KENYA CERTIFICATE OF SECONDARY EDUCATION

AGRICULTURE CURRICULUM

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INTRODUCTION (AGRICULTURE)

This syllabus has been compiled with a view to accomplishing two fundamental objectives. First, the learners should develop basic principles of agricultural production relevant to Kenya in general, and specifically to their own environments. Secondly, learners should be involved in practical which aim at assisting them to acquire useful agricultural skills. Therefore, it is highly rec1immended that learners be involved in practical work for actual agricultural production.

Affective domain objectives in agriculture are as important as those in cognitive and psychomotor domains. However, they must not be seen as achievable at the end of each single topic. They are long term objectives and are set out in the general rather than specific objectives. The teacher must not forget them in teaching and in assessment.

The syllabus covers crop production, livestock production, farm power and machinery, farm structures, agricultural economics and agroforestry. These are distributed throughout the four-year course.

An attempt has been made to arrange the topics in a logical sequence. However, due to different ecological zones and .weather patterns in the country, teachers are advised to take into account these differences when developing their schemes of work. They should also endeavour to cover the syllabus within the allocated time. In topics on crop and livestock production, teachers should select examples which are most suited to their ecological zones. It is highly recommended that a crop museum be established in each school. Students should also be encouraged to plant suitable trees in their schools and label them using common and botanical names for each tree.

Each school is encouraged to harvest its rain water from the roof catchments, hold it in reservoirs and use it for irrigation and for livestock, among other uses. Rain water harvesting does not only avail cheap water to the school, but also prevents soil erosion and undermining of building foundations. Agricultural and other related activities must not be used as punishment for wrong doers.

At the end of this syllabus are appendices on lists of tools, weeds, pests and diseases to be Studied, However, teachers are encouraged to innovate and to use local resources in teaching. A guide on learner/assessment and self-evaluation is given in appendix II.

GENERAL OBJECTIVES

The Secondary Agriculture course aims to:

1. develop an understanding of agriculture and its importance to the family and the nation

2. promote interest in agriculture as an industry and create awareness of opportunities existing in agriculture and related sectors.

3. demonstrate that farming is a dignified and profitable occupation

4. enhance skills needed in carrying out agricultural practices

5. provide a background for further studies in agriculture

6. develop self-reliance, resourcefulness and problem solving abilities in agriculture

7. develop occupational outlook in agriculture

8. enable schools to take an active part in national development through agricultural activities

9. create awareness of the role of agriculture in industrial and technological development

10, enhance understanding of the role of technology and industrialization in agricultural development

11. promote agricultural activities which enhance environmental conservation

12. promote consciousness of health promoting activities in agricultural production.

**AGRICULTURE SYLLABUS**

 **FORM I**

1.0.0 Introduction to Agriculture (8 Lessons)

2.0.0 Factors Influencing Agriculture (24 Lessons)

3.0.0. Farm Tools And Equipment (7 Lessons)

4.0.0 Crop Production I (Land Preparation) (7 Lessons)

5.0.0 Water Supply, Irrigation And Drainage (10 Lessons)

6.0.0 Soil Fertility I (Organic Manures) (6 Lessons)

7.0.0 Livestock Production I (Common Breeds) (7 Lessons)

8.0.0 Agricultural Economics I (Basic Concepts and Farm Records) (7 Lessons).

**1.0.0 INTRODUCTION (8 LESSONS)**

1.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

a) define agriculture

b) state the main branches of agriculture

c) describe farming systems

d) explain the role of agriculture in the economy and demonstrate an appreciation of its importance to the country

e) demonstrate an appreciation for the wide and varied opportunities in agriculture.

**CONTENT:**

1.2.1 Definition of agriculture

1.2.2 Branches of agriculture

**Crop-farming (Arable farming)**

 i) Field crops

 ii) Horticulture

 - Floriculture (flower farming)

 - Olericulture (vegetable farming)

 - Pomoculture (fruit farming)

**Livestock farming**

 i) Pastoralism - mammalian livestock farming

 ii) Fish farming (Aquaculture)

 iii) Apiculture (Bee keeping)

 iv) Poultry keeping

Agricultural economics

Agricultural engineering

**1.2.3 Systems of farming**

• Extensive

• Intensive

• Large scale farming

• Small scale farming

Note: Study each of the above systems under:

- Meaning

- Advantages

- Disadvantages

**1.2.4 Methods of farming**

• Mixed farming

• Nomadic pastoralism

• Shifting cultivation

• Organic farming

• Agroforestry

Note: Learners should be reminded that any of the above methods can be subsistence or commercial

**1.2.5 Roles of agriculture in the economy**

• Food supply

• Source of employment

• Foreign exchange earner

• Source of raw materials for industries

• Provision of market for industrial goods

• Source of capital

**2.0.0 FACTORS INFLUENCING AGRICULTURE (24 LESSONS)**

2.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

a) explain the human factors influencing agriculture

b) explain biotic factors influencing agriculture

c) explain how climatic factors influence agriculture

d) define soil

e) describe the process of soil formation

1) describe soil profile

g) determine soil constituents

i classify soils by physical characteristics

i) explain chemical properties of soils

j) relate crop and livestock distribution to soils in different regions.

