per group **Time:** 30 minutes

RESOURCES:

- Fresh eggs (or model eggs)
- Egg cartons or trays
- Refrigerator or cooler with ice packs
- Thermometer (optional)
- Paper towels
- Food-safe disinfectant or sanitizer
- Labels or stickers
- Markers
- Observation worksheet

INSTRUCTIONS

PART A: Egg Preservation Investigation

Each group researches and discusses the following methods of preserving eggs:

1. Refrigeration
2. Oiling or coating eggs with mineral/vegetable oil
3. Liming (lime water preservation)
4. Freezing egg contents
5. Pickling eggs

Record:

1. How the method works
2. Advantages
3. Disadvantages
4. Best time to use it

PART B: Proper Egg Storage

Inspect the eggs and demonstrate the correct storage practices by:

1. Cleaning only lightly soiled eggs (do not wash clean eggs unnecessarily).
2. Removing cracked or broken eggs.
3. Placing eggs in cartons with the pointed end facing downward.
4. Labelling cartons with:
   - i. Packing date
   - ii. Grade
   - iii. Best-before date

   Packing Date: 15/05/2025
   Grade: LARGE
   Best Before: 12/06/2026
5. Storing eggs in the coolest available location or refrigerator.

9°C
4°C

DISCUSSION

1. Why should eggs be stored with the pointed end facing downward?
2. Why should cracked eggs not be marketed?
3. How does refrigeration help preserve egg quality?

DID YOU KNOW?

Proper preservation and storage keep eggs fresh for longer, reduce waste, and ensure consumer safety!

TEXTBOOK REFERENCE

Agricultural Science for Secondary Schools in Guyana Book 3.

Topic: Preparation and Marketing of Livestock

Sub-topic: Preparation of Eggs

Activity 29.7: The Egg Marketing Challenge 'Ready, Set, Sell!'

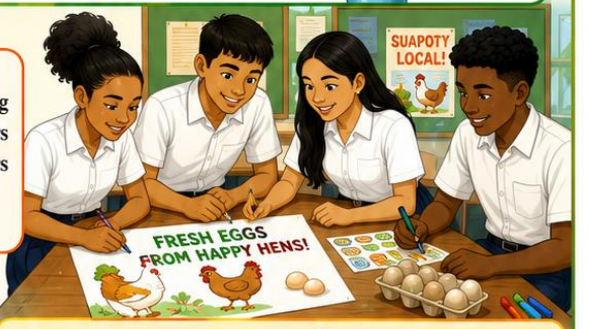
Group Activity: 4 to 5 students per group | **Time: 30 minutes**

Resources:

- Fresh eggs (or model eggs)
- Egg cartons or trays
- Labels or stickers
- Markers

Instructions:

Imagine your group owns a poultry farm that is preparing to sell eggs to supermarkets, restaurants, and customers at the local market. Your task is to convince customers that your eggs are the best choice.



Part A: Your group must create a Farm Identity



Develop:

1. Farm name
2. Farm logo
3. Farm slogan

Examples:

1. Sunny Side Poultry
2. Golden Nest Farms
3. Fresh Start Eggs

Possible slogans:

- "Fresh Every Day!"
- "Quality You Can Trust!"
- "Farm Fresh from Our Nest to Your Table!"

Part B: Design an Egg Carton

Create an attractive carton label that includes:

1. Farm name
2. Logo
3. Number of eggs
4. Egg grade
5. Packing date
6. Best-before date
7. Storage instructions
8. Price
9. Contact information



Topic: Preparation and Marketing of Livestock

Sub-topic: Preparation of Eggs

Activity 29.7: The Egg Marketing Challenge 'Ready, Set, Sell!'

Ready, Set, Sell!

Group Activity: 4 to 5 students per group

Time: 30 minutes

Resources

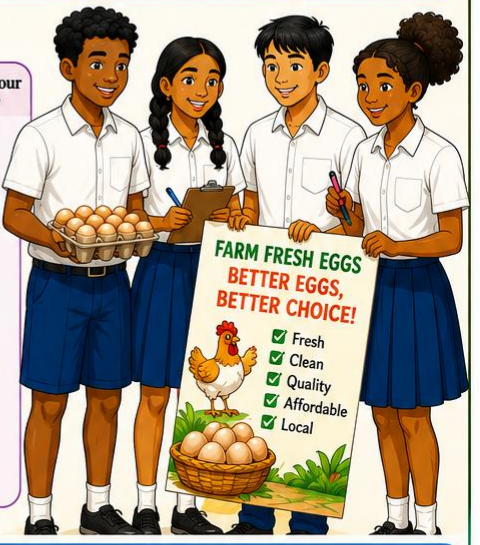
- Fresh eggs (or model eggs)
- Egg cartons or trays
- Labels or stickers
- Markers

Part C: Develop a Marketing Strategy

1 Who are your customers?	2 Where will you sell your eggs?	3 What makes your eggs different?
1 Families	1 Farmers' market	1 Farm fresh
2 Supermarkets	2 Grocery stores	2 Locally produced
3 Restaurants	3 Roadside stall	3 Clean and carefully graded
4 Hotels	4 Door-to-door delivery	4 Affordable
5 Bakeries	5 Online orders	5 High-quality
		6 Safe and hygienically packaged







Part D: Create an Advertisement

Choose ONE

- Television commercial
- Radio advertisement
- Social media advertisement
- Market announcement
- Live sales presentation



The advertisement should include:

1. Why customers should buy your eggs
2. Benefits of your product
3. Price or special offer
4. Catchy slogan

Maximum time: 2 minutes

Did You Know?

