443 - AGRICULTURE

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;

II. promote agricultural activities which enhance environmental conservation;
12. promote consciousness of health promoting activities in agricultural production.

1.0.9 INTRODUCTION TO AGRICULTURE

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) describe farming methods;
e) explain the role of agriculture in the economy.

1.2.0 Content

1.2.1 Definition of agriculture.
1.2.2 Branches of agriculture.

- Crop-farming (Amble farming) - Field crops; Horticulture - Floriculture (flower farming), Olericulture (vegetable farming) and Promoculture (fruit farming).
- Livestock farming: Pastoralism (mammalian livestock farming); Fish farming; Apiculture (Bee keeping); Poultry keeping
- Agricultural economics
- Agricultural engineering.

1.2.3 Systems of fanning; Extensive, Intensive, Large scale, and Small sea Study these under the following headings; Meaning, Advantages and

Disadvantages.

1.2.4 Methods of farming: Mixed farming; Nomadic Pastoralism; Shifting cm Organic farming; Agro-forestry.

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1.25 Roles of agriculture in the economy: Food supply; Source of employment Foreign exchange earner; Source of raw materials for industries; Provision market for industrial goods; Source of capital.

2.0.0 FACTORS INFLUENCING AGRICULTURE

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 g) determine soil constituents;
h) classify soils by physical characteristics;
i) explain chemical properties of soils;
j) relate crop and livestock distribution to soils in different regions.

2.2.1 Content

2.2.2 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.
2.2.3 Biotic Factors: Pests, Parasites, Decomposers, Pathogens, Predators, Pollinators
Nitrogen fixing bacteria

2.2.4 Climatic Factors

- Rainfall: Intensity, Reliability, Quantity; Distribution.
- Temperature: - How topography and altitude affect temperature.

- How temperature influences crop and livestock production.

- Wind: Evapotranspiration, Lodging, Pollination, Seed dispersal, Soil erosion
- Light – Intensity, Duration – long, neutral and short day plants, Wavelength

Note: - Each factor to be discussed with respect to Land potentiality, Crop production, Livestock production, Crop and livestock distribution in Kenya.

2.2.5 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, Importance of each constituent, Physical properties of soil.
- Soil Structure – definition, types, influence on crop production.
- Soil texture –definition, soil textural classification, influences on crop growth and production, porosity, capillarity, drainage and water retention capacity.
- Soil colour
- Chemical properties of soil -Soil pH, PH influence on crop growth and production, effects of pH on mineral availability.

3.0.0 SOIL AND WATER CONSERVATION

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3.1.0 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 various types of erosion;
e) describe various methods of erosion control;
1) carry out soil erosion control measures;
g) describe water harvesting and conservation techniques;
h) describe micro-catchments and their uses;
i) design and construct a micro-catchment.

3.2.0 Content

3.2.1 Soil erosion - definition

3.2.2 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)

3.2.3 Agents of erosion: Water, Wind, Human beings and Animals.

3.2.4 Types of erosion: Splash/rain drop, Sheet, Rill, Gully (gully formation, types of gullies), River bank, Solifluction, Landslides.
3.2.5 Biological/cultural control: Grass strips, Cover crops, Contour farming and strip cropping, Mulching, Afforestation/forestation.

.2.6 Physical/structural control: Stone lines, Filterstrips, Trashlines, Terraces (level, graded, broad-based, narrow-based. Bench, fanya juu, fanya chini), Bunds, Cutoff-drains/Diversion ditches, Gabions/porous dams, Ridging.
3.2.7 Water harvesting: Roof catchments, Rock catchments, Weirs and dams, Ponds, Retention ditches/Level terraces.
3.2.8 Micro-catchments: Types, Uses, Laying out and construction methods.

4.0.0 WATER SUPPLY, IRRIGATION AND DRAINAGE

4.1.0 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 litigation;
1) describe methods of irrigating land;
g) list the equipment used in litigation;
h) grow a crop through irrigation;

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1) cart: out maintenance oil drilling equipment and facilities;
j) define drainage;
k) explain the importance of drainage;
1) describe the methods of drainage;
m) explain how agricultural activities pollute water and how this can be prevented;

4;2;0 Content

4;2;I Water supply: Sources of water4 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
4;2;2 litigation: Definition, Importance (include irrigation as a method of land reclamation) Methods (surface4 subsurface, overhead, drip).