**CONTENT:**

**2.2.1 Human factors**

• Levels of education and technology

• Health - HIV/AIDS and health in general

• Economy (include liberalization)

• Transport and communication

• Market forces (local and international)

• Government policy

• Cultural and religious beliefs

**2.2.2 Biotic Factors**

• Pests

• Parasites

• Decomposers

• Pathogens

• Predators

• Pollinators

• Nitrogen fixing bacteria

**2.2.3 Climatic Factors**

Rainfall

 - intensity

 - reliability

 - quantity

 - distribution

• Temperature

 - How topography and altitude affect temperature

 - How temperature influences crop and livestock

• Wind

 - Evapotranspiraton

 - Lodging

 - Pollination

 - Seed dispersal

 - Soil erosion (note section 21.2.1)

• Light

 - Intensity

 - Duration - long, neutral and short day plants

 - Wavelength

Note: Each factor to be discussed with respect to the following:

 - Land potentiality

 - Crop production

 - Livestock production

 - Crop and livestock distribution in Kenya

**Edaphic factors**

• Definition of soil

• Soil formation

• Soil profile

 - Definition

 - Characteristics of different soil layers

 - Difference between soil formed in situ and depositions

 - Soil depth and its influence on crop production

• Soil constituents

 - Constituents (demonstrate presence of each)

 - importance of each constituent

• Physical properties of soil

i) Soil structure

 - Definition

 - Types

 - Influence on crop production

ii) Soil texture

 - definition

 - soil textural classification\_

 - influences on crop growth and production, porosity, capillarity, drainage and water retention capacity.

iii) Soil colour

Chemical properties of soil

- Soil pH

- pH influence on crop growth and production

- Effects of pH on mineral availability.

**3.0.0 FARM TOOLS AND EQUIPMENT (7 LESSONS)**

3.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

a) identify various farm tools and equipment

b) name parts of various farm tools and equipment

c) describe the use of various tools and equipment

d) carry out maintenance practices on tools and equipment

e) demonstrate an appreciation for care and maintenance of tools.

**CONTENT:**

3.2.1 Garden tools and equipment

3.2.2 Workshop tools and equipment

• Woodwork tools and equipment

• Metalwork tools and equipment

3.2.3 Livestock production tools and equipment

3 2 4 Plumbing tools and equipment

3.2.5 Masonry tools and equipment

Note: Study the above tools under the following headings:

 - Name and uses

 - Parts and uses

 - Maintenance practices

Note: (see Appendix I for list of tools and equipment to be studied).

**4.0.0 CROP PRODUCTION I (LAND PREPARATION) (7 LESSONS)**

4.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

a) explain the importance of land preparation

b) describe the various types of cultivation

c) relate each cultivation operation to correct tools and or implements

d) prepare a piece of land ready for crop production.

**CONTENT:**

4.2.1 Land preparation

 Definition

 Importance

4.2.2 Operations in land preparation

 Clearing land before cultivation

 - Importance (include clearing as a method of land reclamation)

 - Methods and equipment

 Primary cultivation

 - Definition and importance Timing

 - Choice of tools and implements

 Secondary cultivation

 - Definition and importance

 - Number of operations

 - Correct tools and implement for different operations

 - Relating final tilth to the intended planting material

 Tertiary operations

 - Ridging

 - Rolling

 - Levelling

Note: For each type:

 - give reasons

 - explain how it is carried out

 Sub-soiling

 - Meaning

 - Importance

 - Equipment used

4.2.3 Minimum tillage

 Definition

 Importance

 Practices.

**5.0.0 WATER SUPPLY, IRRIGATION AND DRAINAGE (10 LESSONS)**

5.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

a) state the sources of water for the farm

b) describe collection, storage, pumping, and conveyance of water;

c) describe water treatment and explain its importance

d) define irrigation

e) explain the importance of irrigation

f) describe methods of irrigating land

g) list the equipment used in irrigation

h) grow a crop through irrigation

i) carry out maintenance on irrigation equipment and facilities

j) define drainage

k) explain the importance of drainage

I) describe the methods of drainage

m) explain how agricultural activities pollute water and how this can be prevented

n) demonstrate an appreciation for clean water in farming and life in general.

**5.2.0 Content**

**5.2.1 Water supply**

• Sources of water

• Collection and storage of water

• Pumps and pumping

• Conveyance of water

- Piping: - types of pipes

- Choice of pipes

- Canals

- Transportation in containers

**• Water treatment**

 -Meaning

 - Methods

 - Importance

• Uses of water on the farm

**5.2.2 Irrigation**

Definition

• Importance (include irrigation as a method of land reclamation)

• Methods

- surface

- sub-surface

- overhead

- drip

Note: Discuss advantages and disadvantages of each method

• Maintenance practices of each irrigation system

5.2.3 Project on crop production through arty method of irrigation

5.2.4 Drainage

• Definition

• Importance (include as a method of land reclamation)

• Methods of drainage

- Surface

- Sub-surface

- Pumping

- Planting of appropriate trees

5.2.5 Water Pollution

• Meaning

• Agricultural practices that pollute water

• Methods of pollution prevention and control.

**6.0.0 SOIL FERTILITY I (ORGANIC MANURES) (6 LESSONS)**

**6.1.0 Specific Objectives**

By the end of the topic, the learner should be able to:

a) define soil fertility

b) explain how soil fertility can be maintained

c) describe how soil loses fertility

d) define and distinguish organic matter, manure and humus

e) explain the importance of organic matter in the soil

0 describe the different organic manures

g) prepare compost manure;

h) demonstrate a caring attitude towards soil.

**6.2.1 Soil fertility**

• Definition

• How soil loses fertility Maintenance of soil fertility

**6.2.2 Organic Manure**

• organic matter and humus

• importance of organic matter in the soil

• types of organic manures Green manure

- Farm-yard manure

- Compost manure

Note: For each type, describe its preparation, advantages and disadvantages and use

**6.2.3 Compost manure:**

• Meaning

• Materials used and materials to avoid

• Preparation methods and procedure

- Heap

- Pit.

