**SECOND TERM AGRICULTURAL SCIENCE NOTES FOR SS2.**

**TOPIC: WEED**

 Weed is any plant that grows in a place where it is not expected to grow or a plant which grows out of place. Weed can also be defined as a plant that grows where it is not desired in such a way that it constitutes nuisance either to human, livestock or crops.

 All farmers have to work hard to prevent their crops from being invaded by weed. Losses in crop yield due to weeds may be greater than those due to plant pest and diseases. If a farmer fails to control weed growth, the chances of successful crop production are seriously reduced.

**EFFECTS/ECONOMIC IMPORTANCE OF WEEDS**

The harm done by weed is due mainly to their competition with crops. The effects or economic importance of weeds include:

1. Weeds compete with crops for space: when a young plant is developing, weeds rapidly crowd and smother the crop and the space needed for healthy is reduced.
2. Weeds compete crops for sunlight: weeds are capable of producing many large leaves which shade crops seedlings and therefore reduce the amount of sunlight which is available for photosynthesis.
3. Weeds compete with crops for Nutrients: the root of weeds rapidly develop and remove considerable proportion of the available plant nutrients thereby reducing the healthy growth of the plants.
4. Weeds harbor Crop Pest and Diseases: some weeds may have harbor crop pest and diseases by acting as a host, i.e. providing the insect food when crops are not available.
5. Weeds compete with crops for soil moisture: their root is capable of developing fast and removing a large portion of the soil moisture required for the normal growth of the plant.
6. Losses in crop yield : the combined competition of weed and crops eventually will result in low yield.
7. Weeds compete with crops for soil Oxygen: weeds are capable of developing long root which remove considerable amount of oxygen required for crop root respiration .
8. Losses in quality of crops : the quality of harvested crops will reduce and this will affect market values of such crops .
9. Losses in income of the farmer : the low yield coupled with the reduction in the quality of produce , and increase in the cost of controlling the weeds consequently leads to losses in the income of the farmer .
10. Reduction in the palatability of some grasses : weeds also invade pastures ,reducing the palatability of useful grasses.
11. Some weeds are toxic to farm animals : the leaves and stem of some weeds contain toxins which may be dangerous to farm animals .

However some weeds are still useful to the farmer in the following ways :

1. Some weeds can acts as cover crops.
2. Some are used as forage grasses and legumes for feeding farm animals.
3. Some are used to prepare compost mad green manure.
4. Some weeds can help to control soil erosion.

**Characteristics and growth habit of selected weeds**

 Weeds often possess characteristics which increase their growth habit and mode of dispersal. Factors which aid the growth habits of weeds include :

1. Production of large quality of seeds.
2. Some weeds reproduce by seeds.
3. Some weeds reproduce by vegetation propagation.
4. Growth of large leaves within a short  time.
5. Weeds growth is favoured during the rainy season.
6. Most weeds are wind-pollinated.
7. Production of large quantities of pollen grains.

**Dispersal of weeds seeds and fruits**

 Most seeds and fruits of weeds are generally dispersed by wind and animals.

Mode of Dispersal of weeds includes :

1. Dispersal of seeds by winds.
2. Dispersal of seeds by animals.
3. Dispersal of seeds by water.
4. Dispersal of seeds by explosive mechanism.

**Common /types of weeds found on the farmland**

|  |  |
| --- | --- |
| Common Names | Botanical Names |
| Guinea grass | Panicum maximum |
| Bahama grass | Cynodon dactylon |
| Carpet grass | Axonopus compressus |
| Sensitive plant | Mimosa pundica |
|  Spear grass | Imperiata cylindrical |
| Wire grass | Aspilia africana |
| Centro | Centrosema pubescens |
| Blue feather | Commenlina nudiflora |
| Stubborn grass | Eleucine indica |
| Stubborn weed | Sida acuta |
| Goat weed | Ageratum conizoids |
| Elephant grass | Penisetum purpureum |
| Giant star grass | Cynodon plactostachynum |
| Pig weed | Boerhavia diffusa |
| Bush green | Amaranthus spinosus |
| Water leaf | Talinum triangulare |
| Sedge plant | Cyperus rotandus |
| Tridax | Tridax procumbens |
| Calopo | Calopogonium mucunoides |
| Northern gamba | Andropogon gayanus |
| Sun hemp | Crotalaria juncea |
| Mucuna | Mucuna utilis  |
| Stylo | Stylosanthes gracilis |
| Southern gamba | Andropogon tectorum |
| Kudzu or puero | Pueraria phaseoloides |

**General control of weeds, grasses and legumes**

 Weeds can be controlled through a number of methods;

1. Mechanical /physical method : the mechanical methods of controlling weeds are ;
2. Hand pulling /hand picking: this involves uprooting of weeds from the soil by hand.
3. Hoeing : this involves uprooting weeds from the soil by using hoe
4. Slashing : through this method, the Arial part of the weeds are removed with cutlass leaving behind the root in the soil
5. Rotary cultivation: this involves using hand drawn implements to undertake the ploughing and burying of weeds.
6. Biological control : this involves the introduction of some insects and herbivores animals to farmland to eat up the leaves of these weeds
7. Cultural control: this involves the practice of crop rotation and the growth of cover crops to suppress the growth of weeds on the farmland. The cultural methods of weed control are;
8. Flooding
9. Burning
10. Mulching
11. Cover cropping
12. Crop rotation
13. Chemical control: this involves the use of chemical solutions called herbicides to control the growth of weeds.

**TOPIC: CROP IMPROVEMENT**

 Crop Improvement refers to the ways of developing and breeding of crop varieties which are better than the existing varieties in a number of characters.

**Aims of Crop improvement**

 The breeders involves in improving our crops usually have certain aims in mind when doing their work. These aims include:

1. To increase Yield: the varieties of crops so-developed by breeders are capable of giving very high yield or quantity of crop per unit of the land.
2. To improve the quality of produce: the quality of farm produce enhances its usefulness and value. Plant breeders can improve on the taste, colour, size, nutritive value and fiber content of crops.
3. To adapt to climatic condition : plant breeders develop varieties of crops that are able to withstand extreme condition of cold ,drought, and wind by adjusting the growth cycle of the variety better to suit the available growing season.
4. To increase resistance to diseases: they could also develop varieties of crops which are not only resistant to diseases but produce high yield in the presence of diseases.
5. To meet the power of growers : improvements in farming methods may particular characteristics desirable to growers in their plants.
6. To obtain uniformity of plants: one of the aims is to breed crops which can grow and mature uniformly to facilitate mechanism or ease of harvesting.
7. To breed crops with early maturity: also to produce crops which will mature early.
8. To improve harvesting qualities: breeders try to produce crops that can be harvested with ease and without damaging to the seeds/fruits.
9. To improve the nutritional value of the produce: also to develop crops that have nutritional value like high protein, mineral vitamins, etc. which are useful to man.
10. To meet the needs of consumers (processors or industrialists): the demand by food processors as well as other consumers creates pressure for new quality of plants.

**MENDELIAN LAWS OF INHERITANCE**

 To understand the mendelian laws the following terms need to be understood

1. Character or Traits: these are the inherited attributes which the plant breeders select. E.g. seed colour , seed size , plant height , disease resistance etc.
2. Chromosomes: these are the rods or thread shaped bodies found in the nucleus of a cell. The chromosomes houses or contains the genes .
3. Gene: these are hereditary units or units of inheritance.
4. Gamete: this is a mature sex cell which takes part in sexual reproduction. There are two types of male gamete or spermatozoa (in animals) and pollen grains (in plants) and female gamete or egg or ovum (in animals) and ovules (in plants). Gamete is usually Haploid
5. Zygote: is a single cell formed as a result of union of a male gamete with a female gamete.
6. Allelomorphs : these are pairs of genes on the position of a chromosome (i.e. locus) that control contrasting characters.
7. Phenotype : these are the physical and physiologically expressed traits of an individuals e.g. height
8. Genotype: this is a term used to describe those traits or sum total of the genes inherited from both parent.
9. Dominant Character: this is the character shown in an individual without any significant influence of the contrasting characters present in the same individual on the dominant character.
10. Recessive character: this is unexpressed character in the presence of a dominant character in an individual.
11. Homozygous: a plant is said to be homozygous if the two members of a pair of genes controlling a given pair of contrasting characters are identical.
12. Backcross : is a cross between an offspring and one of the parents
13. Heterogeneous : a plant is said to be heterogeneous if the two members of a pair of genes controlling a given pair of contrasting characters are different e.g. (Tt) for tallness
14. Hybrid: this is the offspring got from crossbreeding two pure varieties of any species.
15. Filia generation: the offspring of parents make up the filia generation.

Mendel’s laws of inheritance are in two forms;

1. Mendel’s 1st law of segregation of genes : this 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.
2. Mendel’s 2nd law of independent assortment of genes : states    that each character behaves as a separate unit and is inherited independently of any other character.

**Process of crop improvement**

 The process of crop improvement includes:

1. Introduction
2. Selection
3. Breeding or Hybridization

**Introduction**

 This involves the importation of introduction or some varieties of crop with desirable characteristics into area where they have not existed before.

**Advantages of introduction**

1. It helps to introduce new varieties of crops to a new area.
2. It may enhance greater productivity.
3. It may perform better if there is better climatic condition in the new location.
4. It may also perform better if there is better soil condition in the new area.
5. Absence of pests and diseases.
6. It helps to upgrade the quality of the local varieties of crops.

**Disadvantages of introduction**

1. There is  the possibility of introducing new crop diseases
2. The new crop may not be able to adapt to climatic condition of the new location
3. It also introduce new pests to the new environment
4. The introduced crop may not be able to adapt to soil conditions of the condition

**Selection**

 This involves the artificial picking of crops with desirable characteristic which are most favoured by the environment.

**Method of selection includes:**

1. Mass selection :  crops are selected or rejected on the basis of their own. performance or merits
2. Pure line selection  : only one crop plant with good character.
3. Pedigree selection : crops are selected on the basis of the performance of their ancestors.
4. Progeny selection: crop plants are selected on the basis of the performance of their offspring of progeny.

**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 best stands are multiplied for distribution.
4. Crops with undesirable characters are detected and rejected.
5. It reduces the spread of diseases and pests.

**Disadvantages of selection**

1. Selection is tedious and time consuming.
2. It is very expensive in terms of time and money.
3. It requires expertise which may not be available.
4. It brings about the elimination of some desirable traits f the parent stock.

**Breeding or hybridization**

 Hybridization is a method by which an offspring is produced through the crossing of two different plant varieties of the same species.

**Types of breeding**

1. In-breeding: this is pollination and fertilization of closely related crop plants in order to retain certain desirable characteristics. This can lead to pure breed or pure line.
2. Cross breeding: this is the pollination and fertilization of unrelated crop plants belonging to different breeds.  This results in the production of an offspring which is superior to the average performance of the parents. This is called Hybrid vigour “heterosis”.

Advantages of breeding

1. It can produce a superior offspring resulting in hybrid vigour or heterosis ( cross breeding )
2. Progeny grows more rapidly (cross breeding).
3. Production of pure-line (in breeding).
4. Offspring can withstand variations of environment (cross breeding).

Disadvantages of breeding

1. It could lead to “inbreeding depression”. Which is the depression of loss in vigour and performance of offspring (in breeding ).
2. There is a drop in production or yield of crops in terms of quantity and quality (in breeding)
3. It may lead to poor or low resistance to disease attack (in-breeding).

Methods of improving Crop Productivity

   Productivity of crops can be achieved through a combination of methods which includes :

1. Crop improvement methods: crops ca n be improves through introduction, selection and hybridization.
2. Proper timing of planting: crops should be grown at the right time to avoid high temperature, inadequate rainfall or abundance of pests and diseases during growth.
3. Adoption of better cultivation methods: such as crop rotation which adds nutrients to the soil, prevent erosion, pests and diseases outbreak and helps to increase yield.
4. Use of manures and fertilizers: the use of manure like farm yard, compost and green manure in combination with the use of fertilizers helps to add nutrients to soil and promotes good growth of crops.
5. Control of pests of crops: the control of pests of crops which cause reduction in yield and growth can help in the improvement of crops.
6. Control of diseases of crops.
7. Use of resistance varieties: some varieties of crops are capable of resisting disease’s attack and can mature early; thereby by increasing the yield of crops.
8. Use of good crop varieties: there are some varieties of crops which naturally will grow well in different environmental conditions.

