TOPIC: FARM STRUCTURES

Farm structures are physical constructions put up on the farm to facilitate the production process.

Examples of farm structures include;

- Buildings;(stores, offices, animal houses).
- Water storage structures (dams, boreholes, tanks and reservoirs)
- Fences (barbed wire fence, plain wire, wooven wire fence, electric fence, trench fence and live fence)
- Animal handling structures (spay races, cattle dips, crushes).

FENCES:

A fence is a barrier made out of some wood, metal stakes, nails or wires and living plants for the purpose of keeping animals from straying or keeping intruders out of the farm.

IMPORTANCE OF FENCES ON THE FARM

- Fences provide privacy and security to the farm i.e. keep out trespassers and thieves.
- Fences help to demarcate the farm boundaries hence avoiding land disputes with neighbours.
- Fences can facilitate rotational grazing on the farm by dividing the farm into paddocks.
- Fences are used in controlling breeding by reducing inbreeding and random mating as males can be kept away from the females.
- Fences make it easier to practice mixed farming by protecting crops from animals.
- Double fencing is very effective in controlling ticks and other internal worms on the farm.
- Live fences can act as wind breaks hence controlling wind erosion and destruction of farm structures.
- A network of fences add beauty to the farm.
- Fences can increase the value of the farm since they are assets.
- Fences make it easier to regulate the water supply by distributing water troughs in the various paddocks.
- Fences reduce the labour requirement as animals can be left to graze on their own.

FACTORS THAT MAY DETERMINE THE TYPE OF FENCE TO BE USED:

- Availability of capital; with enough capital, fences like electric fences can be used.
- Topography; hilly areas may not favour trench and concrete fences since they can be damaged.
- Animals to be confined; small livestock such as goats, sheep and poultry can be confined in woven fence but not on barbed wire.
- Fences enable grouping of animals according to their age, making feeding easier or confines livestock in paddocks.
- Skills of the farmer; highly sophisticated fences like electric fence can only be handled by skilled people.
- Farmers' interest; some fences may be highly preferred by the farmer hence used on the farm.
- Maintenance costs; fence with high maintenance cost are least preferred by the farmers.

TYPES OF FENCES:

LIVE FENCE; this is made of living plants, trees and shrubs planted in rows to form a hedge that is thick enough to prevent penetration by animals or intruders. The common shrubs used in making live fences are; Kei apple, sisal, tick berry milk plants euphorbia spp etc.

ADVANTAGES OF LIVE FENCES:

- Planting materials can be obtained locally hence cheap.
- Little maintenance is needed once plants have established.
- When they are mature they help to conserve soil and water by acting as wind breaks.
- Thorny species like Kei apple, sisal effectively discourage intruders and trespassers.
- Live fences can last for a long period of time if well managed.
- If well planted and managed live fences can give a pleasant look of the farm.
- The pruned branches and leaves can provide supplementary source of food to animals.

DISADVANTAGES OF LIVE FENCES:

- Live fences may take many years to grow and make an effective fence.
- The growth of live fences may be irregular leaving some gaps which appear only later to allow both animals, thieves and intruders to pass through easily.
- Hedges without thorns create good hiding places for thieves, wild animals and vermin.
- Hedges require regular treaming and gap filling which is both labourious and expensive.
- Hedges may compete with crops for nutrients.
- Some hedge plants are poisonous to animals.
- Some hedges harbour pests that attack both animals and crops.
- Live fences can not be used effectively to sub divide land into paddocks for grazing.
- Some varieties of hedges like Kei apple may be dangerous to farm animals, man and his transport systems like bicycles.

HOW TO ESTABLISH A HEDGE (LIVE FENCE):

- Select a desirable plant species and obtain the planting seeds. They should be free from pests, diseases and viable.
- Clear the area and dig out any perennial weeds within the reach of one meter.
- Make planting holes large enough and in straight lines depending on the land boundaries.
- Sow the seeds in the holes and cover with top soil mixed with manure.
- Keep watering the seeds until they have germinated.
- Carry out gap filling and thinning after germination of seedlings.
- Control weeds frequently to reduce weed competition with seedlings for growth factors.
- Control pests and diseases to enable the hedge to grow vigorously.
- Pruning should start at an early stage to encourage lateral growth which helps to remove all gaps in the fence.

MANAGEMENT OF ALREADY ESTABLISHED HEDGE:

- Regular pruning to control height and to allow lateral branches.
- Regular spraying with pesticides and fungicides to control pests and diseases which affect the growth of the hedge.
- Gap filling by re-planting with new plants.

- Regular weeding to reduce competition for growth factors and to encourage vigorous growth.
- Control of fire destruction by clearing the vegetation around the hedge one meter (1m) wide.
- Pass 2 to 3 strands of barbed wire in non-thorn hedges to discourage the attempts by the animals to break through.

BARBED WIRE AND POST FENCES:

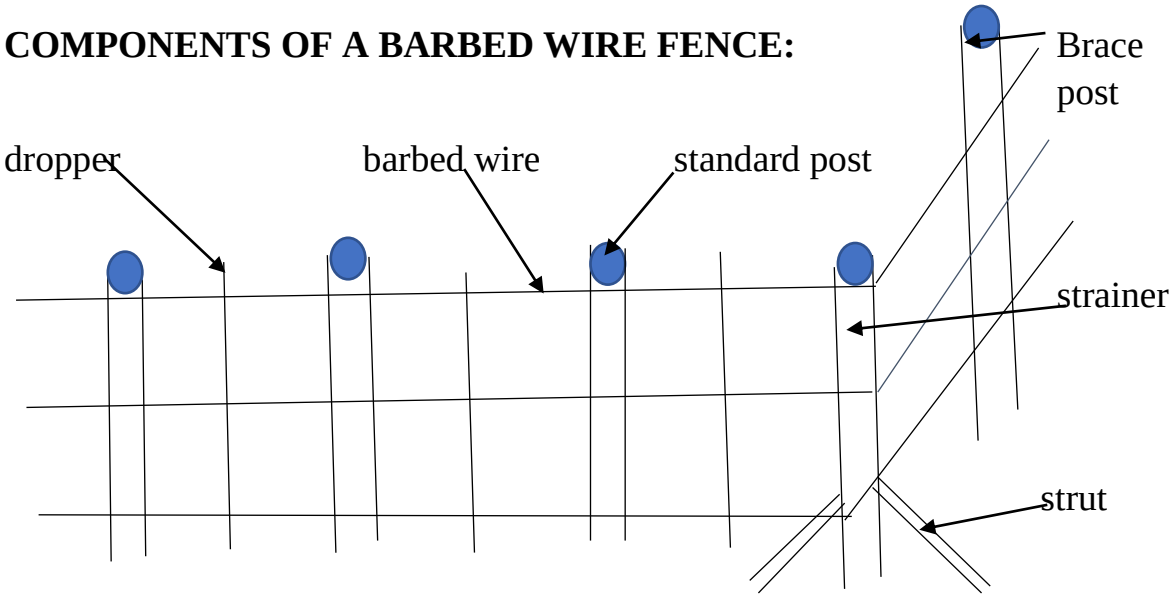
This is made up of barbed wires tightly stretched and supported upright on posts that are well set on the ground. The wire is fixed onto poles by means of staples which are U-shaped.

