

FARM MACHINERY

Farm machinery is a labour saving devices used in farming operations. They include various types of machines and implements used in the farm such as tractors, ploughs, harrows, cultivators, ridgers, planters, harvesters, shellers, dryers, sprayers, incubators and milking machines

TRACTOR

The tractor is a powerful and expensive multipurpose motor vehicle used for lifting or pulling farm implements. It consists of an internal combustion engine and a hydraulic system equipped to power both mobile and stationary equipment and implements. It also has a power-take-off (P.T.O.) shaft and coupling points that are used in pulling implements like a ploughs, and four wheels consisting of two large hind wheels and a pair of small front wheels.

FUNCTIONS /USES OF THE TRACTOR

- Tractor is used in drawing farm implements like ploughs, harrows, ridgers, planters etc.
- It can also be a stationary power source for equipment like shellers, threshers, grinders etc
- It is used to carry farm inputs like chemicals, fertilizers, seeds etc from one section of the farm to another.
- It can also be used to carry harvested crops or other products from the farm to the market.
- It is used for transporting of farm workers
- It is used for bush clearing, cultivation, planting, weeding and applying pesticides

DAILY MAINTENANCE OF A TRACTOR

- Keep the tractor clean by removing all trashes/mud at the start of any operation.
- Check water and oil levels daily and top it when necessary.
- Check tyre pressures before start of operations.
- Check electrolyte of battery every day and top where necessary.
- Adhere strictly to manual or manufacturer's advice

PERIODIC MAINTENANCE OF TRACTOR

- Worn out tyres should be replaced and tyre pressure guaged regularly.
- Ensure that nuts, screws or shield are checked and tightened at regular intervals and replace them necessary.
- Employ a competent and experienced tractor operator.
- Servicing of the fuel injectors is required.
- Wash and clean the caburator regularly and always park the tractor in a shed.
- The linkages, steering and other movable parts should be greased occassionally.

BULLDOZERS

- Bulldozers are powerful tractors and expensive machines with a broad steel blade or sheet at the front.
- It has a tract-type metal chains, used for its movement.
- It consists of internal combustion engine which uses diesel or petrol.
- The bulldozer which has track metal chains, moves by the aid of driving sprocket, track rollers and idler rollers.

FUNCTIONS AND USES OF BULLDOZER

- Bulldozer is used for bush clearing.
- It is used for felling trees and stumps.
- It is used for levelling the ground.
- It is also used to construct roads on the farms and in the rural areas.
- It is used in the moving and collection of earth.

DISADVANTAGE OF USING BULLDOZERS FOR LAND CLEARING

- It destroys the structure of the soil.
- It leads to reduction of soil fertility.
- It also causes compaction of the soil.
- It can cause air and noise pollution.
- The bulldozer is an expensive that cannot be afforded by peasant farmers.
- It can cause soil erosion and water logging.

TREE PULLER

The tree puller is a machine that looks like a bulldozer having the ability to move on the top soil surface with minimal disturbances on the top soil. It has a unique feature of pulling up trees from their stands with slight disturbance of the rich top soil.

ADVANTAGES OF USING THE TREE PULLER OVER A BULLDOZER

- Tree puller does not compress the soil.
- It does not remove the top soil which is very fertile.
- The removal of soil cover is avoided, thus retaining mulching effects of vegetative cover.
- Land is less prone to erosive forces.
- The organic matter content of the soil is retained.
- It leads to non-destruction of soil structure.
- It normally uproots the trees with minimal disturbance of the soil.

SHELLERS

A sheller is a machine operated electrically, mechanically, or manually. It is made up of a hopper, bucket, a winder and a drum with rubber or metal spikes. It is a processing machine used to separate dry grains at 10% moisture content from a cob or maize.

FUNCTIONS: They are used mainly to separate the seeds from the husk or cob – removing the hard, covering of nuts, grains (rice, maize, cowpea). Etc.

DRYERS

- These are machines used to reduce moisture content of commodities electrically such as grains, cocoa etc.
- **FUNCTIONS:** It is used for drying plant materials e.g. cocoa, groundnuts, beans, maize etc. It is also used for drying animal products such as meat. It generates heat or distributes heat which dries up or reduces moisture content of stored produce

INCUBATORS

Incubators are made in varying sizes and designs. It uses different types of fuel such as oil lamp, electricity etc to supply the heat required. They are used for hatching fertilised eggs artificially taking 21 days for fertilised eggs of domestic fowl to develop and hatch in incubators. Before the eggs are placed, the incubator should be run for 12-24 hours. For incubators to function properly, they require the following conditions – temperature of 37-39 °C , adequate ventilation and a relative humidity of 50-70%; an optimum level of 60%.