**TOPIC: PRINCIPLE OF DEMAND AND SUPPLY**

 Demand is an economic principle that describes a consumer’s desire and willingness to pay a price for a specific good or service. Holding all other factors constant, an increase in the price of a good or service will decrease demand, and vice versa.

**Law of Demand**

 The law of demand states that when the price of a good rises, the amount demanded falls, and when the price falls, the amount demanded rises.

**Demand Schedule**

 Demand schedule is a table that lists the quantity of a good all consumers in a market will buy at every different price. A market demand schedule for a product indicates that there is an inverse relationship between price and quantity demanded.

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

**Demand curve**

 This is a graph showing how the demand for a commodity or service varies with changes in its price.

**Factors Affecting Demand**

 Even though the focus in economics is on the relationship between the price of a product and how much consumers are willing and able to buy, it is important to examine all of the factors that affect the demand for a good or service. These factors include:

1. **Price of the Product**

 There is an inverse (negative) relationship between the price of a product and the amount of that product consumers are willing and able to buy. Consumers want to buy more of a product at a low price and less of a product at a high price. This inverse relationship between price and the amount consumers are willing and able to buy is often referred to as The Law of Demand.

1. **The Consumer’s Income**

 The effect that income has on the amount of a product that consumers are willing and able to buy depends on the type of good we’re talking about. For most goods, there is a positive (direct) relationship between a consumer’s income and the amount of the good that one is willing and able to buy. In other words, for these goods when income rises the demand for the product will increase; when income falls, the demand for the product will decrease. We call these types of goods normal goods. However, for some goods the effect of a change in income is the reverse. For example, think about a low-quality (high fat-content) ground beef. You might buy this while you are a student, because it is inexpensive relative to other types of meat. But if your income increases enough, you might decide to stop buying this type of meat and instead buy leaner cuts of ground beef, or even give up ground beef entirely in favor of beef tenderloin. If this were the case (that as your income went up, you were willing to buy less high-fat ground beef), there would be an inverse relationship between your income and your demand for this type of meat. We call this type of good an inferior good. There are two important things to keep in mind about inferior goods. They are not necessarily low-quality goods. The term inferior (as we use it in economics) just means that there is an inverse relationship between one’s income and the demand for that good. Also, whether a good is normal or inferior may be different from person to person. A product may be a normal good for you, but an inferior good for another person. As with income, the effect that this has on the amount that one is willing and able to buy depends on the type of good we’re talking about. Think about two goods that are typically consumed together. For example, bagels and cream cheese. We call these types of goods compliments. If the price of a bagel goes up, the Law of Demand tells us that we will be willing/able to buy fewer bagels. But if we want fewer bagels, we will also want to use less cream cheese (since we typically use them together). Therefore, an increase in the price of bagels means we want to purchase less cream cheese. We can summarize this by saying that when two goods are complements, there is an inverse relationship between the price of one good and the demand for the other good. On the other hand, some goods are considered to be substitutes for one another: you don’t consume both of them together, but instead choose to consume one or the other. For example, for some people Coke and Pepsi are substitutes (as with inferior goods, what is a substitute good for one person may not be a substitute for another person). If the price of Coke increases, this may make Pepsi relatively more attractive. The Law of Demand tells us that fewer people will buy Coke; some of these people may decide to switch to Pepsi instead, therefore increasing the amount of Pepsi that people are willing and able to buy. We summarize this by saying that when two goods are substitutes, there is a positive relationship between the price of one good and the demand for the other good.

1. **The Tastes and Preferences of Consumers**

 This is a less tangible item that still can have a big impact on demand. There are all kinds of things that can change one’s tastes or preferences that cause people to want to buy more or less of a product. For example, if a celebrity endorses a new product, this may increase the demand for a product. On the other hand, if a new health study comes out saying something is bad for your health, this may decrease the demand for the product. Another example is that a person may have a higher demand for an umbrella on a rainy day than on a sunny day.

1. **The Consumer’s Expectations**

 It doesn’t just matter what is currently going on – one’s expectations for the future can also affect how much of a product one is willing and able to buy. For example, if you hear that Apple will soon introduce a new iPod that has more memory and longer battery life, you (and other consumers) may decide to wait to buy an iPod until the new product comes out. When people decide to wait, they are decreasing the current demand for iPods because of what they expect to happen in the future. Similarly, if you expect the price of gasoline to go up tomorrow, you may fill up your car with gas now. So your demand for gas today increased because of what you expect to happen tomorrow

1. **The Number of Consumers in the Market**

 As more or fewer consumers enter the market this has a direct effect on the amount of a product that consumers (in general) are willing and able to buy. For example, a pizza shop located near a University will have more demand and thus higher sales during the fall and spring semesters. In the summers, when less students are taking classes, the demand for their product will decrease because the number of consumers in the area has significantly decreased.

**What is ‘Demand Elasticity?’**

 Demand elasticity, in economics, refers to how sensitive the demand for a good is to changes in other economic variables. Demand elasticity is important because it helps firms model the potential change in demand due to changes in price of the good, the effect of changes in prices of other goods and many other important market factors. A firm grasp of demand elasticity helps to guide firms toward more optimal competitive behavior. Elasticity greater than one are called “elastic,” elasticities less than one are “inelastic,” and elasticity equal to one are “unit elastic.”

**What is ‘Price Elasticity Of Demand’**

 Price elasticity of demand is a measure of the relationship between a change in the quantity demanded of a particular good and a change in its price. Price elasticity of demand is a term in economics often used when discussing price sensitivity. The formula for calculating price elasticity of demand is:

Price Elasticity of Demand = % Change in Quantity Demanded / % Change in Price

If a small change in price is accompanied by a large change in quantity demanded, the product is said to be elastic (or responsive to price changes). Conversely, a product is inelastic if a large change in price is accompanied by a small amount of change in quantity demanded.

1. Perfectly Elastic Demand:

 When a small change in price of a product causes a major change in its demand, it is said to be perfectly elastic demand. In perfectly elastic demand, a small rise in price results in fall in demand to zero, while a small fall in price causes increase in demand to infinity. In such a case, the demand is perfectly elastic or ep = 00. The degree of elasticity of demand helps in defining the shape and slope of a demand curve. Therefore, the elasticity of demand can be determined by the slope of the demand curve. Flatter the slope of the demand curve, higher the elasticity of demand. Though, perfectly elastic demand is a theoretical concept and cannot be applied in the real situation. However, it can be applied in cases, such as perfectly competitive market and homogeneity products. In such cases, the demand for a product of an organization is assumed to be perfectly elastic. From an organization’s point of view, in a perfectly elastic demand situation, the organization can sell as much as much as it wants as consumers are ready to purchase a large quantity of product. However, a slight increase in price would stop the demand.

2. Perfectly Inelastic Demand:

 A perfectly inelastic demand is one when there is no change produced in the demand of a product with change in its price. The numerical value for perfectly inelastic demand is zero (ep=0). Demand remains constant for any value of price. Perfectly inelastic demand is a theoretical concept and cannot be applied in a practical situation. However, in case of essential goods, such as salt, the demand does not change with change in price. Therefore, the demand for essential goods is perfectly inelastic.

3. Relatively Elastic Demand:

 Relatively elastic demand refers to the demand when the proportionate change produced in demand is greater than the proportionate change in price of a product. The numerical value of relatively elastic demand ranges between one to infinity. Mathematically, relatively elastic demand is known as more than unit elastic demand (ep>1). For example, if the price of a product increases by 20% and the demand of the product decreases by 25%, then the demand would be relatively elastic.

4. Relatively Inelastic Demand:

 Relatively inelastic demand is one when the percentage change produced in demand is less than the percentage change in the price of a product. For example, if the price of a product increases by 30% and the demand for the product decreases only by 10%, then the demand would be called relatively inelastic. The numerical value of relatively elastic demand ranges between zero to one (ep<1). Marshall has termed relatively inelastic demand as elasticity being less than unity.

5. Unitary Elastic Demand:

 When the proportionate change in demand produces the same change in the price of the product, the demand is referred as unitary elastic demand. The numerical value for unitary elastic demand is equal to one (ep=1).

**Supply**

 Supply may be defined as the quantity of commodity which a producer is willing and able to offer for sale at a given price over a particular period of time. The quantity of commodity offered for sale in the market is known 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 scheduled is a table which shows the relationship between price and quantity of commodity supplied. It shows the quantity of goods that can be supplied as the price of goods change.

**Supply Curve**

 Supply curve, in economics, graphic representation of the relationship between product price and quantity of product that a seller is willing and able to supply. Product price is measured on the vertical axis of the graph and quantity of product supplied on the horizontal axis.

Reasons for change in supply curve

1. Change in the cost of production

2. An increase in the number of producers will cause an increase in supply

3. Expansion in capacity of existing firms, e.g. building a new factory

4. An increase in supply of a related good e.g. beef and leather

5. Climatic conditions are very important for agricultural products

6. Improvements in technology, e.g. computers, reducing firms costs

7. Lower taxes reduce the cost of goods

8. Increase in government subsidies will also reduce cost of goods

 Price elasticity of supply Price elasticity of supply (PES) measures the responsiveness of quantity supplied to a change in price. It is necessary for a firm to know how quickly, and effectively, it can respond to changing market conditions, especially to price changes. The following equation can be used to calculate PES. The elasticity of supply measures the responsiveness of the quantity supplied to a change in the price of a good, with all other factors remaining the same.

Implications of demand and supply on agricultural production

1. When demand is lower than supply , the price of the produce will fall and farmers will be discouraged from further production
2. When demand exceed supply ,price would tend to rise and farmers would be stimulate to produce more
3. Higher supply of agricultural products may lead to reduction in price and demand
4. high cost of a product may lead to low demand and high demand for its substitute
5. High taste of agricultural products by consumers will lead to high demand for such products
6. Increase in the income of consumers may lead to increase in the demand agricultural products and vice versa
7. high cost of production may lead to low supply and high prices of products and vice versa
8. High cost and lack of farm input may lead to low supply and high cost of farm products and vice versa
9. Favourable weather and climate for production will lead to high supply of farm products and vice versa
10. increase in the numbers of farmers will lead to higher supply and reduction in the price of food, and vice versa

**Law Of Diminishing Returns**

 A concept in economics that if one factor of production (number of workers, for example) is increased while other factors (machines and workspace, for example) are held constant, the output per unit of the variable factor will eventually diminish. Although the marginal productivity of the workforce decreases as output increases, diminishing returns do not mean negative returns until (in this example) the number of workers exceeds the available machines or workspace. In everyday experience, this law is expressed as “the gain is not worth the pain.

**Importance Of Law Of Diminishing Returns In Agriculture**

1. It helps the entrepreneurs to determine the best proportion to combine the various factors of production.
2. It also enables him to know when to stop adding more input of the variable factors to a fixed factors.
3. It also enables him to determine the wages he will pay to his workers.
4. It enables him to minimize cost and avoid wastage of resources in order to make more profits.

**TOPIC: FARM ACCOUNTS**

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

**FARM RECORDS**

 Farm records are written documents showing major activities going on in the farming business. To enable farmer to manage his farm very well ,he must keep some records

**Importance Of Farm Records And Accounts**

1. Changes in prices of produces : enables farmers to monitor the changes in the price of produce bought or sold by the farm.
2. It show the financial position of the farm.
3. Whether profit or loss is made.
4. Detection of fraudulent practices.
5. For taking management decisions.
6. For procurement of loans.
7. Determination of annual tax.
8. Determination of actual worth of the farm.
9. For comparing management efficiency.
10. Farm auditing.
11. Data for planning and budgeting.

**Types of farm records and account**

 Farm records which a good farmer should keep are;

1. The cash book receipt and payment record.
2. Annual valuation.
3. Farm diary.
4. Farm inventory.
5. Yield and production records.
6. Payroll or labour record.
7. Farm input utilization record.
8. Profit and loss account.

**Types Of Farm Accounts**

1. Sales account : this is also known as sales and receipt account.
2. Purchase account.
3. Farm valuation.
4. Cash analysis account.
5. Farm income statement.
6. Balance sheet or Net worth statement.