The commonly used posts are made of wood, metal and concrete. The wire is tightened using a wire strainer.

EQUIPMENTS FOR A BARBED WIRE FENCE;

- Posts; wood, metal or concrete.
- Wire; barbed wire or plain wire.
- Staple nails or U-nails.
- Wire strainer.
- Hammer, hand saw, measuring tape and a pair of pliers.

COMPONENTS OF A BARBED WIRE FENCE:



STRAINER/CORNER POST; this is the biggest of all the posts. It is normally fixed at the corners and gates. Strainers are always braced with struts to resist the strain of the pull of wires.

STANDARD OR ORDINARY POST; this is a medium post used everywhere to hold the wire except at the corners and gates. Standards experience less strain since the wire pulls them in both directions.

DROPPER; this is long thin piece of wood which are usually woven upright between the posts. Droppers reduce wire sag and discourage any animal that may try to push itself through the fence.

STRUT; this is a post fixed on the corner post and into the ground to support the corner post.

BRACE POST; this is the first post after the corner post.

PROCEDURE OF CONSTRUCTING A BARBED WIRE FENCE:

- Determine the area on the ground where the fence line is to pass.
- Clear the land where the fence line is to pass to a width of about two meters to allow ample working space and ensure it is right land to be fenced.
- Locate the corners where the corner posts are to be fixed.
- Dig holes at the corners and along the corners using a straight line.
- Fix the corner posts.
- Using the recommended spacing, mark out the sites where the holes for gate posts, foot path should be fixed.
- Nail struts to the corner posts and gate posts.
- Fix standards.
- Fix the wire starting from the lower one, the number of strands will depend on the docility of the animals to be contained.
- Droppers are then fitted in between the standard posts.

ADVANTAGES OF WIRE FENCE:

- The fence is less attacked by termites and fire.
- The fence can last for long especially if wooden posts are treated or if the posts are metal or concrete.
- Wire fences do not compete with crops for growth requirements as in live tree fencing.
- Wire fences do not become hosts for pests and diseases.
- Wire fences can be established easily/quickly.

DISADVANTAGES OF WIRE FENCE:

- It is easy to establish.
- Requires skill to establish it.
- Barbed wire can damage the hides and skins of animals.

CALCULATIONS INVOLVING FENCES

Teso College Aloet school farm has a rectangular piece of land measuring 1500 meters by 600 meters around which a four-strand perimeter barbed wire fence is to be constructed. Given that the length of the barbed wire roll is 600 meters and the spacing between the fence posts is 5 meters and no gate should be provided, calculate;

1. The number of fence posts required to fence the farm.

Solution;

Establish first the perimeter of the farm land.

Perimeter = 2 (length + width)

P = 2(1500 +600)

= 3000 + 1200

=**4200m**

But, the spacing between the poles is 5 meters,

Therefore, the number of poles = $\frac{\text{perimeter of the land}}{\text{Spacing between posts}}$

No. of poles = $\frac{4200}{5} + 1$

= **841 poles**

2. The number of rolls of wire required to fence the farm land.

Solution;

No. of rolls = $\frac{\text{perimeter of farm land x No. of strands}}{\text{Size of the roll of wire.}}$

= $\frac{4200 \times 4}{600} = \frac{16800}{600}$

= **28 rolls of wire**

3. The number of staples required to fence the farm land.

Solution;

No. of staples = No of poles x No of strands

= 841 x 4

= **3364 staples**

4. If the cost of one roll of barbed wire is 60,000 shs. Calculate the total cost on barbed wire.

Solution;

Total cost of barbed wire = No. of rolls x cost of rolls

= 28 x 60000

Total cost of barbed wire = **1,680,000=**

ELECTRIC FENCES:

These are movable fences made of posts, insulators, fencing wire and a 6 Volt battery or source of electricity. When in operation, any animal that touches the fence gets a shock though not enough to harm it.

ADVANTAGES OF ELECTRIC FENCE:

- It is suitable of strip grazing.
- Can easily be relocated to another area.
- It is very effective in protecting crops from big wild animals.
- Reduces labour requirement.

DISADVANTAGES OF ELECTRIC FENCE:

- It is very expensive to establish/maintain.
- Requires reliable power source.
- Unapproved electric controller units can be dangerous.
- It requires skills to install.
- Continuous shocks frighten the animals reducing their productivity.

TOPIC: ANIMAL HANDLING LAYOUTS

These are structures used when handling farm animals for specific purposes. The handling layouts include;

- The Crush.
- The Plunge Dip/ Dip tank.
- Spray race.
- Handling yards.

THE CRUSH:

A crush is a structure used for enclosing/restraining animals during routine husbandry practices.

Operations that can be carried out in a crush include;

- Vaccination
- Deworming/drenching
- Castration
- Taking blood samples
- Milking
- Foot treaming
- Hand spraying or hand dressing of ticks
- Weighing of animals
- Artificial insemination
- Dehorning
- Branding /identification
- Close examination of sick animals
- Pregnancy tests

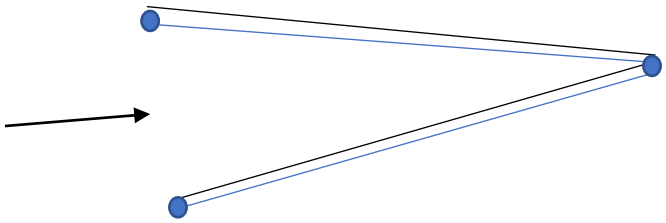
ESSENTIALS OF A GOOD CRUSH:

- It should be made up of sliding bars at the entrance to hold the animal back while in the crush.
- It should be made up of steel pipes or wooden posts.
- It should have a gate for exit.
- It should have entrance for the animal to enter into the crush.
- It should have head yoke to hold or fix the head.
- It should share dimensions 2meters long, 1.5 meters wide and 0.75 meters wide.

TYPES OF CRUSHES

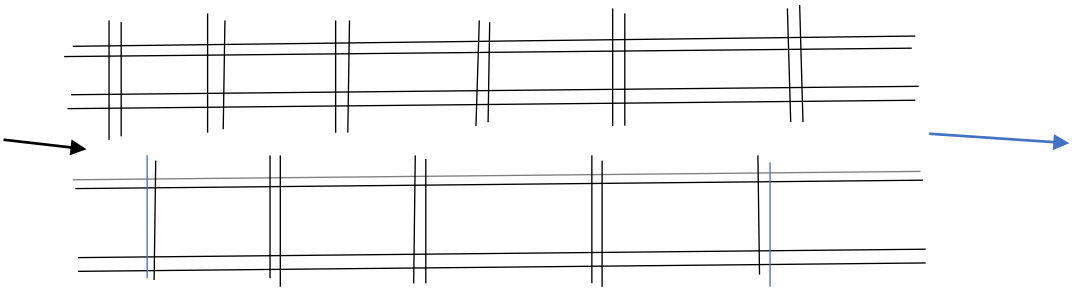
1. **Three -post crush**; this is used when restraining one animal. It has an entrance and is enclosed at the other end.