**7.0.0 LIVESTOCK PRODUCTION I (COMMON BREEDS) (7 LESSONS)**

7.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

a) name various livestock species

b) define the terms livestock, breed and type

c) describe the various breed characteristics

d) state the origin of various livestock breeds

e) classify the various breeds into types name the external parts various livestock specie

g) demonstrate an appreciation of the socio-economic of livestock.

CONTENT:

7.2.1 Importance of livestock

7.2.2 Livestock species Cattle

• Cattle

 - Exotic

 - Indigenous

• Goats

• Sheep

• Pigs

• Poultry (chicken)

• Rabbits

• Camels

Discuss each under the folio

• Breed origin and character Type of each breed

• External parts of each livestock species

• Typical conformation

7.2.3 Terms used to describe livestock in different species by age, se. and use.

**8.0.0 AGRICULTURAL ECONOMICS I (BASIC CONCERPTS AND FARM RECORDS) (7 LESSONS)**

8.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

a) define economics and agricultural economics

b) explain basic concepts of economics

c) describe the importance agricultural economics

d) explain the importance of farm records

e) describe the different types of farm records

1) keep farm records.

**CONTENT:**

8.2.1 Definition

• Economics

• Agricultural Economics

8.2.2 Basic Concepts of Economics

• Scarcity

• Preferences and choice Opportunity cost

8.2.3 Uses of farm records

8.2.4 Types of farm records

• Breeding Feeding

• Production

• Health

• Field operations

• Inventory

• Labour

• Marketing

**FORM II AGRICULTURE SYLLABUS.**

9.0.0 Soil Fertility II (Inorganic Fertilizers) (12 Lessons)

10.0.0 Crop Production II (Planting) (16 Lessons)

11.0.0 Crop Production III (Nursery Practices) (16 Lessons)

12.0.0 Crop Production IV (Field Practices) (14 Lessons)

13.0.0 Crop Production V (Vegetables) (16 Lessons)

14.0.0 Livestock Health I (Introduction) (16 Lessons)

15.0.0 Livestock Health II (Parasites) (16 Lessons)

16.0.0 Livestock Production II (Nutrition) (12 Lessons)

Agriculture Encyclopaedia

**9.0.0 SOIL FERTILITY II (INORGANIC FERTILIZERS) (12 LESSONS)**

9.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

a) list the essential elements

b) classify the essential elements

c) state the role of each macro- nutrient

d) describe the deficiency symptoms of the macro-nutrients

e) identify and classify fertilizers describe the properties of various fertilizers

g) describe soil sampling and testing procedures

h) use appropriate methods of fertilizer application

i) ca1culate fertilizer application rates

j) explain how soil acidity and alkalinity affect crop production.

**CONTENT:**

9.2.1 Essential elements

 Macro-nutrients

- carbon, hydrogen and oxygen

- fertilizer elements (N, P, K)

- liming elements (Ca, Mg, S)

 Role of macro-nutrients in plant growth

 Deficiency symptoms of macro-nutrients in crops

 Micro-nutrients

9.2.2 Inorganic fertilizers

 Classification of fertilizers

 Identification of fertilizers

 Properties of fertilizers

 Methods of fertilizer application

 Determination of fertilizer rates

9.2.3 Soil sampling

 Meaning

 Soil sampling methods and procedures

 Sites to avoid

 Preparation and Procedure of sending soil for testing

9.2.4 Soil testing

 Meaning

 Importance

 Testing for pH

 How soil pH affects crop production

Note: Learners to make a table showing optimum pH range for various crops with the help of the teacher.

10.0.0 CROP PRODUCTION II (PLANTING) (16 LESSONS)

10.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

a) state the correct planting materials for various crops

b) select and prepare planting materials

c) determine the optimum time of planting

d) state the factors which determine the depth of planting

e) describe the planting procedures for different crops

f) state the factors that determine seed rate, spacing and plant population

g) calculate plant population

h) demonstrate an appreciation for economical use of land.

CONTENT:

10.2.1 Types of planting materials

 Seeds

 - Description

 -Advantages

 - Disadvantages

 Vegetative materials

 - Description

 - Advantages

 - Disadvantages

 Plant parts used for vegetative propagation

 - Slips

 - Splits

 - Bulbils

 - Crowns

 - Suckers

 - Tubers

 - Vines

 - Cuttings and setts

10.2.2 Selection of planting materials Suitability to ecological conditions (use maize hybrids and coffee varieties as examples)

 Purity

 Germination percentage

 Certified seeds

10.2.3 Preparation of planting materials

 Breaking dormancy

 Disease and pest control/seed dressing

 Seed innoculation

 Chitting

Note: Give appropriate crop for each Practice

10.2.4 Planting

 Timing

 -Factors to consider

 -Advantages of timely planting

 Methods of planting

 - Broadcasting

 - Row planting

 - Oversowing (refer to pastures- 25.2.1)

 -Undersowing

Note: Give appropriate crop for each method

10.2.5 Plant population

 spacing

 - factors to consider

 seedrates

 - factors to consider

 calculation of plant population

10.2.6 Depth of planting

 factors to consider

Note: Learners should:

 - carry out the above practices

 - develop a table showing spacing for different local crops

11.0.0 CROP PRODUCTION III (NURSERY PRACTICES) (16 LESSONS)

11.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

a) describe a nursery bed

b) distinguish between a nursery bed, a seedling bed and a seed bed

c) state the importance of a nursery bed

d) select a suitable site for a nursery

e) prepare a nursery bed fl manage a nursery bed

g) transplant crops from a nursery

h) bud a seedling

i) graft a seedling

j) explain the importance, budding, grafting, layering and tissue culture

k) describe damage caused by animals on tree seedlings and how to prevent it.