MILKING MACHINES

- Milking machines are used for milking or extracting fresh milk mechanically from the udder of cattle, sheep (ewe) and goat (doe). Milking machines are more efficient; they save labour; stop the cow from becoming strippers and reduce the danger of contamination. The quality of milk obtained depends on the care taken in cleaning and operating the machine. The process by which the substance – milk collected with the milking made is made fit for human consumption is called **pasteurisation**.

ECONOMIC IMPORTANCE OF MILK

- It is a source of protein in food.
- It can be used in raising foster calves, lambs or children.
- It is used in the preparation of baby food.
- It supplies mineral to livestock.
- It is used as an extender in artificial insemination practices.
- It is also used in the preparation of dairy products such as butter, cheese, yoghurt. Etc.

STEPS TO TAKE DURING MILKING

- Thorough cleaning of animals before milking.
- Fore-milk must be tested with test cup.
- Handle milking with care. The farmer should concentrate on their work while the animal being milked should be treated with care.
- There should be no distractions like smoking during milking.
- Milk animals in clean environment.
- Observe hygienic or sanitary rules.

HARMFUL CONTAMINATIONS OF MILK IN A DAIRY FARM

- Stones/pebbles
- Urine
- Droplets from sick animals
- Straw/Hay/Silage
- Body hair
- Bacteria
- Dirt from tools
- Excreta
- Insects
- dusts
- Cobwebs

TRACTOR - COUPLED EQUIPMENTS

PLOUGH

The plough is a primary tillage or soil cultivation implement. Mainly driven by animals or tractor which is the first implement required in land preparation. There are two types of ploughs namely the disc plough and the mouldboard plough.

DISC PLOUGH

This implement is strong in nature and adapted to tropical environment where the soil contains stones, hard pans, and roots of plants.

Parts of a disc plough include beam or frame.

Coupling point or hinge, linkage point or scrapper, concave disc, knife, disc bearing, furrow wheel or balancing disc, spring, standard and beam cap.

ADVANTAGES OF USING A DISC PLOUGH

- Disc plough is capable of working in heavy soil and moulding heavy soil.
- It is designed to roll over stumps and obstacles which may easily damage the edges of mouldboard plough.
- Makes deeper cut than a mouldboard.
- Roots of trees are extensively removed.
- Buries weed more completely than mouldboard plough.

DISADVANTAGE OF USING A DISC PLOUGH

- It causes soil compaction due to its heavy weight and constant usage.
- It may results in soil erosion.
- It leads to destruction of soil structure.
- Ploughing is not uniform leaving some of the surface rough and some ground uncut.

MOULDBOARD PLOUGH

- The mouldboard plough is also a primary tillage implement used for land preparation. It is adapted for use in temperate or light soil where there are no rocks , hard pans and plant roots. The mouldboard plough is not strong as the disc plough. Parts of the mouldboard plough include: beam frame, coulter or vertical disc, share point, mouldboard and standard .
- Beam/Frame: It carries the plough and other components and provides additional weight for greater depth.

- Coultier or Vertical disc: It makes vertical cuts and furrows.
- Share point: This makes horizontal cuts and uproots weeds.
- Mouldboard: It carries the soil and inverts the weeds or exposes the roots of weeds.
- Standard: It bears the mouldboard and share.

ADVANTAGES OF USING A MOULDBOARD PLOUGH

- It can only be used in temperate soil or light soil.
- It can also be used in soil free from stones, stumps and hard pans.

DISADVANTAGES

- > It cannot be used very well in tropical environments
- > It loses its share point when in contact with an obstacle.
- > It predisposes soil to erosion.
- > Soil compaction takes place when used often.

GENERAL FUNCTIONS OF DISC AND MOULDBOARD PLOUGH

- The plough bites the soil and turn it over to form soil clods or lumps
- They can be used to control weeds
- Their work helps to improve the aeration of the soil
- They bury plants and crop residues, thereby improving the fertility of the soil
- They help to mix the soil together
- They improve water-infiltration capacity which increases the water content of the soil.

HARROWS

Harrow is a secondary tillage implement also used for land preparation. It can also be driven by work animals or a tractor. It is used immediately after ploughing and before ridging. The harrow is an instrument designed to break up soil lumps and level the surface after ploughing.

