**AGRICULTURAL SCIENCE SS 2**

**THIRD TERM**

**SCHEME OF WORK**

**WEEK TOPIC**

1-2 Common Weeds Found in Farm: Meaning, Types, Examples and Economic Importance

3-4 Crop Improvement: Meaning, Aims, Methods, Processes of Crop Improvement

5-6 Basic Economic Principles: Principles of Demand and Supply, Effects of Demand and Supply, Law of Diminishing return

7-8 Farm Records and Farm Accounts

9-10 Animal Nutrition

11 Revision

12 Examination

**REFERENCE BOOKS**

* Essential Agricultural Science for Senior Secondary Schools, by O.A. Iwena
* WAEC PAQ
* Essential economics

**WEEK ONE AND TWO**

**TOPIC: COMMON WEEDS FOUND IN FARMS**

**CONTENT**

* Meaning of Weeds
* Effects of weeds on crops and the Economy
* Various types of weeds and their botanical names
* Methods of weed control

**MEANING OF WEEDS**

A weed is any plant that grows in a place where it is not (expected to grow) wanted

**ECONOMIC IMPORTANCE OF WEEDS**

1. They compete with crops for space
2. Weeds compete with crops for sunlight
3. Weeds compete with crop for nutrient
4. Weeds habour crop pests and pathogens
5. Weeds compete with crop for soil moisture
6. It leads to loss in crop yields
7. Weeds compete with crop for soil oxygen
8. They reduce the quality of crops
9. They reduce the income of farmers
10. They cause reduction in the taste of some grasses
11. Some weeds are toxic to farm animals

**BENEFITS OF WEEDS TO FARMERS**

1. Weeds helps in checking soil erosion
2. Some weeds are useful as food for humans
3. Some weeds serve as food for animals
4. Certain weeds have medicinal values
5. They can be used as green manure
6. Some are used for making roots, mats and baskets
7. Weeds are used for mulching
8. Weeds are used for compost making

**EVALUATION**

1. What are weeds?
2. List five beneficial effects of weeds

**CHARACTERISTICS AND GROWTH HABIT OF WEEDS**

1. Production of large quantity of seeds
2. Some weeds reduced by seeds
3. Some weeds reduced by vegetative propagation
4. Growth of large leaves within a short time
5. Weeds growth is favoured during rainy season
6. Most weeds are wind pollinated
7. Production of large quantity of pollen grains

**DISPERSAL OF WEED SEEDS AND FRUITS**

Most seeds and fruits of weeds are generally dispersed by wind and animals. The mode of dispersal are;

1. Dispersal of seeds by wind

Such weeds have feathery, winged or powdery seeds e.g. Tridax (pwd weed), goats weed, guinea grass, elephant grass and many other species of grasses.

1. Dispersal of seeds by Animal

Animal dispersed weeds usually have sticky, hooked, edible or colourful fruits or seeds. The sticky and hooked types of fruits and seeds adhere to the coats of grazing animals and are carried from one place to another. Examples of such animals are; rabbits, rats squirrels, antelope and man. Pig weed and commelina spp are example of such weed.

1. Dispersal of seeds by water

Water dispered weeds have water proof cuticles, air spaces within the fruit and a light weight

1. Dispersal of seeds by explosive mechanism

Few plants and all leguminouns weeds are dispersed by explosive mechanism eg water leaf, centro, pueraria, calapo and mucuna.

**COMMON WEEDS FOUND ON FARMS**

|  |  |  |
| --- | --- | --- |
| **S/N** | **COMMON NAME** | **BOTANICAL NAME** |
| 1. | Guinea grass | Panicum maximum |
| 2. | Bahama grass | Cynodon dactylon |
| 3. | Carpet grass | Axonopus compressus |
| 4. | Cogon grass | Imperata cylindrica |
| 5. | Spear grass | Heteropogon contortus |
| 6. | Wild sun flower | Aspilia Africana |
| 7. | Centro | Centrosema pubescens |
| 8. | Water leaf | Talinum triangulare |
| 9. | Wire/sida weed | Sida acuta |
| 10. | Goat weed | Ageratum conyzoides |
| 11. | Elephant grass | Pennisetum purpureum |
| 12. | Giant star grass | Cynodon plectostachyum |
| 13. | Pig weed | Amaranthus spinosus |
| 14. | Tridax | Tridax procumbens |
| 15. | Calapo | Calapogonium mucunoides |
| 16. | Sunhemp | Crotalaria juncea |
| 17. | Mucuna | Mucuna utilis |
| 18. | Stylo | Stylosanthes gracilis |
| 19. | Northern gamba | Andropogon gayanus |
| 20. | Southern gamba | Andropogon tectorum |
| 21. | Puero | Pueraria phaseoloides |

**EVALUATION**

1. List and explain different weed dispersal method
2. List five weeds and their botanical names

**GENERAL CONTROL OF WEEDS**

1. Mechanical control: involves the use of machines such as bulldozer, tree puller, plough etc to get rid of unwanted plants.
2. Physical or manual control: This can be done in different ways which includes hand pulling, hoeing, slashing with cutlass etc.
3. Biological Control: This involves the introduction of some insects and herbivorous animals to farmland to eat up the leaves of the weed and even the entire plant in some cases.
4. Cultural control: This involves the use of farming system to get rid of wed. It can be achieved by practice of crop rotation and the growing of cover crops to suppress the growth of the weeds on the farm. Other types of cultural weed control methods are: flooding, bush burning, mulching
5. Chemical Control: This involves the use of chemical solution called herbicides to control weeds. Some herbicides are selective while some are non-selective or contact herbicide