Note.` - the advantages and the disadvantages of each.

Maintenance practices of each irrigation system.
4;2i Project on crop production through any method of Irrigation.
414 Drainage: Definition, Importance (include as a method of land ret lamatioii)5
Methods of drainage (surface, sub-surface, pumping, planting of appropriate trees);
4;2; Water Pollution: Meanings Agricultural practices that pollute water, Methods of pollution prevention and control.

SOIL FERTILITY I (Organic Manures)

Specific Objectives

By the end of the topic5 the learner should be able to:
a) define soil fertility;
b) explain how soil fertility can be maintained; describe how soil loses fertility;
l) define and distinguish organic matter manure and humus;
e) explain the Importance of organic matter In the soil

f) describe the different organic manures;
g) prepare compost manure

Soil fertility Definition4 How soil loses fertility, Maintenance of soil fertility. Organic Manure Organic matter and humus4 Importance of organic matter in the soil, types of organic manures - green manure, Famyard manure Compost manure

Note; For each type, describe its preparation, advantages and disadvantages and u4c.
5.2.3 Compost manure: Meaning, Materials used and materials to avoid, Preparation methods and procedure (Heap and Pit).

6.0.0 SOIL FERTILITY: II (INORGANIC FERTILIZERS)

6.1.0 Specific Objectives

By the end of the topic, the learner should be able to:
a) list the essential elements;

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b) classify' the essential elements;
c) state the role of each macro-nutrients, micro-nutrients;
d) describe the deficiency symptoms of the macro-nutrients, micro-nutrients;
e) identify and classify fertilizers;
1) describe the properties of various fertilizers;
g) describe soil sampling and testing procedures;
h) use appropriate methods of fertilizer application;
i) calculate fertilizer application rates;
j) explain how soil acidity and alkalinity affect crop production.

6.2.0 Content

6.2.1 Essential elements
Macro-nutrients: carbon, hydrogen and oxygen, fertilizer elements (N.PK.), liming elements (Ca, Mg), Sulphur, Role of macro-nutrients in crops,
Deficiency symptoms of macro-nutrients ts in crops
Micro-nutrients: Role of micro-nutrients in crops, Deficiency symptoms of micro-nutrients in crops,
6.2.2 Inorganic fertilizers: Classification of fertilizers, Identification of fertilizers, Properties of fertilizers, Methods of fertilizer application, Determination of fertilizer rates..
6.2.3 Soil sampling: Meaning, Soil sampling methods and procedures, Sites to avoid, Preparation and Procedure of sending soil for testing.
6.2.4 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.

7.0.0 FARM TOOLS AND EQUIPMENT

7.1.0 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.,

7.2.0 Content

7.2.1 Garden tools and equipment
7.2.2 Workshop tools and equipment: Woodwork tools and equipment, Metalwork tools and equipment.
7.2.3 Livestock production tools and equipment
7.2.4 Plumbing tools and equipment
7.2.5 Masonry tools and equipment.

Note: Study the above tools under the headings: Name and uses, Parts and uses, Maintenance practices
See the appendix for the list of tools and equipment to be studied.

8.0.0 CROP PRODUCTION I (LAND PREPARATION)

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8.1.0 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 cultivation operation to correct tools and or implements;
d) prepare a piece of land ready for crop production.
8.2.0 Content
8.2.1 Land preparation: Definition, Importance.
8.2.2 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 implements
- Secondary cultivation: Definition and importance, Number of operations, Relating final tilth to the intended planting material.
- Tertiary operations: Ridging, Rolling, Leveling

Note: For each operation: give reasons and explain how it is carried out.
Sub-soiling: Meaning, Importance, Equipment used.
8.2.3 Minimum tillage: Definition, Importance, Practices.

9.0.0 CROP PESTS AND DISEASES

9.1.0 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) identif` and classify some of crop pests and diseases;
e) carry out general disease and pest control measures.
9.2.0 Content
9.2.1 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, est control measures.
9.2.2 Diseases: Definition, Classification of diseases according to cause, Identification of common diseases, Disease control, Harmful effects of diseases, Disease control measures.