Consumers often decide whether to buy eggs within a few seconds. Clean, well-packaged, properly labelled eggs with attractive branding are more likely to sell and can earn farmers higher profits.



Textbook Reference: Agricultural Science for Secondary Schools in Guyana Book 3.

Topic: Apiculture

Sub-topic: Apiculture and Its Importance

Group Activity 30.1: Bee Awareness Exhibition

Group Activity:
4 to 5 students per group

Time:
30 minutes

Resources:
- Craft paper
- Markers
- Coloured pencil
- Samples of honey products

INSTRUCTIONS

A PART A: Entrepreneur Activity

Students act as entrepreneurs selling honey or beeswax products.

They design logos, slogans, and advertisements.

This introduces business skills and shows how apiculture supports income and employment.



B PART B: Bee Fair Exhibition

Combine all projects into a classroom "Bee Fair."

Posters, products, art, and marketing campaigns are displayed.

Invite other classes or parents to learn about the value of apiculture.



Textbook Reference: Agricultural Science Book 3

Topic: Apiculture

Sub-topic: Types and Functions of the Different Classes of Bees

Group Activity 30.2: Role Play "Build your Own Hive & Apiary"

Group Activity:
4 to 5 students per group

Time:
30 minutes

Resources:
- Craft paper
- Markers
- Coloured pencil
- Samples of honey products

INSTRUCTIONS

★ Divide the class into three groups:

1 QUEEN BEES

Represent fertility and egg-laying.



★ **Key Function:**
Lays all the eggs and ensures the continuation of the colony.

2 DRONES

Represent mating with the queen.



★ **Key Function:**
Mates with the queen and helps pass on genetic traits.

3 WORKERS

Represent feeding, cleaning, and hive maintenance.



★ **Key Function:**
Builds the hive, collects nectar and pollen, feeds larvae, cleans the hive, and protects the colony.

★ Each group acts out their role in a short skit, showing how they contribute to hive survival.

Textbook Reference:
Agricultural Science Book 3

Topic: Apiculture

Sub-topic: External Parts of the Bee

Activity 31.1: Buzz into Bee Anatomy

Individual Activity

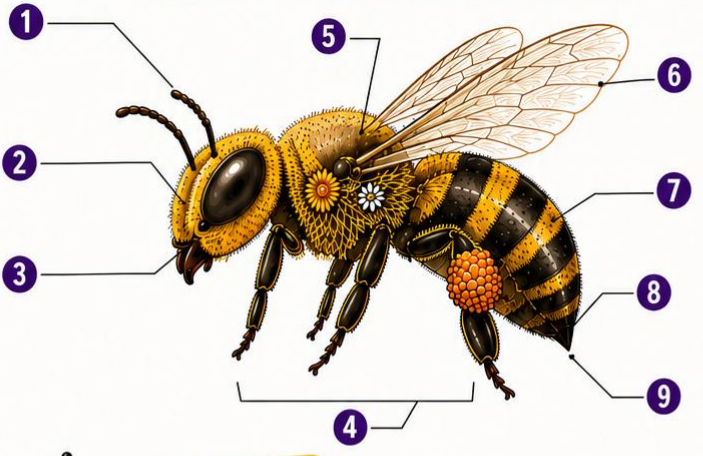
Time: 30 minutes

Resources:
- Craft paper
- Markers
- Coloured pencil

Instructions:

1. Examine the diagram of the bee as shown below and label the external parts using the word bank provided.
2. State the function of each external part of the bee.

THE EXTERNAL PARTS OF A BEE



WORD BANK

1. Antennae
2. Compound Eye
3. Mouthparts
4. Legs
5. Thorax
6. Wings
7. Abdomen
8. Pollen Basket
9. Stinger

Fun Fact!
A worker bee visits hundreds of flowers every day!

Bonus Challenge:
Colour your drawing neatly and make it look real!

Textbook Reference: Agricultural Science Book 3

Topic: Apiculture

Sub-topic: Pests and Diseases affecting Bees

Activity 31.2: The Apiary News Report



Group Activity: 4 to 5 students per group

Time: 30 minutes

Resources:

- Toy microphone (optional)
- News template
- Phone (optional)

Instructions

Pretend your group works for **Agri News Guyana!**



1. Create a 2-minute news report about a pest or disease outbreak affecting bees. (2 MINUTES)
2. Include in your report:
   - What happened
   - What caused it
   - How beekeepers are affected
   - Advice to farmers
   - Prevention tips
3. Present your report as a live news broadcast. (LIVE)
4. Be clear, interesting and creative!
5. The best report earns the most points!



Pro Tip! Plan your story, speak loudly and work as a team!

GREAT REPORT + GREAT TEAMWORK = BIG POINTS!

SAVE THE BEES, SAVE OUR FUTURE!

Textbook Reference: Agricultural Science for Secondary Schools in Guyana Book 3

Topic: Apiculture

Sub-topic: Harvesting Honey and Parts of the Hive

Activity 31.3: Hive Explorer Challenge

Group Activity: (2–3 teams)

Time: 30 minutes

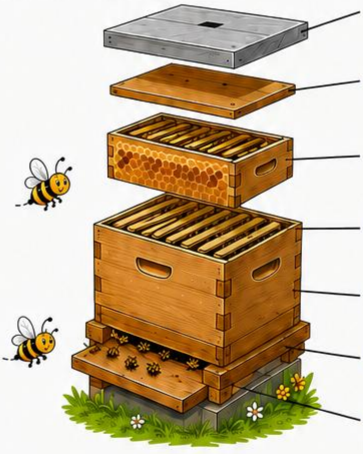
Resources:
Note pad
Camera
Pen

A PART A: Identify Hive Parts

★ Identify and label the parts of the hive using the word bank below.