Diagram of a three-post crush:



2. **A continuous / variable length crush;** this is used when handling many animals. It is made of two parallel fences. It is made in such a way that its narrow at the bottom and wide at the top or it may be vertical from top to bottom. It can be as long as is convenient for the operation to be carried out.

Diagram of a continuous crush:



ADVANTAGES OF CRUSHES:

- A crush can be used for a variety of operations.
- It is constructed using locally available materials
- There is no risk of loss in milk production or condition of animals due to trekking to far off communal dips.
- The farmer can properly control the strength of the acaricide.
- No risk of animals collecting or spreading diseases at the communal dip.
- Can be used to spray both sick and pregnant animals.
- It can help in operations like milking, vaccination, Artificial insemination that can not be done in a dip.

DISADVANTAGES OF CRUSHES:

- It is not durable unless it is made out of steel posts and rails.
- It is not convenient for handling so many animals in operations like spraying.
- The animal may not be covered well with acaricide.
- Crushes waste acaricide since it is not reused.
- Crushes may not be able handle calves.

A PLUNGE DIP / DIP TANK.

A dip tank is a structucture used to control ticks by total submergence of the animals in the acaricides.

CHARACTERISTICS OF A GOOD CATTLE DIP.

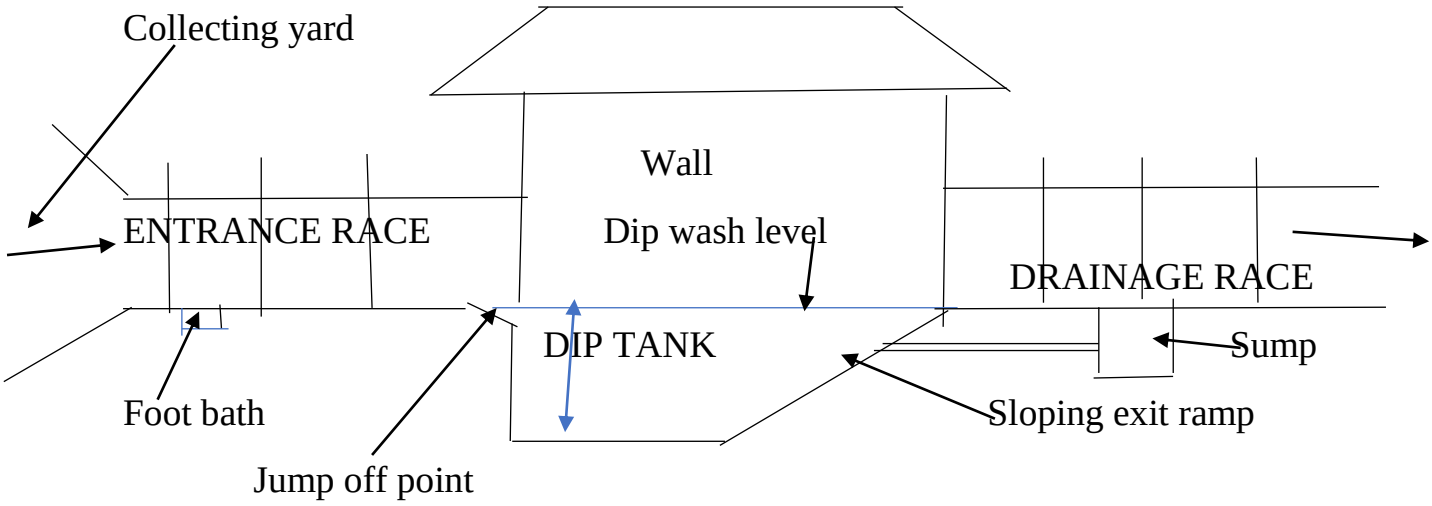
- The collecting yard should have adequate space for holding cattle.
- The collecting yard should be made of concrete for easy cleaning.
- The entrance race should be made of concrete to reduce the amount of dung /dirt carried on feet into the dip tank.
- The entrance race to the dip tank should have a slanting jumping point, to allow easy jumping into the dip tank.
- It should have a cut-walk / side walk for the farmer to guide animals through, across the dip wash.
- The footbath should be filled with adequate clean water to remove dirt and dung from the feet of animals.
- The drainage race should be slopping backwards to allow the acaricide to flow back into the dip tank.
- The drainage race should be long enough to allow the acaricide to drain from the animals.
- The cattle dip should have walls made of concrete with no cracks to avoid loss of acaricide through seepage.
- The dip should have a leak-proof roof to avoid dilution by rain water and reduce evaporation.
- The exit ramp/steps should have gentle slopes to allow the animals move out of the dip tank easily.
- It should have a concrete floor /rough surface from the collecting yard to the drainage race to avoid sliding of animals.
- The dip tank should have adequate capacity to hold enough dip wash to cover the animals.

- The return pipe should be slopping towards the dip tank to allow excess acaricide to flow back in the dip tank.
- Should have a soak-away pit to allow proper disposal of used acaricide.
- The drainage pipe should slope outside to divert rain water from entering dip tank.
- It should have a sump which collects and filters the acaricide from the drainage race before it is returned to the tank.

PRECAUTIONS THAT SHOULD BE TAKEN BEFORE TAKING ANIMALS TO A DIP.

- Do not dip sick animals because they can collapse inside the dip.
- Pregnant animals and small animals should not be dipped for they can get injured.
- Do not dip on a rainy day because the acaricide can be washed a way before it sticks properly.
- Dipping should be done during cool hours of the day to avoid absorption of the acaricide by dilated veins of the animals.
- Animals should not be dipped when they are thirsty because they can be tempted to drink the acaricide.
- Ensure correct level of the dip wash in the tank.
- Ensure correct concentration of the acaricide in the dip tank.
- Ensure there is enough water/disinfectant in the foot bath.
- Ensure the acaricide is uniformly mixed before dipping.
- Ensure the roof is leakproof/not leaking.
- Replenish the dip wash regularly.

Across section of a plunge dip:



DIPPING PROCEDURE:

- Assemble the animals in the colleting yard.
- Allow the animals to drink water before dipping starts.
- Check the level and concentration of the dip wash and replenish if necessary.
- Fill up the footbath with clean water.
- Open the pipe that returns the dip wash from the drainage race to the tank.
- Animals are allowed or forced to move trough the entrance race in a line and plunge into the swim bath where they are completely immersed into the wash.
- Animals then walk out of the swim bath using the exit ramp.
- Animals are held in the drainage race so that excess dip wash drains off their bodies.
- The first 10 to 20 animals to be dipped should be dipped again as they could have passed through the dip wash before it was well mixed.
- The animals are then allowed to leave the drainage race.