**Definition Of Some Accounting Terms**

1. Farm asset: is anything of value n the possession of a farm business. Assets are grouped into two classes;
2. Fixed assets: these are assets which are not used up during production. Example, landed property ,farm buildings
3. Current assets: these are assets which are used up during production . Examples, water, feed, drugs , fertilizers etc.
4. Liabilities : is the money owned to external persons or corporate bodies e.g. loan from banks. Liabilities are grouped into two classes;
5. Current or short term liabilities : they are debts that must be paid within one accounting year  e.g. creditor’s loan
6. Long term liabilities : there are debts which cannot  paid back within one e.g. long term loans from banks
7. Net capital, Net worth or owner’s Equity: this is the total money supplied by the owner of the business. Assets – liabilities = owner’s equity
8. Liquidity: is the ability of the farm business to meet its financial commitment as they fall due.
9. Solvency: this is the ability of the farm business to cover the liquidation of the asset.
10. Appreciation: refers to increase in value of worth of an asset as the asset is being used over time.
11. Depreciation: this refers to decrease or loss or reduction in value in the value or worth of an asset as the asset is being used over time.
12. 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 of the asset is too low.
13. Useful life of an asset: this means the number of years a piece of farm equipment can effectively serve a farmer.

**Calculation of depreciation and Salvage value**

 There is relationship between depreciation and salvage value of fixed assets.

Methods of calculating depreciation of farm machines

1. Straight line method or fixed installment method
2. Annual revaluation method
3. Unit of production or output method
4. Declining/reducing balance method
5. Sum-of-the-years-digits method

**Formulae for Calculating Depreciation**

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

**TOPIC: Animal Nutrition**

 The food given to farm animals is generally known as livestock feed of simply feed. Animals need feeds for growth repair of worn out tissues, energy and the general well being of the animals.

**Effects of feed shortage in animal production**

 Feed shortage will lead to the following effects in the animal production

1. Loss of weight or low birth weight.
2. Poor reproduction or delay in puberty or late maturity.
3. Poor milk, meat and egg production is recorded.
4. Could also lead to high death rate.
5. Increase in susceptibility to diseases.
6. Slow growth rate of livestock.
7. Draft animals becomes weak and unable to work.

**Classification of livestock feed**

1. Basal/energy feed of carbohydrate concentrate
2. Protein concentrate
3. Mineral / vitamins supplement
4. Roughages

**BASAL FEED/ENERGY FEED**

 These are mostly easily digestible carbohydrates with low protein content. They constitute 60 to 90% of practical livestock rations. They have low fibre content thus need to be supplemented by high protein feeds.

**ROUGHAGES**

 Roughages are feeds that are rich in plant fibre. They can be prepared in the following ways:

a. Hays: these are sun-dried forage packed and kept for feeding animals.

b. Silage: these are forage crops cut fresh, compressed in a pit and allowed to ferment.

c. Straw: this consists of dried plant materials as maintenance ration during periods of food scarcity.

d. Forage: this refers to grasses and legumes used for feeding farm animals.

e. Fodder: these are crops grown specially to feed farm animals, example: corn, groundnut, legumes, grasses, etc.

**PROTEIN CONCENTRATE**

Characteristics

1. It has crude fiber content less than 18 percent
2. It is high in protein
3. Low in carbohydrates and fats
4. Low in fibre
5. Highly digestible
6. Low in minerals

**MINERAL AND VITAMINS SUPPLEMENTS**

Characteristics

1. They are required in small quantity in the feed
2. They supplement basal and protein concentrate
3. Low in energy
4. Low in protein
5. Low in fibre
6. High in minerals and vitamins
7. They are necessary for growth and development
8. They largely aid food digestion
9. They largely aid resistance to diseases
10. They include minerals, vitamins and essential amino acids.

Methods of preparing feed ingredients

1. Blood meal: collect fresh blood from the abattoir and allow to clot in the open. Heat the blood to reduce the moisture content and kill the pathogens. After heating the blood now in lumps is dried and crushed into powder.
2. Fish meal: fish meals can be prepared sin two major ways, these are :dry and wet processes.
3. Dry process: collect fresh fish, sun-dry or smoke it to reduce the moisture content, and then ground it into powder.
4. Wet process or Rendering: collect the fresh fish, heat it with steam, then, dry it and crush into powder.
5. Groundnut / palm kernel cake: collect the seeds of groundnut /palm kernel, crush and press to remove the oil .then press the remnants with machine to form cakes, which are dried.
6. Cotton seed meal: collect cotton seeds, grind them and extract oil from oil from the crushed. Dry the residue or cake later.
7. Bone meal : this  can be prepared in two ways :
8. Dry process : collect bones from the abattoir , dry and burn them ,then crush the burnt bones to the desired textures
9. Wet process or rendering: collect bones form the abattoir, heat with steam, crush and dry the crushed bones.
10. Maize / Guinea corn: remove grains from the cobs, dry them and crush or grind to desired texture.

 Feed ingredient can be prepared or process for animals by making into mash and pellets while some have to be cooked before it can be fed to the animals.

**TOPIC: Basics for Livestock Nutrition**

Introduction

 The most important aspect in keeping livestock healthy and able to produce is a proper nutritious diet. Cattle belong to a class of animals called ruminants. This group also includes sheep and goats. Ruminants have a digestive system which allows them to efficiently digest and absorb most of their nutrients from forages. There are four compartments in the beginning of the digestive tract, one of which is called the rumen that contains near 50 gals of fluid and ingested forage. The rumen has a large population of microbes, mainly bacteria and some protozoa, which allows for the degradation of the fibrous material in forage. Much of the initial digestion of feed is done by microbes in the rumen. Sheep and goats are also ruminants, but the initial digestive tract compartments are of different proportions and configuration than cattle. They are often referred to as “small ruminants”. The horse is a non‐ruminant herbivore. These animals do not have a multi‐compartmented stomach as cattle do, but are able to consume and digest forage. The cecum and colon, parts of the large intestine, serve the somewhat same purpose for the horse that the rumen does for the cow. Llamas and alpacas are “pseudo‐ruminants” because they have three continuous compartments in the fore digestive tract instead of four like ruminants. Swine utilize different types of feed than ruminants, due to the differences in their digestive systems. Swine are monogastrics, meaning they only have one stomach which is similar to that of humans. Usually grains are the main part of a swine’s diet. They can eat a portion of their diet from pasture, although the forage from the pasture needs to be of high quality. The diet for livestock is usually referred to as a ration and a balanced ration is the amount of feed that will supply the proper type and proportions of nutrients needed for an animal to perform a specific purpose.

**The Six Basic Components of a Ration**

**Water** ‐ Water is often over looked but is the most critical component of any ration. It is essential in allowing most of the physiological functions in the body. Water has been a difficult nutrient to determine the actual requirement for many livestock primarily because water is usually provided free of choice. When water is limited in a ration, the dry matter intake is reduced and the correct amount of nutrients for the animal is restricted.

**Functions of water**

1. Water is provided for drinking purpose
2. It is used for metabolic and digestion of food
3. Water is also used for dipping / drenching animals against ectoparasites and endoparasites
4. Water equally used for washing or cleaning animals
5. It is used  for cleaning floors ,pens or for sanitation purpose
6. Water is also used for milk and meat processing
7. Water is part of the body of any animal
8. It is used for maintenance of body temperature
9. Water is used for irrigation of pastures
10. Water is a constituent of milk, egg, and meat.

**Protein** – Protein is needed for the structuring of muscles, skin, hair and internal organs and is the only food source of nitrogen. Crude protein is the total protein content of a feed. Since proteins contain 16% nitrogen on average, knowing the total amount of nitrogen will determine an approximate amount of protein in the feed. Proteins are composed of amino acids and each protein has a variety of the 22 amino acids in different quantities. Many amino acids are synthesized in the body, but there are eight amino acids that are not synthesized and need to be provided in the ration. These are called essential amino acids. The digestion and absorption of amino acids and nitrogen is different in each species of livestock.

Functions of Protein

1. Protein are essential for growth of young ones
2. They are used for the repair of worn out tissues
3. They are used in the formation of gametes in reproduction
4. Meat, egg and milk production in livestock depend on the protein level in the animal.
5. They required in the production of enzymes and hormones in the  body of livestock
6. Protein is essential for the sustenance of life
7. They are also necessary for flesh build up
8. Protein provides the raw materials for building protective covering such as hair
9. They are also used in the formation of digestive juice and other secretions of the intestine.
10. Proteins are equally useful in the production of of antibodies

**Energy** ‐ Energy allows the animal to do physical work. It also provides the ability to grow, lactate, reproduce, and enable other physiological functions such as feed digestion. Energy is not actually a nutrient but a total caloric value of a feed. There are several chemical, mechanical, and mathematical methods to determine feed energy values.  Some of these are called digestible energy, metabolizable energy, net energy, and total digestible nutrients. A total digestible nutrient (TDN) is the energy value most commonly used in simple rations. Each ingredient in a ration has a different digestible energy value and of those values there is a different amount of energy that is metabolized and used in the body.

**Fiber** – Crude fiber is an estimate of structural carbohydrates found in plants and grains. It has a varying amount of digestible material from high to low in cellulose and lignin respectively. Fiber limits the energy value of plants for monogastrics such as pigs, but the microbes in the digestive tracts of the other livestock species mentioned above are capable of utilizing the fiber which provides energy in the ration. Fiber also provides the necessary bulk in the digestive tract and regulates the time of passage of food. This helps to maintain a population of microorganisms which are critical for healthy digestion.

**Minerals** ‐ Minerals are very much needed for the physiology of structure, metabolic and immune functions in the animal. There are two classifications of minerals. **Macro minerals** (calcium, phosphorous, sodium, chlorine, magnesium, potassium, and sulfur) are those that are required in the most amounts in a ration compared to **minor minerals** (iron, copper, molybdenum, manganese, zinc, cobalt, iodine, and selenium, and others) which are needed in less amounts.

**Vitamins** ‐ Vitamins are similar to minerals in that they take part in many physiological functions, including coenzymes for metabolic functions and antioxidants, which are compounds that help prevent damage to cells. Vitamins are grouped into two categories, fat soluble and water soluble. Many of the important vitamins for forage eating animals are either synthesized by microbes in the digestive system, obtained from sunlight, or are stored in the liver. Many of those vitamins that are not made in the animal are easily provided in adequate amounts in the forage.

**Fat and oil**

Composition: fat are composed of carbon, hydrogen and oxygen

Sources : these are palm oil , palm kernel cake ,groundnut cake , coconut meal ,  linseed cake ,cotton seed cake , milk , lard , tallow,

Functions

1. Fats provides more energy than carbohydrates.
2. Fats supply essential fatty acids and fat build-up.
3. They also provide fat soluble vitamins.
4. They improve the palatability of diet.
5. Fats helps in the maintenance of body temperature
6. They prevent dustiness of feeds

**The Basics for Livestock Rations**

 Every ration will be different depending on species, age, size and weight, gender, stage of reproduction, demands for production or work, and environment. The proper formulation of rations for livestock is dictated by appropriate nutrient requirements for each type of animal under a variety of conditions. The National Academy Press publishes a series of tables about nutrient requirements for livestock. The National Research Council (NRC) compiles the data for these publications which can be purchased or read online from the web site listed below. In addition to knowing the nutrient requirements, it is also necessary to know the nutrient composition of each feedstuff per ration. While the book value forage analysis is good information to compose a proper ration, when possible it is best to sample the individual feedstuff used and have it analyzed. The greatest variation between the book value and the actual value is in forages.

Note: Ruminants are animals whose digestive system contains fermenting microbes that help to digest forage.

Note: Components of a Ration:

Water

Protein

Energy

Fiber

Minerals

Vitamins

TYPES OF RATIO /DIET AND THEIR USES

* Diet: a diet is defined as the amount of feed regularly given to or consumed by the animal. It is formulated to meet specific metabolic or physiological function such as: growth, lactation, maintenance of pregnancy, reproduction, egg laying etc.
* Ration: ration is the total supply of feed given to an animal in a 24 hour period. In other words, ration is the amount of food taken by an animal per day.
* Balance Ration: a balance ration is the feed containing all essential nutrients in the correct quality and in adequate proportion for feeding animals.