10.0.0 CROP PRODUCTION II (PLANTING)

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;

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f) state the factors that determine seed rate, spacing and plant population;
g) calculate plant population.

10.2.0 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.
.2.3 Preparation of planting materials: Breaking dormancy, Disease and pest control/seed dressing, Seed inoculation, Chitting.
Note: Give appropriate crop examples 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), undersowing.

note: Give appropriate crop examples for each method
Plant population:

- Spacing - factors to consider, seed rate
- Calculation of plant population per unit area. : Factors to consider

110,0 CROP PRODUCTION III (NURSERY PRACTICES

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;
(0 establish a nursery bed
(g manage a nursery bed;
(h) transplant crops from a nursery;
(1) bud a seedling;
Q) graft a seedling;
(k) explain the importance of budding, grafting, layering and tissue culture;
(I) describe damage caused by animals on tree seedling and how to prevent it

11 2,0 Content

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Nursery bed:

Definition, Difference between a nursery bed, seedling bed and a seed bed, importance, Site selection, nursery establishment (vegetable nursery, tree nursery, 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 preparation of rooting medium
preparation of cuttings.

11,22 Routine management in raising seedlings: Seed drilling, Mulching, Watering, Shading, Pricking out, Hardening off, Weed control, Pest control, Disease control,

I I,23 Budding: Meaning, Methods and procedure, Appropriate plants, Appropriate tools and materials.
Note: Learners to practise budding of orange scions on lemon root-stocks or other appropriate plants,
II l4 Grafting: Meaning, Methods and procedure, Appropriate plants, Appropriate tools
and materials.
Note: Learners to practice grqlling on appropriate fruit trees.
1124 Importance of budding and grafting.
11.2.6 Layering: Methods, Importance, Appropriate crops/plants tbr layering, Materiah used in layering.

11.2.7 Tissue culture fbr 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 I

12.IS Specific Objectives

By the end of the topic the learner should be able tot
(a) define crop rotation;
(I,) state the importance of crop rotation;
(c) draw a crop rotation programme;
(d) distinguish terms used in crop fanning;
(e) state the importance of mulching in crop production;
(f) describe the importance of various routine field practices In crop production;
(g) catty out various field practices;
(h) state the correct stage rot harvesting various crops;
(i) describe harvesting practices for various crops

122O Content

12.2.1 Crop rotation: Definition, Importance, Factors influencing crop rotation, Rotational programmes.

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12.12 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.

12.24 Routine field practices: Thinning, Rogueing; Gapping, Training Pruning(Coffee single and multiple stem, capping, de-suckering, changing cycles; banana stool management; pyrethrum - cutting back), Earthing up, Crop protection (weed control pests and disease control

Note:- Study the importance and timing of each activity and the appropriate kite crops.
12.2.5 Harvesting: Stage and timing of harvesting, Methods of harvesting, Precautions during harvesting

12.2.6 Post = harvesting practices: Threshing/shelling, Drying, Cleaning, Sorting and grading, Dusting, Packaging.
12.2.7 Storage: Importance, types of storage, Preparation of *tore.

13.0.0 CROP PRODUCTION V (VEGETABLES)

13.1.1 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 a crop production records;
(c) market farm produce.
13.2.0 Content
13.2.1 Vegetable crops: Tomatoes (use varieties that require pruning and staking), Carrots, Onions, Cabbages/Kales.

14.0.0 CROP PRODUCTION VI (FIELD PRACTICES II

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) explain how crop production can be an economically lucrative activity.
14.2.0 Content
14.2.1 Production of: Maize/millet/sorghum, Beans
Discuss the above crops under the following:-
- Meaning of hybrids, composites and cultivars
- Selecting best hybrids, composites or cultivars for given climatic regions.
- 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.
14.2.2 Rice production: Land preparation, Water control, Use of flooding in rice-field, Fertilizer application, Weed control.
14.2.3 Harvesting of the following crops: Cotton, Pyrethrum, Sugar cane , 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