WORD BANK

1. Roof (Outer Cover)
2. Inner Cover
3. Honey Super
4. Frames
5. Brood Box
6. Entrance
7. Bottom Board



B PART B: Visit from an Apiarist

★ Visit from an Apiarist to demonstrate the methods of harvesting honey.

★ Role play to demonstrate the steps in harvesting honey using a 'pretend' smoker.



Textbook Reference:
Agricultural Science book3



Topic: Aquaculture

Fish Handling and Processing



Sub-topic: Managing a Fish Farm

Activity 32.1: Aquaculture in Action

Group Activity:
(3 to 5 students per group)

Time:
30 minutes

Resources:
Note pad
Camera
Pen

A PART A: Visit a Local Fish Farm

- Visit a nearby fish farm with your group and make observations.
- Take notes and photos of the ponds, fish, feeding, and other management practices.
- Discuss with your team what you learned about managing a fish farm.



Think Smart!
What are the key things needed to run a successful fish farm?

B PART B: Build a Mini Fish Farm



Each group becomes a "Fish Farm Management Team."
Groups design their own fish farm layout, labeling areas for feeding, drainage, and harvesting.
They must explain how they'll manage each factor listed above.

Textbook Reference:
Agricultural Science Book 3

Topic: Aquaculture
Fish Handling and Processing

Sub-topic: Establishing and Managing a Fish Farm

Activity 32.2: Fish Farm Investigation Challenge

Group Activity:
3 to 5 students per group

Time:
30 minutes

Resources:
- Fish farm inspection checklist
- Camera (optional)
- Markers
- Chart paper

A PART A: Fish Farm Case Study Challenge

Instructions

★ Each group receives a fish farm case study.

Example:
A farmer notices that fish are growing slowly. The pond is full of weeds, birds are eating fish daily, and there is no drainage outlet.



★ Groups must identify:
- Problems
- Factors affecting production
- Practical management solutions
- Expected improvements

★ Present findings to the class.



B PART B: Pond Inspection and Improvement Challenge

Instructions

★ Visit a nearby fish pond (or observe teacher photographs/videos).

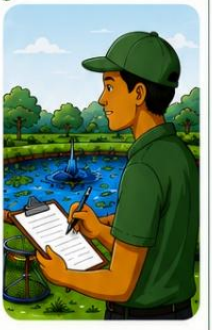
★ Inspect the fish farm for:
- ✓ Site suitability
- ✓ Feeding practices
- ✓ Fertilization
- ✓ Weed control
- ✓ Predator protection
- ✓ Drainage
- ✓ Harvesting facilities

★ Complete the checklist.

★ Recommend three improvements that would make the fish farm more productive.

FISH FARM INSPECTION CHECKLIST

Aspect	Satisfactory (✓)	Needs Improvement (x)	Comments / Observations
Site suitability			
Feeding practices			
Fertilization			
Weed control			
Predator protection			
Drainage			
Harvesting facilities			



Textbook Reference:
Agricultural Science Book 3



Topic: Aquaculture

Sub-topic: Steps involved in Handling Fish



Activity 32.3: Practical Activity 'Fish Handling and Processing'

Group Activity: 4 to 5 students per group

Time: 30 minutes

RESOURCES:

- Fish (fresh)
- Fish scaler or blunt knife
- Cutting boards
- Trays / bowls
- Gloves & aprons
- Projector / computer / videos
- Chart paper, markers, art materials

INSTRUCTIONS

1 SCALING DEMONSTRATION



- Hold the fish firmly on the board.
- Use the scaler or blunt knife.
- Scrape from tail to head.
- Rinse the fish with clean water.
- Remove loose scales.

2 GUTTING PRACTICE



- Make a cut from the vent to the gills.
- Carefully remove the internal organs.
- Do not puncture the stomach or intestines.
- Rinse the cavity with clean water.

3 FILLETTING TECHNIQUE



- Make a cut behind the gills down to the backbone.
- Slice along the backbone from head to tail.
- Remove the fillet and repeat on the other side.

4 SORTING AND GRADING FISH



- Place fish on the board or tray.
- Sort by size, weight and quality.
- Place fish into the correct size grade (Large, Medium, Small).
- Record the number in each grade.

5 VIRTUAL TOUR



- Watch the video presentation.
- Take notes on key fish handling and processing steps.
- Ask questions and discuss as a group.

6 FISH PRODUCT INNOVATION CHALLENGE



- Work as a group to create a new fish product idea.
- Design a label or package.
- Present your product and explain its benefits.

DID YOU KNOW?

Proper fish handling keeps fish safe to eat, reduces waste, and increases its value in the market.





Topic: Storage of Fish

Sub-topic:
Methods of Fish Storage



Activity 33.1: Fish Storage Challenge

'Explore, Evaluate and Debate Fish Storage Methods'.

Group Activity:
3 to 5 students per group

Time:
30 minutes

RESOURCES:



- Note pad
- Ice
- Pen
- Fish



A PART A: Methods of Storing Fish

★ Students to work in groups and demonstrate methods of storing fish.

1. ICING (REFRIGERATION)



Keeping fish on ice or in a refrigerator to slow spoilage.

2. DRYING



Removing moisture from fish by sun or air drying.

3. SMOKING



Using smoke and heat to preserve fish and enhance flavour.