11.2.1 Nursery bed

 Definition

 Difference between a nursery bed, seedling bed and a seed bed

 Importance

 Site selection

 Nursery establishment

 i) Vegetable nursery

 ii) Tree nursery

 iii) Vegetative propagation nursery (tea as an example)

 use of sleeves and other innovations for growing young plants

 making and using seedling boxes for growing young plants

 reparation of rooting medium

 preparation of cuttings

11.2.2 Routine management in raising seedlings

 Seed drilling

 Mulching

 Watering

 Shading

 Pricking out

 Hardening off

 Weed control

 Pest control

 Disease control

11.2.3 Budding

 Meaning

 Methods and procedure

 Appropriate plants

 Appropriate tools and materials

Note: Learners to practice budding of orange scions on lemon root-stocks or other appropriate plants.

11.2.4 Grafting

 Meaning

 Methods and procedure

 Appropriate plants

 Appropriate tools and materials

Note: Learners to practice grafting on appropriate fruit trees importance of budding and grafting

11.2.5 Importance of budding and grafting

11.2.6 Layering

 Methods

 Importance

 Appropriate crops/plants for layering

 Materials used in layering

11.2.7 Tissue culture for crop propagation

11.2.8 Transplanting of vegetable seedlings from nursery to seedbed

 Timing

 Procedure and precautions

11.2.9 Transplanting of tree seedlings

 Timing

 Digging appropriate holes

 Planting including firming and watering

 Protecting the seedlings after transplanting

- Shading

- Damage caused by animals on tree seedlings and how to prevent it.

12.0.0 CROP PRODUCTION IV (FIELD PRACTICES)(14 LESSONS)

12.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

a) define crop rotation

b) state the importance of crop rotation

c) draw a crop rotation programme

d) distinguish terms used in crop farming

e) state the importance of mulching in crop production

f) describe the importance of various field practices in crop production

g) carry out various field practices

h) state the correct stage for harvesting various crops

i) describe harvesting practices for various crops.

12.1.0 Specific Objectives

12.2.1 Crop rotation

 Definition

 Importance

 Factors influencing crop rotation

 Rotational programmes

12.2.2 Terms used in crop production

 Monocropping

 Intercropping Mixed cropping

12.2.3 Mulching

 Meaning

 Importance Types of mulching materials

 - organic

 - inorganic

 Advantages and disadvantages of mulching materials

12.2.4 Routine field practices

 Thinning

 Rogueing

 Gapping

 Training/staking/propping

 Pruning:

 i) Tea - table formation and maintenance

 ii) Coffee

 - single and multiple stem.

 -capping

 -de-suckering

 -changing cycles

 (iii) Banana stool management

 (iv) Pyrethrum

- cutting back

 Earthing up

 Crop protection:

 - Weed control

 - Pests and disease control (see unit 22 and 23)

Note: Study each of the above under

 - Importance

 - Timing

 - Appropriate crops

12.2.5 Harvesting

 Stage and timing of harvesting

 Methods of harvesting

 Precautions during harvesting

12,.2.6 Post - harvest practices

 Threshing/shelling

 Drying

 Cleaning

 Sorting and grading

 Dusting

 Packaging

12.2.7 Storage

 Importance

 Types of storage

 Preparation of store .

13.0.0 CROP PRODUCTION V (VEGETABLES) (16 LESSONS)

13.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

a) grow a vegetable crop from nursery establishment to harvesting

b) keep crop production records

c) market farm produce

d) demonstrate an appreciation of agriculture as an economically lucrative activity.

13.2.1 Vegetable crops

 Tomatoes - use varieties that require pruning and staking.

 Carrots

 Onions

 Cabbages/kales

Note:

- Each student should grow at least one of the above crops keeping all the necessary records

- The teacher should organise the class in such a way that there are

students growing each of the crops

- Class discussions should be organised so that students tell and demonstrate to each other their work in the different vegetable crops. Discussion may be held at the crop plots for students to observe.

- The teacher may organise common nurseries for students growing tomatoes, cabbages/kales and onions. However, all students should actively participate in all nursery establishment and management practices.

- Topics 12.00 and 13.00 should be carried out concurrently as theory and practical.

14.0.0 LIVESTOCK HEALTH I (INTRODUCTION TO LIVESTOCK HEALTH) (8 LESSONS)

14.1.0 Specific objectives

By the end of the topic, the learner should be able to:

a) define health and disease

b) describe signs of sickness in animals

c) state the predisposing of livestock diseases

d) categorize animal diseases

e) carry out disease control practices

f) state the importance of maintaining livestock healthy

g) demonstrate a caring attitude towards livestock.

14.2.1 Health and disease Definitions

• Definitions

• Importance of keeping livestock healthy

• Pre-disposing factors of livestock diseases

• Signs of ill -health in livestock

14.2.2 Classification of livestock diseases by cause

14.2.3 General methods of disease control

14.2.4 Appropriate methods of handling livestock.

15.0.0 LIVESTOCK HEALTH II (PARASITES) (16 LESSONS)

15.1.0 Specific objectives

By the end of the topic, the learner should be able to:

a) describe host-parasite relationship

b) identify different parasites

c) describe the life-cycle of parasites

d) explain methods of parasite control in livestock.