15.0.0 FORAGE CROPS

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15.1.0 Specific Objectives

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

(a) define and classify pastures;
(b) identify forage crops;
(e) describe the ecological requirements of forage crops;
(d) describe the establishment and management of pastures and fodder;
(e) describe forage utilization and conservation.
15.2.0 Content
15.2.1 Pastures: Definition, Classification, Establishment, Management, Utilization - grazing systems -rotational grazing, herding, zero grazing.
15.2.2 Fodder crops: ; Napier/bana grass; Guatemala grass; Sorghum; Kale; Edible cana Lucerne; Clovers; Desmodium; Mangolds; Agro-forest trees/bushes used as fodder.
Nb. Study the above crops under the following: Ecological requirements, Establishment and management, Production per unit area, Utilization.
15.2.3 Forage conservation: Hay making, Silage making, Standing hay.

16.0.0 WEEDS AND WEED CONTROL

16.1.0 Specific Objectives

By the end of the topic, the learners should be able to:
(a) define a weed;
(b) identify weeds;
(e) 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 the environment while controlling weeds.
16.2.0 Content
16.2.1 Weeds: Definition of a weed, Weed identification and classification, Competitive ability of weeds (Appropriate examples for each ability), Harmful effects of weeds (appropriate examples for each effect).
Note:- See appendix Resources B on weeds to be studied.
16.2.2 Weed control methods: Chemical weed control (classes of herbicides, methods of application and safety measures in use of chemicals), Mechanical weed control, Cultural weed control, Biological weed control, Legislative control.

17.0.0 AGRO-FORESTRY

17.1.0 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;

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(g) explain routine tree management;
(h) select appropriate sites for trees in the farm and other areas;
(i) describe various methods of tree harvesting.

17.2.0 Content

17.2.1 Definition of agro-forestry: Forms of agro-forestry
17.2.2 Importance of agro-forestry
17.2.3 Importance of trees and shrubs: Important trees and shrubs for particular purposes; Trees and shrubs to avoid at certain sites and reasons.
17.2.4 Tree nursery: Types of nurseries, Seed collection and preparation, Nursery management, Transplanting.
17.2.5 Care and management of trees: Protection, Pruning and training, Grafting old trees.
17.2.6 Agro-forestry practices: Alley cropping, Woodlots in farms.
17.2.7 Sites for agro-forestry trees: Boundaries, River banks, Terraces, Slopes, Homestead.
17.2.7 Tree harvesting methods.

18.0.0 LIVESTOCK PRODUCTION I (COMMON BREEDS)

18.1.0 Specific Objectives

By the end of the topic the learner should be able to:
(a) state the importance of livestock;
(1,) name various livestock species;
(e) define the terms livestock, breed and type;
(d) describe the various breed characteristics;
(e) state the origin of various livestock breeds;
(f) classify the various breeds into types;
(g) name the external parts of the various livestock species.
18.2.1 Content
18.2.2 Importance of livestock
18.2.3 Livestock species: Cattle (exotic and indigenous), Goats, Sheep, Pigs, Poultry (chicken), Rabbits, Camels.
Discuss each under the following: Breed, origin and characteristics, Type of each breed, External parts of each livestock species, Typical conformation
18.2.4 Terms used to describe livestock in different species by age, sex and use.

19.0.0 LIVESTOCK PRODUCTION III (SELECTION AND BREEDING)

19.1.0 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) describe signs of parturition in cattle, pigs and rabbits.

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19.2.0 Content

19.2.1 Reproduction and reproductive systems: Cattle and Poultry.
19.2.2 Selection: Meaning; Factors to consider in selecting a breeding stock- Cattle, Sheep, Goats, Pigs, Camels; Methods of selection - mass selection , contemporary comparison, progeny testing.
19.2.3 Breeding: Meaning; Terms used in breeding - dominant and recessive genes, Heterosis (hybrid vigour), Epistasis; Breeding systems - Cross-breeding, Upgrading, Inbreeding, Line breeding, Out-crossing

Note: Discuss under the headings: Definition, Advantages and Disadvantages
19.2.4 Signs of heat in Cattle, Pigs and Rabbits.

Note: Study the oestrus cycle of each of the above.

