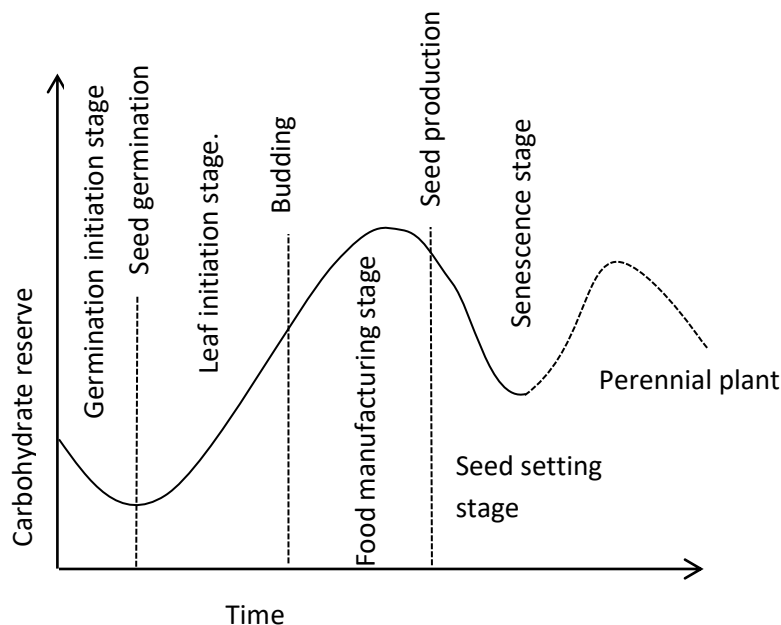


GROWTH STAGES OF A PASTURE PLANT



- The pasture should be grazed during the food manufacturing stage because during this stage animals will get enough nutrients.
- If grazing is done late, animals do not gain much from it because it would be old and most of the carbohydrates would have been lost through leaf fall.
- When seed setting stage begins, nutrients are removed in the leaves and stored in the seeds which are rarely grazed by the animals
- If grazing is done too early, the carbohydrate content in leaves would be low .
- Annual plants have only one cycle and they die after grazing but perennial plants regenerate after they have been grazed by animals.

Growth characteristics considered when selecting pasture plants

- Period from germination to flowering.
- Length of time a pasture plant is able to retain its nutritive quality after flowering.
- Rate of regeneration of pasture plants after grazing .

Factors to consider when establishing pasture plants

Soil type; the soil should be deep, easy to cultivate ,fertile ,well drained ,and with no erosion hazards.

Topography; the land should be gently sloping ,easy to cultivate using machines. If it is hilly ,contours should be followed to avoid erosion.

Climate ; pastures require enough rainfall of more than 800mm with suitable temperatures.

Planting materials; these ensure good pasture establishment .seeds should be certified and vegetative materials should be free from weed seeds.

Economic benefits ;it should be profitable to establish pastures for dairy and beef animals with hopes of recovering money from the sale of products.

GRAZING MANAGEMENT

This is achieved through the following practices;

- Giving grasses time to rest after grazing for 14 days.

- Through using optimum stocking rate.
- Conserving surplus grass i.e hay and silage for later use .
- By using a suitable grazing system.
- Grazing pastures when their nutritive value is still high and moisture content is low.

Objectives of grazing management.

- To produce high quality products.
- To maintain productivity and good quality grasses.
- To maintain valuable species of pastures
- To use grass effectively.

Stocking rate

This refers to the number of animals grazing per unit area of land.

Factors determining stocking rate

These include ;

- Availability of supplementary feeds e.g silage ,hay ;the stocking rate is high when the feeds are available than when they are not available.
- Nutritive value of the pastures ;high stocking rate is used for nutritive pastures while a low stocking rate is used for slow growing pasture plants.
- Breed of the animal;exotic breeds require more pastures and have a low stocking rate compared to indigenous animals.
- Size of the animal; small animals like goats and sheep require a high stocking rate while big animals like cattle require a low stocking rate.
- Rate of growth of the pasture plants;fast growing pasture plants is for high stocking rate while slow growing pasture plants is for low stocking rate.
- Grazing land; the larger the grazing land ,the higher the stocking rate .

NB.Grazing land refers to any vegetated land that can be grazed.

- Pasture management ;well managed pastures allow high stocking rates.
- Grazing intensity ;the higher the grazing intensity ,the lower the stocking rate.

NB.Grazing intensity refers to the number of animals per unit area of available herbage.

- Ease of utilization of the pastures; pasture plants with parts that are not easily reached by animals for grazing do not allow high stocking rate.
- Composition of the pastures ;mixed pastures have a high stocking rate than pure stands .