15.2.1 Host - parasite relationship

 effects of parasites on hosts

15.2.2 External parasites

 Ticks

 Tsetse flies

 Mites

 Lice

 Fleas Keds

15.2.3 Internal parasites

 Roundworms (Ascaris spp)

 Tapeworms (Taenia spp)

 Flukes (Fasciola spp)

Note:

 The parasites in 15.2.2 and

15.2.3 should be studied under the following:

 i) Identification

 ii) Livestock species attacked

 iii) Part(s) of livestock attacked or inhabited and mode of feeding

 iv) Signs and symptoms of attack

 Describe the life cycles of the following:

 i) Roundworm (Ascaris spp.)

ii) Tapeworm (Taenia spp)

iii) Liver Fluke (Fasciola spp.)

iv) Ticks, appropriate examples of:

- one - host

- two - host

- three - host

Note:

 Indicate whether soft or hard tick

 State methods of parasite control giving appropriate example of a parasite for each method.

16.0.0 LIVESTOCK PRODUCTION II (NUTRITION) (12 LESSONS)

16.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

a) identify and classify livestock feeds

b) describe digestion and digestive systems of cattle pig and poultry

c) define terms used to express feed values

d) compute a livestock ration

e) prepare balanced ration for various livestock

f) demonstrate a caring attitude towards livestock.

l6.2.1 Livestock nutrition

 Feeds and Feeding

 - Identification

 - classification of feeds

 - Terms used in expressing feed values

 - Computation of livestock rations

 - Preparation of livestock rations

 Digestive systems.

 - Ruminant (cattle)

 - Non-ruminant (pig and poultry)

 Digestion in cattle, pig and poultry

16.2.2 Appropriate livestock handling techniques while feeding.

FORM III AGRICULTURE SYLLABUS

17.0.0 Livestock Production (Selecting and Breeding) (12 Lessons)

18.0.0 Livestock Production (Livestock Rearing) (10 Lessons)

19.0.0 Farm Structures (18 Lessons)

20.0.0 Agricultural Economics II (Land Tenure and Land Reform) (20 Lessons)

21.0.0 Soil and Water Conservation (19 Lessons)

22.0.0 Weeds and Weed Control (15 Lessons)

23.0.0 Crop Pests and Diseases (14 Lessons)

24.0.0 Crop Productivity VI (Field Practices II) (17 Lessons)

25.0.0 Forage Crops (9 Lessons)

26.0.0 Livestock Health III (Diseases) (20 Lessons)

Agriculture Encyclopaedia.

17.0.0 LIVESTOCK PRODUCTION III (SELECTION AND BREEDING) (12 LESSONS)

17.1.0 Specific Objectives

By the end of the topic the learner should be able to:

a) describe reproduction and

b) reproductive systems.

c) select breeding stock

d) describe breeding systems

e) identify signs of heat in livestocK

f) describe methods used in serving livestock

g) demonstrate a caring attitude towards livestock.

17.2.1 Reproduction and reproductive systems.

 Cattle

 Poultry

17.2.2 Selection:

 meaning

 Factors to consider in selecting a breeding stock

 - Cattle

 - Sheep

 - Goats

 - Pigs

 - Camels Methods of selection

 - mass selection

 - contemporary comparison

 - progeny testing

17.2.3 Breeding

 Meaning

 Terms used in breeding

 - Dominant and recessive genes

 - Heterosis (hybrid vigour)

 - Epistasis

 Breeding systems

 - Cross-breeding

 - Up-grading

 - Inbreeding

 - Line breeding

 - Out-crossing

Note: Discuss under the headings:

- Definition

- Advantages

-Disadvantages

17.2.4 Signs of heat in:

 Cattle

 Pig

 Rabbits

Note: Study the oestrus cycle of each of the above

17.2.5 Methods of service in livestock

 Natural mating

 Artificial insemination

 Embryo transplant

Note: Discuss advantages and disadvantages of each.

17.2.6 Signs of parturition

 Cattle

 Pigs

 Rabbits

Note: Learners to handle livestock in appropriate caring manner.

18.1.0 Specific Objectives

By the end of the topic the learner should be able to:

a) describe livestock rearing practices

b) earn out livestock rearing practices

c) demonstrate a caring attitude towards livestock.

18.2.1 Routine livestock rearing practices

 Feeding practices

- Flushing

- Steaming up

- Creep feeding

 Parasites and disease control practices

 Vaccination

 Deworming

 Hoof trimming

 Docking

 Dipping/spraying

 Dusting

 Breeding practices

 - Crutching

 - Tupping and serving

 - Raddling

 - Ringing

 Identification

 Debeaking

 Tooth clipping

 Culling: Describe general methods and carry out

practicals on:

 - Cattle

 - Poultry

 Dehorning

 Shearing

 Castratio

 - open

 - closed

 - caponization

 Management during parturation:

 - Pigs

 - Cattle

 - Sheep

 - Goats

 - Rabbits

18.2.2 Bee Keeping (Apiculture)

 Importance

 Colony

 Siting of the apiary and hive

 Stocking the bee hive

 Management:

 - Feeding

 - Predator and pest control

 Honey harvesting and processing

18.2.3 Fish Farming (aquaculture)

 Importance

 Types of fish kept in farm ponds

 Management

 Harvesting

 Processing and preservation

18.2.4 Appropriate handling of livestock during routine management.

19.0.0 FARM STRUCTURES (18 LESSONS)

19.1.0 Specific Objectives

By the end of this topic, the learner should be able to:

a) describe parts of a building

b) identify materials for construction

c) describe various farm structures and their uses

d) describe siting of various structures

e) construct and maintain farm structures.

19.2.1 Farm buildings and structures

 Siting

 Parts of a building

 - Foundation

 - Wall

 - Floor

 - Roof

19.2.2 Livestock buildings and structures

 Crushes

 Dips

 Spray race.

20.0.0 AGRICULTURAL ECONOMICS II (LAND TENURE AND LAND REFORM) (8 LESSONS)

20.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

a) define the term tenure

b) describe tenure systems

c) describe land reforms.