Factors normally considered when deciding the type of ration to feed an animal;

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

Types of Ration

There are two types of Ration

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

Categories of animals that require production ration are:

1. Lactating Animals : for milk production.
2. Weaning  Animals : for increase growth.
3. Pregnant Animals : for maintenance of the foetus.
4. Fattening animals : for extra addition of more flesh or meat.
5. Broilers : for rapid growth.
6. Layers : for more egg production.
7. Steaming up or flushing : for  animals before mating to produce more ova/ovum.

Malnutrition in animals

 Malnutrition is a condition in which an animal shows evidence of nutritional deficiency . It occurs when a ration does not supply all the essential nutrients in the right proportion and quantities. In other words ,it result when an animal takes in insufficient food or eats diets which is deficient in one or more nutrient like proteins, carbohydrates ,minerals ,and vitamins .this eventually results n nutritional diseases.

**TOPIC: BASIC ECONOMIC CONCEPTS**

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

* 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 to them are limited (in short supply). The basic need or wants of man are food, clothing and shelter.
* Scarcity: this refers to the limited supply of resources needed to meet (satisfy) wants.
* Choice: this is the system employed in selecting one need to satisfy out of a number of alternatives.
* Scale of preference: is a list of unsatisfied wants in order of importance. This is relative to the individual
* 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.

**TOPIC:ANIMAL NUTRITION**

 The food given to farm animal is generally known as livestock feed simply feed. Farm animal need feed for growth, repair of worn out tissues, energy and the general wellbeing of the animals.

**Effects of feed shortage in animal production**

 Feed shortage will lead to the following effects in animal production;

1. It leads to low birth weight or loss of weight.
2. It result in poor reproduction or delayed puberty or late maturity.
3. Poor milk, meat and egg production is recorded, and this leads to drastic reduction in livestock production.
4. Feed shortage can equally lead to high death rate of farm animals.
5. It also leads to increased susceptibility to diseases.
6. Generally, there is slow growth rate of livestock.
7. Draft animals become weak and unable to work.

**Classification of livestock feed**

 Animal feed can be grouped into four main classes. These are:

* Basal / energy feed or carbohydrate concentrate
* Protein concentrate
* Mineral / vitamins supplement
* Roughages

**Basal/Energy feeds or carbohydrate concentrates**

Characteristics:

(i) A Basal/Energy concentrate is the feed that has crude fibre content less than 18%

(ii) Basal feed refers to feed that are very high in energy or a starchy food e.g. maize, cassava, etc.

(iii) It is high in carbohydrates or fats.

(iv) It is low in protein

(v) It is low in fibre

(vi) Basal feed is highly digestible

(vii) It is low in minerals

**Protein concentrate** characteristics:

1. Protein concentrate is also a type of feed that has crude fibre content less than 18%.
2. Protein concentrate is high in protein.
3. They are low in carbohydrate and fats.
4. They are low in fibre.
5. They are highly. digestible.
6. They are low in minerals.

**Mineral/vitamins supplements**

Characteristics:

1. They are required in small quantities in feed.
2. They supplement basal and protein concentrates.
3. They are low in energy.
4. They are low in protein.
5. They are low in fibre.
6. They are high in vitamins and minerals.
7. They are necessary for growth and development.
8. They largely aid food digestion.
9. They largely aid resistance to diseases.
10. They include minerals, vitamins and essential amino acids.

**Roughages**

Characteristics:

1. Roughages are feeds that have crude fibre content more than 18%.
2. They are high in fibre.
3. They are low in digestible carbohydrate.
4. They are low in protein.
5. They have poor or low digestibility.
6. Pasture plants such as grasses and legumes form the roughages.

 Roughages exist in different forms such as hey, straw, soil-age and silage.

Hey and straw are referred to as dry roughages.

* Hay: Hay refers to the aerial part of a young and succulent grass or herbage cut and dried for feeding animals. It is a cheap source of food for ruminant animals during the dry season where green grasses are not easily available. Its nutritive value is higher than straw.
* Straw: Straw refers to the aerial part of grass or harvested crops cut and stored for future use. Straw is difficult to digest because the plants are cut after the crops have been harvested. The remains of the plant are then cut, dried and fed to farm animals during dry season. It serves just to keep the animal alive. Wet roughages are referred to as soil age and silage.
* Soilage: This refers to the process of cutting fresh or succulent grasses and legumes from the field and taking them to the animals in their pens. They have high moisture content and high nutrients. Soilage is also referred to as zero grazing because animals are not allowed to go out to feed on the grasses but the grasses are cut and set to the animals in their pens
* Silage: This refers to the preservation of green and succulent forage crops under anaerobic condition

Preparation of silage

1. Dig the pit to the size and depth required.
2. Cut pasture species at the right stage of maturity, i.e. before flowering.
3. Chop the pasture into pieces.
4. Wilt the cut and chopped lush (tender) pasture species by spreading them in the sun for about one day.
5. Line the inside of the pit with palm fronds banana leaves or cocoyam leaves.
6. Load the chopped, mixed pasture into the pit in stages.
7. Compress each layer by rolling heavy substances over it to expel much of the air which can cause spoilage.
8. Sprinkle dilute mineral acid after each layer.
9. Deposit other layer and compress the layer each time until the pit is full.
10. Finally compress the help

Spread polythene sheet or banana leaves over the heap to ward off water.

1. Pack a heap of soil on top of the leaves/ or polythene sheet.
2. Provide shade over the heap.

**Method of preparing feed ingredients**

* Blood meal: Collect fresh blood from the abattoir and allow it to clot in the open. Heat the blood to reduce the moisture content and kill the pathogens. After heating, the blood now in lumps is dried and crushed into powder.
* Fish meal: Fish meal can be prepared in two major ways. These are: dry and wet processes;
* Dry process: Collect fresh fish, sun-dry or smoke it reduce the moisture content, than ground it into powder
* Wet process of rendering: Collect the fish, heat it with steam. Then, dry it and crush into powder
* Groundnut/palm kernel cake: Collect the seeds of groundnut/palm kernel, crush, and press to remove the oil. Then press the remnants with machines to form cakes, which are dried.
* Cotton-seed meal: collect cotton seeds, grind them and extract oil form the crushed seeds. Dry the residue or cake later.
* Bone meal: Bone meal can be prepared in two ways. These are: dry and wet processes;
* Dry process: Collect bones from the abattoir, dry and burn them then crush the burnt bones to the desired texture.
* Wet process or rendering: Collect bones from the abattoir, heat with steam, crush and dry the crushed bones.
* Maize/ guinea corn: Remove grains from the cobs, dry them and crush or grind to desired texture.

 Feed ingredient can be prepared or processed for farm animal by making

Into mash and pellets while some have to be cooked before it can be fed to farm animals.

**Food nutrients of livestock**

 There are six classes of food nutrients which are needed by animals for growth and proper development. These are:

(1) Carbohydrate

(2) Protein

(3) Fats and Oil

(4) Mineral

(5) Vitamins

(6) Water

**Carbohydrates**

* Composition: Carbohydrate is made up of carbon, hydrogen and oxygen.
* Sources: This include maize, guinea corn, cassava, grasses, wheat, potatoes, rice, millet, yam, Cocoyam, plantain, forage grasses, Hey, silage, molasses, spent grains etc.
* Functions: Carbohydrate provide energy to farm animals for growth, reproduction, milk production and other activities like build-up of fat.

**Protein**

* Composition: Protein is composed of carbon, hydrogen, oxygen and sometimes sulphur, nitrogen and phosphorus.
* Sources: Animal sources of proteins are fish meal, blood meal, meat meal, feather meal, milk, skimmed milk powder, poultry offal meal, shrimp head meal, whole milk powder, cholesterol, termite, insects, earthworms, eggs etc. Plant sources of proteins are soya-beans meal, groundnut cake, palm kernel cake, cotton seed meal, sunflower seed meal, cashew nut meal, leguminous forage. Synthetic sources of protein are methionine, lysine and cysteine which are critical or essential. Amino acids can also be provided.
* Functions: Protein are essential for the growth of young ones. They are used for the repair of worn-out tissues or cells. They are used in the formation of gametes in reproduction. Meat, egg and milk production in livestock depend on the protein level in the animal. They are required for the production of enzymes and hormones in the body of livestock. Protein are essential for the sustenance of life. They are also necessary for flesh built-up. Proteins provide the raw materials for building protective covering such as hair, nails, horns, hoof, wool and feathers etc. They are also used in the formation of digestive juices and other secretions of the intestine. Proteins are equally useful in the production of antibodies.

**Fats and oil**

* Composition: fats are composed of carbon, hydrogen and oxygen
* Sources: These are palm oil, palm kernel cake, groundnut cake, coconut meal, linseed cake, cotton seed cake, milk, lard, tallow.
* Function: Fats provide more energy than carbohydrates. Fats supply essential fatty acids and fat build-up. They also provide fat soluble vitamins. They improve the palatability of diet. Fat help in the maintenance of body temperature. They prevent dustiness of feed

**Minerals**

* Composition: Minerals required by animals are grouped into two major classes:
* Macro-elements or mineral: These are required by animals in large quantity, e.g. calcium, phosphorus, magnesium, potassium, sulphur, sodium and chlorine.
* Trace elements or micro-minerals: These are required by animals in small quantity, e.g. iron, iodine, cobalt, copper, manganese zinc and fluorine.
* Sources: These are bone meal, oyster shell, limestone, salt licks.

MINERAL

Calcium

SOURCES

Bone meal, oyster shell limestone, Milk rock calcium phosphate

FUNCTIONS

* Bone and teeth formation egg shell formation.
* Blood clotting

DEFICENCY SYMPTOMS Ricket, osteomalacia, soft egg shell. Retarded growth

MINERAL

 Phosphorus

SOURCES

Bone meal, Dicalcium phosphate, fish meal

FUNCTIONS

* Bone and teeth formation;
* acid-base balance; egg shell formation

DEFICIENCY SYMPTOMS Ricket, lack of appetite osteomalcia

MINERAL

 Magnesium

SOURCES

Salt licks, wheat gems, forage, grasses

FUNCTIONS

Aid functioning of the nervous system activation of enzymes

DEFICIENCY SYMPTOMS Hyper-irritability, nervous disorder called tetany

MINERAL

Sulphur

SOURCES

Salt licks, fish meal

FUNCTIONS

Constituents of protein and amino acids like cysteine, methione

DEFICIENCY SYMPTOMS Poor growth

MINERALS

Iron

SOURCES

Yeast, iron injection, salt licks

FUNCTIONS

* Constituent of haemoglobin in red blood cell.
* Constituent of protein called myoglobuline

DEFICIENCY SYMPTOMS Anaemia e.g. baby pig anaemia of piglets.

MINERAL

Iodine

SOURCES

Iodized salt, fish meal

FUNCTIONS

Constituent of hormone called thyroxine

DEFICIENCY SYMPTOMS Goiter

MINERAL

Cobalt

SOURCES

Salt licks

FUNCTIONS

* Constituents of vitamins B12.
* Activate some enzymes

DEFICIENCY SYMPTOMS General malnutrition

MINERAL

 Copper

SOURCES

Salt licks

FUNCTIONS

Aids formation of heamoglobin& iron absorption

DEFICIENCY SYMPTOMS Anaemia

MINERAL

Fluorine

SOURCES

Salt licks, fluorinated water

FUNTION

Prevents tooth decay.

DEFICIENCY SYMPTOMS

Tooth decay.

 **Vitamins**

 Vitamins are organic substances also required by animals for proper growth and development of the body. Vitamins are grouped into two major classes:

* Fats soluble vitamins: These are vitamins that are soluble in fats e.g. vitamins A,B,E and K
* Water soluble vitamins: These are vitamins that are soluble in water e.g. Vitamins C and cabalamine, pantothenic acid, folic acid etc.