4. FREEZING

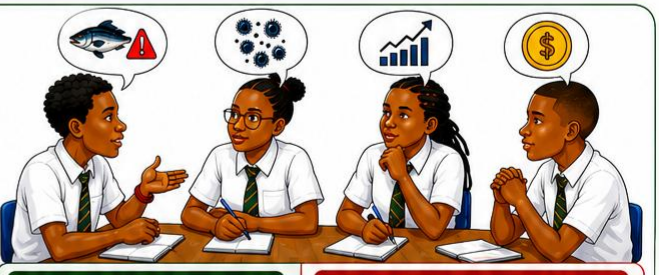


Storing fish at very low temperatures to keep it fresh for longer.

B PART B: Debate

★ **Debate Motion:**
'What are the possible issues of storing fish for prolonged periods of time?"

1. Teacher assigns task to each team:
   Proposing team (agree with motion)
   Opposing team (disagree with motion)
2. Each team presents speeches including opening statements, rebuttals, and closing summaries.



PROPOSING TEAM (Agree) ✓

Points to consider:

1. Spoilage and loss of quality
2. Food poisoning risks
3. Economic losses

OPPOSING TEAM (Disagree) ✗

Points to consider:

1. Proper storage prevents spoilage
2. Modern methods extend shelf life
3. Cost-effective methods are available

Textbook Reference:
Agricultural Science Book 3

Topic: Storage of Fish

Sub-topic: Determining Storage Requirements and Calculating Weight of Fish

Activity 33.2: Fish Weight Explorer Challenge

GROUP ACTIVITY

3 to 5 students per group

TIME

35 minutes

RESOURCES

Fresh fish samples | Weighing scale | Calculator | Notebook, pen | Ice | Table/ chart paper

1 STEP 1: WEIGHING FISH (10 mins)

Measure and record the weight of fresh fish.

Sample	Number of Fish	Total Weight (g)	Average Weight per Fish (g)
1			
2			
3			



2 STEP 2: STORAGE AND RE-WEIGHING (10 mins)

Store the fish using your chosen method. After the storage period, re-weigh the fish.

Sample	Number of Fish	Total Weight After Storage (g)
1		
2		
3		



3 STEP 3: CALCULATIONS (10 mins)

Use the formula below to calculate weight loss.

Weight Loss (g) = Weight Before Storage (g) – Weight After Storage (g)

$$\text{Percentage Weight Loss (\%)} = \frac{\text{Weight Loss (g)}}{\text{Weight Before Storage (g)}} \times 100$$

Sample	Weight Before (g)	Weight After (g)	Weight Loss (g)	% Weight Loss
1				
2				
3				



4 STEP 4: ANSWER THE QUESTIONS (5 mins)

1. Which storage method resulted in the least weight loss?
2. Why does fish lose weight during storage?
3. How does weight loss affect the quality and value of fish?
4. If a customer orders 5 kg of fish after storage and the weight loss is 15%, how much fresh fish will you need to start with? Show your calculation.



REFERENCE:

AG00202 – Handle and Care for Fish | CCAGIA1006 – CVQ Level 1 Inland Aquaculture Operations (Tilapia Production)



Topic: Aquaculture

Sub-topic: Hazards & Personal Protective Equipment (PPE)



Activity 33.3: PPE Safety Challenge 'Safety Gear Briefing'

TIME: 40 minutes

RESOURCES:



Note pad | Ice | Pen | Fish | Life vest | Safety helmet | Gloves | Safety boots | Camera (optional)

GROUP ACTIVITY:

4 to 5 students per group

PART A: AQUACULTURE OFFICER PPE DEMONSTRATION

The Aquaculture Officer demonstrates the correct use of Personal Protective Equipment (PPE) and explains how it protects workers from common hazards in aquaculture operations.

Life vests and jackets for water safety



Non-slip boots and gloves to prevent accidents



Helmets for head protection



Wear the right PPE, use it correctly, and inspect it regularly.
SAFE WORK TODAY, HEALTHY LIFE TOMORROW!



PART B: ROLE PLAY

Each group represents a fish processing unit.
Assign roles: safety officer, quality controller, preservation expert.

SAFETY OFFICER



Monitors safety practices, checks PPE use, and identifies potential hazards.

QUALITY CONTROLLER



Ensures fish quality standards are met and products are safe for consumers.

PRESERVATION EXPERT



Applies proper preservation methods to extend shelf life and maintain quality.

Textbook Reference:
Agricultural Science book 3



Topic: Aquaculture

Sub-topic:
Methods of Preventing Spoilage in Fish



Activity 33.4: Practical on Fish Preservation Techniques

TIME: 40 minutes

RESOURCES:

Note pad, Camera, Pen, Fish, Knife, Vacuum seal, Salt, Fireside, Dehydrator

GROUP ACTIVITY:

4 to 5 students per group

Instructions: Work in groups to preserve fish using the methods of preservation shown below.

METHODS OF PREVENTING SPOILAGE IN FISH

1. REFRIGERATION (0–4°C)



Store fish in the refrigerator at 0–4°C to slow down the growth of bacteria.

2. FREEZING (-18°C OR LOWER)



Freeze fish at -18°C or lower to stop bacterial activity and keep fish for a longer period.

3. SALTING AND DRYING



Rub fish with salt and dry in the sun or shade to remove moisture and prevent spoilage.

4. SMOKING



Smoke fish over controlled heat to remove moisture, improve flavour and prevent spoilage.

5. VACUUM PACKAGING



Seal fish in vacuum bags to remove air and slow down the bacteria that cause spoilage.

Textbook Reference:
Agricultural Science book 3

Topic: Regional Agricultural Institutions

Sub-topic: Groups of Regional Agricultural Institutions

Activity 34.1: "Regional Institutions Through Art"

Time: 30 mins

Group Activity: 4 to 5 students per group

Resources: Paint, canvas, paint brushes, pencil

INTRODUCTION & DISCUSSION

Use simple examples to discuss how regional agricultural institution helps Caribbean Communities (e.g., funding schools, improving farming, training youth, supporting trade).