HOW TO ENSURE EFFECTIVENESS OF DIPPING

- Maintain the dipping routine.
- Avoid dipping on a rainy day.
- Mix the acaricide in the correct proportion.
- Ensure that the roof is leak proof.
- Ensure the correct level of dip wash in the dip tank.
- Open the drainage pipe during dipping and close it after dipping.
- Replenish the dip wash regularly.
- Ensure that there is always adequate clean water in the foot bath to clean the hooves of the animals.
- Close the return pipe after dipping to avoid dilution of the dip mwash by rain.
- Use acaricide that has not expired.
- Ensure that the acaricide is thoroughly mixed before dipping.

FACTORS THAT REDUCE THE EFFECTIVENESS OF DIPPING ANIMALS.

- Failure to follow the dipping routine.
- Mixing a weak concentration of the acaricide.
- Improper mixing of acaricide.
- Leaking roof leading to dilution of the acaricide.

- Dipping in a rainy day or hot day as rain washes away the acaricide before it sticks and can evaporate due to heat.
- Low level of the dip wash in the dip tank.
- Failure to replenish the acaricide.
- Use of expired acaricide.
- Accumulation of mud in the dip tank.

ADVANTAGES OF CATTLE DIPS

- Animals are fully covered by the dip wash since total immersion allows complete body coverage.
- Dip wash can be used several times especially when the strength of the wash is maintained.
- Recommended for commercial livestock farmers where large numbers of animals are kept.
- Spoilage of the acaricide is minimal.
- It is cheaper in the long run.
- It requires little labour to use.
- It requires less technical skills to use than the spray race.

DISAVANTAGES OF CATTLE DIPS:

- The cost of installing it is quite high for small scale farmers to afford.
- It requires skills to detect concentration of wash.
- It can not be used on calves, pregnant cows, sick animals and other small animals.
- Animals can be injured especially when the level of the dip wash falls below the recommended level.
- Dip wash can poison animals if poorly diluted or may not be effective if it is too dilute.
- It is labour intensive and time consuming to empty and to refill.
- Rain water may dilute the dip wash if wind blows off the roof.
- It is not economical where there are few animals.
- Contagious diseases such as foot and mouth can easily spread in the herd.
- There may be leakage at the bottom and cracks on the wall when the construction is poor.
- Pipes may accumulate pathogens like virus and bacteria

MAINTENANCE OF A DIP TANK.

- Seal off cracks once they appear in the dip tank to avoid losses of dip wash through leakage.
- When emptied, the swim bath should be thoroughly cleaned and all sediments removed.
- Vegetation around the dip tank should be slashed to avoid concealment. Uproot trees and shrubs that grow near the tank as their roots can damage the walls of the tank.
- Repair leaking roofs to avoid dilution of dip wash by rain water and excessive evaporation during hot weather.
- The dip tank should be fenced to avoid children and stray animals from falling in and drowning.
- Top dip wash level where necessary.

EXAMPLES OF ACARICIDES:

- Gammertox
- Supona
- Bacdip
- Coopertox
- Delnav
- Decatix
- Toxaphane
- Supamix
- Supona extra

Dip filling; this involves mixing and filling the dip tank with formulated acaricide.

- Take note of the tank capacity
- Take note of the acaricide to be used and recommended mixing ratio.

Example: An acaricide X(Decatix) is to be used in a dip tank whose capacity is 18,600 L. the recommended mixing ratio is 1: 500.

The acaricide to be formulated will be;

Mixing ratio x tank capacity

1 x 18,600

500

37.2L of acaricide

Boosting the tank; this is topping up of the dip tank with specified amount of formulated acaricide.

- Take note of the tank capacity at the start of dipping i.e. 18,600L
- Take note of the tank capacity after dipping i.e. 16,000L

Therefore; the amount of water to be added to the dip tank will be;

18,600 L – 16,000L = **2,600L**

If the recommended acaricide ratio is 1:500, then the acaricide to be added to the dip tank will be;

Ratio of mixing acaricide x amount of water to be added.

$$= \frac{1 \times 2{,}600}{500}$$

= **5.2 L** of acaricide

Dip testing; This involves checking whether the concentration of the dip wash is still effective. Dip wash concentration usually decreases with time and the frequency at which it is used.

Farmers using the dip are advised to collect the well stirred dip wash in the bottle and take to the veterinary laboratory.

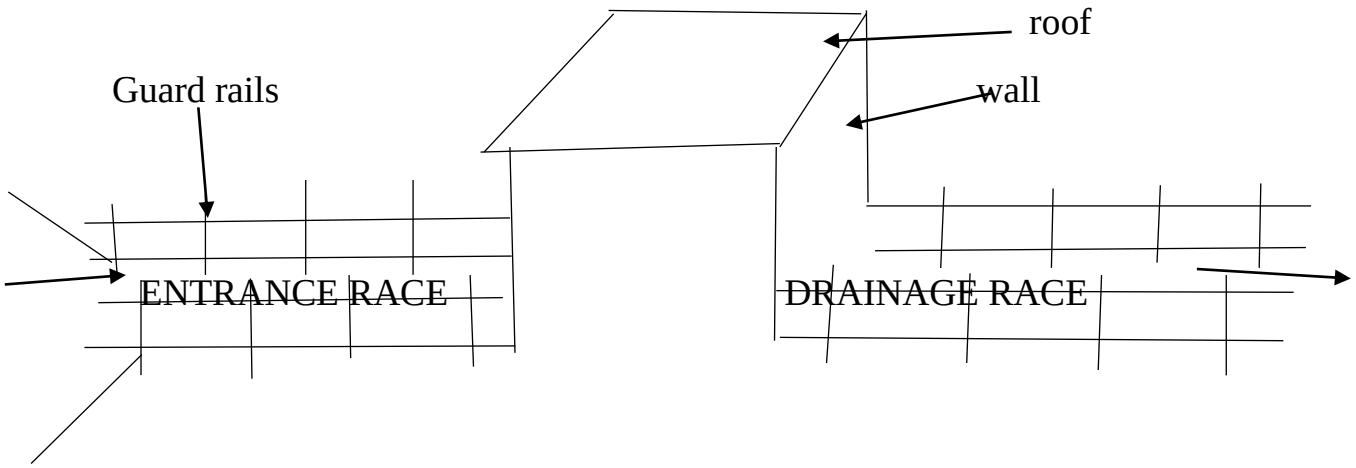
The bottle should be labelled with information below;

Farmer's name, location, dip number, capacity of the dip tank, name of the acaricide used, the dipping interval and date.