**REASONS WHY WEEDS ARE DIFFICULT TO CONTROL**

1. They have vigorous growth, they are aggressive and persistent
2. Weeds have high reproductive capacity
3. Their seeds have long period of viability
4. Weeds have efficient dispersal method
5. They have efficient means of propagation
6. They have long period of dormancy
7. They produce many seeds
8. They have short life cycle

**GENERAL EVALUATION**

1. a. What are weeds?

b. Discuss the methods of weed dispersal

1. List five economic importance of weeds
2. List five common weeds and state their botanical names
3. Discuss the four methods of weed control
4. Give three reasons why weeds are difficult to eradicate

**READING ASSIGNMENT**

* Essential Agricultural Science for senior Secondary School by O.A. Iwena Chapter 28 pages 249-260
* Answer the following questions from WAEC PAQ 2005 theory question 5

**WEEKEND ASSIGNMENT**

1. A cowpea growing in a maize plot is a \_\_\_\_\_\_\_\_ A. plant B. weed C. crop D. animal
2. Seed of centro, calapo are usually dispersed by \_\_\_\_\_ A. wind B. water C. explosive mechanism D. animals
3. Which of the following is not a cultural weed control methods A. flooding B. burning

C. mulching D. hoeing

1. Which of the following is not a physical method of weed control? A. hand pulling

B. mulching C. hoeing D. slashing

1. Weeds have a \_\_\_\_\_ lifecycle A. long B. medium C. short D. average

**THEORY**

1. a. What are weeds

b. Describe four methods of weed control

1. a. List four benefits of weeds to farmers

b. State four reasons why weeds are difficult to control

**WEEK THREE AND FOUR**

**TOPIC: CROP IMPROVEMENT**

**CONTENT**

* Meaning of crop improvement
* Aims of crop improvement
* Methods of crop improvement
* Processes of crop improvement

**MEANING OF CROP IMPROVEMENT**

Crop improvement is defined as the science that deals with the development of new crop varieties with superior quality and quantity.

**AIMS OF CROP IMPROVEMENT**

1. To increase yield
2. To improve the quality of produce
3. To adapt to climatic conditions
4. To increase resistance to diseases
5. To increase resistance to pests
6. To meet the needs of growers
7. To produce crops with uniform agronomic characteristics
8. To breed crops with early maturity
9. To improve nutrient value of the produce
10. To meet the needs of consumers

**EVALUATION**

1. What is crop improvement?
2. State five aims of crop improvement

**DEFINITION OF SOME GENETIC TERMS**

1. Genes: These are hereditary unit or basic unit of inheritance
2. Chromosomes: They are rod or thread like bodies found in the nucleus of a cell
3. Character or Trait: These are the inheritance attributes or features possessed by an organism e.g. seed colour
4. Gamete: It is a mature sex cell
5. Zygote: is a single cell formed as a result of the union of a male gamate with a female gamate
6. Allelomorphs (allele): These are pairs of genes on the position of a chromosome that control a character
7. Phenotype: is the sum total of all observable features of an organism i.e. physical, physiological and behavioural traits e.g. height, weight and skin colour
8. Genotype: is the sum total of the genes inherited from parent.
9. Dominant character: This is a trait or character that is expressed in an offspring when two individuals with contrasting character or traits are crossed
10. Recessive character: This is the character or trait which does not produce the effect in the presence of dominant character.
11. Homozygous: An individual is said to be homozygous if it has two similar genes for the same character, i.e. the pair of gene controlling a given pair of contrasting characteristics are identical e.g TT for height T for Tall or tt for height t for short
12. Heterozygous: An individual is said to be heterozygous if the two members of a pair of genes controlling a pair of contrasting characters are different. e.g Tt for height T for Tall and t for short
13. Filial generation: The offspring of parents make up the filial generation. The first, second and third filial generations are represented by F1, F2 and F3 respectively.
14. Hybrid: These are offsprings from a cross between parents that are genetically different but of the same species.
15. Hybridization: This is the crossing of plants with contrasting characters. There are two major types of hybridization, this includes monohybridization and Dihybridization.

Dihybridization involves the crossing of plants with two pairs of contrasting characters.

Monohybridization involves the crossing of two pure traits.

1. Mutation: is a change in the genetic make-up of an organism resulting in a new characteristic that is inheritable.

**EVALUATION**

1. Define; A. Gene B. Chromosome C. Trait
2. Explain; A. Mutation B. Hybridization C. Genotype

**MENDELIAN LAWS**

1. The first law of Mendel is also called the **law of segregation** of genes states that; genes are responsible for the development of the individual and that they are independently transmitted from one generation to another without undergoing any alteration. This is clearly seen in monohybrid crossing.
2. The second law of Mendel which is also called the **law of independent assortment** of genes state that each character behaves as a separate unit and is inherited independently of any other character. This is clearly seen in the dihybrid crossing.

**PROCESS OF CROP IMPROVEMENT**

These includes; introduction, selection and breeding of hybridization.

1. **INTRODUCTION**: This involves the importation or introduction of some varieties of crops with desirable characteristics into areas where they have not existed before.

**ADVANTAGES**

1. It helps in bringing a new variety to a new areas
2. It may enhance greater productivity
3. It may perform better if there is a better climate condition
4. The past of the crop of the crops is usually absent in the new area

**DISADVANTAGES**

1. There is possibility of introducing a new diseases
2. The crop may not be able to adapt to climatic condition of the new environment
3. It may introduce now pests to the new environment
4. It may not be able to adapt to the soil condition of the area
5. **SELECTION:** This involves the picking of crops with desirable characteristics which are most favored by the environment. Selection could be natural or artificial.

**Natural selection** involves the ability of a crop to survive wide range of environmental conditions and still remain standing.