VITAMINS

Vitamin A (retinol)

SOURCES

Fish meal, grasses yellow maize

FUNCTIONS

Proper eye sight (or vision) Epithelical cell formation aid reproduction

DEFICIENCY SYMPTOMS Night blindness

VITAMINS

Vitamin C (Ascorbic)

SOURCES

Grasses, vegetables and fruits

FUNCTIONS

Formation of connective tissues, bone and dentine

DEFICIENCY SYMPTOMS

Scurvy

VITAMINS

Vitamin D (Calciferol)

SOURCES

Bone meal, fish meal and sunlight

FUNCTIONS

Aids bone and teeth formation, egg shell formation

DEFICIENCY SYMPTOMS Ricket, Osteomalacia, soft shell egg

VITAMINS

Vitamin E (Egosterol)

SOURCES

Vegetables, grasses synthetic vitamin E

FUNCTIONS

Aids reproduction. As an antioxidant

DEFICIENCY SYMPTOMS Reproductive failure like starility and premature abortions

VITAMINS

Vitamin K (phylloquinone)

SOURCES

Fish meal, vegetables

FUNCTIONS

Aids blood clotting prothrombin formation

DEFICIENCY SYMPTOMS

Haemorrhages i.e. inability of the blood to clot in time

VITAMINS

Vitamin B1 (thiamine)

SOURCES

Yeast, cereals, green plants

FUNCTIONS

Co-enzyme in energy metabolism

DEFICIENCY SYMPTOMS Poor appetite, Beri-beri

VITAMINS

Vitamin B2 (Riboflavin)

SOURCES

Green herbage and milk products

FUNCTIONS

Co-enzyme in protein and fat metabolism

DEFICIENCY SYMPTOMS Slow growth dermatitis

VITAMINS

Vitamin B12 (Cobalamine)

SOURCES

Fish meal, milk products

FUNCTIONS

As co-enzyme in several biochemical reactions. Red blood cell formation

DEFICIENCY SYMPTOMS Pernicious anaemia

VITAMINS

Niacin (Nicotinic acid)

SOURCES

Yeast, cereals, grasses

FUNCTIONS

Carbohydrate oxidation

DEFICIENCY SYMPTOMS Pellagra (reddish tongue)

**Water**

 water is very important in livestock management, be it to the animals or to their immediate environment.

* Sources of water: Drinking water, from tap, metabolic water from food, rain water, water from rivers and ponds, grasses and fresh fodder.
* Function of water

Water is provided for drinking purposes

It is used for metabolic and digestion of food

Water is also used for dipping/drenching animals against ectoparasites and

Endoparasites

Water is equally used for washing or cleaning animals

It is used for cleaning floors, pens or for sanitation purposes

Water is also used for milk and meat processing

Water is part of the body of any animal

It is used for the maintenance of body temperature

Water is used for irrigation of pasture

Water is a constituent of milk, egg and meat.

Types of ration/diet and their uses

* Diet: a diet is defined as the amount of feed regularly given to or consumed by an animal. It is formulated to meet specific metabolic or physiological function such as: growth, lactation, maintenance of pregnancy, reproduction, egg laying etc.
* Ration: Ration is the total supply of feed given to a animal in a twenty-four hour period. In other words, ration is the amount of food taken by an animal per day.
* Balance Ration: A balance ration is the feed containing all essential nutrients in the correct quantity and in adequate proportion for feeding animals.

Components of a balance ration include; carbohydrate, protein, fats and oil, minerals vitamins and water. All these must be taken at the right proportion by farm animal for normal growth, lactation, reproduction and other body activities

Factors normally considered when deciding the type of ration to feed an animal

1. The purpose for which the animal is being kept: If an animal is to be kept for the purpose of production, such animal will require more feed while those not on production will require little feed.
2. The class of animal: Animals belong to different classes and as such, their feed
3. Requirement will also vary
4. Age of the animal: Feeds are given to farm animals based on their ages, e.g. in Poultry, the chicks (0-6 weeks) requires more nutritious feed (20% crude protein) then growers (6 – 18 weeks) which require about 14% crude protein
5. Animal’s condition of health: The animals that are healthy tend to each more Feed while sick ones consume less
6. Management system: The system of management also determines the type of Feed given to farm animals. Quality fed are usually given to animals on intensive system of management while animals on extensive system fend for themselves
7. Physiological state of the animals: pregnant and lactating animals tend to

Consume more feeds than animals that are not in these conditions

**Types of ration**

There are two types of rations. These are:

* Maintenance ration: This is the type of ration given to farm animals just to maintain normal functioning of the body system. In other words. Maintenance ration supplies enough nutrients just to enable the animal carry on the normal body activities without losing or gaining weight. The ration enables the animal to maintain its body weight but, it cannot be used for production purposes. Examples of maintenance ration include the ration given to ruminant animals like straw, hay during dry season. Maintenance ration can be supplied to breeding animals when they are non-lactating animals when they are not lactating
* Production ration: This is the type of ration given to farm animals to enable them produce. In other words, production ration supplies nutrients above what is required for maintenance in order to make the animal capable of high production which can be in form of milk, meat, egg, growth etc.

Categories of farm animals that require production rations include:

* Lactating animals: for milk production
* Weaning animals: for increase growth
* Pregnant animals: for maintenance of the foetus
* Fattening animals: for extra addition of more meat of flesh
* Broilers: for rapid growth
* Layers: for more egg production
* Steaming up or flushing: for animal before mating to produce more ova/ovum.

**Ration formulation**

 Ration formulation involves the careful combination of all the food nutrients in such a way as to meet the nutritional requirement for a particular animal. When formulating ration for farm animals, the following principles should be considered;

1. The physiological state of the animal, whether for pregnant, dry or lactating or
2. Young animals
3. The availability of the feedstuff
4. The composition of the nutrients
5. The age of the animal
6. The familiarity of the feed to animals
7. Palatability of the feed

**The cost of the feedstuff.**

 Careful combination of protein sources (e.g. fishmeal, groundnut cake), fat sources (e.g. palm kernel cake, oils) vitamins, mineral sources (e.g. bone meal, oyster shell) carbohydrate sources (e.g. maize, guinea corn) will provide all the food nutrients to prepare a balanced diet or ration.

To prepare a ration for layers, the following ingredients, for example, are required:

Maize meal (carbohydrate)                =          65%

Groundnut cake (protein)                   =          20%

Fish meal (protein)                                          =          5%

Palm oil (oil)                                                    =          4%

Bone meal (mineral)                           =          5%

Mineral salt (mineral)                         =          0.5%

Vitamins supplement (vitamins)        =          0.5%

100%

**Malnutrition in farm animals**

Definition: Malnutrition is a condition in which an animal shows evidence of nutritional deficiency. It occurs when a ration does not supply all the essential nutrients in the right proportion and quantities. In other words. It results when an animal takes in insufficient food or it eats diet which is deficient in one or more nutrients like protein, vitamins, carbohydrate, mineral and vitamins. This eventually result in nutritional disease. Malnutrition diseases, causes, symptoms and corrections are shown below:

**LEAVE SPACE FOR THE TABLE**

**TOPIC**: **Meaning of agricultural extension**

 Agricultural extension can be defined in any of the following ways:

* Agricultural extension is process whereby modern farming techniques and Research findings are taken to the farmers through extension workers and, problems of the farmers are taken to research institutions for solution.
* Agricultural extension is an informal, voluntary agricultural Education involving the spread or dissemination of information on recent improved development in agriculture from researchers to the farmers through extension.
* Agricultural extension is the process system or service which assists farmers of through education procedures in improving farming methods and Techniques.

**Roles or functions or objectives of agricultural extension**

 Agricultural extension is very important for the development of agriculture in West Africa. Government should encourage agricultural extension services for the following reasons:

1. Increase in agricultural production: It encourages farmers to increase their production of food crops, cash crops and livestock.
2. Teaches improved farming practices: It teaches farmers improved practices in the cultivation, rearing and processing of crops and livestock.
3. Collection and collation of basic information: It helps to collect and collate basic Information relating to rural programmes.
4. An intermediary between farmers and research institutes: It acts as an Intermediary between farmers and research institutes.
5. Supervision of agricultural loans: it helps to supervise the beneficiaries of Agricultural loans.
6. Changes people’s attitude towards their problems: it helps to change people’s Attitude towards their problems.
7. Raises standard of living: it helps to raise the standard of living of the farmers.
8. Identification of proper marketing channels: it helps to identify proper marketing channels for the farmers to sell their products.
9. Acquisition of skills: it helps to acquire skills and specialization in the production of crops and livestock.
10. Teaches land management techniques: it introduced and teaches farmers, land Management techniques which increase land fertility and productivity.
11. Teaches improved practices in product processing: it enables farmers to be taught improved practices in processing of livestock and crops.
12. Implementation of auxiliary programmes: it helps in planning, organizing and Implementing auxiliary programmes, e.g. young farmers clubs.
13. Assistance to foreign experts: it enables extension officers to give necessary assistance to foreign experts visiting states on the invitation of government in order to carry out various feasibility studies in various fields of agriculture.
14. Supervision of agricultural development programmes: it assists in supervising and evaluating agricultural development programmes.

**Problems facing agricultural extension in West Africa**

 Problems facing or militating against agricultural extension in West Africa include:

1. Inadequate farm input: Farm or agricultural input are inadequate and often get to the users (farmers)very late.
2. Non-involvement of extension officers: The subject matter specialists (agricultural extension officers) are often not properly involved.
3. Inadequate transport facilities: inadequate transport facilities for extension staff.
4. Inadequate motivation of extension agents: Extension agents are not Sufficiently motivated.
5. Poor supervision of farmers: The supervision of the farmers by the extension agents is weak or poor.
6. Delay in information: Information to farmers is usually delayed and distorted due to poor training of the extension agents.
7. Inadequate of the tradition and customs of local communities: Many agents are ignorant of the traditions and customs of their system. Making it difficult for them to receive audience.
8. Inadequate extension workers: Very few extension workers are available to work with too many farmers i.e. there is low extension-farmer ratio.
9. Poor communication facilities: Poor facilities for extension communication Which limit the scope and efficiency of coverage.
10. Illiteracy of the farmers: target farmers are largely illiterate and find it difficult to follow instructions.
11. Inadequate monitoring of extension agent performance: Poor or inadequate monitoring of the activities or poor performances of the extension agents because of difficulties, therefore, mediocrity is often perpetrated.
12. Inadequate extension tools: Extension tools and facilities are grossly inadequate for the extension workers to succeed.
13. Conservatism of farmers: The conservatism of farmers makes changes difficult.
14. Undefined roles for agents: There is no properly defined roles for the extension workers. Hence, they are not effective in their work.

**Target group of the extension agent**

* Commercial farmers and Subsistence farmers.
* Farmers’ cooperative societies.
* Nomads; youth organization e.g. young farmers club.
* Non-governmental organizations.
* Fishermen/fish farmers.
* Community development associations.
* Bee keepers.

**Methods of disseminating new ideas and techniques to farmers**

 Methods used in disseminating new ideas and techniques to farmers are grouped into three classes: (i) Individual method

(ii) Group method and

(iii) Mass media method.

**Individual method**

 The individual method includes farm and home visits, aimed at direct contact between farmers and the extension agents. The purpose is to give advice or assistance on a wide range of farm and home problems. In order to succeed, it may require the assistance of volunteer leaders or administrators to arrange meetings so as to develop public relation with organizations and important individuals. Examples of individual methods of disseminating ideas and innovations include;

* + 1. home of the farmer
		2. office or farm
		3. telephone call
		4. correspondence
		5. result demonstration.

**Advantages of individual method**

1. It gives and obtains information that will be useful to farmers and Researchers.
2. It can only work for a small group of farmers.
3. More attention is given to the individual farmers than any other method.
4. It may involve the use of telephone which makes information dissemination Faster.

**Disadvantages of individual method**

1. It is a time consuming method.
2. It is also a very tedious method.
3. Extension agent cannot reach many farmers.
4. It may be very expensive e.g. telephone calls.

**Group Method**

 The group method involves the working together with groups of farmers under the supervision of the extension worker(s). Examples of group methods include:

* 1. symposia
	2. lectures
	3. debates
	4. Group discussion
	5. excursions
	6. field trips
	7. group demonstration plots
	8. agricultural show.

**Agricultural show**

 Agricultural show is usually organized by federal, state or local government and companies to demonstrate or exhibit farm produce from improved agricultural practices.