The most popular type of harrow is the disc harrow – consist of numerous small disc, spaced closer on a common shaft to form a gang. There may be one or two pairs of gang working in the same direction. Important parts of a disc harrow are handle, drawbar, scrappers, steel discs and wheels.

FUNCTIONS OF A DISC HARROW

- It helps to break up soil lumps created by plough
- It pulverises the soil and puts in a better tilt or fine particles and level the soil
- It is used to remove weeds
- It is used to cover seeds and fertilizers with soil
- It helps to spread organic manure on the field and mixes them with soil.

RIDGERS

The ridger is a secondary soil cultivation implement used for land preparation. It is used after harrow and before planter. There are two main types of ridgers which are disc and mouldboard ridgers. Both work on the same principles, but disc ridgers, like all disc implements, are better adapted to tropical environments.

There are five disc in a ridger, two disc in each part facing each other. It has a strong metal beam linking all the disc. The beam is connected through small frames to a point of attachment to the tractor. The shape of a ridger is longitudinally symmetrical. Important parts of the ridger include scrapper, coulter, standard and coupling point.

FUNCTIONS AND USES OF A RIDGER

- Ridgers are used mainly to make ridges
- It eases the penetration of roots and tubers of crops after use
- It helps to control erosion and improves aeration
- It eases the percolation of water after use
- It prevents the growth of weeds after use
- It collects together rich top soils, thus increasing nutrient availability
- It also facilitates the harvesting of roots crops.

MAINTENANCE OF PLOUGHS, HARROWS AND RIDGERS

- Keep implements clean by removing all trashes and mud from it at the start and the end of all operations
- Ensure that nuts, caps, screws or shields are tight
- Grease metal joints or bearings gradually
- Adhere strictly to manual instructions from the manufacturer
- Replace worn out parts
- Keep implements in cool and dry sheds
- Employ a competent and experienced tractor operator to ensure the use of these implements properly.

SURVEYING

- Farm surveying is defined as the process by which measurement of land is made on the farm and its physical features for purpose of making appropriate recommendations on where to plant crops, put up certain structures and farm buildings for its best use.
- Such measurements by tables, plans or layout are done for specific purposes. The dimensions include its length and width. The physical features are topography, (slope), valleys height above sea level, streams, rock, hills and depressions. It can also mean the measuring and mapping out of the position, size and boundaries of an area of farmland.

IMPORTANCE OF FARM SURVEYING

- It helps to determine the hectare of land.
- It exposes the gradient or slope of the land.
- It helps the farmer to make decisions on locations of various farm buildings and structures.
- It helps to determine the amount of input of labour, seeds, fertilizers and chemicals to be used on the farm.
- It enables farmers to make the best use of available resources in order to achieve maximum profits.
- Loans can be gotten with the help of farm survey plans.
- Gives the owner of the land security.
- Does not allow for wastage of land.
- Helps to determine the yield of crops.
- It can be used as a basis of feasibility studies

SURVEYING EQUIPMENTS

RANGING POLES: It is made of wood or metal of varying lengths. It is generally circular in section, though some octagonal types are obtainable. It is usually painted black, bright red and white to enable it to be seen from a distance and has a pointed end. For easier handling, most modern poles are detachable into two. For very long distances, flags of red and white fabrics are attached to improve visibility. Six poles form a convenient number for a survey team. It is used in marking stations and for marking straight lines.

GUNTER'S CHAIN: It consists of series of dumb bell-shaped links of steel wires joined together by three small rings. It is used in taking short or detailed measurement of length, breath, width of farms along a straight line.

MEASURING TAPES: This is used for taking measurement of length, width and height.

PRISMATIC COMPASS: It is normally placed on a stand and has a prism with a straight slot. It is used in taking bearings and measuring angular distances. It has a magnetized needle or pointer mounted in a circular metal box and rotates freely, indicating the bearing of the reference point. Ordinarily, it points in the direction of the magnetic north.

THEODOLITE: It consists of a tripod stand, made of wood or light metal in solid or liquid telescopic legs. The tripod stand forms the base of the instrument. It has a lower plate which contains the graduated horizontal circle made of glass or brass. It is used to measure horizontal or vertical angles or planes.

ARROWS/PINS: These are used for marking stations.

OFFSET STAFF: This is used to take short distances called offsets from the chain line. Tapes are often used in place of offset staff.

BEACON OR PILLAR: It is made of rectangular block usually in concrete form with marks inscribed on top of the block. It is used for marking off points measured. It is also used for the recognition of the measured or surveyed area.