**Artificial selection** involves use of man’s intelligence to retain crops with desired traits on the farm.

**Methods of artificial selection includes;**

* 1. **Mass Selection:** Crops with desirable characteristics are selected among others.
  2. **Pure line Selection:** Only one crop plant with good characteristics is selected
  3. **Pedigree Selection:** Crop plants are selected based on the performance of their ancestors
  4. **Progeny Selection**: Crop plants are selected based on the performance of their offsprings

**ADVANTAGES OF SELECTION**

1. It ensures that only the best naturally available crop is grown
2. Crops with desired qualities are selected
3. Seeds from the best stands are multiplied for distribution
4. It reduces the spread of diseases and pests

**DISADVANTAGES OF SELECTION**

1. Selection is tedious and time consuming
2. It is very expensive in term of time and money
3. It requires expertise
4. It causes elimination of some desirable traits of the parent stick
5. **BREEDING OR HYBRIDIZATION:** is a method by which an offspring is produced through the crossing of two different plant varieties of the same spices

**TYPES OF BREEDING**

1. **Inbreeding:** This is the pollination and fertilization of closely related crop plants. This can lead to pure breed or pure line
2. **Pure line:** It is obtained when a plant is being self-fertilized or crossed continuously with a closely related species for many generations so that the desirable qualities it possess does not change from one generation to another.
3. **Cross Breeding:** This is the pollination and fertilization of unrelated crop plants belonging to different breeds. This results in production of hybrids

**ADVANTAGES OF BREEDING**

1. It can produce a superior offspring resulting in hybrid vigor or heterosis
2. Progeny grow more rapidly in cross breeding
3. Offsprings can withstand the variation of environment

**DISADVANTAGES OF BREEDING**

1. Inbreeding leads to depressing or loss in vigor and performance of offspring.
2. There is drop in production of the crops in quantity and quality in inbreeding
3. It may leads to poor or low resistance to disease attacks in inbreeding

**METHODS OF IMPROVING CROP PRODUCTIVITY**

1. By crop improvement (Introduction, selection and breeding)
2. Planting at the proper time
3. Adoption of better cultivation methods
4. Use of manures and fertilizers
5. Control of pests of crops
6. Control of diseases of crops
7. Use of Resistant varieties
8. Use of good crop varieties

**GENERAL EVALUATION**

1. State the Mendelian laws
2. What is crop improvement
3. List three aims of crop improvement
4. State two advantages of breeding
5. State two methods of improving crop productivity

**READING ASSIGNMENT**

* Essential Agricultural Science for senior Secondary School by O.A. Iwena Chapter 39 pages 366-376
* Answer the following questions from WAEC PAQ 2005 theory question 6, 2008 theory question 6, 2009 theory question 5 and 2011 theory question 6

**WEEKEND ASSIGNMENT**

1. The unit of inheritance is \_\_\_\_\_\_ A. chromosomes B. eggs C. genes D. gamates
2. \_\_ are thread like bodies found in the nucleus of a cell A. chromosomes B. eggs C. genes

D. gamates

1. The fusion of male and female gamate result in \_\_\_\_ A. embryo B. genes C. gamates

D. zygote

1. An individual with pair of identical genes for the same character is called \_\_\_\_ individual. A. homozygous B. heterozygous C. gamates D. zygote
2. The character which express itself in the presence of the other is said to be \_\_\_\_

A. dominant B. recessive C. sexual D. asexual

**THEORY**

1. a. What is crop improvement?

b. State two aims of crop improvement

1. a. State the Mendelian laws

b. State two methods of improving crop productivity

**WEEK FIVE AND SIX**

**TOPIC: BASIC ECONOMIC PRINCIPLES**

**CONTENT**

* Basic economic concepts
* Principle of demand and supply
* Effects of demand and supply
* Law of diminishing return

**BASIC ECONOMIC CONCEPTS**

The following economic concept explains the behavior of consumers of agricultural goods. These concepts or elements includes

1. Wants: this is the desire or needs of man to own goods and services that give satisfaction. These wants are insatiable because the resources needed to cater for them are limited (in short supply). The basic need or wants of man are food, clothing and shelter.
2. Scarcity: this refers to the limited supply of resources needed to meet (satisfy) wants.
3. Choice: this is the system employed in selecting one need to satisfy out of a number of alternatives.
4. Scale of preference: is a list of unsatisfied wants in order of importance. This is relative to the individual
5. Opportunity cost: is the satisfaction of one want or need at the expense of another. It is expressed in terms of the value or worth of forgone alternative. It is also referred to as the true or real cost while money cost is the amount spent in order to acquire a particular good or service.

**PRINCIPLES OF DEMAND AND SUPPLY**

Demand: Demand may be defined as the quality of goods a consumer is willing and ready to buy at a given price over a given period of time. Demand is effective when willingness to buy is backed with the ability to pay.

**LAW OF DEMAND**

The law of demand states that the higher the price, the lower the quantity of goods that will be demanded or the lower the price, the higher the quantity of goods that will be demanded.

**DEMAND SCHEDULE**

This is a table showing the relationship between the price and quantity of that commodity demanded. This table below obeys the law of demand.

|  |  |
| --- | --- |
| Price N | Quantity Demanded (kg) |
| 100 | 10 |
| 80 | 20 |
| 60 | 30 |
| 40 | 40 |
| 20 | 50 |

**DEMAND CURVE**

Demand Curve is a graph showing the relationship between price and quantity of that commodity demanded. This curve derived from demand schedule.

Demand Curve:

**FACTORS AFFECTING DEMAND**

1. Price of good
2. The price of other commodities
3. Income of the consumer
4. Changes in taste of consumer
5. Population
6. Periods of festivals
7. Expectation of changes in prices
8. Taxation

**EVALUATION**

1. What is demand?
2. List five factors affecting demand

**SUPPLY**

Supply may be defined as the quantity of goods which a producer is willing and ready to offer for sale at a given price over a given period of time. Quantity of goods offered for sale in the market is referred to as effective supply.