19.2.5 Methods of service in livestock: Natural mating, Artificial insemination, Embryo transplant.
Note: Discuss advantages and disadvantages of each
19..2.6 Signs of Parturition in Cattle, Pigs and Rabbits.
Note: Learners to handle livestock in appropriate caring manner.

LIVESTOCK HEALTH I (INTRODUCTION TO LIVESTOCK HEALTH)

20.1.0 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 factors of livestock diseases;
(d) categorize animal diseases;
(e) carry out disease control practices;
(fl state the importance of maintaining livestock healthy;
(g) describe appropriate methods of handling livestock.
20.2.0 Content
20.2.1 Health and disease: Definitions; Importance of keeping livestock healthy; Predisposing factors of livestock diseases; Signs of ill-health in livestock.
20.2.2 Classification of livestock diseases by cause.
20.2.3 General methods of disease control
20.2.4 Appropriate methods of handling livestock.

21.0.0 LIVESTOCK HEALTH II (PARASITES)

21.1.0 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) state signs & symptoms of attacks;
(e) explain methods of parasite control in livestock.
21.2.0 Content
21.2.1 Host: Parasite relationship; Effects of parasites on hosts.
21.2.2 External parasites: Ticks, Tsetse flies, Mites, Lice, Fleas, Keds
21.2.3 Internal parasites: Roundworms (Ascaris spp); Tapeworms (Taenia spp); Flukes (Fasciola spp).

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Note: The parasites should be studied under the following: -Identification, Livestock species attacked, Part(s) of livestock attacked or inhabited and mode of feeding.
21.2.4 Signs and symptoms of attack.
21.2.5 Describe the life cycles of the following:Roundworm (Ascaris spp); Tapeworm (Taenia spp); Liver fluke (Fasciola spp); Ticks (appropriate example one host, two host , three host)
Note: Indicate whether soft or hard tick
21.2.6 Methods of parasite control giving appropriate example of a parasite for each method.

2.0.0 LIVESTOCK HEALTH III (DISEASES)

22.1.0 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;
(c) describe the signs of each disease;
(d) state the predisposing factors where applicable;
(e) carry out simple control measures of livestock diseases;
(fl state the measures taken to avoid environmental pollution.

22.2.0 Content

22.2.1 Protozoan diseases: East coast fever; Anaplasmosis; Coccidiosis; Trypanosomiasis (Nagana).
22.2.2 Bacterial diseases: Fowl typhoid; Foot rot; Contagious abortion (Brucellosis); Scours; Blackquarter; Mastitis; Anthrax; Pneumonia
22.2.3 Viral diseases: ; rinderpest; Foot and mouth ; Newcastle; Fowl pox; Gumboro; African Swine fever.
22.2.4 Nutritional diseases: Milk fever; Bloat.
All the above diseases should be studied under the following:

- Animal species attacked
- Cause/casual organism/agent and or vector
- Predisposing factors (where applicable)
- Incubation period (where applicable)
- Signs and symptoms of disease
- Simple control measures of the diseases
- Appropriate measures to avoid environmental pollution.

23.0.0 LIVESTOCK PRODUCTION II (NUTRITION)

23.1.0 Specific Objectives

By the end of the topic, the learner should be able to:
(a) identify and classify livestock feeds;
(b) describe digestion;
(c) define terms used to express feed values;
(d) compute a livestock ration;
(e) prepare balanced ration for various livestock;
(0 describe the appropriate livestock handling techniques while feeding.
23.2.0 Content
23.2.1 Livestock nutrition: Feeds and Feeding (identification, classification of feeds, terms used in expressing feed values, computation of livestock rations, preparation of livestock rations); Digestive

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systems (ruminant eg cattle, and non- ruminant eg pig and poultry); Digestion in cattle, pig and poultry.
23.2.2 Appropriate livestock handling techniques while feeding.

24.0.0 LIVESTOCK PRODUCTION IV (LIVESTOCK REARING PRACTICES)

24.1.0 Specific Objectives

By the end of the topic, the learner should be able to:
(a) describe livestock rearing practices;
(b) carry out livestock rearing practices;
(c) describe appropriate handling techniques of livestock during routine management.