A SPRAY RACE:

This is a farm structure that is used to control external parasites like ticks, mites and biting flies on animals. It consists of an enclosed race in which cattle are exposed to a dense spray delivered at a high pressure from a system of appropriately arranged jets/nozzles. The discharged fluid drains to the sump from which it is re-pumped as a spray. To ensure the efficiency of the spray race, the nozzles must be kept clean and so should the screen that traps dirt before the acaricide mixture returns to the sump.

Structure of a spray race.



COMPONENTS OF A SPRAY RACE.

- Has an entrance race where animals gather before moving into the crush.
- Has a system of pipes with nozzles pointing inwards from all directions.
- Has a foot bath for cleaning the hooves of animals before they move into the spray race.
- Has two parallel walls that trap the splashing spray.
- Has a concrete floor to minimize contamination of a spray wash and mud.
- Has a roof which prevents rain water from entering and to trap the splashing spray wash.
- Has a drainage race where the animals are retained for some time so that excess spray wash drips from their bodies.
- Has a pump that forces the spray wash to move under pressure along the pipes.
- Has filters which trap particles in the spray wash and prevent blockage of nozzles.
- Has a sump/ reserviour where the spray wash is stored.

PROCEDURE OF OPERATION OF A SPRAY RACE

- The spray wash is pumped from the sump or reserviour and forced to move along pipes at a high pressure.
- The spray wash emerges through the nozzles which break it down into small misty droplets.
- The animals are allowed to walk through the race towards the drainage race in a line/single file and they are fully covered by the spray wash.

- The sprayed wash and that dripping from the animals drain back to the reserviour via filters that remove foreign particles then it is re circulated to the system.

ADVANTAGES OF A SPRAY RACE

- It is cheaper to install than a dip tank and thus easier for individual farmers to install and maintain it.
- It uses a small quantity of spray.
- The farmer is able to change the type of acaricide at every spraying without the expense of having to re-fill a large tank capacity.
- Many animals can be sprayed in a short time.
- Less labour is needed to operate a spray race.
- It can be used to spray small animals such as goats and sheep.
- It can also be used to spray calves and pregnant cows that are about to deliver since it causes fewer disturbances on the animals.
- Fresh acaricide is used always thus ensuring good quality and effectiveness of the spray wash.

DISADVANTAGES OF A SPRAY RACE.

- Nozzles can easily be blocked by dirt in the spray.
- There are possibilities of certain parts of the animal's body not being covered by spray wash.
- Requires technical skill to operate the spray race.
- It needs reliable power source to run the pump at the required speed.
- It is only economical with a large herd.

HANDLING YARDS.

These are enclosures attached to every animal handling layout for gathering animals together before they are directed into dips and spray races. They are also used for;

- General handling of livestock
- Culling
- Sorting out animals for sale
- General observation of the animals.

TOPIC: FARM BUILDINGS.

These are structures needed by all farmers for their particular enterprises. Farm buildings serve the following;

STORES; these are used for storing crops and machinery. A good farm store should have the following characteristics;

- Be high enough above the ground not to allow in rodents and other pests.
- Be well ventilated.
- Be leak proof and thief proof.
- Have rat guards 50 cm above the ground incase of a maize crib.
- Be easy to clean.
- Be heated in a well-drained area.

LIVESTOCK HOUSES; these are structures that are used for confinement of livestock. They include pens and sheds. They have the following characteristics;

- Well ventilated.
- Well drained
- Rough concrete floor sloppy and easy to clean.
- Receives enough natural light.
- Has enough space for the animals.
- Has properly plastered walls.
- Is leak proof and thief proof.
- It should be warm but not hot.

WORKSHOPS; these are structures that are used for maintaining farm tools and machinery. They have the following characteristics;

- Have a concrete floor.
- Have enough space.
- Well ventilated.
- Leak proof and thief proof.
- Strong plastered walls.
- Have safety devices for first aid and fire extinguishers in case of fire outbreak.
- Should have enough natural light.

OFFICES; these are where farm planning, management activities and records are kept. Offices should have the following characteristics;

- Well ventilated.

- Have enough working space.
- Leak and thief proof.
- Have enough light either natural or electricity.
- Warm enough.
- Be easy to clean.

RESIDENTIAL HOUSES; these houses the farmer and his labourers. Residential houses should have the following characteristics;

- Leak and thief proof.
- Well ventilated.
- Easy to clean.
- Have enough natural light.
- Large enough.

GREEN HOUSES; these are used for growing crops that require specific growth conditions such as temperature, humidity, light intensity and duration. Crops are also produced out of season.

IMPORTANCE OF FARM BUILDINGS

- They increase production by decreasing crop/ animal loses.
- They increase the quality of farm produce.
- They decrease the labour requirement e.g. when drying crop products under sheds or in cribs.
- They protect production tools and machinery from weather elements that cause rusting.
- They help to store farm produce when market prices are low so that they are sold when the prices are high.
- They increase efficiency and ease in management on a farm.
- They guard against bad weather on stored crops.
- They protect farm animals from effects of bad weather.
- They reduce cases of theft on the farm.
- They add value to the farm.
- Animal buildings help in separating young stock from old stock, separating and isolating the sick animals.
- Farm buildings such as toilets and bathrooms serve a sanitary function.
- They provide comfort to humans and animals by acting as places of abode.

FACTORS TO CONSIDER WHEN SITTING FARM BUILDINGS.

1. Topography; the buildings should be on flat high ground to facilitate drainage but not on low flat or steep slopes.
2. Availability of water; buildings should be sited near permanent supply of water for both livestock and domestic use.
3. Direction of prevailing wind; buildings should be sited on the leeward side where the winds cannot blow off the roofs or have an effect on the feeding habits of the animals.
4. Position of the sun; site the buildings where hot sunrays do not directly get into the house but should have sufficient supply of sunlight in the mornings and evenings.
5. Size of the building; the buildings should be large enough to shelter the livestock, stored crops, farm implements and machinery. They should not be overcrowded.
6. Accessibility; farm buildings should be sited near main road for easy delivery of the various farm inputs and farm produce.
7. Location of the building; should be located on the center of the farm. Stores and workshops should be near the home stead for security and supervision purposes.
8. Soil type; buildings should be sited on infertile areas of the farm so as to leave the fertile areas for cultivation.
9. Power supply; buildings for machinery and workshops should be near the electricity supply line for easy access to electricity.
10. Panaroma view; a homestead should be located where a large part of the farm can be seen.
11. Special considerations; inflammable substances such as fuels should be sited at a reasonable distance from the other buildings.
12. Allowance for future consideration/ expansion; some land should be set aside for future expansion should need arise.
13. Government regulations; government has some set regulations when sitting buildings e.g. latrines should be 30 m from sleeping houses and on the lower side of the farm house.
14. Relationship between enterprises; buildings for related enterprises should be located close to one another to save time and costs e.g. workshops and fuel stores, calf pens and kraals.

MATERIALS USED FOR BUILDING FARM BUILDINGS.