**LAW OF SUPPLY**

The law of supply states that the higher the price, the higher the quantity of produce that will be supplied or the lower the price, the lower the quantity of produce that will be offered for sale.\

**SUPPLY SCHEDULE**

Supply Schedule is the table which shows the relationship between price and quality of commodity supplied. See the table below.

|  |  |
| --- | --- |
| Price N | Quantity Supplied (kg) |
| 100 | 50 |
| 80 | 40 |
| 60 | 30 |
| 40 | 20 |
| 20 | 10 |

**SUPPLY CURVE**

Supply Curve is a graph showing the relationship between price and quantity of goods supplied or offered for sale. The supply schedule is used to draw the supply curve as shown below.

Supply Curve:

**FACTORS AFFECTING SUPPLY**

1. Price of good
2. Level of Technology
3. Cost of production
4. Government Policy
5. Weather condition
6. Taxation
7. Price of other commodities
8. Number of producers
9. Natural disasters

**EVALUATION**

1. What is supply?
2. State the law of supply.

**LAW OF DIMINISHING RETURN**

The law states that as successive amount of a variable factor are applied to one or more fixed factors, output might increase a lot at first, but there comes a point at which the use of an additional amount of the variable factor will add less to output than the proceeding amount.

In other words, it state that as more and more units of a variable factor of a production are added to fixed factor, after a certain point, the marginal product diminishes or declines.

Diminishing returns is caused by poor/inexperienced management resulting in the use of more than required amount of one or more factors of production thereby making them less effective.

**IMPORTANCE OF LAW OF DIMINISHING RETURNS IN AGRICULTURE**

1. It enables managers effectively combine factors of production to attain optimal output.
2. It minimizes wastage on unproductive input.

**DEFINITION OF TERMS**

1. Fixed factors: these are assets or resources whose value does not change in the short run e.g Land
2. Variable factor: these are assets or resources whose value changes in the short run e.g capital, labour
3. Total product (TP or Q): is the overall quantity of output or yield produced by the farm.
4. Average product (AP): is the overall quantity of output or yield produced by the farm per variable input.
5. Marginal product (MP): is the change in quantity produced resulting from change in variable input.

This can be represented in the table below;

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Fixed factor | Variable factor | Total output (kg) | Marginal product (kg) | Average product (kg) |
| 10 | 1 | 10 | - | 10 |
| 10 | 2 | 25 | 15 | 12.5 |
| 10 | 3 | 46 | 21 | 15.3 |
| 10 | 4 | 60 | 14 | 15 |
| 10 | 5 | 73 | 13 | 14.6 |
| 10 | 6 | 83 | 10 | 13.8 |
| 10 | 7 | 83 | 0 | 11.9 |
| 10 | 8 | 80 | -3 | 10 |

Graph demonstrating the law of diminishing return

TP

AP

MP

Increasing +ve return

Decreasing +ve return

decreasing +ve return

**output**

**CLASS ACTIVITY (WAEC PQ)**

1. State the law of diminishing returns.
2. Using the table below, make an input-output graph and describe the relationship between fertilizer used and maize yield.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Quantity of fertilizer (bags) | 0 | 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 |
| Maize yield (Kg) | 8 | 24 | 48 | 80 | 120 | 150 | 170 | 180 | 180 | 170 |

1. Explain the main cause of diminishing returns in agricultural production.

**GENERAL EVALUATION**

1. What is demand?
2. State the law of demand
3. What is supply?
4. State the law of supply
5. State the law of diminishing return
6. Differentiate between total product, marginal product and average product.

**READING ASSIGNMENT**

* Essential Agricultural Science for senior Secondary School by O.A. Iwena Chapter 35 pages 343 – 347 and Chapter 37 pages 353 – 362,.
* Answer the following questions from WAEC PAQ 2007 theory question 9, 2008 theory question 9 & 10, 2012 theory question 9 & 10, 2014 theory question 5, 2017 theory question 6, 2000 theory question 9, 1994 theory question 9 and 1991 theory question 9

**WEEKEND ASSIGNMENT**

1. The higher the price, the \_\_\_\_ the quantity demanded A. higher B. lower C. up D. down
2. Increase in population will lead to \_\_\_\_\_ demand A. high B. low C. medium D. long
3. The real cost of an item is the \_\_\_\_ A. cost of forgone alternative B. amount spent to acquire the item C. cost of substitute item D. money cost of the item
4. Short run in production refers to \_\_\_\_ A. a period in which there is at least one fixed factor of production B. a period in which there is at least one variable factor of production C. a period in which there is no fixed factor of production D. a period in which there is variable factor of production
5. An example of variable input in poultry production is? A. Land B. Feed C. Fertilizer or manure D. Incubator

**THEORY**

Complete this table

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Quantity of fertilizer (bags) | 0 | 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 |
| Maize yield (Kg) | 8 | 24 | 48 | 80 | 120 | 150 | 170 | 180 | 180 | 170 |
| Marginal product (Kg) |  |  |  |  |  |  |  |  |  |  |
| Average product (Kg) |  |  |  |  |  |  |  |  |  |  |

**WEEK SEVEN AND EIGHT**

**TOPIC: FARM RECORD AND FARM ACCOUNT**

**CONTENT**

* Meaning of Farm Accounts/Farm records
* Importance of Farm Account / farm records
* Types of Farm Record
* Types of Farm Account

**MEANING OF FARM ACCOUNTS AND RECORDS**

**FARM ACCOUNT**

Farm Accounts are statements of money paid out or received for goods and services used in a farming business.

