



**CARIBBEAN EXAMINATIONS COUNCIL**

**Caribbean Advanced Proficiency Examination®  
CAPE®**

# **AGRICULTURAL SCIENCE SYLLABUS**

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# Introduction

The Caribbean Advanced Proficiency Examination (CAPE) is designed to provide certification of the academic, vocational and technical achievement of students in the Caribbean who, having completed a minimum of five years of secondary education, wish to further their studies. The examinations address the skills and knowledge acquired by students under a flexible and articulated system where subjects are organised in 1-Unit or 2-Unit courses with each Unit containing three Modules. Subjects examined under CAPE may be studied concurrently or singly.

The Caribbean Examinations Council offers three types of certification. The first is the award of a certificate showing each CAPE Unit completed. The second is the CAPE Diploma, awarded to candidates who have satisfactorily completed at least six Units, including Caribbean Studies. The third is the CXC Associate Degree, awarded for the satisfactory completion of a prescribed cluster of seven CAPE Units including Caribbean Studies and Communication Studies. For the CAPE Diploma and the CXC Associate Degree, candidates must complete the cluster of required Units within a maximum period of five years.

Recognised educational institutions presenting candidates for the CXC Associate Degree in one of the nine categories must, on registering these candidates at the start of the qualifying year, have them confirm, in the required form, the Associate Degree they wish to be awarded. Candidates will not be awarded any possible alternatives for which they did not apply.

# Agricultural Science Syllabus

## ◆ RATIONALE

Agricultural Science is a broad multidisciplinary field that encompasses aspects of exact, natural, economic and social sciences that are used in the practice and understanding of agriculture and the environment. Agriculture is the set of activities that transform the environment for the production of animals and plants for food and other human usage. In addition, to protecting the environment, agriculture provides jobs especially for rural people and contributes to the viability of the area, creates a more stable food supply, and provides other desired environmental and rural outputs.

The CAPE Agricultural Science Syllabus was developed in response to the fact that agriculture and food are prime industries in the region and are key components in the development of policies that drive economic growth, utilise natural resources and sustain the environment. It is very important that the agricultural industry in the Caribbean has persons who are equipped with the knowledge, skills and competencies to undertake and sustain the development of the agricultural sector leading to the goal of wealth creation through increased food production; and food security and safety. Additionally, there is increasing recognition of the role that agriculture plays in improving nutrition and health.

Based on the attributes of the Ideal Caribbean Person as articulated by CARICOM, this course of study in CAPE Agricultural Science can contribute to the development of a Caribbean person who demonstrates multiple literacies, independent and critical thinking, questions the practices of past and present and brings this to bear on the innovative application of science and technology to problem solving; and values and displays the creative imagination in its various manifestations and nurtures its development in economic and entrepreneurial spheres in all other areas of life. With reference to the UNESCO Pillars of Learning, this course of study will also contribute to a person who will learn to know, learn to do, learn to live together, learn to be and learn to transform themselves and society. Hence, persons will be better positioned not only to be farmers, but to make evidence-based and informed judgments and decisions on implementing best practices to enhance the sector over time and on preserving the environment. The syllabus is designed to provide the knowledge, skills and competencies that are required for further studies, as well as for the world of work.

## ◆ AIMS

This syllabus aims to:

1. develop knowledge and understanding of the importance of agriculture as it relates to food and the environment and the multifunctionality of territories of the Caribbean region;
2. provide knowledge of the dynamic nature of the value-added chain in agricultural production (from production to consumption), post-production and marketing in a complex national, regional and international market;

3. develop an appreciation of the importance of agriculture in alleviating hunger and poverty, ensuring food security and safety, and improving nutrition and health;
4. develop an appreciation of the importance of agriculture in providing multiple pathways to employment and further education;
5. increase an awareness of the relationship between agriculture and the environment and the importance of preserving the environment;
6. utilise modern technology to improve agricultural production and encourage innovation and food security within nations and regionally;
7. use the scientific method to solve problems and make informed judgements;
8. integrate information, communication and technological (ICT) tools and skills.

## ◆ SKILLS AND ABILITIES TO BE ASSESSED

The skills students are expected to have developed on completion of this syllabus have been grouped under two headings:

- (a) Knowledge and Comprehension;
- (b) Application.

### **Knowledge and Comprehension (KC)**

Knowledge: The ability to identify, remember and grasp the meaning of basic facts, concepts and principles.

Comprehension: The ability to select appropriate ideas, match, compare and cite examples and principles in familiar situations.

### **Application (A)**

Application: The ability to use facts, concepts, principles and procedures in unfamiliar situations. The ability to analyse and interpret unfamiliar situations, and make reasoned judgements and recommendations.

## ◆ PREREQUISITES OF THE SYLLABUS

Any person with a good grasp of the contents of the Caribbean Secondary Education Certificate (CSEC) Agricultural Science or Integrated Science or Biology syllabuses or equivalent, should be able to pursue the course of study defined by the syllabus. However, successful participation in the course of study will also depend on the possession of good verbal and written communication skills.



## ◆ STRUCTURE OF THE SYLLABUS

The subject is organised in two (2) Units. A Unit comprises three (3) Modules each requiring fifty (50) hours. The total time for each Unit, is therefore, expected to be one hundred and fifty (150) hours. Each Unit can independently offer students a comprehensive programme of study with appropriate balance between depth and coverage to provide a basis for further study in this field.

### **UNIT 1: Fundamentals of Agriculture and Crop Production**

Module 1	-	The Science and Business of Agriculture
Module 2	-	Horticulture and Management
Module 3	-	Postharvest Technology and Innovation

### **UNIT 2: Animal Production and the Environment**

Module 1	-	Agriculture and the Environment
Module 2	-	Animal Production and Management
Module 3	-	Livestock Products and Innovation

In this syllabus, the specific objectives which are denoted by an asterisk (\*) are particularly suitable for practical exercises. However, practical work should not necessarily be limited to these objectives.

## ◆ APPROACHES TO TEACHING THE SYLLABUS

The specific objectives indicate the scope of the content and the activities of the School-Based Assessment (SBA) that should be covered.

The role of the teacher is to facilitate students' learning accurate and unbiased information that will indirectly contribute to a more scientifically literate citizen, that is, capable of making educated decisions regarding the world we live in.

For Units 1 and 2, the cultivation of the crops, and the rearing of the animals must start in October to allow for achieving all the specific objectives contained in Modules 1, 2 and 3 of each unit.



# ◆ UNIT 1: FUNDAMENTALS OF AGRICULTURE AND CROP PRODUCTION

## MODULE 1: THE SCIENCE AND BUSINESS OF AGRICULTURE

### GENERAL OBJECTIVES

On completion of this Module, students should:

1. understand the principles governing Agriculture and its role locally and regionally;
2. know the Biology of plants and animals;
3. understand the different biogeochemical cycles and their effect on agriculture;
4. understand how the charges of elements relate to the absorption of nutrients in plants and animals;
5. understand the processes involved in Agribusiness management;
6. appreciate the importance of technology to the development of agriculture in the region;
7. develop analytical and practical skills.