24.2.0 Content

24.2.1 Routine livestock rearing practices: Feeding practices (flushing, steaming up, creep feeding); Parasites and Disease control practices (vaccination, dehorning, 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; Castration (open, closed, caponization);

Management during parturition:- pigs, cattle, sheep, goats and rabbits.

24.2.2 Bee Keeping (Apiculture): Importance; Colony; Siting of the apiary and hive; Stocking a bee hive; Management – feeding and predator and pest control; Honey harvesting and processing.

24.2.3 Fish Farming (aquaculture): Importance; Types of fish kept in farm ponds; Management; Harvesting; Processing and preservation.
24.2.4 Appropriate handling of livestock during routine management.

25.0.0 LIVESTOCK PRODUCTION VI (CATTLE)

25.1.0 Specific objectives

By the end of the topic, the learner should be able to:
(a) raise young stock;
(b) describe milk by its components;
(c) describe milk secretion and let-down;
(d) milk using correct procedure and technique;
(e) describe marketing of beef cattle and milk;
25.2.0 Content
25.2.1 Raising young stock: ; Feeding; Weaning ; Housing; Routine practices.
25.2.2. Milk and milking: Milk composition,; Milk secretion and let down; Clean milk production (equipment and materials (include milking machine), cleanliness of the milk man /milk woman, milking procedure (by hand and by machine), Milking techniques); Dry cow therapy.
25.2.3 Marketing of milk
25.2.4 Marketing beef cattle.

26.0.0 LIVESTOCK PRODUCTION V (POULTRY)

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26.1.0 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;
(e) describe conditions necessary for artificial incubation;
(d) identify, suitable sources of chicks;
(e) describe broodiness and natural brooding; (fl describe brooder and brooder management;
(g) describe rearing systems;
(h) describe the feeding for each age and category of poultry;
(i) identify stress and vices;
0) state the causes of stress and vices;
(k) state the effects of vices and stress in poultry;
(1) state control measures of vices and stress;
(m) describe marketing of eggs and poultry meat;
(n) select, sort and grade eggs for marketing;
(o) explain how poultry production can be an economically lucrative activity.

26.2.0 Content

262.1 Parts of an egg
26.2.2 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).
26.2.3 Sources of chicks
26.2.4 Brooding: ; Meaning; Natural brooding; Artificial brooding (brooder and brooder management, conditions equipment, management of layers and broilers.
26.2.5 Rearing systems: Extensive (free range); Semi-intensive (fold system); Intensive (deep litter and battery cage system.)

Note: Include advantages and disadvantages of each system.
26.2.6 Chicken feeding: Broilers and Layers.
26.2.7 Stress and vices in chicken: Identification; Causes; Control.
26.2.8 Marketing: Eggs –(-include grading of eggs for marketing) and meat.

27.0.0 FARM STRUCTURES

27.1.0 Specific Objectives

By the end of the 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 structure.
27.2.0 Content
27.2.1 Farm building and structures: Siting; Parts of a building (foundation, wall, roof
27.2.2 Livestock buildings and structures: Crushes; Dips; Spray race; Dairy shed/parlour; Calf pens; Poultry houses and structures (deep litter, Coops, folds/arks, Runs, battery cages); Rabbit hutches/Rubbitry; Piggery/pigs sty; Fish ponds; Silos (for silage); Zero grazing unit; Bee hives.
27.2.3 Farm stores: Feed; Farm produce; Chemical; Machinery; Tools
27.2.4 Green house: Meaning; Construction materials used; Uses.

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27.2.5 Fences in the farm: Types of fences and materials used; Uses – advantages and disadvantages; Gates and passes in fences; Fence reinforcement.

Note: Construct any of the following structures: a crush, a beehive, a hutch

28.0.0 FARM POWER AND MACHINERY

28.1.0 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 drawn implements, their uses & maintenance;
(d) describe the various animal drawn implements, their uses and maintenance;
(e) describe tractor service and maintenance practices.