CARDI



Trains farmers and promotes sustainable agriculture.

IICA



Builds skills and supports agricultural development.

CDB



Funds projects that improve food security and rural life.

CRFM



Supports fisheries and promotes responsible fishing.

YOUR TASK:

In groups, choose one of the institutions above (or another regional agricultural institution).

Create a painting, drawing, or mural that shows the institution's role and how it benefits Caribbean people.

Add symbols, colours, and words to make your artwork meaningful and creative.



Textbook Reference:
Agricultural Science for Secondary Schools in Guyana Book 3, Chapter 6, pages 164-167.

Topic: Regional Agricultural Institutions.

Sub-topic:
Roles of Regional Agricultural Institutions.

Activity 34.2: Digital Pamphlet & Video Exploration

Time: 30 mins

Group Activity: 4 to 5 students per group

Resources: Internet access or video provided by teacher.

PART A: VIDEO VIEWING

Watch the educational video provided by your teacher about regional agricultural institutions.



While watching, identify:

- Name of each institution
- Main role or function
- How it benefits Caribbean people
- Example of its impact

Take notes in your notebook as you watch.

Let's learn, create and appreciate the institutions that grow our Caribbean!

Textbook Reference:
Agricultural Science for Secondary Schools in Guyana Book 3



Topic: Regional Agricultural Institutions.



Sub-topic:
Roles of Regional Agricultural Institutions.



Activity 34.2: Digital Pamphlet & Video Exploration



Time: 30 mins

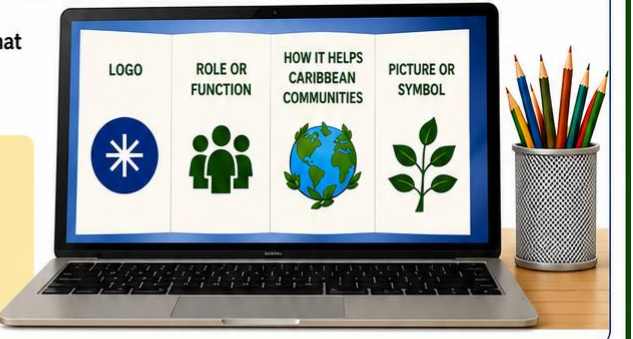
Group Activity: 4 to 5 students per group

Resources: Internet access or video provided by teacher.

PART B: PAMPHLET CREATION

In groups, create a digital pamphlet that highlights the role of each regional agricultural institution.

Your pamphlet should include:
- Institution logo
- Main role or function
- How it helps Caribbean communities
- Picture or symbol related to its work



Let's learn, create and appreciate the institutions that grow our Caribbean!

Textbook Reference:
Agricultural Science for Secondary Schools in Guyana Book 3

Topic: Regional Agricultural Institutions.

Sub-topic: CARICOM Connections

Activity 34.3: CARICOM Connections



Time: 30 mins

Group Activity: 4 to 5 students per group

Resources:

- Computer, tablet, or smartphone
- Internet access
- Digital pamphlet software (Canva, Google Slides, Microsoft PowerPoint, or Microsoft Publisher)
- Notebook and pen for research notes

GROUP RESEARCH & DIGITAL PAMPHLET

In groups, research one regional agricultural institution and how it connects to CARICOM. Use computers to gather information and prepare for your digital pamphlet.



PAMPHLET CREATION

Your digital pamphlet should include:

- Institution name and logo
- Role and responsibilities
- How it supports agriculture in the Caribbean
- How it connects with CARICOM
- Benefits to Caribbean people
- Pictures or symbols related to its work
- Sources of information

INSTITUTION NAME & LOGO	ROLE & RESPONSIBILITIES	HOW IT CONNECTS WITH CARICOM	BENEFITS TO CARIBBEAN PEOPLE	PICTURES OR SYMBOLS

Let's learn, create and appreciate the institutions that grow our Caribbean!

Textbook Reference:
Agricultural Science for Secondary Schools in Guyana Book 3



Topic:
The Business of Farming
Farm Organization and Planning (Budget)
Sub-topic:
Importance of Budgeting





Activity 35.1:
"Plan Your Farm Budget"



Group Activity:
4 to 5 students per group

Time:
30 minutes

Resources:



Scenario cards | Data sheets | Calculator | Pen | Paper

PART A Scenario Challenge

Follow the steps below.

1. Your group will draw one scenario card.
2. Use the information on the card to complete the Farm Budget Data Sheet.



Your group must:

- Estimate all costs and income carefully.
- Calculate your estimated profit (Total Income – Total Costs).

GROWING TOMATOES	RAISING CHICKENS	PLANTING RICE
		
You plan to grow tomatoes in a 0.5 acre field and sell them at the local market.	You plan to raise 20 chickens and sell eggs and some chickens.	You plan to plant rice on 1 acre and sell it after harvest.

FARM BUDGET DATA SHEET

EXPECTED COSTS		EXPECTED INCOME		
Item	Estimated Cost (GYD)	Item	Market Price (GYD per unit)	Estimated Yield (units)
Seeds / Chicks		Product 1		
Fertilizer / Feed		Product 2		
Labor		Product 3		
Tools / Equipment				
Other Costs		TOTAL INCOME		
TOTAL COSTS				

ESTIMATED PROFIT (TOTAL INCOME – TOTAL COSTS) = _____

PART B Challenge Round ⚠

1. Introduce an unexpected event (e.g., pest outbreak, price drop, drought).



2. Groups must revise their budget to show how the event will affect costs, income, and profit. They should plan how to respond and reduce losses.