### SPECIFIC OBJECTIVES

### EXPLANATORY NOTES

Students should be able to:

- |  |  |
|--|--|
| 1. differentiate among the different branches of agriculture;  | Agricultural Economics.<br>Agricultural Engineering.<br>Agronomy.<br>Animal Science.<br>Harvesting (fisheries).<br>Horticulture. |
| 2. explain the production systems associated with agriculture; | Extensive.<br>Intensive.<br>Semi-Intensive.<br>Integrated.   |
| 3. discuss the evolution of agriculture in the region;         | Techniques - crops, livestock, fisheries:<br><br>(a) traditional;<br>(b) non-traditional;<br>(c) modern.                         |

## UNIT 1

### MODULE 1: THE SCIENCE AND BUSINESS OF AGRICULTURE (cont'd)

#### SPECIFIC OBJECTIVES

#### EXPLANATORY NOTES

Students should be able to:

- |     |   |  |
|-----|---|--|
| 4.  | explain the different transport mechanisms across the cell membrane;*                       | Passive transport.<br>Simple diffusion.<br>Facilitated diffusion.<br>Active transport (sodium/potassium pump).<br><br>(Simple demonstrations).   |
| 5.  | describe the endocrine systems in farm animals;   | Location and functions of the endocrine glands- including the exocrine gland. Hormones and their functions.  |
| 6.  | discuss the anatomy and physiology of male and female reproductive systems in farm animals; | Chicken rabbits, pigs, fish and small animals.   |
| 7.  | describe the process of digestion in ruminant and non-ruminant animals;                     | Ruminant animals - sheep and goats.<br><br>Non-ruminant animals- chicken and rabbits (Hindgut fermenters).   |
| 8.  | explain the role of plant processes in crop production;*                                    | Photosynthesis – light and dark reactions.<br>Respiration – Krebs and Calvin Cycle.<br>Transpiration (pull and stream).<br>Photoperiodism.<br>Translocation.<br>Phototropism.<br><br>(Simple demonstrations) |
| 9.  | explain the importance of biogeochemical cycles to agricultural production;                 | Carbon cycle.<br>Nitrogen cycle.<br>Phosphorus cycle.<br>Water cycle.  |
| 10. | explain the significance of cation exchange capacity in nutrient uptake;                    | Level of acidity and alkalinity in soils.<br><br>Cations and anions effect on soil fertility.  |

## UNIT 1

### MODULE 1: THE SCIENCE AND BUSINESS OF AGRICULTURE (cont'd)

#### SPECIFIC OBJECTIVES

#### EXPLANATORY NOTES

Students should be able to:

11. explain the concepts involved in agribusiness;

Management performance.  
Scope of management decisions.

Steps in decision making:

- (a) supply and demand;
- (b) diminishing returns;
- (c) depreciation;
- (d) comparative advantage;
- (e) resource substitutions.

Use of capital and credit.

12. explain the importance of agricultural trade to the region.

Definition of trade.  
Impact of trade liberalisation.  
Impact of food safety and security.  
Impact of exploitation of natural resources on domestic food supply.

International Trade Agreements:

- (a) World Trade Organization (WTO);
- (b) North American Free Trade Agreement (NAFTA);
- (c) Caribbean Common Market (CARICOM);
- (d) Africa Caribbean Pacific Countries (ACP);
- (e) Union of South American Nations (UNASUR).

## UNIT 1

### MODULE 1: THE SCIENCE AND BUSINESS OF AGRICULTURE (cont'd)

#### Suggested Teaching and Learning Activities

To facilitate students' attainment of the objectives in this Module, teachers are advised to engage students in the following teaching and learning activities.

1. Use videos to explain sodium/potassium pump.
2. Conduct research in groups on the evolution of Agriculture in the region.
3. Use computer aided technology, for example, YouTube and other social network, to conduct brain-storming sessions.
4. Visit an abattoir or research station to assist in identifying parts of the digestive and reproductive systems of non-ruminant and ruminant animals.
5. Use local materials to construct models to demonstrate the processes involved in the biogeochemical cycles.
6. Engage students in debates.
7. Supervise Agriculture Experience (SAE), –Incorporate real life experiences in an agribusiness setting by interacting with a farmer or a farming enterprise.

#### RESOURCES

- Burton, L. DeVere                      *Agriscience, Fundamentals and Application*, New York: Delmar, Cengage Learning, 2010.
- Frandsen                                      *Anatomy and Physiology of Farm Animals*, New Jersey: Wiley Blackwell, 2009.
- Ganpat, W. and Isaac, W.              *Sustainable Food Production Practices in the Caribbean*, Kingston: Ian Randle Publishers, 2012.

#### eBooks

Website: [www.cta.int](http://www.cta.int)

AD02 -Soil Fertility Management  
AD26 -Marketing For Small Scale Producers  
AS6 -When We Take Care of the Land. pdf  
CTA -Good Agriculture Policy



**UNIT 1**  
**MODULE 2: HORTICULTURE AND MANAGEMENT**

**GENERAL OBJECTIVES**

On completion of this Module, students should:

1. understand the principles of horticulture;
2. appreciate the concept of integrated crop management;
3. develop practical and analytical skills.

**SPECIFIC OBJECTIVES**

Students should be able to:

1. discuss the methods and importance of non-conventional crop farming systems in the region;
2. discuss the management of turf grass;
3. practise sustainable landscaping;
4. discuss the production of ornamental plants;

**EXPLANATORY NOTES**

Tissue Culture.  
Hydroponics.  
Roof-top farming.  
Indoor farming.  
Organic farming.

Relate to the sporting disciplines:

- (a) cricket;
- (b) golf;
- (c) tennis;
- (d) football (soccer).

Lawn management

To include:

Soil management:

- (a) biofiltering of waste;
- (b) irrigation;
- (c) run-off.

Integrated Crop Management (ICM).  
Wildlife habitats.  
Shade /wind break.  
Recycling.  
Re-newable energy/solar lighting.

Anthurium.  
Ginger lily.  
Orchid.  
Rose.  
Houseplants.



## UNIT 1

### MODULE 2: HORTICULTURE AND MANAGEMENT (cont'd)

#### SPECIFIC OBJECTIVES

#### EXPLANATORY NOTES

Students should be able to:

- |    |   |  |
|----|---|--|
| 5. | propagate orchard crops;*                                   | Budding.<br>Grafting.<br>Layering.   |
| 6. | discuss the production of traditional crops;                | Banana.<br>Citrus.<br>Sugar cane.<br><br>Include innovative uses   |
| 7. | cultivate a fruit, root and leaf crop;*                     | Crops:<br><br>(a) tomato;<br>(b) sweet pepper;<br>(c) lettuce.<br><br>Transplanting.<br>Direct planting. |
| 8. | explain appropriate harvesting techniques;                  | Maturity index.<br>Methods of harvesting.<br>Purposes of harvesting.<br>Time of day.                     |
| 9. | discuss the benefits of ornamental horticulture production. | Entrepreneurial opportunities.<br>Aesthetic value.<br>Social and economic benefits.                      |

## UNIT 1

### MODULE 2: HORTICULTURE AND MANAGEMENT (cont'd)

#### Suggested Teaching and Learning Activities

To facilitate students' attainment of the objectives in this Module, teachers are advised to engage students in the following teaching and learning activities.

1. Cultivate three crops to investigate land preparation, disease control, pest control and weed control.
2. Visit commercial farms to examine the different irrigation systems and tillage implement and machinery.
3. Construct a simple irrigation system.
4. Use computer aided technology.
5. Supervise Agriculture Experience (SAE) – Incorporate real life experiences in exploratory agriculture by interacting with a farmer or a farming enterprise.

#### RESOURCES

- Burton, L. DeVere                      Agriscience, Fundamentals and Application, New York: Delmar, Cengage Learning, 2010.
- Smith, B.                                      The Farming Handbook, The Netherlands: CTA Posthus 380, 2006
- Ganpat, W. and Isaac, W.              *Sustainable Food Production Practices in the Caribbean*, Kingston: Ian Randle Publishers, 2012.