1. **WOOD/TIMBER;** this is the commonest and cheapest building material. It can be used in almost every part of the building; foundations, wall

structures, floors, roof structures (purlins, rafters, trusses, struts and tie beam).

ADVANTAGES OF WOOD

- It is readily available in most areas.
- It is relatively cheap to buy.
- It is light to lift during work.
- It is easy to cut into required shape and size.
- With good treatment, it can last longer.
- It's a good insulator against heat and electric shocks.
- Wooden materials have good appearance.
- It is a traditional material.
- Its adaptable for a number of jobs.

DISADVANTAGES OF WOOD

- Wood is susceptible to termite, insect and fungal attack.
- Has a problem of rotting during humid weather conditions.
- Can easily catch fire and burn completely during dry season.
- Wood has a short life span compared to metal.
- Wood develops defects e
  g it can easily crack.
- Produces noise when used for floor elements.
- It can not be used for a wide span as compared to concrete.

TREATMENT OF WOODEN MATERIALS AND FENCE POST

Wood is usually obtained when it is fresh and wet. To season (dry it) it thoroughly, air is preferably used.

PRECAUTIONS WHEN DRYING TIMBER BY AIR.

- Provide a roofed shed or some kind of cover to keep off direct sunshine and rain.
- Timber can be heaped in stucks but must be supported off the ground so as to allow free air circulation beneath and to avoid absorption of moisture from the ground.
- Piles of timber should be separated by wooden rods.
- In order to avoid warping, all the supports and stickers should be placed closely enough to bear the weight.
- The stuck should be parallel to the ground support to avoid sliding and bending.

- Heavy boards should be placed at the bottom and lighter boards at the top of the pile.

METHODS OF TREATMENT OF WOOD

A. HOT AND COLD SOAKING METHOD

- Peeled wood is immersed into a preservative in a tank.
- Contents are heated for two hours or near boiling point.
- Moisture/wood cell in the wood would expand.
- The poles are allowed to cool while still in the preservative.
- Moisture in the cells contracts and draws in the preservative deeply into the fiber.

B. SAP DISPLACEMENT.

- Peel off the back from the freshly cut poles
- Immerse the butts of the wood /poles into the preservative in the tank.
- Keep the poles in the preservative at least five to six days.
- The sap/moisture in wood evaporates and is replaced by the preservative.
- The wood or poles are inverted and allowed to stand in the preservative for five to six days.

C. VACUUM/PRESSURE TREATMENT

- Peel off the back from the freshly cut poles.
- Pack the peeled off poles in a large cylinder.
- Apply the pressure pump which will force the preservative into the wood.

D. PAINTING/VANISHING

Where wood is painted with old engine oil, paint or vanished.

CHEMICALS FOR TREATMENT OF TIMBER

To prevent attack of;	**Chemicals to use**
Weevils and other insects	Pentachlorophenol.
	Waste engine oil.
Termites	10mls of 16% Dieldrin in 10 litters of water.
	Arsenic pentoxide.
Fungi	Arsenic pentoxide
	Sodium dichromate.
	Copper sulphate

2. **CONCRETE;** this is a mixture of cement, sand and aggregates in correct proportions depending on the strength required and the type of job to be done.

STEPS IN MAKING GOOD CONCRETE.

- Select the ingredients.
- Select the right proportions on the type of work.
- Mix the concrete thoroughly to ensure a good bond.
- Place a concrete in proper frames so as to hold the concrete in a proper shape until it hardens.
- Finishing the concrete depending on the job. Residential houses would need a smooth finish.
- Curing is necessary to get concrete hardened enough.

SOME CONCRETE MIXTURES

Type	**cement**	**sand**	**Course aggregates**	**uses**
Strong	1	1.5 -2 parts	3 parts	Columns, walls, floor.
Standard	1	2 parts	4 parts	Foundation, floor.
Medium	1	2.5 -3 parts	5 parts	Foundations.
Lean	1	3 parts	6 parts	Foundations, thick walls.

ADVANTAGES OF CONCRETE

- Concrete is resistant to decay and rusting.
- Concrete can be made stronger by reinforcing with iron bars.
- Has a good sound insulating property.
- Concrete can last for very long.

DISADVANTAGES OF CONCRETE

- Concrete requires skill to make.
- Concrete is very expensive to make.
- Concrete is very heavy to use in constructions.
- With intensions, concrete can break easily.
- Concrete requires time to cure and gain its strength.
- Concrete because of its rigid nature can easily be affected by earth tremours.

3. **MORTAR;** this is a mixture of cement, sand and water which is used to bind the materials firmly. Mortar is used to bind bricks or blocks and for plastering the walls and screeding the floor. Lime is normally added to increase plasticity and ease of handling but provides a weaker mortar which is less resistant to weathering.

QUALITIES OF GOOD MORTAR.

- It should have adequate strength.
- It should have good workability.
- It should have a reasonable amount of plasticity, improved by adding lime to mix.
- It must provide a good and strong bond with bricks, blocks or stones.
- It should be able to be mixed at an economic cost.
- It should be durable over a long period.

MIXING MORTAR

- Clear the surface to remove any contaminants.
- Measure a known volume of clean sand and spread it slightly.
- Measure a known volume of cement or lime and add on top of sand.
- Mix the contents thoroughly by turning over with a spade for several times until the mixture becomes homogeneous.
- Add water a little at a time as mixing proceeds until mortar of suitable consistence and workability is obtained.
- Use the mortar within two hours of mixing or else should be discarded.