**FARM RECORD**

Farm Records are written documents, showing major activities going on in the farming business

**IMPORTANCE OF FARM ACCOUNTS/RECORDS**

1. It enables the farmer to monitor the changes in prices of product brought or sold.
2. It shows the financial position of the farm
3. It helps to determine profit
4. Detection fraudulent decisions
5. For taking informed management decision
6. For procurement of loans
7. For determination of annual tax
8. Determining the actual worth of the farm
9. For comparing management efficiency
10. To evaluate performance of an enterprise
11. To estimate future farm returns.
12. It provides basis for conducting research.
13. To monitor health status of crops and animals.

**EVALUATION**

1. What is farm record and account?
2. List five importance of keeping farm records and account.

**TYPES OF FARM RECORD**

1. Farm Diary: This is the record of daily activities
2. Farm Inventory: This is the list of all assets on the farm and their money worth or value
3. Sales and purchase record: record of revenue and expenses made by the farm business.
4. Yield or production record: it contain the information on output of crops and animal product
5. Payroll or labour record: It shows the amount and types of labour hired or employed to work on the farm and rate at which their wages are paid
6. Farm Input Utilization Record: It shows the input required, utilized and their level of input application.

**TYPES OF FARM ACCOUNT**

1. Sales Account: Sales Account is also known as sales and receipt account. This shows data of farm produce, the quantity, date sold, to whom and at what price.
2. Purchase Account: It is also known as purchased for use on the farm.
3. Farm Valuation: This is the value of the farm at the beginning and end of production. At the beginning it is called opening valuation while at the end, it is called closing valuation.
4. Cash Analysis Account: It shows the details of the income and expenditure of a farm over a given period of time
5. Farm Income Statement: It comprises of all the farm receipts (sales) and expenses came out on the farm over a period of time as shown below;

**INCOME STATEMENT OF AKANDE FARMS FOR OCTOBER, 1995**

|  |  |  |  |
| --- | --- | --- | --- |
| **EXPENSES** | **₦** | **RECEIPT** | **₦** |
| Feeds | 2000 | Egg | 5000 |
| Drugs | 400 | Culled layer | 3000 |
| Water | 100 | Manure | 200 |
| Labour | 500 |  |  |
| Fuel | 200 |  |  |
| Net Income | 5000 |  |  |
| Total | 8,200 |  | 8,200 |

1. Balance Sheet or Networth Statement: The balance sheet shows the capital or financial position of the farm at the end of the accounting period usually a year.
2. Profit and Loss account: This is the type of account prepared at the end of the business period, usually a year. By farmer with the purpose of knowing weather his business is making profit or loss.

In this account, all expenses and purchases are listed on the left hand side i.e. debit side and all receipts on sales are recorded on the right hand i.e. credit side. Closing valuation is also put on the right while opening valuation is put on the left.

**IMPORTANCE OF PROFIT AND LOSS ACCOUNT**

1. It helps to detect if the farm is making profit or a loss
2. It helps to determine the overall performance of the farm at the end of the account period
3. It aids future planning of the farm for better results.

Example

Prepare a profit and loss account for Segun Farms for the year which ended 31/12/17, using the following data;

1. Cost of feed N500
2. Cost of drugs N 200
3. Sales of Eggs N 2000
4. Eggs for domestic use N 200
5. Loss due to mortality N 300
6. Value of stick left N 600
7. Farm wages N 400
8. Sales of spent layers N 1000
9. Transportation cost N 300
10. Depreciation N 200
11. Electricity bill N 300
12. Net profit N 1600

**SOLUTION**

**SEGUN FARMS PROFIT AND LOSS ACCOUNT AS AT 31ST DECEMBER, 2017**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **DEBIT** | | | **CREDIT** | | |
| **S/N** | **ITEMS** | **₦** | **S/N** | **ITEMS** | **₦** |
| 1 | Cost of feed | 500 | 1 | Sales of spent layers | 2000 |
| 2 | Cost of drugs | 200 | 2 | Eggs for domestic use | 200 |
| 3 | Loss due to mortality | 300 | 3 | Value of stick left | 600 |
| 4 | Farm wages | 400 | 4 | Sales of spent layers | 1000 |
| 5 | Transportation cost | 300 |  |  |  |
| 6 | Depreciation | 200 |  |  |  |
| 7 | Electricity bill | 300 |  |  |  |
| 8 | Net profit | 1600 |  |  |  |
|  | Grand Total | 3800 |  | Grand Total | 3800 |

**EVALUATION**

1. a. List five types of farm record

b. Explain any two of record mentioned

1. a. List five types of farm account

b. Explain profit and loss account

**DEFINITION OF SOME ACCOUNTING TERMS**

1. Farm Asset: This is anything of value in the possession of a farm business, There are two types;
2. Fixed Assets: These are assets which are not used up during production. Examples are; landed property, farm building, motor vehicles, tools and implements, incubator and milking machine
3. Current Assets: These are assets which are used up during the process of production eg water, feed, drugs, chemical, fertilizers, seeds and cash in bank.
4. Cost: these are expenses made during production. There are two types fixed and variable cost
5. Fixed Cost: This is the component of the total of production cost which does not vary with the level of production e.g. cost of buildings, equipment, machineries, farm structures (Silo, barn e.t.c)
6. Variable Cost: This is the other component of the total cost which varies directly with the level of production e.g wages, salaries, cost of seeds, cost of fertilizer, cost of agrochemical e.t.c
7. Liabilities: This is the money owed to external persons or corporate bodies e.g. loan to banks. The two types are;
8. Current or short term liabilities: These are debts that must be paid back within one accounting year
9. Long term liabilities: These are debts that cannot be paid within an accounting year
10. Net Capital, Net worth or owner equity: This is the total amount of money supplied by the owner of the farm business.