Types of stocking rates..

High stocking rate;this leads to low animal production. There is overstocking and this leads to soil erosion .It is normally 6-10 animals per hectare.

Optimum stocking rate;the number of animals are adequate to fully utilize the available pastures .3-5 cattle per hectare .The optimum stocking rate is influenced by;

- Rate of forage generation after grazing.
- Type of animal product expected .
- Botanical changes in the pasture with time.

- Nutritive value of the pasture.
- Seasonal variations in the feed supply.
- Ease with which animals can reach the forage.

Low stocking rate; the underutilization of herbage ie 1-2 cattle per hectare.

GRASS LANDS

A grass land is an area where grasses are the main component of the vegetation. It is mainly managed by cattle keepers in order to have better pastures or grasses for their animals.

Importance of grass lands

- Grass lands help to conserve soil moisture by providing a good soil cover.
- They help to break the life cycle of pests and diseases when established in a rotation.
- They help to control soil erosion.
- They are cheap sources of livestock feeds compared to commercial feeds .
- Grasses help in recycling nutrients by bringing nutrients from the lower layers of the soil.
- They add organic to the soil when they decompose.
- They help in improving the soil structure.
- When legumes are mixed ,they add nitrogen to the soil since legumes have root nodules and the nitrogen fixing bacteria which help to fix nitrogen into the soil.
- Grass lands ensure proper utilization of land therefore land cannot be redundant.

GRAZING SYSTEMS

These refer to the ways in which the pastures are utilized by the animals .These include;

- Zero grazing.
- Continuous grazing.
- Communal grazing.
- Strip grazing.
- Tethering.
- Deferred grazing.
- Rotational grazing.

Zero /stall grazing.

This is a grazing system where fresh pastures are cut, collected and carried to animals confined in stalls. It is known as cut and carry system or feed stall system.

Other feed materials used include agro industrial bi-products e.g cereal brans and commercial concentrates.

Advantages

- Animals are protected from adverse climatic conditions.
- Manure collection is easy.
- Grasses from distant and unfenced fields can be utilized.
- It reduces the distance walked by animals to get food and water.
- It reduces wastage of pastures due to trampling on by the animals.
- Grasses can be wilted hence controlling bloat.

Disadvantages

- It may lead to soil infertility if manure is not taken back to the fodder gardens.
- High initial costs of establishing the stalls.
- The farmer can only keep a small number of animals.
- The method is highly effective where market for milk is high.
- Collecting fodder and cleaning stalls requires a lot of labour.

Rotational grazing.

This involves dividing the pasture into paddocks and allowing the herd to graze in one paddock at a time until the herbage is uniformly grazed to a given height and the herd is moved to another paddock.

Advantages.

- There is uniform grazing of pastures .
- The intervals in grazing allow room for mechanical practices e.g fertilizer application.
- It is possible to conserve excess grasses which may not be possible in continuous grazing.
- Manure is well distributed throughout the field.
- It allows maximum utilization of herbage .
- It breaks the lifecycle of parasites.
- It gives grasses enough time to recover from grazing.

Disadvantages

- Animals are denied a chance of selective grazing.
- It requires high levels of skills to manage the grazing areas.
- A lot of capital is needed to fence and maintain the grazing areas.
- It requires a lot of labour to move the water points.

Continuous grazing

This is an extensive system of grazing where animals remain in the same pasture for a long period of time.

Advantages

- The animals graze on highly nutritive pastures.
- Fencing costs are reduced.
- The animals select grasses they deserve.

Disadvantages

- It may encourage random mating and breeding.
- Selective grazing leads to wastage of herbage.
- It leads to low productivity of animals due to poor quality grasses.
- It encourages buildup of ticks and internal parasites.
- It results in under or over stocking due to poor quality of grasses.

Strip grazing.

This is where animals are confined in small fenced strips of land where they graze and after 1 or 2 days the strip is moved forward on a fresh grazing area.

OR

It is a system of grazing where animals are enclosed to eat grass /pastures within a small area confined by a small movable electric fence.

Advantages

- Animals get fresh pastures almost every day.
- There are high levels of output from animals since they do not walk long distances.
- It allows intensive grazing of animals.
- Animal manure is well distributed throughout the field.
- It gives pastures enough time to recover.

Disadvantages

- The electricity may be dangerous to animals especially during lightening.
- It requires a lot of labour to move the electric fences.
- The animal's choice of pastures is limited.
- The fresh pastures that animals get may lead to bloat.

Communal grazing

This is where groups of animals belonging to different farmers are allowed to graze together on a common grazing land.

Advantages.