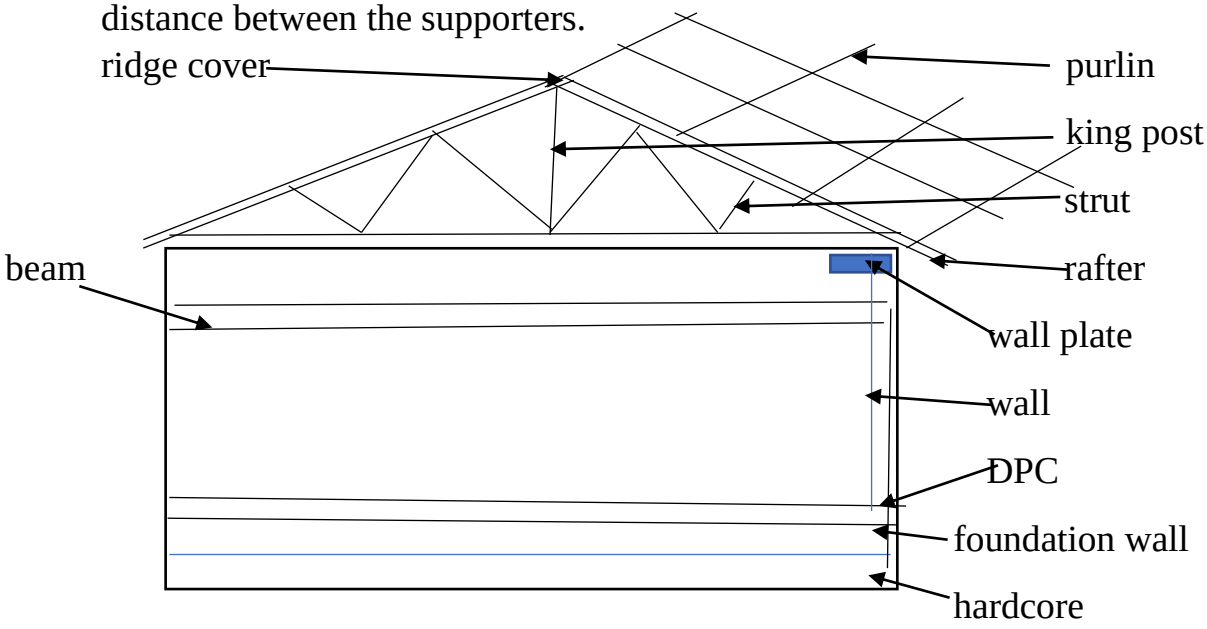
4. **METAL;** the commonest are steel, iron, Aluminium, copper, roofing sheets, pipes, pillars, nails, wire netting and rods. Metals are used for making parts of the roof structure, pillars etc. they need protection against destruction by weather if they are to last longer.
5. **BRICKS;** these are made of clay mixed with water. The paste is beaten to the right consistency and moulded into the required size. The brick is made using a mould, dried and burnt in a kiln. Bricks are used for making foundations, walls and floors.
6. **BLOCKS;** these can be made of clay, sand and marram or concrete. Concrete blocks are made of cement, sand and aggregates or marram in the ratio of 1:2:3 with water. They are shaped to the desired size in a mould. Blocks can be used for making foundations, walls and floors.
7. **EARTH;** this is dug out clay, sand or ordinary top soil and mixed with water to get mud.

8. **STONES;** these are big stones called hard core and the small ones are called aggregates. They are used for making foundations, floors and walls.
9. **THATCH;** these are used as roofing materials instead of iron sheets or tiles, grass, papyrus leaves and banana leaves are the commonly used.
10. **PLASTICS;** these are commonly used in temperate regions for both internal and external fittings. However, they are rarely used for external fittings in the tropics because they deteriorate rapidly in bright sunlight. Plastics can be used in internal fittings such as water and electric pipes, green houses, shades for stores.
11. **GLASS;** this is rarely used in farm buildings because of being delicate. It is mainly used in fittings in doors and windows to allow light inside the buildings.

THE DIFFERENT PARTS OF A BUILDING

- **FOUNDATION;** this is composed of a trench which is dug 35 cm wide and about 60 cm deep in the ground in which the concrete of mix 1:3:6 is poured. It is on the concrete trench that blocks or bricks or stones are laid. A mortar of 1: 6 ratios is then used for joining bricks.
- **PLINTH WALL;** is the first part of the wall made of bricks or blocks on the concrete foundation. Plinth wall is raised 15 cm above the ground level. Beyond that point the main wall begins.
- **ANTI- PROOF COURSE (APC);** is the course of concrete about 15 cm thick on the plinth wall. It prevents insects especially termites and moisture from entering the wall above,
- **DAMP PROOF COURSE (DPC);** is a sheet of polythene paper or sand paper coated with tar. It is laid on the Anti-proof course above the plinth wall. It prevents insects especially termites and moisture from entering the wall above.
- **THE FLOOR;** this can be made on concrete, blocks or wood. The concrete floor is most preferable. The first layer is made of big stones (hardcore). the second layer is made of concrete and the third layer is made of mortar and a finishing coat of cement which gives a smooth finish.
- **THE WALL**; this is built of blocks, bricks stones, mud or wood. The extending heights of the wall or the width of the wall structure is called a gebel.

- **THE WALL PLATE;** Is a timber structure laid a long the two lengths of a wall. Its job is to receive the weight of the roof and sustain it. It is tied on the wall by the whoop iron.
- **THE ROOF;** is a structure composed of trusses and the covering sheeting. The truss is made up of a tie beam as a base, two rafters above the base to form a triangular structure, and a number of struts which serve as supporters.
- **THE BEAM;** this is a horizontal unit of reinforced concrete running a cross the whole length of the wall of building. It is used to resist loading acting a cross its longitudinal axis by transferring the effect over a distance between the supporters.



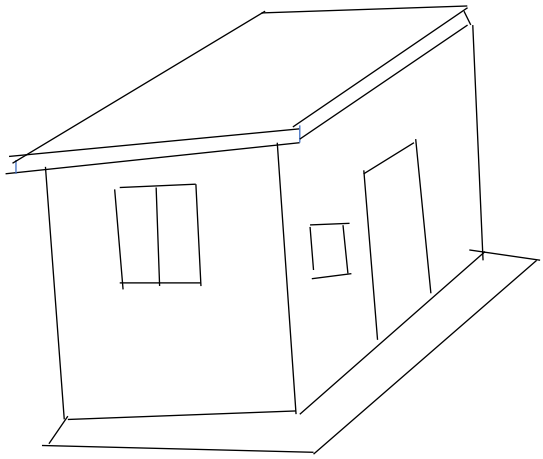
1. **RAFTER;** its timber that receives or holds purlins and covering sheeting. Rafters rest on the wall plate.
2. **THE BEAM;** is a timber that joins the rafters.
3. **KING POST;** joins the rafters at a pitch and to the tie beam. Its used to make the trusses ridged.
4. **STRUTS;** joins the king post to the rafter. They make the truss more ridged and stronger.
5. **THE PURLINS;** can be made of wood, metal or concrete. They are laid on the trusses horizontally. They are used for holding the covering sheet.
6. **COVERING SHEET;** can be corrugated iron sheets, tiles, asbestos glass or grass. They are laid on the purlins.
7. **RIDGE COVER;** this can be tiles, metal covers. They are placed on the ridge of purlins to cover the ridge.

8. **FASCIA BOARD/BARGE BOARD;** is a timber piece or board placed on the ends of rafters to prevent water flowing to the rafters and avoids them from rotting.