Asset – Liability = Owner’s Equity or Capital

1. Liquidity: is the ability of a farm business to meet its financial obligations as they fall due. It is the ease at which farm asset can be covered to cash.
2. Solvency: This is the ability of the farm business to cover its liquidation of the asset. A business is solvent if the sale of its assets would be sufficient to pay off all debts
3. Appreciation: This is the increase in the value or worth of an asset as the asset is being used over time. Examples of assets that can appreciate are; growing animals, cash crops, land etc.
4. Depreciation: Depreciation refers to the loss or reduction in the value or worth of an asset as the asset is being used over time
5. Salvage Value: This is the amount at which an asset is sold off when it is no longer economical to keep, or when the cost of maintenance is too high
6. Useful life Span: This means the number of years a piece of farm equipment can effectively serve the farmer.

**EVALUATION**

1. Define the following: (i) Appreciation (ii) Solvency (iii) Liquidity
2. Distinguish between fixed assets and variable assets.

**Calculations of Depreciation and Salvage Value**

The formula for calculating depreciation is as follows,

1. Total depreciation = cost price of asset – salvage value of asset
2. Annual depreciation =

Example: A plough was purchased in 1985 at the cost of N 6000 and sold off in 1990 at the cost of N 1000

Calculate;

1. The salvage value
2. Total depreciation
3. Annual depreciation
4. Appreciation

Solution

* Cost price of the plough = N 6000
* Salvage value = N 1000
* Lifespan of useful life (1990 - 1985) = 5years

1. Salvage value = N 1000 i.e the price at which it was sold off
2. Total Depreciation

= Cost price – salvage value

= N 6000 – N 1000

= N5000

1. Annual Depreciation

=

=

=

=N1000 (annual depreciation)

1. There is no appreciation

**CLASS ACTIVITY**

Answer questions 3, 4, 6 and 9 from Essential Agricultural science on Page 448.

**GENERAL EVALUATION**

1. What are farm records and account?
2. List five importance of keeping farm records and accounts.
3. List five types of farm account.
4. Distinguish between fixed and variable cost.

**READING ASSIGNMENT**

* Essential Agricultural Science for senior Secondary School by O.A. Iwena Chapter 48 pages 440-449
* Answer the following questions from WAEC PAQ 1989 theory question 10, 1993 theory question 10, 1996 theory question 10, 1997 theory question 10, 1998 theory question 10, 2013 theory question 9 & 10, 2009 theory question 9 & 10, 1999 theory question 9, 2006 theory question 9 and 2007 theory question 9

**WEEKEND ASSIGNMENT**

1. In profit and loss account, opening valuation is put on the \_\_\_\_\_ A. credit side B. debit side C. and side D. all sides
2. Ability of farm to meet its financial commitment as the falls due is \_\_\_\_\_ A. solvency B. liquidity C. depreciation D. appreciation
3. The amount at which an asset is sold off when the cost maintaining it is high is called \_\_\_\_ A. useful life B. lifespan C. salvage value D. asset
4. Day to day activities on the farm are recorded in \_\_\_\_\_ A. register B. diary C. payroll D. inventory
5. Farm assets are recorded in \_\_\_\_\_ A. diary B. register C. inventory D. labour

**THEORY**

1. a. What is profit and lost account

b. List five types of farm records

1. a. What is farm asset

b. Distinguish between credit and subsidy

**WEEK NINE AND TEN**

**TOPIC: ANIMAL NUTRITION**

**CONTENT**

* Meaning of Animal Nutrition
* Classification of livestock feeds
* Food Nutrients of livestock

**MEANING OF ANIMAL NUTRITION**

Animal nutrition is the process by which an animal obtains nutrient necessary for its healthy growth and development.

**IMPORTANCE OF ANIMAL FEEDS**

1. Animal feeds are needed for growth
2. Useful for repair or worn out tissue
3. It provides energy
4. It is useful for the general well-being of the animal.
5. It aids animal’s resistance to diseases.
6. It influences maturity in animals.
7. It aids optimal production in animals.

**DEFINITION OF FEED**

Feed refers to the food given to animals. They contain nutrient element either alone or in combination with other substances which supports the healthy growth and development of livestock.

**CLASIFICATION OF LIVESTOCK FEEDS**

Animal feeds can be classified into four main groups according to the digestibility, quantity of fibre, quantity required and moisture in the feed. The four groups of feeds are;

1. **Concentrates**: They are fee with a low proportion of fibre and water content. They are easily digested by farm animals. Concentrates can be further be subdivided into two groups: Those containing a high proportion of carbohydrates are called carbohydrate concentrates/basal feed/energy feed e.g maize, guinea corn, cassava e.t.c while those with a high proportion of proteins are called protein concentrates e.g beans, peas, cotton seed, sunflower seeds and heads, groundnuts, palm kernel and animal products such as meat, blood meal, bone meal, fishmeal and milk.
2. **Roughages**: Roughages are very low in protein and carbohydrate but high in fibre. They are not easily digested by animals, therefore are fed together with concentrate foods for young animals and those kept for milk and meat production. Examples are hay, groundnut hulls, straw, bean pods and maize stover.
3. **Succulents**: These have high water content. They are easy to digest. Examples are freshly cut/lush grass and legume plants (soilage), pumpkin, silage, melons and most green crops.
4. **Supplements (minerals and vitamins)**: they are required in small quantities, low in energy, protein and fibre but high in vitamins and minerals. They aid digestion and increase animals resistance to diseases. They are available in basal and protein concentrate feeds. Other sources are bone meal, oyster shell, salt licks etc.
5. **Basal/Energy Feed or Carbonhydrate Concentrates**