282.0 Content

28.2.1 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.
28.2.2 Tractor Engine: four stroke cycle engine (diesel and petrol); Two stroke cycle engine
28.2.3 Systems of the tractor: Fuel system; Electrical; Ignition; Cooling; Lubrication; Transmission (clutch, gears, differential, final drive).
28.2.4 Tractor service and maintenance
28.2.5 Tractor drawn implements, their uses and maintenance: Attachment methods (one point hitch - draw bar, three point hitch – hydraulic and power take off- P. T. 0); Implements (trailer, disc plough, mould board plough, harrows - disc [plain, notched], spike toothed, spring tined, sub-soilers, ridgers); Rotary tillers; Mowers (Gyro, reciprocating, planters and seeders); Cultivators/weeders; Sprayers; Harvesting machines (grain, root crops, forage); Shellers.
28.2.6 Animal drawn implements, uses and maintenance: ploughs; carts; ridgers.

29.0.0 AGRICULTURAL ECONOMICS I (BASIC CONCEPTS AND FARM RECORDS)

29.1.0 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 of agricultural economics;
(d) explain the importance of farm records;
(e) describe the different types of farm records;
(0 keep farm records.

29.2.0 Content

29.2.1 Definition: Economics and Agricultural Economics.
29.2.2 Basic concepts of economics: Scarcity; Preferences and choice; Opportunity cost.
292.3 Uses of farm records
29.2.4 Types of farm records: Breeding; Feeding; Production; Health; Field operations; Inventory; Labour; Marketing.

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30.0.0 AGRICULTURAL ECONOMICS II (LAND TENURE AND LAND REFORM)

30.1.0 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

30.2.0 Content

30.2.1 Land tenure: Definition; Tenure systems - (I) individual (types, advantages and disadvantages) and (ii) Collective (description, advantages and disadvantages).
30.2.2 Land reforms: definition; types of reform and reasons for each (fragmentation, consolidation, adjudication, registration (emphasize the importance of a title deed); Settlement and resettlement.

31.0.0 AGRICULTURAL ECONOMICS III (PRODUCTION ECONOMICS)

31.1.0 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 farming business;
(0 state sources of agricultural support services;
(g) describe risks and uncertainties in farming;
(h) explain ways of adjusting to risks and uncertainties.

31.2.0 Content

31 .2.1 National income: Household-firm relationship; Gross Domestic Product (GDP); Gross National Product (GNP); Per Capita Income; Contribution of agriculture to national development.
31.2.2 Factors of production: Land (definition and methods of acquisition); Labour (definition, types, measures of labour, ways of increasing labour efficiency; Capital (definition, types and sources); Management (definition, role of a farm manager)
31.2.3 Production function: Increasing returns; Constant returns; Decreasing returns
3 1.2.4 Economic laws and principle: The law of diminishing returns; The law of substitution; The law of equimarginal returns; Principle of profit maximization.
31.2.5 Farm planning: Meaning; Factors to consider; Steps
31.2.6 Farm budgeting: Definition; Importance; Types (partial and complete)
3 1.2.7 Agricultural services available to the farmer
3 1.2.8 Risks and uncertainties in farming: Meaning; Common risks and uncertainties; Ways of adjusting.

32.0.0 AGRICULTURAL ECONOMICS IV (FARM ACCOUNTS)

32.1.0 Specific Objectives

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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) identify various books of accounts and their uses;
(d) prepare and analyse financial statements.

32.2.0 Content

32.2.1 Financial documents and books of accounts: Financial documents (Invoices, Statements, Receipts, Delivery notes, Purchase orders); Books of Accounts (Ledger, Journal, Inventory, Cash book); Financial statements; Cash analysis; Balance sheet; Profit and loss account.

33.0.0 AGRICULTURAL ECONOMICS V (AGRICULTURAL MARKETING AND ORGANIZATIONS)

33.1.0 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) identi problems in marketing of agricultural products;
(f) list various agricultural organizations;
(g) describe the role of each of the agricultural organizations.
33.2.0 Content
33.2.1 Market and marketing
33.2.2 Types of markets
33.2.3 Demand, supply and price theory
33.2.4 Marketing functions
33.2.5 Problems of marketing agricultural products and possible solutions
33.2.6 Marketing boards, agents and institutions
33.2.7 Co-operatives: Formation; Functions
33.2.8 Associations and unions: Agricultural society of Kenya (ASK); Young Farmers Clubs (YFC); Kenya National Farmers Union (KNFU); Agricultural based Women groups.