Agricultural show provides forum for interaction between and within farmers and manufacturers. It is also effective in stimulating farmers’ interest to adopt new farm or agricultural techniques or improved practices. It also provides avenues for of agricultural produce.

**Advantages of group method**

1. It enables extension workers to reach out to many farmers at a time.
2. It saves time and money.
3. It is not as tedious as in the case of individual method.
4. Farmers tend to show more interest in what may be introduced.

**Disadvantages of group method**

1. Some member of the group may easily discourage others.
2. Extension agent may not always find all members of the group to be present all the time.
3. Extension officers may not be enough to carry out their jobs in many groups.

**Mass media**

 Mass media involve the dissemination of information through special media of communication to the farmers. The method is used to create awareness and interest in the new ideas and techniques among the majority of the farmers. In other words, this method enables many people to know about the new innovation. Mass media include the use of radio, television, newspapers, film shows, pamphlets, banners, handbills and hand-outs.

**Types of mass media**

 There are two major types or group of mass media. These are electronic media and print media.

* Electronic media: This involves the use of electronics like, radio, television, film show, etc. to disseminate information to farmers. Through the electronic media, many people can easily be reached if only they have the means. It is an expensive method by which farmers can easily be contacted.
* Print media: This involves the use of media like newspapers, banners, handbills newsletters, hand-outs, pamphlets, etc. to disseminate information to people. Just like the electronic media, information can get to many people but illiteracy, combined with poverty would prevent many people from getting the desired information.

 Mass media, (electronics and print) have the same advantages and disadvantages.

**Advantages of mass media**

1. They can reach out to a large audience provided it is within means.
2. They may not require the presence of extension agents.
3. The new techniques and innovation can easily reach the farmer at a fixed date and time e.g. either on radio or television.
4. Time wasting and stress involved in going round the farmers are eliminated.
5. Farmers can put the new ideas to use by themselves.
6. The information, especially print media last long.
7. The printed information can be posted or received by mail.
8. Pictures (in electronic) can easily be served as teaching aids.
9. It is useful in information dissemination to deaf but literate famers.

**Disadvantages of mass media**

1. They are very expensive to operate e.g. talks on radio or television.
2. They are only useful to the educated farmers; illiterate farmers can never benefit.
3. They are only available to farmers who are wealthy enough to own television and radio sets.
4. Farmers may find it difficult to ask questions on matters which they do not understand.

**Agricultural extension programmes in West Africa**

 Agricultural extension programmes are the media or channels through which new ideas and techniques are disseminated to rural farmers. In other words, they are bodies or agencies which have extension workers on the job to improve their daily services that they will be able to transfer these innovations to the rural famers.

**Importance of agricultural extension programmes**

1. To change peoples’ outlook towards their living conditions
2. To teach rural people to recognize and take interest in their problems so as to overcome them
3. To teach farmers improved practices using various methods, demonstrations, Lectures, film shows, sympodial, radio etc.
4. To act as a link between farmers and research institutions/Government
5. To teach farmers efficient management on the farms
6. To assist in obtaining loans and credits
7. To assist in locating markets for their farm produce
8. To monitor the use of Agric loans
9. To assist farmers to locate sources of farm input
10. To evaluate the success or otherwise of the extension programme
11. To educate rural woman on home management
12. To plan and execute farming educational programmes

**Adoption of innovation**

 Agricultural research organization normally brings new innovations to the farmers through extension agents. The adoption of innovations or new ideas and techniques in agricultural is not always automatic. Depending on several factors, the rate of adopting of a particular innovation varies with individuals.

**Factors affecting the rate of adoption of innovation**

1. Level of education: The more educated a farmers is, the higher the rate of adoption of innovation. It will take a longer time for an illiterate farmers to accept new ideas in farming.
2. Attitude of the farmer: Most farmers that develop positive attitude toward new innovations are more likely to succeed than those that do not respond at all.
3. Financial status of a farmer: Experience has shown that wealthy farmers are ever willing to accept and experiment on new farming techniques that than very poor or peasant farmers.
4. Size of the farm: The bigger the farm, the higher the rate at which a farmer will be willing to accept new ideas. Also the smaller the farm the slower the rate of adoption of innovation.
5. Presence of extension worker: the presence of extension worker within the farming community may help the individual farmer to accept the new ideas or techniques in farming.
6. Result of demonstration plots: The result from demonstration plots, particularly, if it is a good one will promote the acceptance and adoption of the innovation but when the result is not good, farmers will abandon the whole idea concerning the innovation.

**Categories of farmers based on adoption of innovation**

 Agricultural research organization or extension officers usually categories farmers according to the rate of adoption of new innovation. These categories include:

* Innovators
* Early adopters
* Late adopters
* Never adopters

**Innovations**

 Innovations are farmers who introduce changes or new ideas of farming into a new area. Such ideas may reach the innovators through the extension agents, mass media, or they might have seen it done in another place. The proportion of such people are usually very small. They may suffer some losses due to inexperience or error during the cause of doing their work. As a result of these reasons, they will require encouragement.

**How to encourage the innovation**

1. Expert advice: There is need for the extension officer to constantly be with innovators to render expert advice to them concerning what they are doing.
2. Granting credit facilities: The extension agent can assist these farmers to source for loans to enable them important or critical for the success of the new innovation must be easily available to the farmers.
3. Provision of farm inputs: Essential farm inputs such as chemicals. Fertilizer, Seed, etc. which are important or critical for the success of the new innovation must be easily available to the farmers.
4. Granting insurance cover: There should be insurance cover, particularly on the new ideas and innovations the farmers are trying to establish. Whether they succeed or fail would not have much impact for the farmers since there is an insurance on the programme.
5. Providing market for produce: This innovators have to be assured that their produce will be purchased at an encouraging price. This will boost the moral in the practice of the new idea or innovations.
6. Organizing agricultural shows: This should be done to enable the innovators exhibit or display their products for the purpose of attracting others.
7. Prizes/Awards: Prizes and awards should be given to the innovators.
8. Subsidy: The activities of the innovators should be subsidized to encourage hem.
9. Market information: The extension agencies should provide vital market Information to the innovators.

**Early adopters**

 Early adopters is the second group that comes in immediately after the innovators. Depending on a number of factors as discussed above, the percentage of early adopters may be high or low.

 If the percentage is low (say 10% or below), it shows that:

* The new idea was not uniformly accepted
* The new idea has to be practiced by some for others to see the result
* The new idea must have run into a hitch
* The new idea must have run into been too complex to understand

 if the Percentage is high (say 30% or above) it shows:

* The new idea was uniformly accepted
* The new idea was practiced by all farmers
* The new idea was smoothly executed without problems
* The new idea was a simple and an easy one.

**Late adopters**

 Late adopters are the third group of farmers that can accept new ideas and techniques. In most cases, the number or percentage of late adopters is usually very high.

**Reasons for high number of late adopters**

1. They may be illiterate farmers.
2. They may be poor or peasant farmers.
3. They may have conservative attitude.
4. The idea may be too complex for them.
5. Some of the farmers must have waited to see the result of that of a person.
6. Practicing them now some of the farmers must have run into problems in the course of implementing the new innovation.
7. The farmers may be disenchanted with inconsistent government policies and programmes.
8. Poor communication system also account for high number of late adopters.
9. It may also be as a result of a weak extension system.
10. Cultural and tradition belief system do slow down the adoption of new ideas.
11. When the result of the new technique is not significantly better than the existing method, the people drag their feet.

**Never adopters**

 Never adopters is the last group of farmers that will never accept nor adopt the new innovations. This group of farmers no matter how best the extension agents will try to convince them, will never change their mind. High level of illiteracy, poverty and conservatism are the major reasons for these farmers’ unwillingness to adopt new innovations.

**Factors responsible for their unwillingness to accept or adopt innovations**

1. Illiteracy: These farmers who are never willing to adopt innovation are mainly Illiterates who can never appreciate any good work.
2. Conservative attitude: This group of farmers are never willing to accept new Ideas. They will prove to the extension agent that cannot teach them farming as they have been doing it ever before they were born.
3. Poverty: As a result of the high level of poverty, these farmers are never willing To spend a mite of money to acquire new idea. They might need everything free of charge.
4. Lack of exposure: Most of these farmers lack exposure. Hence, they can never appreciate good work or idea that may come to them.
5. Fear of tax payment: These farmer see extension officers as tax collectors. They believe the officers are sent by government to use the introduction of innovation as a means of collecting taxes from them.

**Qualities, functions/roles and problems of agricultural extension officer or agent or worker**

**Agricultural extension officer/worker**

Meaning: An agricultural extension officer or worker is a person who is involved in the dissemination of new ideas and techniques from the research institutes to the farmers. He acts as an intermediary between researches and the farmers.

**Qualities of a good extension worker**

1. Originality: For an extension officer or worker to succeed as an agent of change, He must be original. He must have the native intelligence to be original in his thoughts, words and action.
2. Leadership: He must be a leader among leaders. He must be able to know the Way i.e. his goal and lead the rural farmers to grasp and embrace that goal. He must be patient and able to inspire the rural farmers to achieve the goal.
3. Initiative: A good extension worker must have initiative to tackle problems Himself before referring them to supervisors. He must be able to take steps without being directed.
4. Organizational ability: The success of any extension activity will depend on how It is planned, organized and executed. He should be able to organize training of leaders.
5. Problem solving ability: A good extension worker must be able to recognize Problems, define them in simple terms and solve them if they fall within his training and experience.
6. Clear judgment: He must possess great foresight, he must be able to appreciate The problems of the farmers on the ground and know what to do to solve them.
7. Reliability/honesty: An extension worker must be reliable, a man of his words. If The agency sends him down to the rural area, he should go down to deliver the piece of information and bring back feedback. If the rural farmers discover that he is reliable, they can then assimilate the new innovation and research findings.
8. Communication skill: An excellent extension worker must possess good Communication skills e.g. good command of local language, boldness and oratorical abilities.
9. Freedom from local politics: A good extension worker must not be involved in The local polities so as to win the confidence of all members of the target group.
10. Respect for culture and traditions: He must be a good mixer for him to succeed. He must be able to come down to their level. He should dress like them, eat whatever they present, possibly drink their water, while not losing his goal for doing all these. By these wise behavior he will win the hearts of the rural farmers. He should not feel superior to the farmers so as to achieve his goal. He must be approachable.
11. Technical knowledge: With sound training, an extension worker must be able to Impact knowledge. He should be able to motivate these adult learners to acquire knowledge.
12. Punctuality and availability: He should be able to attend all pre-arranged Meeting, seminars, workshops, etc. promptly and always make himself available.

**Roles of an extension worker**

1. He provides agricultural consultancy services: He consult and reflects on rural or agricultural development project for the farmers.
2. He plans and executes programmes: He plans and executes farming educational programmes.
3. He organizes and supervises farmers’ groups: He organizes and supervises farmers’ groups i.e. meeting, co-operatives and their workers; meetings.
4. He conducts and organizes training for farmers: He conducts or organizes training for farmers.
5. He liaise with other agencies: He liaises with other agencies that may have influence on the rural environment and the farmers.
6. He assist in improving farmers’ outlook: He helps to improve the outlook of farmers towards their problems or difficulties.
7. He acts as intermediary between researchers and farmers: He acts as a connecting lick (intermediary) between the researchers and the farming communities.
8. He teaches farming practices: He teaches improved farming practices to farmers.
9. He evaluates extension programmes: He evaluates agricultural extension programmes and projects.
10. He supervises agricultural loans usage: He supervises the utilization of agricultural loans.
11. He locates marketing channels: Extension agents do assist farmers to locate marketing channels for farm produce.
12. He sources for farm input: Extension agents also assist farmers to source for farm input like fertilizers, seeds, chemicals etc.
13. He sources for farm loans: Extension workers also assist the farmers to source for loans to enable them buy various input and produce crops and livestock.