20.2.1 Land tenure

 definition

 tenure systems

 i) individual

 - Types

 - Advantages and disadvantages

 ii) collective

 - Description

 - Advantages

 - Disadvantages

20.2.2 Land reforms

 Definition

 Types of reform and reasons for each

 - Fragmentation

 - Consolidation

 - Adjudication

 - Registration (Emphasize the importance of a title deed)

 - Settlement and resettlement.

21.0.0 SOIL AND WATER CONSERVATION (19 LESSONS)

21.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

a) define soil erosion

b) explain the various factors that influence erosion

c) list the agents of erosion

d) describe the various types of erosion

e) describe various methods of erosion control

f) demonstrate a caring attitude towards soil and water

g) carry out soil erosion control measures

h) describe water harvesting and conservation techniques

i) describe micro-catchments and their uses.

j) Design and construct a micro-catchment

21.2.1 Soil erosion

 Definition

 Factors influencing erosion

 - Land use and ground cover

 - Topography - gradient and length of slope (horizontal and vertical intervals)

 - Soil type and condition (Erodability)

 - Rainfall intensity (Erosivity)

 Agents of erosion

 - Water

 - Wind

 - Human beings

 - Animals

 Types of erosion

 i) Splash/rain drop

 ii) Sheet

 iii) Rill

 iv) Gully

 - gully formation

 - types of gullies

 v) Riverbank

 vi) Solifluction

 vii) Landslides

 Soil erosion control

 (i) Biological/cultural control

 - Grass strips

 - Cover crops

 - Grassed waterways

 - Contour farming and strip cropping

 - Mulching

 - Afforestation/reafforestation

 (ii) Physical/structural controls

 - Stone lines

 - Filters/strip

 - Trashlines

 - Terraces - level, graded, broad, based, narrow- based, bench, fanya juu, fanya chini.

 - Bunds

 - Cut-off- drains/Diversion ditches

 - Gabions/porous dams

 - Ridging

 21.2.2 Water harvesting

 Roof catchment

 Rock catchment

 Weirs and dams

 Ponds

 Retention ditches/Level terraces

21.2.3 Micro- Catchments

 Types

 Laying out and construction methods

 Uses

Note

- A local soil conservation officer to be contacted for necessary tools and demonstration of skills in establishing level and graded terraces

- Learners to practice using levelling boards, line and spirit level to develop conservation structures.

- Learners to carry out soil and water conservation work in and or out of school wherever appropriate.

22.0.0 WEEDS AND WEED CONTROL (15 LESSONS)

22.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

a) define a weed

b) identify& weeds

c) classify weeds

d) explain the characteristics which make the weeds competitive

e) describe ways of controlling weeds

f) state harmful effects of weeds

g) control weeds

h) exercise safety measures to oneself, to crops and to the environment while rolling weeds.

22.2.1 Weeds

 Definition of weed

 Weed identification and classification competitive ability of weeds (Appropriate examples for each ability)

 Harmful effects of weeds (appropriate examples for each effect) (See Appendix II for weeds to be studied)

22.2.2 Weed control methods

 Chemical weed control:

 - Classes of herbicides

 - Methods of application

 - Safety measures in use of chemicals

 Mechanical weed control

 Cultural weed control

 Biological weed control

 Legislative control

3.0.0 CROP PESTS AND DISEASES(14 LESSONS)

23.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

a) define pest and disease

b) state the main causes of crop diseases

c) describe the harmful effects of crop pests and diseases

d) identify and classify some of the common pests and diseases

e) carry out general disease and pest control measures

f) demonstrate a caring attitude towards the environment while controlling pests and diseases.

23.2.1 Pests

 Definition

 Classification of pests:

 - Mode of feeding

 - Crops attacked

 - Stage of growth of crop attacked

 - Field and storage pests

 Identification of common pests

 Harmful effects of pests

 Pest control measures

23.2.2 Diseases

 Definition

 Classification of diseases according to cause

 Identification of common diseases

 Disease control

 Harmful effects of diseases

 Disease control measures (see appendices Ill and IV for pests and diseases to be studied)

Note: Remind learners of safety in mixing, using and storing of chemicals including container disposal as in unit 2200).

24.0.0 CROP PRODUCTIVITY IV (FIELD PRACTICES II) (17 LESSONS)

24.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

a) describe management practices in crop production

b) carry out management practices for a given crop

c) demonstrate an appreciation of agriculture as an economically lucrative activity.

24.2.1 Production of

(a) Maize/millet/sorghum

(b) Beans

Discuss under the following:-

 Meaning of hybrids, composites and cultivars

 Selecting best hybrids, composites or cultivars for a given climatic region.

 Raising of a maize/sorghum /millet and bean crop from seed bed preparation to harvesting

 Keeping records in production of maize/sorghum/millet and beans

24.2.2 Rice production

 Land preparation

 Water control

 Use of flooding in rice field

 Fertilizer application

 Weed control

24.2.3 Harvesting of the following crops :

 Cotton

 Pyrethrum

 Sugarcane

 Tea

 Coffee

 Under the following

 Stage of harvesting

 Method and procedure of harvesting

 Precautions in harvesting

Note:

Compare cost of production with value of product for maize/sorghum/millet and beans

Discuss why there is a loss or a profit and improvement needed.

25.0.0 FORAGE CROPS (9 LESSONS)

25.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

a) define and classify pastures

b) identify forage crops

c) describe the ecological requirements of forage crops

d) describe the establishment and management of pastures and fodder

e) describe forage utilization and conservation.