POSSIBLE UNEXPECTED EVENTS



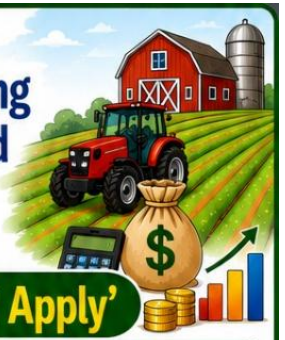
Pest Outbreak | Price Drop | Drought | Flooding

A good budget today leads to a successful harvest tomorrow!



Topic: The Business of Farming Farm Organization and Planning (Budget)

Sub-topic: Types of Budgets



Activity 35.2 'Budget Match and Apply'

Group Activity: 4 to 5 students per group

Time: 30 minutes

Resources:


Scenario cards

Data sheets

Calculator

Pen

Paper

Instructions

Part A: Scenario Challenge

Use the information on the scenario cards to complete tasks.

Scenario 1 – Enterprise Budget

Situation

Mr. Persaud grows only corn on his farm.
He wants to know whether growing corn alone is making a profit.

Information

Income

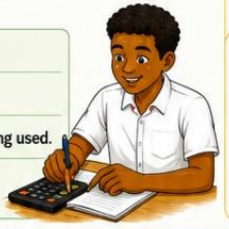
Corn sales:	$900,000

Expenses

Seed:	$90,000
Fertilizer:	$130,000
Labour:	$180,000
Pesticides:	$70,000
Transportation:	$50,000

Student Task

1. Calculate total expenses.
2. Calculate net profit.
3. Identify which budget is being used.
4. Explain why an enterprise budget is suitable.



Scenario 2 – Whole Farm Budget

Situation

Mrs. Adams owns a mixed farm.
She grows corn, raises chickens and goats.
She wants to know if the entire farm is profitable.

Information

Income

Corn	$600,000
Chicken sales	$450,000
Goat sales	$500,000

Expenses

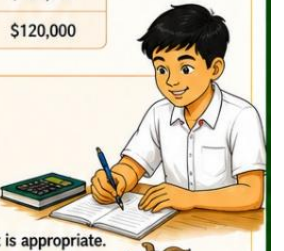
Corn	$250,000
Poultry	$220,000
Goats	$180,000
General farm expenses	$120,000

Student Task

Calculate:

1. Total income
2. Total expenses
3. Net profit

Explain why a whole farm budget is appropriate.



Good planning today leads to a successful harvest tomorrow!



Topic: The Business of Farming Farm Organization and Planning (Budget)

Sub-topic: Types of Budgets



Activity 35.2 'Budget Match and Apply'



Group Activity: 4 to 5 students per group

Time: 30 minutes

Resources:



Scenario cards



Data sheets



Calculator



Pen



Paper

Instructions



Part A: Scenario Challenge

Use the information on the scenario cards to complete tasks.



Scenario 3 – Partial Budget

Situation

A farmer already grows corn.

He is thinking about adding egg production.

He wants to know if this change is worthwhile.



Additional Income		
	Egg sales	$450,000

Additional Expenses		
	Housing	$120,000
	Feed	$150,000
	Pullets	$80,000
	Equipment	$40,000

Student Task



1. Calculate additional income.
2. Calculate additional expenses.
3. Calculate expected profit.
4. Should the farmer start egg production?
5. Give one reason.



Plan smart today, harvest success tomorrow!





Topic: The Business of Farming
Farm Organization and Planning (Budget)
Sub-topic: Types of Budgets



Activity 35.2 'Budget Match and Apply'



Group Activity: 4 to 5 students per group

Time: 30 minutes

Resources:



Scenario cards | Data sheets | Calculator | Pen | Paper

Instructions

Part B: Budget Creation

1. Each group creates a budget for the scenario given.
2. They calculate total income, total expenses, net profit.



Examples of Budgets for Scenarios

Scenario 1 Enterprise Budget

Income

Corn sales	$900,000

Expenses

Seed	$90,000
Fertilizer	$130,000
Labour	$180,000
Pesticides	$70,000
Transportation	$50,000
TOTAL EXPENSES	$520,000
NET PROFIT	$380,000



This shows if growing corn alone is profitable.

Scenario 2 Whole Farm Budget

Income

Corn sales	$600,000
Chicken sales	$450,000
Goat sales	$500,000

Expenses

Corn expenses	$250,000
Poultry expenses	$220,000
Goat expenses	$180,000
General farm expenses	$120,000
TOTAL EXPENSES	$770,000
NET PROFIT	$780,000



This shows if the entire farm is profitable.

Scenario 3 Partial Budget

Additional Income

Egg sales	$450,000

Additional Expenses

Housing	$120,000
Feed	$150,000
Pullets	$80,000
Equipment	$40,000
TOTAL ADDITIONAL EXPENSES	$390,000
EXPECTED PROFIT	$60,000



This shows if adding egg production is worthwhile.



Plan your farm. Control your costs. Grow your profit!





Textbook Reference: Agricultural Science for Secondary Schools in Guyana Book 3

Topic: The Business of Farming

Farm Organization and Planning (Budget)

Sub-topic: Preparation of Budgets

Activity 35.3: Farm Budget Challenge

Group Activity: 4 to 5 students per group

Time: 30 minutes

Resources:

- Scenario Cards
- Worksheet with Budget Table
- Calculator
- Pen
- Paper

SCENARIO

A group of young farmers are preparing to establish a large-scale farm.



INSTRUCTIONS

1. In your groups, discuss and decide how to prepare the budget for the enterprise.
2. List anticipated income, expenses and profits.
3. Include these key elements in your budget

Income

Sources: Salaries, investments, grants, etc.