**Problems facing an agricultural extension officer**

 Problems facing an agricultural extension worker or officer in the discharge of his duties include:

1. High level of farmers’ illiteracy: High level of illiteracy among farmers may affect the rate of adoption of new farming techniques.
2. Absence of credit facilities: Absence of credit facilities to farmers make them uninterested and prevent the implementation of accepted innovations.
3. Insufficient motivation of extension agent: Insufficient motivation of the extension workers by way of better remunerations for their effort tends to retard their performance.
4. Inadequate resources: Extension workers do not have adequate resources, such as money, to travel or enough materials to supply their target farmers.
5. Unfavorable attitude of farmers: Unfavorable attitudes of rural farmers towards government programmes, tend to make extension work a bit difficult.
6. Inadequate trained extension agents: Inadequacy of well-trained extension staff makes the extension worker have a wider area and more farmers than he can cope with.
7. Un coordinated efforts by government agencies: Un coordinated efforts by government agencies may lead to confusion and rejection by farmers.
8. Poor transportation network: Poor transportation network by way of lack of vehicles and motor able roads, militates against the extension worker.
9. Inadequate evaluation machinery: Inadequate evaluation machinery makes it difficult for he agent to assess their own achievement or success.
10. Non-involvement of farmers in planning programmes: Rural farmers, the ultimate consumers of extension programmes are not involved in planning programmes are not involved in planning programmes which results in non-commitment to such programmes when it is introduced.
11. Language barriers: Language barriers do lead to improper dissemination of new innovations by the extension worker.

Inadequate publicity: inadequate publicity by way of mass media are not fully utilized in publicizing extension programmes.

**TOPIC:PROCESSESS OF ANIMAL IMPROVEMENT**

 There are three processes or methods of animal improvement.  These are introduction, selection and breeding.

INTRODUCTION

 Introduction is the bringing into the farm or a country, high quality breeds of livestock with a high productive capacity and other good desirable characteristics from another farm or country.  Before the introduction of such animal from another (exotic breeds), one must be sure that such breeds possess higher quality characteristics than the local breeds.  Different breeds of farm animals exist and these include  the local breeds, imported breeds and the cross breed.

The local breeds are usually small animals, slow-maturing, poor producers, but adapted to local environment and resistant to many diseases.  The exotic (imported) breeds are big animals, early-maturing, good producers but may not adapt to local environment and not resistant to  many diseases.  To obtain a balance, the exotic breeds are used to mate the local breeds to obtain cross breeds which will now combine all the good qualities of exotic and local breeds.

**Advantages of Introduction**

1. Breeds which are not originally present in the home country are introduced
2. It enhances greater productivity
3. It leads to the absence of pests and diseases
4. Breeds may perform better in terms of quality and quantity, if it is able to adapt to local environment **.**

**Disadvantages of Introduction**

1. It may introduce new diseases (s) to the area.
2. It may introduce new pest(s) to the area.
3. It may have the problem of adaptation to the new area.
4. It may not perform maximally.

**SELECTION**

 Selection is the process of picking or selecting from a mixed population, those animals with breeding value as parents.  Selection is undertaken to maximize genetic gain.  It helps to select animals that are capable of transmitting their genetic attributes to their offspring.  Animals with desirable characteristics like good meat production, egg laying etc, are selected.  Selection is grouped into two main classes.

* Natural Selection: This is the ability of individual animal to weather through unfavourable environmental forces to survive and reproduce.  Those that are unable to survive die off.
* Artificial selection: This selection is done by man using his intelligence and influence to select and mate animals in order to increase the number of animals.   There are four types of artificial selection.
* Mass selection: Animas are selected or rejected on the basis of their own performance (merit).  Animals with the desired characteristics are chosen in preference to those not possessing them from a large group of animals.
* Progeny selection: Animals are selected on the performance of their progeny or offspring.  Mothers of the best performed offspring are retained while the mothers of offspring that do not perform well are discarded.
* Family selection: Animals are selected or rejected on the basis of the performance of the relatives or family.  It is usual when family size is large.
* Pedigree Selection: Animals are selected or rejected on the basis of the performance of their ancestors.  This is based on the belief that ancestors have passed on their traits to the animals being considered and so the animals are likely to perform equally or even better than the ancestors.

**Advantages of Selection**

1. It ensures that only the best naturally available animal is selected.
2. Animals with desirable characteristics are selected.
3. Animals from best breeds are bred for distribution
4. Animals with undesirable characteristics are detected and rejected
5. Selection reduces the spread of diseases.
6. It also reduces the spread of parasites associated with breeding stocks.

**Disadvantages of Selection**

1. Selection is tedious and time consuming.
2. It is very costly in terms of time and money
3. It requires expertise which may not be readily available.
4. It brings about elimination or exclusion of some desirable traits of some parent stock.
5. No new desirable characteristics are introduced.

**Breeding**

 Breeding involves the breeding or development of animals by transferring inherited qualities from parents to offspring.  This is achieved through mating.

**Types of Breeding**

* In-Breeding:

This involves mating of more closely related animals than the average of the population from which they come, e.g., the mating of father to daughter, son to mother or brother to sister.

It produces offspring with undesirable characteristics because of recessive genes showing up.

It also enables the farmer to get desired character or quality well developed in an animal

In-breeding helps to produce inbred lines that can be used for cross breeding to produce hybrid vigour.

It also leads to in-breeding depression.

* Line-breeding:

It is closely related or similar to in-breeding.

It involves the mating of not too closely related animals, e.g., mating between cousins.

It has the same disadvantages as in-breeding, but it takes a long period for undesirable trait of the parents to appear (i.e in-breeding depression)

It is used to consolidate traits for a sire or dam.  Most of the high quality commercial characters developed recently have been as a result of line-breeding.

* Cross Breeding:

This is the mating of proven quality animals from different breeds

It may lead to an increase in hybrid vigour, e.g., the cross between muturu breed of cattle which is resistant to trypanosomiasis and Whit Fulani which is susceptible to the disease to produce a hybrid which combines he good qualities of the two breeds.

It results in breeds of animals with higher production capacity than any of the parents

It brings about greater rate of growth in an offspring.

It produces individuals that can withstand climatic variation in the environment

It increases diseases resistance in offspring.

It also promotes higher yields of eggs, meat and milk in offspring.

* Out Breeding: This is the mating of unrelated individuals animals within the same breed.  Out-breeding is the opposite of in-breeding.  It produces offspring with greater vigour and productivity.

**Advantages of Breeding**

1. The crossing or mating of superior animals from two different breeds produces an offspring that is superior to the average of either parent.  This is called hybrid vigour or heterosis (cross breeding).
2. Offspring grows more rapidly and is more economical to rear (cross breeding).
3. It results in the production of pure breeds or pure lines (in-breeding).
4. It helps to concentrate and preserve specific qualities in an animal (In-breeding)
5. Off springs produced can withstand variations within the environment (cross-breeding).

**Disadvantages of Breeding**

1. It may result in in-breeding depression, i.e., a reduction in vigour and performance (in-breeding).
2. It can also result in drop in production such as, milk, egg, mat, slow growth rate, loss of fertility (in-breeding).
3. It may also result in poor resistance to diseases (in-breeding).

**ARTIFICAL INSEMINATION**

 This is the introduction of semen into the reproductive tract of the female by a method other than natural mating.  The semen containing spermatozoa are carefully handled, diluted and stored in freezer at a temperature of 196oc in liquid nitrogen until it is required for use.

For artificial insemination to succeed, the semen which has been stored is introduced into the female reproductive tract during breeding cycle (the heat period) so that fertilization will occur.  Artificial insemination is only possible in animals whose heat period is easily observable because spermatozoa are only viable for few hours after introduction in to the female reproductive tract.

Methods of collecting semen from a proven male for use in artificial insemination are:

* Artificial vagina
* Massage method
* Electro-ejaculation
* Recovery of semen from the vagina after service.

**Advantages of Artificial Insemination**

1. It is easier and less expensive than natural mating since the farmer is saved the expense of maintaining a herd of male animals.
2. It is easier and cheaper to import he semen of exotic breeds rather than the male animals themselves.
3. It makes it possible to use the best male animal to a large extent.
4. It is possible to service many females of different sizes leading to the production of many offspring.
5. It brings about reduction in the transmission of venereal and infectious diseases.
6. It allows for the testing of offspring of a particular individual within relatively short period of time.
7. The semen of a good bull can still be used long after the death of the bull.

**Disadvantages of Artificial Insemination**

1. It requires expertise which may not be readily available
2. Difficulties in detecting heat in female animals may limit the success of artificial insemination
3. In-breeding effects may show up if only a few bulls are used in a particular environment.
4. If the handling procedure is inadequate (i.e improper timing of breeding in the oestrus cycle), the pregnancy rate may be very low.

**TOPIC**: **AGRICULTURAL FINANCING**

MEANING OF AGRICULTURAL FINANCE AND CREDIT

 Agricultural finance is defined as the act of acquisition and use of capital in agriculture.  In other words, it deals with the supply of and demand for funds in the agricultural sector of the economy.  On the other hand, agricultural credits are loans obtained by the farmer to start or to expand his farming business.  It is repayable over a period of time with some interest as determined by the source of the credit.

**Types of Farm credits**

 There are three types or classes of credit.  These are:

* Short term Credit: This is a productive credit which the borrower is expected to refund in a year or less.  It may be used to purchase livestock feed, fertilizers, seeds, fuel, or to pay for hired labour.
* Medium term credit: This credit is to be repaid within a period of two to five years.  It may be used to purchase machinery, breeding livestock or housing for livestock.
* Long term credit: This credit is repayable within a period of three to 20years.  It can be used to purchase costly fixed assests such as land, construction of farm buildings, dams and irrigation projects.
* Agricultural Subsidy: Agricultural Subsidy refers to a non-refundable aid granted to a farmer.  Examples include reduction in the prices of inputs such as fertilizers, improved seeds, chemicals, etc, free information such as weather forecast, new technology, market sources, etc.

**Interest**

Meaning: Interest is the amount paid on borrowed capital or an amount earned above the cost of goods.  Interest is usually paid on borrowed capital which usually comes along with loans.  For example, if a farmer borrows N500,000.00 from a bank and the interest on the loan is 10%, it means the amount he will pay as interest is N50, 000.00 per annum, i.e.,

 X  = N50,000.00

When the farmer is paying back the loan with the interest, the total amount he will pay the bank is N550, 000.00

Differences between Subsidy and Credit

S/N

CREDIT

SUBSIDY

i.

Credit is a repayable loan.

It is a non-repayable loan.

ii.

Credit is always in cash

It may be in cash or in land.

iii.

It includes bank loans, credit schemes and cooperative

It includes reduction in prices of input like chemicals, seeds, fertilizers, etc.

iv.

It has a time  period for its return

It is given and never to be re-turned

v.

Government does not bear part of the burden of a loan

Government bears part of the burden of a subsidy

**IMPORTANCE OF AGRICULTURAL FINANCE**

1. It enables farmers to meet seasonal and annual fluctuations in income and expenditure
2. It enables farmers to adjust to changing economic conditions.
3. It also increases the efficiency of the farmers
4. It enables the farmer to increase the size of his farm.
5. It helps to protect against adverse conditions on the farm.
6. It enables farmers to acquire more farm inputs for increased production.

**SOURCES OF FARM FINANCE**

 Farmers can get credit or loan to finance their farming business through any of the following sources:

* Agricultural bank: Agricultural bank such as the Nigeria Agricultural and Cooperative Bank (N.A.C.B) was established in 1973 to grant loans to all potential farmers.  Only farmers can borrow money from the bank, hence it is called the Farmers’ Bank”.
* Commercial Bank; Commercial banks are major sources of lending to agriculture.  Banks like First Bank, U.B.A, Union Bank have agricultural departments where the farmers can get loan to carry out their farming activities.
* Supervised agricultural credit Scheme: This scheme was set up with the purpose of granting loans to farmers.  The scheme is supervised by the Central Bank of Nigeria (C.B.N)
* Thrift and saving societies: Members contribute money either daily, weekly or monthly.  At the end of an agreed period, the money is paid back to the members which they can use for their farming activities.
* Money lenders: These are people who lend out their money to farmers to enable them to produce.  However, the money lender will charge high interest rate and demand security for such loan.
* Cooperative societies: These are the people who come together to pull their resources (money) together to produce.  Members can easily get loan from the societies.  Apart from this, commercial banks prefer to give loans to cooperative societies than individual farmers.
* Government agencies: Farmers can easily get loans from certain government agencies like the National Directorate for Employment (N.D.E) and Agricultural Development projects (A.D.P) for their farming activities.
* Self Finance: This refers to the money saved by an individual which can be used to finance his farming activities.
* Individuals: Farmers can also borrow money from individuals like friends and relatives to finance a project.