25.2.1 Pastures

 Definition

 Classification

 Establishment

 Management

25.2.2 Utilization

 Grazing systems

 - Rotational

 - Herding

 Zero grazing

25.2.3 Fodder crops

 Napier/bana grass

 Guatemala grass

 Sorghum

 Kale

 Edible cana

 Lucerne

 Clovers

 Desmodium

 Manigolds

 Agroforestry trees/bushes used as fodder

Under the following:

- Ecological requirements

- Establishment and management

- Production per unit area

- Utilization

 Hay making

 Silage making

 Standing hay.

26.0.0 LIVESTOCK HEALTH III (DISEASES) (20 LESSONS)

26.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

a) describe causes and vectors of main livestock diseases

b) state the incubation period of the livestock diseases

c) describe the signs of each disease

d) state the predisposing factors where applicable

e) carry out simple control measures of livestock diseases

f) demonstrate a caring attitude towards livestock.

26.2.1 Protozoan diseases

 East coast fever

 Anaplasmosis

 Coccidiosis

 Trypanosomiasis (Nagana)

26.2.2 Bacterial diseases

 Fowl typhoid

 Foot rot

 Contagious abortion (Brucellosis)

 Scours

 Black-quarter

 Mastitis

 Anthrax

 Pneumonia

26.2.3 Viral diseases

 Rinderpest

 Foot and mouth

 Newcastle

 Fowl pox

 Gumboro

 African Swine fever

26.2.4 Nutritional diseases

 Milk fever

 Bloat

The above diseases should be studied under the following:

 Animal species attacked

 Cause/causal organism/agent and or vector

 Predisposing factors (where applicable)

 Incubation period (where applicable)

 Signs and symptoms of disease

 Simple control measures of the diseases

Note

- Learners to exercise care and use appropriate livestock handling practices

- Exercise care not to pollute the environment with chemicals.

FORM IV AGRICULTURE SYLLABUS.

27.0.0 Livestock Production V (Poultry) (25 Lessons)

28.0.0 Livestock Production VI (Cattle) (16 Lessons)

29.0.0 Farm Power and Machinery (18 Lessons)

30.0.0 Agricultural Economics III (Production Economics) (20 Lessons)

31.0.0 Agricultural Economics IV (Farm Accounts) (10 Lessons)

32.0.0 Agricultural Economics V(Agricultural Marketing and Organisations) (10 Lessons)

33.0.0 Agroforestry (10 Lessons)

Agriculture Encyclopaedia.

27.0.0 LIVESTOCK PRODUCTION V (POULTRY) (25 LESSONS)

27.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

a) identify parts of an egg

b) select eggs for incubation

c) identify suitable sources of chicks

d) describe broodiness and natural brooding

e) describe brooder and brooder management

f) describe conditions necessary for artificial incubation

g) describe rearing systems

h) describe the feeding for each age and category of poultry

i) identify stress and vices

j) state the causes of stress and vices in poultry

k) state the effects of vices and stress in poultry

I) state control measures of vices and stress

m) describe marketing of eggs and poultry meat

n) select, sort and grade eggs for marketing

o) demonstrate an appreciation of poultry production as an economically lucrative activity.

27.2.1 Parts of an egg

27.2.2 Incubation

 Meaning

 Selection of eggs for incubation

 Natural incubation

 - Signs of broodiness in poultry

 - Preparation and management of natural incubation

 Artificial incubation

 - Management of the incubator

27.2.3 Sources of chicks

27.2.4 Brooding

 Meaning

 Natural brooding

 Artificial brooding

 - Brooder and brooder management

 - Conditions

 - Equipment

 - Management of:

 i) layers

 ii) broilers

27.2.5 Rearing systems

 Extensive

 -Free range

 Semi - intensive

 - Fold system

 Intensive

 - Deep litter

 - Battery cage system

Note: Include advantages and disadvantages of each system.

27.2.6 Chicken feeding

 Broilers

 Layers

27.2.7 Stress and vices in chicken.

 Identification

 Causes

 Control

27.2.8 Marketing

 eggs - include, grading of eggs for marketing

 meat.

28.0.0 LIVESTOCK PRODUCTION VI (CATTLE) (16 Lessons)

28.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

a) raise young stock

b) demonstrate a caring attitude towards livestock

c) describe milk by its components

d) describe milk secretion and let - down

e) milk using correct procedure and technique

f) describe marketing of beef cattle and milk

g) Demonstrate an appreciation of cattle production as an economically lucrative activity.

28.2.1 Raising young stock

• Feeding

• Weaning

• Housing

• Routine practices (see unit 18)

28.2.2 Milk and Milking

• Milk composition

• Milk secretion and let down

• Clean milk production

 - Equipment and materials (include milking machine)

 - Cleanliness of the milkman / milkwoman

 - Milking procedure (by hand and by machine

 - Milking techniques

• Dry cow therapy

28.2.3 Marketing of milk

28.2.4 Marketing beef cattle

Note: Learners to exercise care and use appropriate methods in handling livestock

29.0.0 FARM POWER AND MACHINERY (18 LESSONS)

29.1.0 Specific Objectives

By the end of the topic the learner should be able to:

a) describe various sources of power in the farm

b) describe various systems of a tractor

c) describe the various tractor implements, their uses and maintenance

d) describe the various animal drawn implements, their uses and maintenance

e) describe tractor service and maintenance practices.