#### eBooks

Website: [www.cta.int](http://www.cta.int)

AD09 - Vegetable Garden in the Tropics.pdf  
AD17 - Cultivation of Tomato.pdf  
AD18 - Protection of Stored Grains and pulses.pdf  
AD19 - Propagating and Planting Trees.pdf  
AD23 - Protected Cultivation.pdf  
AD29 - Pesticides Compounds, Use and Hazards.pdf  
AD30 - Non Chemical Crop Protection.pdf  
AS1 - Nurseryman and His Trees.pdf  
CTA 003 - Rainwater Harvesting.pdf  
CTA - Good Agriculture Policy.pdf

<http://www.nap.edu>              Pest Management in the Future National Academic of Sciences



## UNIT 1

### MODULE 3: POSTHARVEST TECHNOLOGY AND INNOVATION

#### GENERAL OBJECTIVES

On completion of this Module, students should:

1. demonstrate postharvesting techniques;
2. demonstrate the techniques involved in food processing;
3. acquire knowledge of marketing techniques;
4. understand the importance of food security, food safety and trade;
5. develop practical and analytical skills.

#### SPECIFIC OBJECTIVES

Students should be able to:

1. describe the principles and techniques governing postharvest technology;
2. describe processing procedures;
3. process one of the crops cultivated;\*

#### EXPLANATORY NOTES

Definition of postharvest.  
Definition of postharvest technology.  
Differentiate between processed and unprocessed products.  
Unprocessed commodities techniques to include:

- (a) selection;
- (b) sorting/grading;
- (c) transportation;
- (d) packaging;
- (e) storage;
- (f) labelling.

Canning.  
Drying.  
Freezing.  
Pasteurisation.  
Salting.  
Smoking.



## UNIT 1

### MODULE 3: POSTHARVEST TECHNOLOGY AND INNOVATION (cont'd)

#### SPECIFIC OBJECTIVES

Students should be able to:

4. explain the procedures involved in the marketing of processed and unprocessed crop commodities;
5. develop a business plan for the processed commodity;
6. outline the principles involved in food safety and security in crop production;

#### EXPLANATORY NOTES

including:

- (a) marketing;
- (b) marketing strategies;
- (c) pricing strategies;
- (d) wholesale and retail;
- (e) consumer preferences;
- (f) market behaviour;
- (g) advertising and promotion.

Refer to Specific Objective 3

Consumer research.  
Distribution.  
Pricing.  
Production plan.  
Promotion.

(This should be carried out at the school level).

Definition of food safety.

Hazard Analysis Critical Control Point (HACCP):

- (a) principles governing HACCP;
- (b) application of HACCP Principles.

Definition of food security.

Food and Agriculture (FAO) definition - All people at all times have both physical and economic access to the basic food they need.

The impact of food security on the region including bio security.

Ways of ensuring food security.

## UNIT 1

### MODULE 3: POSTHARVEST TECHNOLOGY AND INNOVATION (cont'd)

#### SPECIFIC OBJECTIVES

#### EXPLANATORY NOTES

Students should be able to:

7. evaluate the impact of technology on agriculture in the region.

Definition of Technology.

Technology related to:

- (a) Global Positioning Systems (GPS);
- (b) reproduction techniques;
- (c) Genetically Modification Organisms (GMO);
- (d) micro propagation.

Positive and negative impact of technology.

#### Suggested Teaching and Learning Activities

To facilitate students' attainment of the objectives in this Module, teachers are advised to engage students in the following teaching and learning activities.

1. Organise competitions for best package design and promotion strategies.
2. Organise field trips to processing plants.
3. Use computer aided technology.
4. Supervise Agriculture Experience (SAE) – Incorporate real life experiences in entrepreneurship.

## UNIT 1

### MODULE 3: POSTHARVEST TECHNOLOGY AND INNOVATION (cont'd)

#### RESOURCES

- Burton, L. DeVere                      *Agriscience, Fundamentals and Application*, New York: Delmar, Cengage Learning, 2010.
- Ganpat, W. and Isaac, W.              *Sustainable Food Production Practices in the Caribbean*, Kingston: Ian Randle Publishers, 2012.

#### eBooks

Website: [www.cta.int](http://www.cta.int)

- AD03 - Preservation of Fruits and Vegetables.pdf
- AD18 - Protection of stored Grains and Pulses.pdf
- AD31 - Storage of Tropical Agricultural Products.pdf
- Postharvest Management.pdf
- CTA 006 - Making Sweetpotato Chips.pdf
- CTA 008 - Preserving Green Leafy Vegetables Oblong .pdf
- CTA 011 - Making Banana Chips and Flour.pdf
- CTA 012 - Processing Tomatoes.pdf
- CTA 006 - Adding Value to Cereals Roots and Tubers .pdf
- CTA - Good Agriculture Policy
- CTA - Setting Up and Running a Small Food Processing Enterprise

## ◆ UNIT 2: ANIMAL PRODUCTION AND THE ENVIRONMENT

### MODULE 1: AGRICULTURE AND THE ENVIRONMENT

#### GENERAL OBJECTIVES

On completion of this Module, students should:

1. understand the importance of the environment to stakeholders;
2. understand the effects of soil, water and air pollution on the environment;
3. appreciate the role of tourism, trade and society to agriculture;
4. be aware of the policies governing pollution;
5. acquire practical and analytical skills.

#### SPECIFIC OBJECTIVES

Students should be able to:

1. discuss the importance of the environment to stakeholders;
2. describe the major sources and impact of atmospheric pollution on the environment;
3. identify procedures used for maintaining and improving air quality;
4. describe the major sources and impact of soil and water pollution;

#### EXPLANATORY NOTES

Farmers.  
Foresters.  
Agro-tourists, for example, hikers, bikers, loggers.

Include climatic conditions and weather.

Importance of air quality.

Atmospheric effects:

- (a) greenhouse;
- (b) thinning of ozone layer;
- (c) global warming.

Composition of Natural soil.

Water quality.

Sources to include:

- (a) run-off;
- (b) agricultural chemical;
- (c) industry pollution;
- (d) domestic use;
- (e) oil spillage.



## UNIT 2

### MODULE 1: AGRICULTURE AND THE ENVIRONMENT (cont'd)

#### SPECIFIC OBJECTIVES

#### EXPLANATORY NOTES

Students should be able to:

5. discuss the importance of international conventions and agreements in regards to pollution control;

Including:

- (a) United Nations Convention on climate change (UNFCCC) and Kyoto protocol;
- (b) Montreal Protocol;
- (c) International Convention for the prevention of Marine Pollution (MARPOL);
- (d) Cartagena Convention on law of the sea (UNCLOS).

6. determine the importance of forest to the environment;

Relationship between forests and other natural resources, for example:

- (a) watershed;
- (b) forest policies;
- (c) primary forest;
- (d) reforestation.

7. discuss the relationship between wildlife and the environment;

Population densities.

Assessing wildlife population.

Harvesting:

- (a) land;
- (b) aquatic.

Wildlife policies.

Wildlife trade:

- (a) land;
- (b) aquatic.

Conservation methods.

## UNIT 2

### MODULE 1: AGRICULTURE AND THE ENVIRONMENT (cont'd)

#### SPECIFIC OBJECTIVES

#### EXPLANATORY NOTES

Students should be able to:

8. describe how the environment can be sustainably utilised for tourism and trade;

Threats to the environment including:

- (a) pollution of land, air and water;
- (b) creation of arid land;
- (c) flora and fauna.

Agro-tourism.

Eco-tourism.

Policies concerning tourism and agricultural trade (including wildlife and foresting).

9. discuss the role of society in shaping the agricultural agenda in the region.

Culture.

Religion.

Taboos.

Ethnicity.

Foods grown, processed and eaten.

Demographics.

Use of indigenous knowledge.

#### **Suggested Teaching and Learning Activities**

To facilitate students' attainment of the objectives in this Module, teachers are advised to engage students in the following teaching and learning activities.