Total Income: Sum of all income sources.

Expenditures

Fixed Costs: Expenses that do not change (e.g., rent, loans).

Variable Costs: Expenses that fluctuate (e.g., utilities, entertainment).

Total Expenditures: Sum of all costs.

Net Balance: Total Income – Total Expenditures

MY FARM BUDGET

INCOME	AMOUNT (G$)	EXPENDITURES	AMOUNT (G$)
1.		FIXED COSTS	
2.		1.	
3.		2.	
4.		3.	
5.		VARIABLE COSTS	
TOTAL INCOME		1.	
		2.	
		3.	
		TOTAL EXPENDITURES	

NET BALANCE (TOTAL INCOME – TOTAL EXPENDITURES) =

GROW
BUILD
ACHIEVE

"Plan Today for a Stronger Tomorrow!"

TEXTBOOK REFERENCE:
Agricultural Science for Secondary Schools in Guyana
Book 3

Topic: Sourcing and Citing Information for Research Purposes

Sub-topic: Introduction to Research and Information Sources

Activity 35.4: Source Detective

Group Activity: 4 to 5 students per group

Time: 30 minutes

RESOURCES



Samples of books, magazines, journals, newspaper.



Access to websites

INSTRUCTIONS

1. Divide students into groups of 4–5.
2. Provide each group with different information sources.
3. Students examine the sources and identify:
   - Type of source
   - Author(s)
   - Title
   - Publication date
   - Publisher/Website
4. Groups record their findings in a table.



RECORD YOUR FINDINGS

Type of Source (Book, Journal, Magazine, Website, Newspaper)	Author(s) (Who wrote it?)	Title (Name of the source)	Publication Date (When was it published?)	Publisher / Website (Who published it or website address)

DISCUSSION:
Why is it important to record this information when conducting research?



TEXTBOOK REFERENCE: Agricultural Science Book 3

Topic: Sourcing and Citing Information for Research Purposes

Sub-topic: Understanding Citation and Referencing

Activity 35.5:

Agricultural Research Escape Challenge



Group Activity:
4 to 5 students per group

Time: 30 minutes

RESOURCES



Clue cards



Source/Citation matching cards



Pens/pencils



worksheet

INSTRUCTIONS

You and your team are Agricultural Researchers trapped in a virtual research lab.
To escape, you must complete a series of challenges. The first team to solve all challenges escapes the lab and wins.

CHALLENGE 1

Identify examples of plagiarism.

Look at the sentences below. Identify which are examples of plagiarism (P) and which are NOT plagiarism (NP). Write P or NP next to each sentence.



EXAMPLE SENTENCES

1. Farming improves food security. (Source: FAO, 2022.) _____
2. Farming is important. Many people say it helps our country grow. _____
3. According to Jones (2021), "Sustainable farming protects the soil and increases yields." _____
4. Farmers work hard every day to produce food. _____

Remember:
Plagiarism is using someone else's ideas, words, or work without giving credit.

CHALLENGE 2

Match sources to their correct citations.

Match each source (A–C) with the correct citation (1–3).

SOURCES

A. Book
B. Journal Article
C. Website

CITATIONS

1. Brown, L. (2020). Soil Fertility and Crop Production. Greenfield Publishers.
2. FAO. (2022). The State of Food and Agriculture. Retrieved from www.fao.org
3. Smith, J. (2021). Sustainable Agriculture Practices. Journal of Agricultural Science, 15(2), 45–60.

Example: A – 1, B – 3, C – 2



THINK
RESEARCH
BE CREDIBLE
BE AMAZING!

First Team to Escape **WINS!**



Good research today, better solutions tomorrow for our farms and our future!



Topic: Sourcing and Citing Information for Research Purposes

Sub-topic: Understanding Citation and Referencing

Activity 35.5:

Agricultural Research Escape Challenge

Group Activity:
4 to 5 students per group

Time: 30 minutes

Instructions: You and your team are Agricultural Researchers trapped in a virtual research lab.
To escape, you must complete a series of challenges. The first team to solve all challenges escapes the lab and wins.

CHALLENGE 3

Correct a poorly referenced paragraph.

Read the paragraph below. Rewrite it correctly using in-text citations and a reference list.



EXAMPLE PARAGRAPH

Organic farming is good for the environment. It improves soil health and increases crop yields. Many studies show this to be true.

_____

_____

_____

Use this source:

Green, K. (2019). Benefits of organic farming. *Journal of Sustainable Farming*, 8(1), 10–22.

CHALLENGE 4

Find missing citation information from source cards.

Use the source cards below to complete the missing citation information.

SOURCE CARD

Author:	Dr. Maria Lewis
Title:	Sustainable Farming for the Future
Publisher:	Green Earth Press
Year:	2021
Place:	Georgetown

CITATION (APA Format)

Lewis, M. (_____). _____

_____

_____

_____



THINK RESEARCH BE CREDIBLE BE AMAZING!

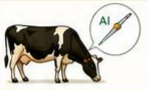
First Team to Escape **WINS!**

Good research today, better solutions tomorrow for our farms and our future!