APPENDIX RESOURCES

A TOOLS AND EQUIPMENT TO BE STUDIED
1. GARDEN TOOLS AND EQUIPMENT TO BE STUDIED

Panga Knap-sack sprayer
Axe Sprinkler
Mattock/pick axe Hose pipe
Jembe/hoe Garden shear
Fork jembe Pruning saw
Spade Pruning knife
Wheelbarrow Meter rule
Watering can Secateurs
Rake Garden fork

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Tape measure Pruning-hook
Soil auger Levelling boards.

2. LIVESTOCK PRODUCTION TOOLS AND EQUIPMENT

Elastrator Stir-up pump
Burdizzo Milk churn
Syringes and needles Strainer/sieve
Thermometer Rope
Halter Milking stool
Hoof trimmer Weighing balance
Strip cup Hot iron
Trochar and canula Tooth clipper
Hard broom Drenching gun
Wool shears Dosing gun
Ear notcher Bolus gun
Bull ring and leading stick Dehorning wire
Bucket Chaff cutter

3. WORKSHOP TOOLS AND EQUIPMENT

Cross cut saw Jack plane
Tenon/back saw Scrapper
Coping saw Try square
Compass saw/key hole saw Wood clamp
Rip saw Sash clamp
Bow saw G-clamp
Hack saw Mallet
Wood chisel Soldering gun
Cold chisel Tin-snip
Mes and rasps Claw hammer
Divider Sledge hammer
Center punch Wire strainer
Spoke share Pliers
Screw drivers Brace and bits
Spanners Hand drills and bits
Pipe wrench Riveting machine
Pipe cutter Crow bar
Levelling rod Masons' square
Spirit level Plumb bob
Mason' s trowel Metal float
Wood float Shovel
Meter rule

B. WEEDS TO BE STUDIED

COMMON NAME BOTANICAL NAME

1. Black Jack *Bidens pilosa*
2. Mexican marigold *Tagetes minuta*
3. Oxalis/sorrel *Oxalis species*

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4. Double thorn *Oxygonum sinuatum*
5. Thorn apple *Datura stramonium*
6. Couch grass *Digitaria scalarum*
7. Nut grass *Cyperusrotundus*
8. Wandering Jew *Commelina benghalensis*
9. Sow thistle *Sonchus oleraceus*
10. Devil' s horsewhip *Achyranthes aspera*
11. Macdonald /gallant soldier *Gallinsoga parvfrlora*
12. Sodom apple *Solanum incanum*
13. Black nightshade *Solarium nigrum*
14. Chinese lantern *Nicandra physalodes*
15. Bracken fern *Pteridium acquilinum*
16. Love grass/Bristly foxtail *Setaria verticillata*
17. Cleavers *Gallium spurium*
18. Stinging nettle *Utica massaica*
19. Fat hen/Goosefoot *Chenopodium species*
20. Rape weed *Brassica napus*
21. Wild oats *Avenafatua*
22. Lantana/tick berry *Lantana camara*
23. Water hyacinth *Eichhornia crassipes*
24. Witchweed *Striga hermonthica*
25. Creeping indigo *Indigofera spicata*

C. CROP PESTS TO BE STUDIED

1. Armyworm
2. Cut worm
3. Locust
4. Moths
5. Fruitfly
6. Mealybug
7. Thrips
8. Beetles
9. Weevils – field and store
10. Birds – weaver, sudan dioch, Mouse bird
11. Rodents – Squirrels, Moles and Rats
12. Boll worms
13. Stainers
14. Nematodes
15. Leaf miners
16. Aphids
17. Stalk borers
18. Loopers
19. Scales.

D. CROP DISEASES TO BE STUDIED

1. maize streak
2. Smuts
3. Blasts
4. Leaf blight
5. Anthracnose
6. Rusts in cereals and leaf rust in coffee

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7. Leaf spot
8. Blight-halow, Early and late
9. Panama disease
10. Cigar-end-rot
11. Mildew
12. Mosaic
13. Die-back
14. Greening
15. Tristeza
16. Wilts - Fusarium and Bacterial
17. Black arm
18. Damping off
19. Coffee Berry Disease
20. Rosette
21. Ratoon stunting disease
22. Armillaria root-rot.

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