1. Visit watershed areas and meteorological station.
2. Identify forms of pollution in their communities and recommend laws for pollution control.
3. Use computer aided technology – YouTube and other social network clubs.
4. Visit the Global Learning and Observation to Benefit the Environment (GLOBE) website and participate in a group project.

<http://www.globe.gov/>

5. Organise debates on social issues, for example, religion, culture, environment, laws, and prices.
6. Discuss policies governing tourism and trade.
7. Supervise Agriculture Experience (SAE), – Incorporate real life experiences in an agribusiness setting by interacting with a farmer or a farming enterprise.



## UNIT 2

### MODULE 1: AGRICULTURE AND THE ENVIRONMENT (cont'd)

#### RESOURCES

Burton, L. DeVere                      *Agriscience, Fundamentals and Application*, New York: Delmar, Cengage Learning, 2010.

Ganpat, W. and Isaac, W.              *Sustainable Food Production Practices in the Caribbean*, Kingston: Ian Randle Publishers, 2012.

#### eBooks

Website: [www.cta.int](http://www.cta.int)

AD11 - Erosion Control in the Tropics.pdf

AD13 - Water Harvesting and Soil Moisture Retention.pdf

AD16 - Agroforestry.pdf

AS6 - When We Take Care of the Land.pdf

CTA - Good Agriculture Policy

## UNIT 2

### MODULE 2: ANIMAL PRODUCTION AND MANAGEMENT

#### GENERAL OBJECTIVES

On completion of this Module, students should:

1. appreciate the importance of animal production to agriculture in the region;
2. understand the management practices associated with farm animals;
3. develop practical and analytical skills.

#### SPECIFIC OBJECTIVES

Students should be able to:

1. explain the importance of animals to humans;
2. explain the importance of genetics and breeding associated with farm animals;
3. discuss reproductive management in farm animals;

#### EXPLANATORY NOTES

Aesthetics.  
Companionship.  
Food.  
Sport.  
Work.

Temperate and tropical breeds.

##### **Type**

A population of animals that breed true and there is no genetic history record or a herd book, for example, Trinidad and Tobago buffalypso.

##### **Breed**

A population of animals that breed true and their genetic history is recorded in a herd book, for example, Barbados Black Belly and Jamaica Hope.

Reproductive Management.  
Selection of breeding stock.  
Mating systems (random and controlled).  
Pregnancy.  
Gestation.  
Parturition.  
Lactation.  
Weaning.  
Reproductive system of chickens, rabbits, cattle, sheep or goats.





## UNIT 2

### MODULE 2: ANIMAL PRODUCTION AND MANAGEMENT (cont'd)

#### SPECIFIC OBJECTIVES

Students should be able to:

4. rear a batch of broiler birds and a pair of rabbits;\*
5. investigate nutrition and feeding associated with farm animals;\*
6. investigate the effect of different conditions on the growth of broiler birds;\*
7. explain the features of housing associated with farm animals in the region;
8. discuss the major health concerns of farm animals in the region;

#### EXPLANATORY NOTES

Farm animals include: chicken, rabbits, pigs, cattle, sheep/goats.

Include Feed Conversion Ratio (FCR):

Feed composition and quality  
Use of feed additives and growth promoters.

Nutritional value of forages –grasses, legumes and fodder crops.

Including:

- (a) nutrition- Feed Conversion Ratio (FCR);
- (b) light;
- (c) stocking density;
- (d) temperature-wind stimulation.

(Refer to page 39-40).

Features to include:

- (a) orientation;
- (b) security;
- (c) sanitation;
- (d) roof design;
- (e) floor design;
- (f) delivery of water;
- (g) ventilation.

Internal and external parasites (including life cycles) and other major diseases.

## UNIT 2

### MODULE 2: ANIMAL PRODUCTION AND MANAGEMENT (cont'd)

#### SPECIFIC OBJECTIVES

Students should be able to:

9. explain the socio-economic factors associated with farm animal production.

#### EXPLANATORY NOTES

Farm animals to include:

- (a) chicken;
- (b) rabbits;
- (c) pigs;
- (d) cattle;
- (e) sheep;
- (f) goats.

Preventative measures:

Bio-security

- (a) isolation;
- (b) traffic control;
- (c) sanitation.

Culture.  
Economics.  
Geographic location.  
Religion.

#### Suggested Teaching and Learning Activities

To facilitate students' attainment of the objectives in this Module, teachers are advised to engage students in the following teaching and learning activities.

1. Rare chicken and rabbit to investigate nutrition, housing, reproduction and control of pests and diseases.
2. Visit farm, interview farmers and make recommendations on the new management system.
3. Visit abattoir to view reproductive systems.
4. Organise a field trip to a livestock farm.
5. Conduct experiment related to the Feed Conservation Ratio (FCR) and nutritional value of forages.
6. Use computer aided technology.
7. Supervise Agriculture Experience (SAE), –Incorporate real life experiences in exploratory agriculture by interacting with a farmer or farming enterprise.



## UNIT 2

### MODULE 2: ANIMAL PRODUCTION AND MANAGEMENT (cont'd)

#### RESOURCES

- Burton, L. DeVere                      *Agriscience, Fundamentals and Application*, New York: Delmar, Cengage Learning, 2010.
- Frandsen                                      *Anatomy and Physiology of Farm Animals*, New Jersey: Wiley Blackwell, 2009.
- Smith, B. 2006                              *The Farming Handbook*, The Netherlands: CTA Posthus 380, 2006.
- Ganpat, W. and Isaac, W.                *Sustainable Food Production Practices in the Caribbean*, Kingston: Ian Randle Publishers, 2012.

#### eBooks

Website: [www.cta.int](http://www.cta.int)

- AD01 - Pig Keeping in the Tropics.pdf
- AD04 - Small Scale Chicken Production.pdf
- AD07 - Goat Keeping in the Tropics.pdf
- AD14 - Dairy Cattle Husbandry.pdf
- AD20 - Backyard rabbit farming in the Tropics.pdf
- AD33 - Duck Keeping in the Tropics.pdf
- AD34 - Hatching Eggs By Hens Or In An Incubator.pdf
- Nutrient Requirements of Small Ruminants.pdf
- CTA 001- Rearing Dairy Goats Oblong.pdf
- CTA     - Good Agriculture Policy

**UNIT 2**  
**MODULE 3: LIVESTOCK PRODUCTS AND INNOVATIONS**

**GENERAL OBJECTIVES**

On completion of this Module, students should:

1. demonstrate the techniques involved in processing livestock products;
2. understand the principles governing non-conventional farming methods;
3. develop skills in marketing livestock products;
4. appreciate the importance of agro-energy;
5. develop practical and analytical skills.

**SPECIFIC OBJECTIVES**

Students should be able to:

1. describe the techniques governing postharvest technology;
2. discuss the importance of emerging technologies and farming systems in agriculture;\*

**EXPLANATORY NOTES**

Activities to include:

- (a) selection;
- (b) sorting/grading;
- (c) transportation;
- (d) packaging;
- (e) storage;
- (f) labelling;
- (g) carcass fabrication.

Definition of:

- (a) micro livestock;
- (b) neo-tropical animals;
- (c) aquaponics.

Set up a simple aquaponics system.

Practices involved in the management of aquaponics.

## UNIT 2

### MODULE 3: LIVESTOCK PRODUCTS AND INNOVATIONS (cont'd)

#### SPECIFIC OBJECTIVES

Students should be able to:

3. explain the management practices involved in aquaculture;

4. discuss the importance of technology in animal reproduction;

5. process carcasses of broiler birds;\*

6. explain the procedures involved in the marketing of processed and unprocessed animal commodities;

#### EXPLANATORY NOTES

Definition of aquaculture.