UMBRELLA AND WRITING MATERIALS: Umbrellas provides shade for accurate reading of the instruments and protects both the surveyor and the instruments from rain. Pencils, biros, and notebooks are used to keep records of all measurements made.

GEOGRAPHIC POSITIONING SYSTEM (GPS): The GPS employs the geographical information system (GIS) in gathering geographic information over the globe. The equipment is capable of giving information on the

- Latitude and longitude of a point
- Elevation of a point above sea level
- Map of the covered area
- Distance covered from one point to the other.

It can also be connected to a computer with an installed programme where the listed information can be

GENERAL MAINTENANCE OF SURVEYING EQUIPMENTS

- All instrument must be clean after use
- Keep instrument in dry and cool places
- Those with metal parts should be oiled or greased or painted before they are put away for a long time
- Keep instrument away from heat and rain to prevent damage and rusting
- Replace worn out parts
- Use instrument only for the intended purpose
- Let competent surveyors handle and use the instrument only or as he may direct.

FARMSTEAD AND ITS IMPORTANCE

Farm stead involves the proper land use planning without the risk of land degradation. It is described as a farm house and all its production and processing structures.

Farmstead planning helps a farmer to

- Ensure proper coordination and control of farm operations
- Arrange for channels for marketing farm produce
- Ensure neatness and avoid pollution of the farm
- Allocate the various soil areas in the farm for its best use
- Estimate labour and farm equipment requirement including farm houses

FACTORS TO CONSIDER IN PLANNING A FARMSTEAD

- **Water supply:** Adequate supply of water is very important for high agricultural productivity. Its location, quantity and quality influences the siting of livestock units, crop fields and the layout of irrigation facilities.
- **Accessibility:** Good accessibility makes marketing of farm produce possible and easy.
- **Soil types:** Crop farms are sited on good and well drained soils. Farm buildings and structures are best locate on poor soils. Farm roads should be constructed on well drained poor soils

- **Topography (Slope):** This to a large extent determines the location of buildings and other farm structures. It also influences the distribution of crops in the low-lying areas while other crops such as yam, cowpea, cassava, millet etc are better grow on the upper segments of the slope.
- **Hygiene:** The location of animal units should be far away from human residential houses to avoid health hazards.
- **Nearness to Market:** It reduces the cost of transportation, exposing the products to buyers and reduces the need for storage facilities.
- **Drainage:** This is done to avoid water-logging and makes movement easier within the farm.

PRINCIPLES OF FARMSTEAD LAYOUT

- Farm buildings should not be erected on slopes to avoid erosion.
- Pen houses should be located on the poorest within the farm.
- Plant crops on the best soils within the farm.
- Residential and office buildings should be located far from the pen houses to avoid noise and unpleasant odour from farm animals wastes and dung.
- buildings should be located in easily accessible areas.

BASIC ECONOMIC PRINCIPLES

DEMAND: Demand simply means a want or desire of a consumers willingness to buy a given product at a given time and a particular price.

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

- That there will be no change in taste and preference of the consumer
- Consumers income remains constant
- That there is no change in the quality of product
- Habits of the consumer remain unchanged

FACTORS AFFECTING DEMAND

- Population:
- Changes in state of the consumer
- Festival periods
- Price
- Price of substitutes
- Change in income
- Changes in weather
- Taxation

SUPPLY

Supply is the quantity of a commodity a producer is willing and able to offer for sale at a given price over a particular period of time.

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.

FACTORS AFFECTING SUPPLY

- The price of the commodity
- Change in cost of production
- Change in technology
- Price of substitutes
- Weather conditions
- Government policies
- Expectations (Speculation)

LAW OF DIMINISHING RETURNS

The law of diminishing returns states that when an increasing amount of one input is added while other input, remain fixed, the output will increase to a point where a further increase in the amount of the variable will result to a decrease of the marginal return per unit of the variable input.

This law is often used in agriculture when the factors of production – Land, Labour, Production are combined to produce certain goods by the enterprenueur

IMPORTANCE OF LAW OF DIMINISHING RETURNS IN AGRICULTURE

- It helps the entrepreneur to determine the best proportion to combine the various factors of production
- It enables him to know when to stop adding input of the variable factors to a fixed factor
- It enables him, to determine the wages he will pay to his workers
- It enables him to minimise cost and avoid wastage of resources in order to make more profit.

FARM ACCOUNTS

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