- Manure is well distributed around the field.
- It is a cheap method due to limited capital investment.
- There is maximum utilization of herbage by the grazing animals .
- The animals are exposed to grass legume mixtures in natural pastures.

Disadvantages.

- It is difficult to control animal breeding.
- Soil erosion is common due to over stocking.
- There is low productivity of pastures and land .
- There is poor quality of pastures due to lack of improvement.
- Control of parasites and diseases is very difficult if farmers are not cooperative.

Deferred grazing.

This is where pastures are left to over grow and form standing hay on which animals may feed later.

Advantages

- It produces fodder for animals during the dry season in form of hay.
- It enables the setting of pasture seeds and regrowth of pasture plants .
- There are no risks of bloat because animals donot eat fresh pastures .

Disadvantages

- The pastures are a fire hazard on the farm since they are dried.
- The pasture grasses are of low nutritive value.
- The slow growing legumes are easily suppressed by the grasses.
- The grasses are less palatable to animals.

Night paddocking; This is a system where animals are grazed on an extensive land during day and confined in small areas during night.

Set stocking ; This involves removing or addition of animals to a herd in order to match the stocking rate with the current carrying capacity of a given pasture.

Tethering; This is a system where animals are tied with ropes, pegged into the ground. It is common for small animals e.g. goats and sheep.

HERBAGE CONSERVATION

This is the practice of preserving herbage that may be abundant in wet seasons so that it is used when herbage is scarce in the dry season. It is conserved in two ways namely;

- Hay
- Silage

Reasons for herbage conservation

- To conserve pastures that can be sold for money.
- To store herbage that is to be used in seasons of shortage of fresh pastures.
- To avoid wastage of herbage during seasons of plenty.
- To increase the number of animals that can be kept per unit area of land.
- To ensure steady supply of animal products e.g. milk, meat etc
- To ensure continuous feed supply to animals throughout the year.

HAY

Hay is partially dry pastures (grasses, legumes, herbaceous plants) fed to the animals during periods when there are no fresh pastures. The main objective of drying the hay is to reduce the moisture content to levels that it can be stored without decomposing.

Forms of hay

Storage hay; this refers to dry pasture which are kept in the stores for future use.

Standing hay; this is a form of hay in which grasses or herbage is allowed to dry while standing in the fields. Therefore animals are allowed to go and feed on them from the field.

Procedures of making hay.

1. Select a suitable species and cultivate it on a good soil.
2. Cut the plant species at the onset of flowering when the nutrient level is high.
3. Curing is done to reduce the moisture content of the pastures and to reduce moulding.
4. The cut pastures are left in the field for 2-4 days to wither before being carried to a shade where they are dried for one week.

NB:Over drying the hay lowers its quality because it decreases the karontenoids content of the pastures .

5. Bailing;the dry hay is coiled and compressed into rectangular or circular bales for easy storage in hay boxes.
6. Storage;the baled hay is packed in a leak proof structure to avoid dump conditions and common salt is added to prevent moulding.Additive such as molasses may be added to increase palatability.

Factors that affect quality of hay

Type of plant used; use of nutritious and leafy plants e.g legumes improves on the quality of hay while use of stemy plants lowers the quality of hay.

Storage of hay; hay that is stored in moisture free conditions is of better quality than that stored in conditions of high moisture content due to rotting.

Moisture content of the hay at the time of bailing; high moisture content of the hay leads to rotting hence lowering the palatability and quality of hay .

Type and amount of additives used; addition of molasses and other additives improves palatability and quality of hay.

Degree of turning; better turning ensures uniform drying and therefore better quality hay while poor turning leads to moulding hence poor quality hay

Degree of exposure to the sunshine : hay that is dried in a shade is of better quality than that dried in the sunshine since its less fibrous.

Storage of growth of the pasture plant used: fodder cut at the right stage (before flowering) gives good hay than that cut at a wrong stage due to lower nutrient content.

Advantages of using hay

- It is cheap to prepare.
- It does not require special skills to prepare.
- It requires less labour to prepare.
- It can be made using any plants available.
- When prepared well, it can be stored for a long period of time.
- In case there are no storage facilities, the hay can be made as standing hay in the field.

Disadvantages.

- It requires a lot of space to store the hay.
- It is a fire risk i.e it can easily catch fire and burn up.
- The nutrient content of the hay is low as compared to silage.
- When the hay is over dried, it can chock the animal when eaten.

SILAGE

This is a succulent feed made by fermenting herbages/pastures purposely for feeding animals.

Silage making involves the following processes;

Ensiling process: the grass is cut when it's about to flower and legumes at podding stage and chopped into small pieces. The chopped material is packed in an airtight chamber and compressed to exclude air. Molasses are added to supply nitrogen. After packing, the chamber is sealed to exclude air and water.