Management practices to include:

- (a) pond management;
- (b) nutrition system;
- (c) aeration;
- (d) water management;
- (e) pH control;
- (f) algae bloom management;
- (g) stocking density.

Integrated aquaculture system (rearing of ducks above fish pond and sheep around fish pond).

Advances in Reproductive Techniques.

- (a) sperm sexing;
- (b) oestrus synchronisation; (Artificial Insemination /Insemination or natural breeding);
- (c) embryo transfer.

Advantages in cloning:

- (a) recombinant DNA;
- (b) reproductive cloning;
- (c) therapeutic cloning;
- (d) genetical engineering (transgenic animals).

Issues governing cloning and other reproductive techniques.

Definition of marketing.  
Marketing strategies.  
Pricing strategies.  
Wholesale/ retail.  
Consumer preferences.  
Market behaviour.  
Advertising and promotion.



## UNIT 2

### MODULE 3: LIVESTOCK PRODUCTS AND INNOVATIONS (cont'd)

#### SPECIFIC OBJECTIVES

#### EXPLANATORY NOTES

Students should be able to:

Refer to Specific Objective 5.

7. develop a marketing plan for the processed commodity;

Consumer research.  
Production plan.  
Pricing.  
Promotion.  
Distribution.

(This should be carried out at the school level).

8. outline the principles involved in food safety and security in animal production;

Definition of food safety.

Hazard Analysis Critical Control Point (HACCP).

- (a) principles governing HACCP.  
(b) application of HACCP Principles.

Definition of food security.

Food and Agriculture (FAO) definition - All people at all times have both physical and economic access to the basic food they need.

The impact of food security in the region.  
Ways of ensuring food security (include bio security).

9. discuss methods used in harvesting agro-energy.

Definition of agro-energy.

Production of agro-energy:

- (a) organic matter – bio digester;  
(b) solar energy;  
(c) wind;  
(d) water.

## UNIT 2

### MODULE 3: LIVESTOCK PRODUCTS AND INNOVATIONS (cont'd)

#### Suggested Teaching and Learning Activities

To facilitate students' attainment of the objectives in this Module, teachers are advised to engage students in the following teaching and learning activities.

1. Conduct research on innovative practices in agriculture, aquaculture, aquaponics, tissue culture and genetically modified foods.
2. Conduct research to analyse the effectiveness of genetically modified foods.
3. Set up a small aquaponics system.
4. Visit Artificial Insemination (AI) facility.
5. Have a logo design competition for products.
6. Design a device that can be used to harvest agro-energy.
7. Invite guest lecturer to speak on marketing.
8. Visit a processing plant.
9. Supervise Agriculture Experience (SAE) – Incorporate real life experiences in entrepreneurship.

#### RESOURCES

- |                          |  |
|--------------------------|--|
| Burton, L. DeVere        | <i>Agriscience, Fundamentals and Application</i> , New York: Delmar, Cengage Learning, 2010.           |
| Frandsen                 | <i>Anatomy and Physiology of Farm Animals</i> , New Jersey: Wiley Blackwell, 2009.                     |
| Ganpat, W. and Isaac, W. | <i>Sustainable Food Production Practices in the Caribbean</i> , Kingston: Ian Randle Publishers, 2012. |

## UNIT 2

### MODULE 3: LIVESTOCK PRODUCTS AND INNOVATIONS (cont'd)

#### EBooks

Website: [www.cta.int](http://www.cta.int)

AD12 - Preservation of Fish and meat Preservation of Fish and Meat.pdf  
AD15 - Small Scale Freshwater Fish Farming.pdf  
AD21 - On Farm Fish Culture.pdf  
AD23 - Protected Cultivation.pdf  
AD26 - Marketing For Small Scale Producers  
AD36 - Preparation of dairy products.pdf  
CTA009 - Make Money with Fish Farming A4.pdf  
CTA013 - How to keep Bees and Process Honey.pdf  
CTA - Agricultural and Fisheries Trade Issues for ACP count. pdf  
CTA - Try the Rabbit.pdf  
CTA - Good Agriculture Policy  
CTA - Setting up and running a Small Meat or Fish Processing  
Enterprise  
CTA - Setting Up and Running Dairy Processing Business



## ◆ OUTLINE OF ASSESSMENT

Each Unit of the syllabus will be assessed separately and grades will be awarded independently for each Unit. The Assessment will comprise two components, external and internal.

### EXTERNAL ASSESSMENT

**(60 per cent)**

**Paper 01** The Paper will consist of forty-five (45) multiple-choice items, fifteen (15) items on each Module. Each question (1 mark) will be weighted by 2. The paper will contribute 30 per cent (90 marks) to the total score.

This paper will allow for a broader coverage of the syllabus. The questions will test knowledge, comprehension and application.

**Paper 02** Section A of this paper will consist of three compulsory structured questions, one on each Module. Each question will be worth 15 marks.

Section B will consist of three essay questions, one on each Module. Each question will be worth 15 marks.

The paper will contribute 30 per cent (90 marks) to the total score.

This paper will require greater in-depth knowledge of the syllabus. The questions on Paper 02 will require application, analysis, synthesis and evaluation.

### SCHOOL-BASED ASSESSMENT

**(40 per cent)**

#### Paper 03 (120 marks)

##### UNIT 1

Candidates will be required to produce a portfolio comprising reports of site visit and field practical activity, and a business plan. The portfolio must include photographs of all activities undertaken.

##### UNIT 2

Candidates will be required to produce a portfolio comprising a report on the processing of carcasses, a marketing plan and the report of an investigation (see page 32). The portfolio must include photographs of all activities undertaken.

SBA marks are not transferrable across Unit. The SBA for each unit is based on skills and competencies related specifically to the Modules of that Unit. However, candidates who repeat the same Unit in a subsequent sitting may reuse their SBA marks.

## **MODERATION OF THE SCHOOL-BASED ASSESSMENT**

A sample of assignments will be requested by CXC for moderation purposes.

School-Based Assessment Record Sheets are available online via the CXC's website [www.cxc.org](http://www.cxc.org).

All School-Based Assessment Record of marks must be submitted online using the SBA data capture module of the Online Registration System (ORS). A sample of assignments will be requested by CXC for moderation purposes. These assignments will be re-assessed by CXC Examiners who moderate the School-Based Assessment. Teachers' marks may be adjusted as a result of moderation. The Examiners' comments will be sent to schools. All samples must be delivered to the specified marking venues by the stipulated deadlines.

Copies of the students' assignment that are not submitted must be retained by the school until three months after publication by CXC of the examination results.

## **ASSESSMENT DETAILS**

### **External Assessment by Written Papers (60 per cent of Total Assessment)**

#### **Paper 01 (1 hour 30 minutes – 30 per cent of Total Assessment)**

##### **1. Composition of the Paper**

The paper comprises forty-five multiple-choice items, fifteen items based on each Module.

##### **2. Syllabus Coverage**

Knowledge of the entire syllabus is required.

The intention of this paper is to test candidates' knowledge across the breadth of the syllabus.

##### **3. Question Type**

Questions may be based on diagrams, data, graph, photographs or prose.

##### **4. Mark Allocation**

- (a) One mark will be assigned for each item.
- (b) The maximum mark available for this paper is forty-five and will be weighted to ninety.
- (c) This paper contributes 30 per cent towards the final assessment.
- (d) The marks will be awarded for Knowledge and Comprehension and Application of Knowledge.

## 5. Use of Calculators

Candidates will be allowed to use a non-programmable calculator in the examinations. Each candidate is responsible for providing his/her own calculator and to ensure that it functions throughout the examinations.

## 6. Use of Geometrical Instruments

Candidates are allowed to use geometrical instruments in the examinations. Each candidate is responsible for providing his or her own instruments.