**Characteristics**

1. They are fed with crude fibre content less than 18%
2. They are high in energy and starchy food e.g. maize and cassava
3. It is high in carbohydrates or fats
4. It is low in proteins
5. Low in fibre
6. It is highly digestible
7. It is low in minerals
8. **Protein Concentrate**

**Characteristics**

1. They crude fibre content is less than18%
2. Protein concentrate is high in protein
3. They are low in carbohydrates and fats
4. They are low in fibre
5. They are highly digestible
6. They are low in minerals
7. **Mineral and Vitamin Supplements**

**Characteristics**

1. They are required in small quantities in feeds
2. They supplement basal and protein concentrates
3. They are low in energy
4. Low in protein
5. Low in fibre
6. High is vitamin and minerals
7. Necessary for growth and development
8. They aid food digestion
9. They aid resistance to diseases
10. **Roughages**

**Characteristics**

1. They are feeds which contain crude fibre that is greater than 18%
2. They are high in fibre
3. They are low in digestible carbohydrates
4. They are low in protein
5. They have poor or low digestibility
6. Pasture grasses and legumes form roughages
7. Roughages exist in different forms which are; hay, straw, soilage and salvage.

**Hay:** It refer to the aerial part of a young and succulent grass or herbage cut and dried for feeding animals

**Straw:** This is the aerial part of grass or harvested crops cut and store for future use. They are difficult to digest. Both hay and straw are called dry roughages

**Soilage:** This refer to the process of cutting fresh or succulent grass or legumes from the field and taking them to the animals in their pens. It is also called zero grazing

**Silage:** This refers to the preservation of green and succulent forage crops under anaerobic conition.

**ACTIVITY**

Describe the preparation of silage.

**EVALUATION**

1. What is animal nutrition?
2. State the classes of animal feed

**ANIMAL FEED INGREDIENTS**

These are the raw materials used in production of animal feeds. These includes; blood meal, fish meal, groundnut cake, palm kernel cake, cotton seed meal, bone meal, maize, guinea corn etc.

**ACTIVITY**

Explain the method of preparing the ingredients mentioned above.

**FOOD NUTRIENTS OF LIVESTOCK**

There are six classes of food nutrients. These are;

1. **CARBOHYDRATE:** It is made up of carbon, hydrogen and oxygen.

**Sources**: Maize, guinea corn, cassava, grasses, wheat, potato, rice, millet, yam, hay, silage, potato, rice millet, yam, hay, silage potatoes etc

**FUNCTIONS OF CARBOHYDRATES**

Provides energy to farm animal for growth, reproduction, milk production and other activities.

1. **PROTEIN:** It is composed of carbon, hydrogen, oxygen and sometimes sulphur, nitrogen and phosphorus

**Sources**: The sources of animal proteins are; fish meal, blood meal, meat meal, milk, earthworms, eggs e.t.c. Plant proteins sources are; soyabeans meal, groundnut cake, palm kernel cake, cotton seed meal, sunflower seed meal, cashewnut meal and leguminous forage. Synthetic sources of proterins are; methionine, lysine, cysteine

**FUNCTIONS OF PROTEIN**

1. Essential for the growth of young animal tissue
2. They are used to repair worn out tissue
3. They are used in the formation of gamates in reproduction
4. They are needed for the production of enzymes
5. They are necessary for flesh built-up
6. Essential for sustenance of life
7. Help to provide raw materials for building protective covering such as hair, nails roof, wool feather e.t.c.
8. They are useful in the production of
9. **FATS AND OIL**

Fat are composed of carbon, hydrogen, and oxygen

**Sources**: These are palm oil, palm kernel cake, groundnut cake, coconut meal, cotton seed cake, milk, lard and fallow.

**FUNCTIONS OF FATS AND OIL**

1. Fats provide more energy than carbohydrates
2. Fat supply essential fatty acids and fat build-up
3. They provide fat soluble vitamins
4. They improve the diet
5. They help in the maintenance of body temperature
6. **MINERALS:** these are essential elements needed by the body but which the body cannot produce. They are grouped into two major classes:
7. Structural mineral elements: Carbon, Hydrogen, Oxygen and Nitrogen
8. Mineral elements is further divided into
9. Macro-elements or mineral: These are required by animals in large quantity e.g. calcium, photophorus, magnesium, potassium, sulphur, sodium and chlorine
10. Trace Elements or micro elements: These are required by animals in small quantity e.g. iodine, cobalt, copper, manganese, zinc and fluorine.

**Sources** are born meal, oyster shell, limestone and salt licks

**FUNCTIONS OF MINERAL**

1. It helps to ensure good health and productivity
2. Present in muscles for muscle contractions
3. Constituent of milk, egg and meat
4. Help in the formation of hormones.
5. Maintain PH balance of body fluids
6. They prevent diseases
7. Regulate blood clothing
8. Help in bone and teeth formation
9. Prevent tooth decay

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| **MINERALS** | **SOURCES** | **FUNCTIONS** | **DEFICIENCY SYMPTOMS** |
| Calcium | Bone meal, oyster shell, limestone, milk rock calcium phosphate | Bone and teeth formation  Egg shell formation  Blood clotting | Ricket, osteomalacia, soft egg shell.  Retarded growth |
| Phosphorus | Bone meal, Dicalcium phosphate, fish meal | Bone and teeth formation; Acid-base balance; Egg shell formation | Ricket, Lack of appetite. Osteomalcia |
| Magnesium | Salt licks, wheat germs, forage, grasses | Aid functioning of the nervous system.  Activation of enzymes | Hyper-irritability, Nervous disorder Called tetany |
| Sodium and Chlorine | Common salt, salt licks, fish meal | Regulates acid-base balance; Maintenance of osmotic pressure, constituents of Hcl Improves pleasant taste of feed. | Reduced growth and weight; decline in appetite. |
| Sulphur | Salt licks, fish meal | Constituent of protein and amino acids like cysteine, methione | Poor growth |
| Iron | Yeast, iron injection, salt licks | Constituent of haemoglobin in red blood cell. Constituent of protein called myoglobuline | Anaemia e.g. baby pig anaemia of piglets. |
| Iodine | Iodined salts, fish meal | Constituent of hormone called thyroxine | Goitre |
| Cobalt | Salt licks, Activate some enzymes | Constituents of vitamins B12 | General malnutrition |
| Copper | Salt licks | Aids formation of haemoglobin & Iron absorption | Anaemia |
| Flourine | Salt licks, fluorinated water | Prevents tooth decay | Tooth decay. |