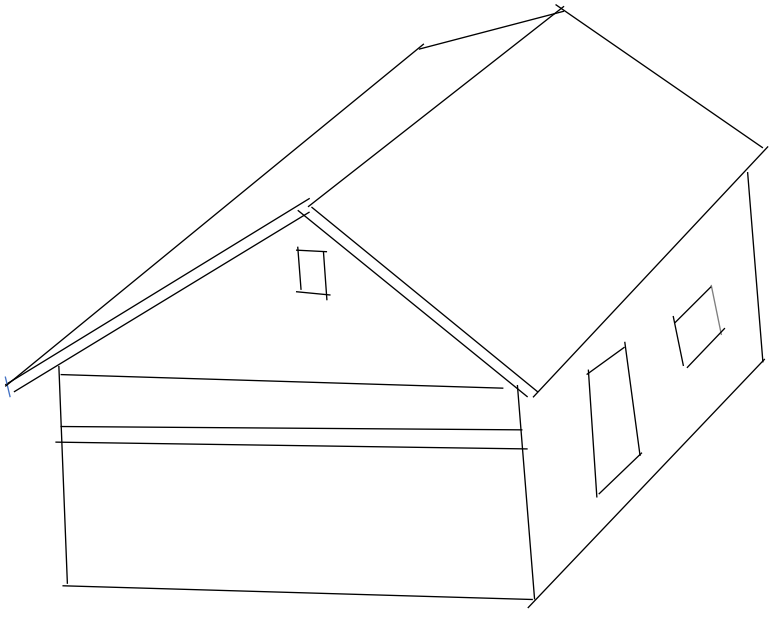
ROOFS:

The type of roof to be constructed depends on the size of the building, use of the building, cost and availability of roofing materials to be used and availability of skilled labour to construct the desired roof. There are three types of roofs;

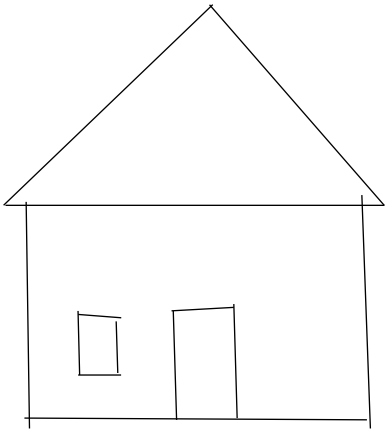
1. **FLAT ROOFS;** these are recommended for large buildings where spacious rooms, free of pillars are needed. However flat roofs are prone to leakage.



2. **PITCHED ROOF;** these slopes either on one side or on two opposite sides of the building. They are not prone to leakage and well protect the walls due to the overhang.



3. CONICAL- SHAPED ROOF;



FEATURES OF AWELL CONSTRUCTED ROOF;

- It should be able to protect the walls from rain.
- It should be able to withstand strong winds and storms.
- It should be leak proof.
- It should be durable, i.e. able to serve for a reasonable time.

TOPIC: FARM WATER SUPPLIES.

Water is one of the essentials of life whether directly or indirectly. An adequate supply of water is essential for the smooth running of farm activities.

IMPORTANCE OF WATER ON THE FARM.

- Required to sustain human, livestock machinery and crop life.
- Required for irrigation especially during drought.
- Used for mixing various solutions of farm chemicals.
- Source of power directly as water-wheel for milling or HEP.
- Used for maintenance of farm hygiene.
- Used to transport farm produce where large water bodies are readily available.
- Water enables diversification of some farm enterprises like fish farming.
- Water is used to cool engines of farm machinery like tractors and millers.

PROBLEMS ASSOCIATED WITH WATER ON THE FARM.

- Loss of soil fertility as a result of washing away of the fertile top soil and leaching.
- Stagnant water can act as a breeding place for parasites like mosquitoes, liver flukes etc.
- Contaminated water sources can lead to out break of diseases such as typhoid and cholera.
- When in excess, water interferes with plant growth and development.
- Livestock and people can drown in water bodies such as ponds, deep wells and rivers if not well protected.

SOURCES OF FARM WATER.

1. **RAINFALL;** farms largely depend on rainfall as a source of farm water. Rain water results from the hydrological cycle.
2. **SURFACE WATER BODIES**; e.g. streams, rivers, lakes swamps, ponds and dams.
3. **UNDERGROUND WATER SOURCES**; these are tapped by springs, wells and boreholes.

WATER STORAGE;

Storage of water on the farm is necessary in order to keep it safe from contamination, avoid wastage, use during times of shortage, especially during the dry season.

The type of storage structure employed will depend on the distribution of rainfall, source of water, the distribution method and the major uses of water.

1. Rain water tanks; these are used for collecting water on a small scale from the roofs of water.
2. Over head water tanks; these are raised off the ground. Water is pumped or flows by gravity into the top of the tank.
3. Dams; these are excavated on the ground to retain the surface run off from the catchment area.

MAINTENANCE OF WATER SUPPLY SYSTEMS.

- Where ponds, springs and wells are used as a source of water supply, the sides the sides should have an appropriate lining of concrete, stones or bricks to prevent contamination. Fence the area to prevent trampling by animals.
- Trees and bushes should not be allowed to grow on the embarkment as their roots can gradually penetrate down wards and lead to a serious seepage.
- All structures associated with the water supplies must be kept in good order to prevent leakage.
- Regular cleaning of open water reserviour or ponds as aquatic plants may block the inlet or outlet pipes.
- Where pumps are used, regular inspection, lubrication and replacement of worn out parts should be done.
- Tree planting in hilly areas and places that are not good for cultivation should be encouraged so as to maintain the water cycle.
- Wastes from industries should be treated before they are discharged into water bodies to avoid contamination.
- Dams, weirs and water reserviour on the ground should be surrounded by a grass lawn to prevent siltation during heavy rainfall.
- Water should be stored for a minimum of 2 days before use to allow sediments to settle and to reduce bacterial content.
- Water for domestic use should be chlorinated or boiled especially if it is to be used for drinking.
- Remove the silt regularly and clean the water source.

REVISION QUESTIONS:

1. (a) With the aid of a well labelled diagram of a cattle dip, briefly describe the structural and dipping procedures.
   (b) What are the advantages and disadvantages of cattle dips?
2. (a) Draw and label a cross section of a cattle dip.
   (b) State the precautions that should be taken before taking animals to dip.
3. (a) Explain the factors that may reduce the effectiveness of dipping animals.
   (b) How can a farmer minimize factors that may reduce the effectiveness of dipping animals?
4. (a) Describe the factors that determine the type of fence to construct.
   (b) Outline the steps to be followed when constructing a barbed wire fence.
5. (a) What are the characteristics of a good store house?
   (b) when selecting a suitable site for farm buildings, what considerations should one bear in mind?
6. (a) What are the features of a plunge dip?
   (b) How can a dip be maintained?
7. (a) Differentiate between dip- boosting and dip-replenishing.
   (b) At the start of dipping, the level of a dip wash in a dip tank was 15,000L, after dipping the level of dip wash reduced to 14,800L. if the recommended mixing ratio is 1:500, calculate;
   i. The amount of water needed to correct the dip wash level.
   ii. The amount of the acaricide needed to correct the strength of the dip wash.
8. (a) Explain factors to consider while constructing a dam on a farm.

   (b) How is the storage and supply of clean water maintained on a farm.

9. (a) Describe the methods of preserving wood.
   (b) Give the advantages and limitations of using metal to construct farm buildings.
10. (a) Describe how a spray race is used in tick control.
    (b) State the advantages of using a spray race in tick control.
    (c) how can a spray race be maintained.