### **Paper 02 (2 hours 30 minutes – 30 per cent of Total Assessment)**

#### 1. Composition of Paper

The paper is arranged into two sections. Section A will consist of three short answer questions, one on each Module. Section B will consist of three structured essay questions, one on each Module. All questions are compulsory.

#### 2. Syllabus Coverage

- (a) Comprehensive knowledge of the entire syllabus is required.
- (b) Each question may focus on a single theme or develop a single theme or several unconnected themes.

#### 3. Question Type

Questions are of a free-response form and may be based on diagrams, data, graph, photographs or prose.

#### 4. Mark Allocation

- (a) Each question is worth 15 marks and the number allocated to each sub-question will appear on the examination paper.
- (b) The maximum mark for this paper is 90.
- (c) This paper contributes 30 per cent towards the final assessment.
- (d) The marks will be awarded for Knowledge and Comprehension and Application of Knowledge.

## **5. Use of Calculators**

Candidates will be allowed to use a non-programmable calculator in the examinations. Each candidate is responsible for providing his/her own calculator and to ensure that it functions throughout the examinations.

## **6. Use of Geometrical Instruments**

Candidates are allowed to use geometrical instruments in the examinations. Each candidate is responsible for providing his or her own instruments.

### **SCHOOL-BASED ASSESSMENT (SBA)**

School-Based Assessment is an integral part of the students' assessment of the course of study covered by this syllabus. It is intended to assist the students in acquiring certain knowledge, skills and attitudes that are associated with the subject. The activities for the School-Based Assessment are linked to the syllabus and should form part of the learning activities to enable the students to achieve the objectives of the syllabus.

During the course of study for the subject, students obtain marks for the competence they develop and demonstrate in undertaking their School-Based Assessment assignments. These marks contribute to the final marks and grades that are awarded to the students for their performance in the examination.

The guidelines provided in this syllabus for selecting appropriate tasks are intended to assist teachers and students in selecting assignments that are valid for the purpose of School-Based Assessment. The guidelines provided for the assessment of these assignments are also intended to assist teachers in awarding marks that are reliable estimates of the achievements of students in the School-Based Assessment component of the course. In order to ensure that the scores awarded are in line with the CXC standards, the Council undertakes the moderation of a sample of the School-Based Assessments marked by each teacher.

School-Based Assessment provides an opportunity to individualise a part of the curriculum to meet the needs of the student. It facilitates feedback to the student at various stages of the experience. This helps to build the self-confidence of the students as they proceed with their studies. School-Based Assessment also facilitates the development of the critical skills and abilities emphasised by this CAPE subject and enhance the validity of the examination on which the students' performance is reported. School-Based Assessment, therefore, makes a significant and unique contribution to both the development of the relevant skills and the testing and rewarding of the student.

### **REQUIREMENTS OF THE SCHOOL-BASED ASSESSMENT**

#### **UNIT 1**

Candidates will be required to produce a portfolio comprising reports of site visit and field practical activity, and a business plan. The portfolio must include photographs of all activities undertaken.

**CRITERIA FOR ASSESSING THE PORTFOLIO**

**40 marks**

**A. Site Visit**

**(5 marks)**

The following are guidelines for assessing the site visit.

- (a) The site visit is internally assessed by the teacher and externally moderated by CXC.
- (b) Each candidate will be required to report on at least one (1) site visit from a crop production farm.

The entry for each site visit should be recorded using the format below and the marks should be awarded accordingly.

Type of farm

Name of farm

Location of farm

Date of visit

Objectives

2 marks

Observations

2 marks

Comments/discussion

4 marks

Recommendations

2 marks

**10 marks**

**(Scale down to 5 marks)**

**B. Field Practical Activity (20 marks)**

Students will be required to cultivate **three** crops.

- Fruit crop - tomato
- Root crop - sweet potato
- Leaf - lettuce

The students will write one (1) report from this activity and the marks should be awarded accordingly.

Name of crop

**Family Name 1 mark**

**Scientific Name 1 mark**

Common Name

**Variety 1 mark**

**Land Preparation 3 marks**

- Land clearing 1 mark
- Primary tillage 1 mark
- Secondary tillage 1 mark

**Planting 2 marks**

- Spacing 1 mark
- Planting technique 1 mark

**Other Cultural Activities 3 marks**

- Moulding
- Staking/Turning Vines
- Pruning
- Mulching
- Irrigation

**(any three, 1 mark each)**

**Fertilizer Application 3 marks**

- Rate
- Type Of Fertilizer
- Methods Of Application
- Timing

**(any three, 1 mark each)**

**Pest and Disease Control 3 marks**



- Rate
- Methods of application
- Timing
- Type of control

**(any three, 1 mark each)**

**Harvesting**

**3 marks**

- Maturing index
- Methods of harvesting
- Postharvest activities

1 mark

1 mark

1 mark

**TOTAL**

**20 marks**

**(Scale down to 15 marks)**

**C. Business Plan**

**Business Description**

**4 marks**

- Mission Statement
- Goals of Company
- Description of Product

2 marks

1 mark

1 mark

**Market Analysis**

**2 marks**

- Customer
- Market size and Trends

1 mark

1 mark

**Marketing Plan**

**4 marks**

- Marketing Strategies
- Sales Methods

2 marks

2 marks

**Production Plan**

**8 marks**

- Production Methods
- Environmental Factors
- Condition of facilities and Equipment
- Production Cost

2 marks

2 marks

2 marks

2 marks

<b>Promotion</b>	<b>3 marks</b>
<ul style="list-style-type: none"> <li>• Advertising</li> <li>• Sampling</li> </ul>	<p>2 marks</p> <p>1 mark</p>
<b>Distribution</b>	<b>3 marks</b>
<ul style="list-style-type: none"> <li>• Cost of Product</li> <li>• Retail/wholesale</li> </ul>	<p>2 marks</p> <p>1 mark</p>
<b>Conclusion</b>	<b>4 marks</b>
<ul style="list-style-type: none"> <li>• Profit and Loss Statement</li> <li>• Recommendations</li> </ul>	<p>2 marks</p> <p>2 marks</p>
<b>Communication of Information</b>	<b>2 marks</b>
Information communicated in a fairly logical manner with several grammatical errors	1 mark
Information communicated in a fairly logical manner with no grammatical errors	2 marks
<b>TOTAL</b>	<b>30 marks</b>
	<b>(Scale down to 20 marks)</b>

## UNIT 2

Candidates will be required to produce a portfolio comprising a report on the processing of carcasses, a marketing plan and the report of an investigation. The portfolio must include photographs of all activities undertaken.



**CRITERIA FOR ASSESSING THE PORTFOLIO**

**40 MARKS**

**A. Processing of Carcasses**

**(10 marks)**

**Sanitation**

**5 marks**

- Workstation
- Attire
- Waste disposal
- Proper use of tools

1 mark  
1 mark  
1 mark  
2 marks

**Slaughtering**

**3 marks**

- Method/procedure
- Materials/equipment

2 marks  
1 mark

**Dressing**

**2 marks**

- Complete defeathering and removal of entrails

2 marks

**Procedures for processing**

**5 marks**

- Appropriate material/equipment preparation
- Adherence to guidelines
- Originality

2 mark  
2 mark  
1 mark

**TOTAL**

**15 marks**

**(Scale down to 10 marks)**

**B. Marketing Plan**

**(10 marks)**

**Consumer Research**

**3 marks**

- Sampling
- Questionnaire

1 mark  
2 marks

**Production Plan**

**4 marks**

- Data Analysis
  - Quantity
  - Timing
- Production Cost

1 mark  
1 mark  
2 marks



<b>Pricing</b>	<b>2 marks</b>
<ul style="list-style-type: none"> <li>• Factors determining price</li> </ul>	2 marks
<b>Promotion</b>	<b>2 marks</b>
<ul style="list-style-type: none"> <li>• Method</li> </ul>	2 marks
<b>Remarks</b>	<b>4 marks</b>
<ul style="list-style-type: none"> <li>• Profit/loss</li> <li>• Conclusions</li> <li>• Recommendations</li> </ul>	1 mark 2 marks 1 mark
<b>TOTAL</b>	<b>15 marks</b>
	<b>(Scale down to 10 marks)</b>

**C. Investigation (20 MARKS)**

For examples of activities for the Investigation, see pages 39-42.