29.2.1 Sources of power in the farm

 Human

 Animal

 Wind

 Water

 Biomass

 - Wood/charcoal

 - Biogas

 Fossil fuel

 - Coal

 - Petroleum

 - Natural gas

 Electrical

 - Hydro

 - Geothermal

 - Nuclear

 - Storage battery

 Solar

29.2.2 Tractor Engine

 Four stroke cycle engine

 dieseL

 petrol

 Two stroke cycle engine

29.2.3 Systems of the tractor

 Fuel system

 Electrical

 Ignition

 Cooling

 Lubrication

 Transmission

 - Clutch

 - Gears

 - Differential

 - Final Drive

29.2.4 Tractor service maintenance

29.2.5 Tractor drawn implements, their uses and maintenance.

 Attachment methods

 i) One point hitch

 - draw bar

 ii) Three point hitch

 - hydraulic

 iii) Power take off (PT O)

 Implements

 i) Trailer

 ii) Disc plough

 iii) Mouldboard plough

 iv) Harrows

 - disc

 plain

 notched

 - spike tooth

 - spring tined

 v) Sub - soilers

 vi) Ridgers

 Rotary tillers

 Mowers

 - Gyro

 - Reciprocating

 Planters and seeders

 Cultivators

 Sprayers

 Harvesting machines

 - grain

 - root crops

 - forage

 Shellers

29.2.6 Animal drawn implements, uses and maintenance

• Ploughs

• Carts

• Ridgers

Note : Teacher should use local resources and diagrams. The school does not need to have tractor, tractor drawn implements, animals and animal drawn implements.

30.0.0 AGRICULTURAL ECONOMICS III (PRODUCTION ECONOMICS) (20 LESSONS)

30.1.0 Specific Objectives

By the end of the topic, the learner should be able to;

a) explain various parameters of national development

b) relate national development to agricultural production

c) state the factors of production and explain how each affects production

d) describe how the law of diminishing returns relates to agricultural production

e) describe agricultural planning and budgeting in a farm business state sources of agricultural support services

g) describe risks and uncertainties in farming

h) explain ways of adjusting to risks and uncertainties.

30.2.1 National income

 Household - firm relationship

 Gross Domestic product (GDP)

 Gross National Product (GNP)

 Per Capita Income

 Contribution of agriculture to national development

30.2.2 Factors of production

 Land

 - Definition

 - Methods of acquisition

 Labour

 - Definition

 - Types

 - Measures of labour

 - Ways of increasing labour efficiency

 Capital

 - Definition

 - Types

 - Sources

 Management

 - Definition

 - Role of a farm manager

Note: Emphasize that by law, a Kenyan can acquire land, settle, invest capital or work anywhere within the country.

30.2.3 Production function.

 Increasing returns

 Constant returns

 Decreasing returns

30.2.4 Economic laws and principle

 The law of diminishing returns

 The law of substitution

 The law of equi-marginal returns

 Principle of profit maximization

30.2.5 Farm planning

 meaning

 factors to consider

 steps

30.2.6 Farm budgeting

 Definition

 Importance

 Types

 -. Partial

 - Complete

30.2.7 Agricultural services available to the farmer

30.2.8 Risks and uncertainties in farming

 Meaning

 Common risks and uncertainties

 Ways of adjusting.

31.0.0 AGRICULTURAL ECONOMICS IV(FARM ACCOUNTS) (10 LESSONS)

31.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

a) state the importance of farm accounts

b) distinguish and describe the various financial documents and their uses

c) prepare and analyse financial statements

d) identify various books of accounts and their uses.

31.2.1 Financial documents and books of accounts

 Financial documents

 - Invoices

 - Statements

 - Receipts

 - Delivery notes

 - Purchase orders

 Books of Accounts

 - Ledger

 - Journal

 -Inventory

 -Cash book

31.2.2 Financial statements

 Cash analysts

 Balance sheet

 Profit and loss account.

32.0.0 AGRICULTURAL ECONOMICS V (AGRICULTURAL MARKETING AND ORGANISATIONS) (10 LESSONS)

32.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

a) define market and marketing

b) describe the various types of markets

c) describe how the law of supply and demand affects the prices of agricultural products

d) state various marketing functions, agents and institutions

e) identify problems in marketing of agricultural products

f) list various agricultural organizations -

g) describe the role of each of the agricultural organizations.

32.2.1 Market and marketing

32.2.2 Types of markets

32.2.3 Demand, supply and price theory

32.2.4 Marketing functions

32.2.5 Problems of marketing agricultural products and possible solutions

32.2.6 Marketing boards, agents and institutions

32.2.7 Co-operatives

• Formation

• Functions

32.2.8 Associations and unions

• Agricultural society of Kenya (ASK)

• Young Farmers Clubs (YFC)

• Kenya National Farmers Union (KNFU)

• Agricultural based Women groups.

33.0.0 AGROFORESTRY (10 LESSONS)

33.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

a) define agro forestry

b) state the importance of agro forestry

c) describe various forms of agro forestry

d) explain the importance of trees

e) select appropriate trees for different uses

f) describe tree nursery management and transplanting

g) explain routine tree management

h) select appropriate sites for trees in the farm and other

i) describe various methods of tree harvesting.

33.2.1 Definition of agro forestry

 forms of agro forestry

33.2.2 Importance of agro forestry

33.2.3 Importance of trees and shrubs

 important trees and shrubs particular purposes

 Trees and shrubs to avoid at certain sites and reasons

33.2.4 Tree nursery

 types of nurseries

 seed collection and preparation

 nursery management

 transplanting

Note: Refer to 11.00 nursery practices

33.2.5 Care and management of trees

 Protection

 Pruning and training

 Grafting old trees

33.2.6 Agro forestry practices

 Alley cropping

 Multi-storey cropping

 Woodlots in farms

33.2.7 Sites for agro forestry trees

 Boundaries

 Riverbanks

 Terraces

 Slopes

 Homestead

33.2.8 Tree harvesting methods.