Fermentation process: the ensiled forage will continue to expire aerobically until all the available oxygen is used up. It then undergoes anaerobic respiration (fermentation) under the action of lactobacilli to produce organic acids especially lactic acid which gives silage a good flavor, kills off other microbes and preserves the silage. Lactobacilli works best at pH of 3.8-4.3 and temperatures above 37.8°C.

If the temperatures are low, add more molasses into the chamber and if very high, add water or more forage. The acidic condition helps to check on activity of clostridium bacteria present in forage that convert sugar and lactic acid into butyric acid causing rotting and a bad smell.

The activity of clostridium is stimulated by moisture.

Silage is then stored in silos or silage chambers e.g. tower silos, silage pits/trenches etc.

Conditions for effective fermentation of silage.

- Temperatures of about 37.5°C.
- Carbohydrate/energy supply for action of lactobacilli.
- Anaerobic conditions (absence of oxygen)
- Acidic pH conditions for action of lactobacilli.

Procedures of making silage.

1. Select the forage plants with high carbohydrate but low moisture content.
2. Cut them and wilt them to about 65% moisture content.
3. Chop them to ease compaction and to exclude air.
4. Crush the materials with a roller to ease packing.
5. Compress the materials to exclude air.
6. Add additives such as sugar molasses, mineral salts, cassava flour, poultry manure to provide energy for microbes that breakdown the organic materials to produce lactic acid.
7. Press the material to prevent oxidation.
8. Seal or cover the silo immediately and rapidly with polythene to prevent air entry.
9. Dig a trench around the silo to direct off run off.
10. After 2 days, check the temperatures in the silo (37.8°C) and if the temperatures are high, add water to lower the temperatures.

Common losses during silage making.

- Losses due to scattering of the forage during chopping.
- Losses due to exposure and contact with the soil.
- Losses due to aerobic conditions in the silos.
- Losses due to seepage of water in the silos.

Ways of reducing losses during silage making.

- Addition of additives to increase the nutrient content of the silage.
- Proper compaction of the materials to exclude oxygen.
- Proper harvesting and chopping materials to reduce loss of leaves.
- Faster covering of the material when the silo has been opened to reduce spoilage due to external conditions.

- Proper wilting of the materials to reduce the possibilities of rotting due to high moisture content.

Advantages of silage over hay.

- It is more succulent than hay.
- It can be fed to the animals directly without any additives.
- It is more nutritious to the animals.
- Loss of nutrients during silage making is low.
- It improves the animal's appetite and feed intake.
- There is less wastage of food since its more palatable.

Disadvantages of silage

- It is expensive in terms of additives and preservatives used.
- It requires a lot of labour to prepare.
- It is difficult to compact the materials properly.
- It requires large quantities of forage to be made.
- It requires a lot of capital and machinery to prepare.
- Some nutrients may be lost due to water seepage in to the silo.
- In case of poor fermentation ,its smell is transmitted to the milk.

Factors that affect the quality of silage.

Type of grass and legume species ensiled: Some plant materials contain a lot of nutrients and good quality silage than those that contain fewer nutrients.

Moisture content of the material: Too much moisture content leads to deterioration of the silage hence leaching of the nutrients.

Silo temperature: very high temperatures lead to breakdown of proteins which are useful to the animals .The ideal temperature is 37.8°C.

Precaution against rain: Rain causes leaching ,rotting and therefore silage protected from rain is of better quality.

pH of the materials ensiled : pH 4 is the most ideal for action of lacto bacilli and therefore gives good quality silage than high pH.

Type and amount of additives used: the more the additives ,the better quality of silage because additives increase the nutrient content and palatability of the silage.

Degree of chopping of the material: chopping of the materials makes them easy to compact and fermentation by the bacteria.

Stage of growth of the forage plants: materials cut after flowering give low quality silage as the nutrients are already used for reproductive purposes in the plant while those cut at flowering stage give quality silage.

Degree of compaction of the material: a poor compaction results to rotting of the material hence poor quality silage while a good compaction leads to a good quality silage .

Differences between silage and hay

<i>Silage</i>	<i>Hay</i>
Less risk of fire.	High risk of fire.
Partially decomposed.	Not decomposed.
It is a succulent forage.	It is dry roughage.
Weather conditions donot affect making of silage.	Highly affected by weather condition.
Production requires exclusion of air or oxygen.	Doesnot require exclusion of oxygen.
High digestibility.	Low digestibility.
Requires less space for storage.	Requires more space for storage.
Made up of pastures and several additives.	Made up of pastures mainly.
Processing requires action of bacteria.	Processing doesnot require action of bacteria.
More palatable and softer.	Less palatable and hard.