Criteria for assessing the Investigation

<b>1. Problem Statement</b>	<b>1</b>	<b>1</b>
<b>2. Purpose of Project</b>	<b>1</b>	<b>1</b>
<b>3. Methods of Data Collection</b>		<b>2</b>
<ul style="list-style-type: none"> <li>• Data collection design described.</li> <li>• Design clear, appropriate, carried out with few flaws.</li> </ul>	1 2	
<b>4. Literature Review</b>		<b>2</b>
<ul style="list-style-type: none"> <li>• Literature review appropriate.</li> <li>• Literature review appropriate and comprehensive.</li> </ul>	1 2	
<b>5. Presentation of Data</b>		<b>2</b>
<ul style="list-style-type: none"> <li>• Used photographs.</li> <li>• Used photographs and tables.</li> </ul>	1 2	
<b>6. Analysis of Data</b>		<b>4</b>
<ul style="list-style-type: none"> <li>• Some analysis attempted.</li> <li>• Analysis adequately done.</li> <li>• Analysis used 2 or more approaches.</li> <li>• Analysis used a variety of approaches or exceeded requirements of the course.</li> </ul>	1 2 3 4	



<b>7. Discussion of Findings</b>		<b>5</b>
<ul style="list-style-type: none"> <li>• Some findings stated. 1</li> <li>• Some findings stated and supported by data. 2</li> <li>• Some findings stated, supported by data and their interpretability addressed. 3</li> <li>• All findings stated, supported by data and their interpretability addressed. 4</li> <li>• Reliability or validity, and usefulness of some findings addressed. 5</li> </ul>		
<b>8. Conclusion</b>		<b>2</b>
<ul style="list-style-type: none"> <li>• Conclusion clear and based on finding(s). 1</li> <li>• Conclusion clear, based on finding(s), valid and related to purpose(s) of project. 2</li> </ul>		
<b>9. Recommendations</b>		<b>2</b>
<ul style="list-style-type: none"> <li>• Few recommendations based on findings. 1</li> <li>• Recommendations fully derived from findings. 2</li> </ul>		
<b>10. Communication of Information</b>		<b>2</b>
<ul style="list-style-type: none"> <li>• Information communicated in a fairly logical manner with several grammatical errors. 1</li> <li>• Information communicated in a logical manner with no grammatical errors. 2</li> </ul>		
<b>11. Bibliography</b>		<b>2</b>
<ul style="list-style-type: none"> <li>• Number of references is less than 4.</li> <li>• Number of references is greater than 4, written using a consistent convention. 1</li> </ul>		
<b>Total</b>		<b>25 marks</b>
		<b>(Scaled down to 20 marks)</b>

## Examples of activities for the Investigation in Unit 2

### 1. Evaluation of two (2) broiler rations on Feed Conversion Ratio (FCR) - Nutrition.

Requirements: 100 day old chicks, 4 pens of equal sizes, 2 different growing rations

Method:

- (a) divide birds into four (4) groups (25 birds per pen);
- (b) weigh birds on arrival (day old chicks) and record weights;
- (c) thereafter weigh birds every week and record weights;
- (d) feed one grower ration to two (2) groups and the other grower ration to the other two (2) groups;  
  
(All birds should receive the same starter ration)
- (e) weigh refusals every morning and record. Weigh feed every morning before offering to birds and record;
- (f) calculate weekly feed conversion ratio (FCR);  
  
(FCR – feed consumed during a particular period divided by the weight gained during the same period);
- (g) calculate FCR for the entire production period;
- (h) explain any differences in FCR between the two (2) treatments.

### 2. Effect of light on the growth rate of broilers –Lighting

Requirements: 100 day old chicks, 4 pens of equal size

Method:

- (a) divide birds into four (4) groups (25 birds per pen);
- (b) weigh birds on arrival (day old birds) and record weights;
- (c) after brooding reduce the number of hours of light in two pens (example - leave the lights on in two (2) pens during the night. **IMPORTANT** – ensure that this light does not illuminate the other pens);
- (d) weigh bird weekly and record weights;
- (e) explain any differences in growth rates and final weights among the groups.



### 3. Effect of stocking density on broiler production (Housing)

Requirements: 100 day old chicks, 4 pens of equal sizes.

Method:

- (a) divide birds into four (4) groups and place each group into a pen;  
Stocking Density: Pen 1 = 20 birds  
Pen 2 = 20 birds  
Pen 3 = 30 birds  
Pen 4 = 30 birds
- (b) calculate stocking densities for each pen;
- (c) weigh birds on arrival (day old birds) and record weights;
- (d) thereafter weigh birds every week and record weights;
- (e) explain any differences in the final weights among the groups.

### 4. Effect of wind stimulation on broiler production -Temperature

Requirements: 100 day old chicks, 4 pens of equal size 4 fans

Method:

- (a) divide birds into four (4) groups (25 birds per pen);
- (b) place fans in two (2);
- (c) pens;
- (d) weigh birds on arrival (day old birds) and record weights;
- (e) beginning after brooding turns fans on during the day;
- (f) weigh birds on arrival (day old birds);
- (g) thereafter weigh bird weekly and record;
- (h) explain any differences in the final weights among the groups.

### GENERAL GUIDELINES FOR TEACHERS

1. The specific objectives highlighted by an asterisk are suitable for School-Based Assessment, but the assignments need not assess only these objectives.
2. The reliability of the marks awarded is a significant factor in the School-Based Assessment, and has far reaching implications for the candidate's final grade. Teachers are asked to note the following:



- (a) the marks awarded must be carefully transferred to the CXC School-Based Assessment forms;
- (b) the teacher must allocate one-third of the total score for the School-Based Assessment to each Module. **Fractional marks should not be awarded.** In cases where the mark is not divisible by three, then the allocation is as follows:
  - (i) when the remainder is 1 mark, the mark is allocated to Module 3;
  - (ii) when the remainder is 2, then a mark is allocated to Module 3 and the other mark to Module 2;

For example, 35 marks are allocated as follows:

- (iii)  $35 / 3 = 11$  remainder 2 so 11 marks to Module 1 and 12 marks to each of Modules 2 and 3.
- (c) the standard of marking should be consistent.
3. Candidates who do not fulfil the requirements of the School-Based Assessment will be considered absent from the whole examination.

## ◆ REGULATIONS FOR PRIVATE CANDIDATES

Candidates who are registered privately will be required to sit Paper 01, Paper 02 and Paper 03. Detailed information on Papers 01, 02 and 03 is given on pages 28 to 31 of this syllabus.

## ◆ REGULATIONS FOR RESIT CANDIDATES

Resit candidates must complete Papers 01 and 02 of the examination for the year for which they re-register. A candidate who rewrites the examination within two years may reuse the moderated School-Based Assessment score earned in the previous sitting within the preceding two years.

Candidates are no longer required to earn a moderated score that is at least 50 per cent of the maximum possible score; any moderated score may be reused.

Candidates reusing SBA scores in this way must register as 'Resit candidates' and provide the previous candidate number. (In order to assist candidates in making decisions about whether or not to reuse a moderated SBA score, the Council will continue to indicate on the pre-slip if a candidate's moderated SBA score is less than 50 per cent).