**Problems Farmers may Encounter from Some Credit Sources.**

* Commercial Banks
1. They are usually biased in favour of large sacle farmers only.
2. They demand collateral which farmers cannot provide.
3. There is the problem of relatively high interest rate.
* Community Banks
1. The amount of credit is usually small and inadequate to meet the needs of farmers.
2. They insist on a would-be lender coming to open account with them before loans are given.
* Money Lenders
1. They are usually biased towards enterprises that bring in quick returns to repay the loan.
2. Their interest rates are too high to allow for an appreciable input from the farm business.
* Family Sources
1. The use of loan is usually small and inadequate
2. They usually insist on short-term credit.

**IMPLICATIONS OF FARM CREDITS**

 The procurement of loans or credits for farming activities is associated with some implications.  In other words, farmers find it difficult to get loans from banks because of the following reasons:

1. Interest rates: Interest rate is the rate at which farmers can borrow money from bank, i.e, the amount of interest a farmer will have to pay on the money borrowed.  High interest rate discourages borrowing while low interest rate encourages borrowing.  Therefore, farmers cannot borrow when the interest rate is too high.
2. Collateral Security: This is what the banks and other financial institutions will want a borrower to present before a loan can be given.  Such securities include landed property, buildings, etc.  most farmers do not have these securities and therefore, cannot borrow money.
3. Long gestation period of some crops: Some crops like rubber, cocoa and oil palm take a very long time to mature.  Banks, therefore, find it very difficult to grant loan to farmers engaged in the cultivation of such crops.
4. Unpredictable climate which can lead to crop failure: Agricultural activities in Nigeria depend naturally on rainfall.  A good rainfall encourages productivity but lack of rainfall is a doom to farming activities.  Banks, therefore, are always afraid to lend money to farmers because unfavourable climate can lead to crop failure.
5. Lack of farm records: Farmers lack good farm records of all their activities which can be used to assess their credit worthiness.
6. High level of loan defaulters: Farmers may not be able to repay the principal, let alone the interest charged, in case of natural disaster.
7. Lack of insurance Policy: Farmers do not take insurance on their farms.
8. Lack of moratorium: Banks do not give moratorium or deferment of payment of loans to farmers.
9. Land tenure System: The prevalent land tenure system works against procurement of agricultural loans.
10. Small farm holdings: Farm holdings are too small and uneconomical to operate for mechanization and profit.
11. Lack of awareness: As a result of high level of illiteracy among farmers, they are hardly aware of the existence of loan facilities in banks.
12. Bureaucracy: Bureaucracy (red tapism) which is normally involved in the procurement of loan does lead to non-disbursement of loans to farmers.

**TYPES AND CLASSIFICATION OF FARM ANIMALS**

Farm animals refers to a group of animals which are rear in the farm either for food or for commercial purposes.

The various types of farm animals include :

Poultry (fowl),pig, cattle,sheep,goat, rabbit, snail,ducks, turkey,geese, ostrich,fish, shrimps, grass cutter,need etc.

Farm animals are classified into three major groups,based according to :

a) Habitat

b) Nature of their digestive tract

c) Uses

Classification of farm animals according to habitat :

Habitat is defined as any environment in which an organism lives naturally.

Types of farm animals based on their habitat

a) Terrestrial Habitat : Terrestrial habitat refers animals that live on land.All their growth, development, feeding and all activities are related to land.e.g. poultry birds, cattle,sheep,goat, rabbit,geese, turkey,pig, ostrich and grass cutter.

b) Aquatic habitat : Aquatic habitat refers to animals that live in water (river, streams,lakes, lagoons,well,ponds,seas etc) all their growth, development, feeding and all activities are related to live in water e.g.fishes,crabs and shrimps.

Classification of farm animals based on the nature of their digestive tract ( alimentary canal.

Digestive tract is that part of the digestive system where digestion of food takes place in the body.These are :

a) Monogastric ( non- ruminant animals : These are animals which possess only one stomach and they do not ruminate ( i.e.they do not chew the cud).These animals have simple stomach and cannot digest cellulose and fibres properly e.g pig, rabbit and poultry birds (domestic fowl, turkey, ostrich and geese).

b) Polygastric ( ruminant animals) : These are farm animals which possess four stomach compartments ( complex stomach) and hence they can ruminate or chew the cud.These animals can chew the cud and digest cellulose and fibres properly.The four stomach compartments of these animals are rumen,(the largest), reticulum, omasum and abomasum ( true stomach) e.g.cattle, sheep,goat and rabbit.They are all herbivores (i.e they feed mainly on herbs or grasses ).

Classification of farm animals based on their uses

All farm animals are reared for one or more uses to the farmers either for food or for other purposes.Some of the uses of farm animals include :

1) Food (protein, mineral and some vitamins) e.g. cattle,sheep,goat, rabbit,fowls turkey,snail e.t.c.

2) Hide and skin ( derived from the skin of cattle, sheep, goat rabbit e.t.c).Used for bags,shoes, footwear, jackets and decorations.

3) Horns ( derived from cattle, sheep and goat,found in the head regions of these animals,used as raw materials in knife handles,bell heads, decorative purposes, fertilizers,feed ingredients, musical instrument flute, for fighting in form of protection.

4) Milk : Milk is derived from farm animals like cow (cattle),ewe (sheep),sows (pigs), and for (goat).The part that produce this milk is the mammary gland or udder.Milk provide protein in food,used in baby food preparation, supplies mineral and vitamins to livestock.

5) Egg : Eggs are mainly produced in poultry birds e.g.fowls,turkey,geese,turkey,geese and ostrich.Egg is a source of protein,use in pharmaceutical,used industrially, for paint making, adhesives,scouring powder, sources of calcium in animal feeds,also used in the manufacturing of vaccines and cosmetics.

6) Feather : Feathers are derived mainly from poultry birds such as domestic fowl, turkey,geese and ducks, feathers are used mainly for making pillows, cushions, mattresses and dusters.

ENVIRONMENTAL PHYSIOLOGY

Environmental physiology refers to the effects of the environment on the growth and performance of farm animals.Normal growth and performance are enhanced when climatic factors like temperature, rainfall,wind,relative humidity, sunlight e.t.c. are moderate.Excess or lack of these factors definitely will definitely will have a negative impact on the growth and overall performance of farm animals.

Effects of changes in climate on growth of farm animals :

i) Extremes of either hot or cold conditions is unfavourable and reduces the performance of farm animals.

ii) Wind aids the spread of disease (e.g. tuberculosis) which cause retarded growth and even death of farm animals.

iii) High rainfall leads to the multiplication of tsetse flies which transmit trypanosomiasis and such disease reduces the growth or even leads to the death of farm animals.

iv) High temperature leads to heat stress in farm animals.

v) High relative humidity affects the food intake of farm animals.

vi) High intensity of radiation affects food intake of farm animals.

vii) High humidity in poultry houses causes mouldiness of feed, thereby leading to low feed intake and retarded growth.

viii) Moderate wind velocity promotes good ventilation, enhances normal growth of farm animals.Extremes of wind have negative impacts on the growth of animals.

ix) Increase in temperature of blood flowing through the brain of birds initiates panting and this inturn leads to water loss through evaporation.

x) At low temperatures,there is reduced feed efficiency as more nutrients are needed for body maintenance, leading to poor growth.

Effects of temperature on :

a) Brooding of chicks :

i) Temperature of 35-39°c provide warmth blfor the chicks.

ii) Temperature range of 35 -39°c leads to proper development.

iii) Moderate/ideal temperatures makes them to spread evenly and feed well.

iv) High temperature makes chicks to pant and move away and sit with their mouth open.

v) Low temperature leads to hurdling together which may lead to suffocation and death.

vi) High temperature leads to poor feather development.

vii) High temperature leads to pecking

viii) There is greater susceptibility to diseases at both high and low temperatures lead to retarded growth.

ix) Both high and low temperatures lead to poor feed efficiency/ utilization.

Effects of changes in climate on reproduction

i) Heat stress (i.e, high temperatures) causes abortion in farm animals.

ii) High relative humidity affects the productivity of farm animals

iii) High intensity of radiation causes heat stress in farm animals,thus reducing their reproductive capabilities.

iv) High temperature leads to low rate te of conception or fertilization in farm animals.

v) At high temperature,frequency of mating and quality and quantity of semen in breeder birds decrease.

vi) At high temperature,fertility, fertility and hatchability in breeder birds decrease.

vii) High temperature decreases ovulation in animals.

viii) Light controls sexual maturity ( low light intensity is desirable for rearing pullets to prevent early sexual maturity.

ix) High rainfall and high humidity cause chilling of young ones soon after parturition.

x) High temperature decreases or reduces sexual activities in farm animals.

xi) Egg production is drastically reduced at extremes of temperatures.

xii) High temperature can reduce spermatogenesis of male animals.

Effects of changes in climate on milk production

i) High relative humidity favours the growth of disease pathogens that can reduce milk production in farm animals.

ii) High intensity of radiation from the sun causes heat stress in animals,thus reducing their milk production.

iii) High temperature causes heat stress,this reducing the rate of milk production in farm animals.

iv) High temperature and rainfall do not favour the rearing of dairy animals.

v) High rainfall leads to the multiplication of tsetse flies which transmit trypanosomiasis in dairy cows,thereby leading to low milk production.

vi) Extremes of rainfall do not favour the growth of grasses, leading to low feed, intake and less milk production by farm animals.

vii) Milk spoilage occurs at a temperature of 37°C.

viii) Pathogenic bacteria in mil are destroyed when milk is subjected to a high temperature of about 74°C (pasteurization).

ix) Extremes of temperature affect feed intake, leading to low milk production.

x) Physiological process are retarded at extreme of temperature leading to low milk production.

Effects of changes in climate on egg production

Changes in climate have some effects on egg production in poultry birds.The effects include:

a) Temperature

i) High temperature causes a reduction in feed intake, leading to low egg production.

ii) It reduces spermatogenesis and libido in males.

iii) High temperature causes heat stress,thus reducing egg production.

iv) It may result in death of birds, particularly chicks and layers.

v) It increases water intake in hot weather and reduces water intake in cold weather.

vi) It is necessary for incubation of eggs.

vii) High temperature leads to decrease in feed efficiency, leading to a low egg production.

viii) Egg storage period is reduced under high temperature.

ix) High temperature reduces hatchability of eggs.

x) At high temperature, fertility and hatchability in breeder birds decrease.

xi). Extreme temperature leads to decrease in egg quality.

xii) Ideal or moderate temperature leads to better egg production.

Control of Heat/Temperature

i) Fans or air conditioners should be introduced.

ii). Enough windows or opening for ventilation should be provided.

iii). Windows should be covered with cloth materials to conserve heat.

iv). Vents should be provided at the roof tops.

v). Poor conductors of heat should be used as roofing sheet.Sun reflecting sheets can also be used or the roof should be painted with white.Pens should also have ceiling boards under the roof.

vi) Room heaters or lanterns should be used to warm buildings when it is cold.

vii). During construction, keep open parts of buildings away from direct solar radiation (i.e. East - west direction).

b) Relative Humidity

 i). It is very important in incubation of eggs.

 ii). High humidity compounds heat stress.

 iii). Low humidity induces rapid water loss from the birds' body and thus increases their water intake.

 iv). High humidity encourages the spread of diseases.

 v) High humidity causes feed to go mouldy.

Control of Humidity

i) This can be controlled by fixing of humidifyers or open trays filled with water to increase humidity.

ii) Free ventilation should be allowed when the humidity is high.

iii). Spilling of water in poultry houses should be avoided to reduce humidity or dampness.

c) Light

i) It controls egg laying in hens.

ii) Duration of lighting controls time spent at feeding which regulates growth and the rate of feathering.

iii). Direct light of high intensity causes stress to the eyes.

iv). Bright light makes the birds active.

v) Light makes objects visible.

Control of light

i) In short day length,extra illumination should be provided.

ii) A reasonable part of the walls should be made up of wire mesh or glass to promote lighting.

iii) Windows should be covered with dark cloth to reduce light intensity.