WEEKLY TOPICS AND VIDEO LINKS

WEEK	TOPIC	VIDEO LINKS
1	Plant Nutrition Sources of Nutrients in Crop Production	https://youtu.be/NHqEthRCqQ4?si=VGymd0V8KhVSrx8
2	Major and Minor Nutrients used in Crop Production Role of Major and Minor Nutrients used in Crop Production	https://youtu.be/Katy6SSf8FI
3	Characteristics of Fertile Soils Deficiency Symptoms of Major and Minor Nutrients in Crop Production	https://youtu.be/GEq4LGkBglo https://youtu.be/ZSNuMOxYReM https://www.youtube.com/shorts/wpOKGKva010?feature=share https://youtu.be/Ral9wog5-D0 https://youtu.be/NJ1FyQ48yz0
4	Crop Production: Nomenclature Economic Importance of Crops	https://youtu.be/kO3sYLXUeI4 https://youtu.be/E1RMqkmsDrs https://youtu.be/gbbJet1Z7Ss
5	Vegetable Flower Crop (Broccoli): Planting Materials	https://youtu.be/8meGKFqKnWs
6	Vegetable Flower Crop (Broccoli): Harvesting, Post Harvesting and Marketing	https://youtu.be/jDoVpU-tIQ8
7	Ornamental Crop (Heliconia)	https://youtu.be/93BX6hNQlgI
8	Traditional Crop (Sugarcane): Structure of the Sugarcane Plant/Planting Materials	https://youtu.be/_IzWWpsdeSk
9	Traditional Crop (Sugarcane): Care and Management of the Crop	https://youtu.be/V-58hB_xtCU
10	Traditional Crop (Sugarcane): Harvesting	https://youtu.be/IUXQh-UPFjE https://youtu.be/LL2pc85P_So https://youtu.be/QABiEb9xvFc
11	Traditional Crop (Rice): Structure of the Rice Plant/ Planting Materials	https://youtu.be/J_mMS3EkHok
12	Traditional Crop (Rice): Care and Management of the Crop	https://youtu.be/SZcB2nHkjk4
13	Traditional Crop (Rice): Harvesting	https://youtu.be/ddrsjwuZi68
14	Cultural Practices Associated with Crop Production Control Methods for Weeds, Pests, and Diseases affecting Crops	https://youtu.be/rXT5HwHI9w https://youtu.be/Ca8r3b0uw5M https://youtu.be/Dn0SXMGXySU https://youtu.be/TwxfqD73W¡Y
15	Major Pests and Diseases affecting Crops	https://youtu.be/LskAiyrQygA https://www.youtube.com/shorts/w5RUUjElAjc?feature=share https://youtu.be/AVSs-EkYTCo
16	Working with Chemicals in the Environment	https://youtu.be/r9x33zkLdKA https://youtu.be/9tcpvM7gYPA https://youtu.be/_w-Q75Yspw4 https://youtu.be/rU8-1YYjgUc
17	Sheep, Goat and Cattle Production in Guyana and the Caribbean	https://www.youtube.com/watch?v=9ZGc-LJzlp8

WEEKLY TOPICS AND VIDEO LINKS

WEEK	TOPIC	VIDEO LINKS
18	 Breeds of Sheep, Goats and Cattle	https://www.youtube.com/watch?v=nsdCHQWXirg
19	 External Positions and Parts of Sheep, Goats, and Cattle	https://www.youtube.com/watch?v=ENSUi2ypLNw
20	 Digestion in Sheep, Goats and Cattle	https://youtu.be/r9x33zkLdKA https://youtu.be/9tcpvM7gYP
21	 Definition and Terms used in Reproduction in Sheep, Goats and Cattle Production	https://www.youtube.com/watch?v=UEjajtfJWSM
22	 Mating Artificial insemination (AI) in Sheep, Goats, and Cattle	https://www.youtube.com/watch?v=r6qTgCPrwuo
23	 Parturition and Signs of Ill Health Sheep, Goats and Cattle	https://www.youtube.com/watch?v=JFb2YVNMcfw
24	 Sources of Foods	https://www.youtube.com/watch?v=g90Ef-pxhro
25	 Animal Nutrition Livestock Rations Pasture Grasses Supplementary Feeding Methods (Silage and Hay)	https://www.youtube.com/watch?v=nDwypkmjZD4 https://www.youtube.com/watch?v=J9OP6OWqHys
26	 Common Pests and Diseases affecting Sheep, Goats and Cattle	https://www.youtube.com/watch?v=3Fx2KAZp8s4
27	 Common Pests and Diseases affecting Sheep, Goats and Cattle	https://www.youtube.com/watch?v=3Fx2KAZp8s4
28	 Preparation and Marketing of Livestock Marketing of Meat (Cuts of meat)	https://www.youtube.com/watch?v=UEwgulMm3uc
29	 Preparation and Marketing of Livestock	https://www.youtube.com/watch?v=hq-xXoW_HaA https://www.youtube.com/watch?v=i0NeR7zBsJI https://www.youtube.com/watch?v=My5Qj04IXdc
30	 Apiculture (Bee Keeping)	https://www.youtube.com/watch?v=esJXJS4G3FM https://www.youtube.com/watch?v=9ePic3dtykk&t=34s
31	 Apiculture Pests and Diseases affecting bees Harvesting of Honey Parts of the hive	https://www.youtube.com/watch?v=rhGPVFupkzA
32	 Aquaculture Fish Handling and Processing	https://www.youtube.com/watch?v=iBMqlmWr3FI
33	 Storage of Fish	https://www.youtube.com/watch?v=jpjyIzH58mA
34	 Regional Agricultural Institutions	https://www.fao.org/americas/multimedia/video-detail/fao-explainer/en
35	 The Business of Farming Farm Organization and Planning (Budget) Sourcing And Citing Information for Research Purposes	https://www.youtube.com/watch?v=GSXI2i_CHno https://www.youtube.com/watch?v=LfB1S4hjcBY https://www.youtube.com/watch?v=-JV9cLDCgas https://www.youtube.com/watch?v=kyXWKvNd0Rg