Resit candidates must be registered through a school, a recognised educational institution, or the Local Registrar's Office.

## ◆ ASSESSMENT GRID

The Assessment Grid for the Unit showing marks assigned to papers and to Modules, and percentage contributions of each paper to the total scores.

Papers	Module 1	Module 2	Module 3	Total	(%)
<b>EXTERNAL ASSESSMENT</b>					
Paper 01 (90 minutes) Multiple-choice questions	30 (15 items)	30 (15 items)	30 (15 items)	90 (45 items)	(30)
Paper 02 (2 hours 30 minutes) Section A – Structured questions Section B – Essay questions	15 15	15 15	15 15	45 45	(30)
<b>SCHOOL-BASED ASSESSMENT</b>					
Paper 03 SBA (CVQ Level 2)	40	40	40	120	(40)
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>300</b>	<b>(100)</b>

## ◆ GLOSSARY

<u>WORD</u>	<u>DEFINITION/MEANING</u>	<u>NOTES</u>
Analyse	Examine in detail.	
Annotate	Add a brief note to a label.	Simple phrase or a few words only.
Apply	Use knowledge/principles to solve problems.	Make inferences/conclusions.
Assess	Present reasons for the importance of particular structures, relationships or processes.	Compare the advantages and disadvantages or the merits and demerits of a particular structure, relationship or process.
Calculate	Arrive at the solution to a numerical problem.	Steps should be shown; units must be included.
Classify	Divide into groups according to observable characteristics.	
Comment	State opinion or view with supporting reasons.	
Compare	State similarities and differences.	An explanation of the significance of each similarity and difference stated may be required for comparisons which are other than structural.
Construct	Use a specific format to make and/or draw a graph, histogram, pie chart or other representation using data or material provided or drawn from practical investigations, build (for example, a model), draw scale diagram.	Such representations should normally bear a title, appropriate headings and legend.
Deduce	Make a logical connection between two or more pieces of information; use data to arrive at a conclusion.	
Define	State concisely the meaning of a word or term.	This should include the defining equation/formula where relevant.
Demonstrate	Show; direct attention to.	
Derive	To deduce, determine or extract from data by a set of logical steps some relationship, formula or result.	This relationship etc. may be general or specific.
Describe	Provide detailed factual information of the appearance or arrangement of a specific structure or a sequence of a specific process.	Description may be in words, drawings or diagrams or any appropriate combination. Drawings or diagrams should be annotated to



<u>WORD</u>	<u>DEFINITION/MEANING</u>	<u>NOTES</u>
		show appropriate detail where necessary.
Determine	Find the value of a physical quantity.	
Design	Plan and present with appropriate practical detail.	Where hypotheses are stated or when tests are to be conducted, possible outcomes should be clearly stated and/or the way in which data will be analysed and presented.
Develop	Expand or elaborate an idea or argument with supporting reasons.	
Diagram	Simplified representation showing the relationship between components.	
Differentiate/ distinguish (between/ among)	State or explain briefly those differences between or among items which can be used to define the items or place them into separate categories.	
Discuss	Present reasoned argument; consider points both for and against; explain the relative merits of a case.	
Draw	Make a line representation from specimens or apparatus which shows an accurate relation between the parts.	In the case of drawings from specimens, the magnification must always be stated.
Estimate	Make an approximate quantitative judgement.	
Evaluate	Weigh evidence and make judgements based on given criteria.	The use of logical supporting reasons for a particular point of view is more important than the view held; usually both sides of an argument should be considered.
Explain	Give reasons based on recall; account for.	
Find	Locate a feature or obtain as from a graph.	
Formulate	Devise a hypothesis.	
Identify	Name or point out specific components or features.	
Illustrate	Show clearly by using appropriate examples or diagrams, sketches.	

<u>WORD</u>	<u>DEFINITION/MEANING</u>	<u>NOTES</u>
Interpret	Explain the meaning of.	
Justify	Explain the correctness of.	
Investigate	Use simple systematic procedures to observe, record data and draw logical conclusions.	
Label	Add names to identify structures or parts indicated by pointers.	
List	Itemize without detail.	
Measure	Take accurate quantitative readings using appropriate instruments.	
Name	Give only the name of.	No additional information is required.
Note	Write down observations.	
Observe	Pay attention to details which characterize a specimen, reaction or change taking place; to examine and note scientifically.	Observations may involve all the senses and/or extensions of them but would normally exclude the sense of taste.
Outline	Give basic steps only.	
Plan	Prepare to conduct an investigation.	
Predict	Use information provided to arrive at a likely conclusion or suggest a possible outcome.	
Record	Write an accurate description of the full range of observations made during a given procedure.	This includes the values for any variable being investigated; where appropriate, recorded data may be depicted in graphs, histograms or tables.
Relate	Show connections between; explain how one set of facts or data depend on others or are determined by them.	
Sketch	Make a simple freehand diagram showing relevant proportions and any important details.	
State	Provide factual information in concise terms outlining explanations.	
Suggest	Offer an explanation deduced from information provided or previous knowledge. (... a hypothesis;	No correct or incorrect solution is presumed but suggestions must be

<u>WORD</u>	<u>DEFINITION/MEANING</u>	<u>NOTES</u>
	provide a generalization which offers a likely explanation for a set of data or observations.)	acceptable within the limits of scientific knowledge.
Test	to find out, following set procedures	

## ◆ SUGGESTED RESOURCES

All schools presenting candidates for this subject **should provide the minimum facilities relevant to the areas to be covered.** However, where schools are having difficulties in providing these facilities the practical requirements of the syllabus can be met through any or a combination of the following alternatives:

- (a) summer attachment programmes under guidance and supervision;
- (b) sharing practical instructional facilities;
- (c) visits to Agricultural stations;
- (d) visits to private commercial farms;
- (e) sharing facilities with other schools.

Failure to provide these facilities may adversely affect students' performance. **It is recommended that participating schools provide the following facilities for each group of thirty students:**

### The Field

1. Land Space
  - 1 bed 9' x 3' (approximately three square metres per student).
  - Nursery, grow box unit for vegetables, spices and herbs.
  - Grass plots – 2 pasture grasses, 2 soiling grasses, 1 legume.
2. Livestock
  - (a) poultry: broilers -100 once per term;
  - (b) EITHER sheep: 1 male and 3 females.
3. Security
  - fencing
4. Field Tools and Equipment
  - access to:
    - wheelbarrow;
    - watering hose;
    - watering cans;
    - miscellaneous propagating tools, for example, pruning shears, secateurs, pruning saw, budding knife, tapes;
    - other agricultural tools - spade, hoe, rake, fork, cutlass;
    - scale;
    - soil auger or substitute, for example, flat spade and knife or cutlass;
    - rain gauge;
    - wet and dry bulb thermometers, weather vane, anemometer.
5. Safety
  - first aid kit

## Other Facilities

1. Maintenance
  - 1 farm attendant
2. Field Tools, Materials and Equipment
  - access to: spraying equipment, for example, mist blowers
  - knapsack sprayers with shield.

Chemicals

  - (a) Insecticides and fungicides;
  - (b) Herbicides/weedcide
  - (c) Fertilizer
  - miscellaneous veterinary equipment, for example, syringes, ear markers, clinical thermometers.
3. Laboratory Equipment
  - access to science laboratory:
    - simple balances;
    - microscopes;
    - hand lenses (one per student);
    - glassware including crucibles;
    - chemicals;
    - lamps;
    - 1 potometer;
    - 1 desiccator;
    - 1 set of sieves;
    - measuring instruments - tapes, rulers, pH meter.
4. Visual Aids
  - access to:
    - multimedia projector;
    - computer.

**Western Zone Office**  
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