1. **VITAMINS:** are organic substances also required by animals for proper growth and bosy development. The types are;
2. Fat Soluble Vitamins: These are vitamins which are soluble in fat e.g. A,D,E and K
3. Water Soluble Vitamins C and B-Complex. Examples of vitamin B-Complex are; cobalamine, pantothenic acid and folic acid.

|  |  |  |  |
| --- | --- | --- | --- |
| **MINERALS** | **SOURCES** | **FUNCTIONS** | **DEFICIENCY SYMPTOMS** |
| Vitamin A (retinol) | Fish meal, grasses, yellow maize | Proper eye sight (or vision), Epithelical cell formation, Aid reproduction. | Nightblindness |
| Vitamin C (Ascorbic) acid | Grasses, vegetables and fruits. | Formation of connective tissues, bone and dentine | Scurvy |
| Vitamin D (Calciferol) | Bone meal, fish meal and sunlight | Aids bone and teeth formation, egg shell formation | Ricket, Osteomalacia, soft shell egg. |
| Vitamin E (Tocopherol) | Vegetables, grasses, synthetic vitamin E | Aids reproduction.  As an antioxidant. | Reproductive failure like sterility and premature |
| Vitamin K (phylloquinone) | Fish meal, vegetables | Aids blood clotting. Prothrombin | Haemorrhages i.e inability of the blood to clot in time. |
| Vitamin B1 (Thiamine) | Yeast, cereals, green plants | Co-enzyme in energy metabolism | Poor appetite, Bere-beri |
| Vitamin B2 (Riboflavin) | Green herbage and milk products | Co-enzyme in protein and fat metabolism | Slow growth, Dermatitis |
| Vitamin B12 (Cobalamin) | Fish meal, milk products | As co-enzyme in several biochemical reactions.  Red blood cell formation | Pernicious anaemia. |
| Vitamin B3 Niacin  (Nicotinic acid) | Yeast, cereals, grasses | Carbohydrate oxidation | Pellagra |

1. **WATER**

**Sources** of water; tap, feed, rain, rivers, pond and fresh fodder.

**FUNCTION OF WATER**

1. Water is provided for drinking purposes
2. It is used for metabolic and digestion of food
3. For dipping/drenching animal against ectoparasites
4. For washing or cleaning of animals
5. For sanitation, cleaning of floor and pens
6. For processing animal products
7. For maintenance of body temperature
8. For irrigation of pasture
9. It helps to get rid of waste products in the body
10. Helps to maintain body turgidity

**FUNCTIONS OF ANTIBIOTICS**

1. Helps to fight against pathogen
2. Helps to heal sore and wounds in animals
3. They increase absorption of nutrient from digestive tract

**EVALUATION**

1. State five functions of proteins.
2. What are macronutrient?

**TYPES OF RATION/DIET AND THEIR USES**

**Diet**: is defined as the feed formulated to meet specific needs of an animal. It is also referred to as the amount of feed regularly given to or consumed by animal. It is formulated to meet specific metabolic or physiological functions such as growth, location, maintenance of pregnancy, reproduction or egg laying.

**Ration**: is the total supply of food given to animals in a twenty four hour period.

**Balanced Ration:** A balanced ration is the feed containing all essential nutrients in the correct quantity and in adequate proportion for feeding animals.

**Types of balanced ration**

1. **Maintenance Ration:** This is given to farm animals just to maintain normal functioning of the body system.
2. **Production Ration:** This is the type of ration given to farm animals to enable them to produce.

**Factor to be considered when deciding the type of Ration to feed an Animal**

1. The purpose for which the animal is kept
2. Age of the animal
3. Animal’s condition of health
4. Management System
5. Physiological state of the animal

**Categories of farm animals that require production ration are;**

1. Lactating animals
2. Weaned animals
3. Pregnant animals
4. Fattening animals
5. Broiler
6. Layers
7. Steaming up or flushing

**GENERAL EVALUATION**

1. What is balanced ration?
2. Distinguished between production and maintenance ration
3. State five functions of vitamins
4. State five functions of water

**READING ASSIGNMENT**

* Essential Agricultural Science for senior Secondary School by O.A. Iwena Chapter 33, pages 329-338
* Answer the following questions from WAEC PAQ 1995 theory question 7, 2012 theory question 8 and 2014 theory question 4

**WEEKEND ASSIGNMENT**

1. \_\_\_\_ is essential for bone formation A. iron B. calcium C. carbon D. lodine
2. Night blindness is as a result of lack of vitamin \_\_\_\_ A. A B. B C. C D. D
3. Ricket is as a result of deficiency of vitamin \_\_\_\_ A. A B. B C. C D. D
4. Which of these is a micronutrient A. calcium B. manganese C. magnesium D. sulphur
5. Goitre is as a result of deficiency of \_\_\_\_ A. iron B. cobalt C. copper D. lodine

**THEORY**

1. a. What is a nutrient?

b. List five characteristics of roughages.

1. a. Define (i) Diet (i) nutrition (iii) production ration

b. State five functions of proteins.