Silage making

Silage is a high-moisture fodder preserved through fermentation in the absence of air that can be made from grasses, fodder sorghum, green oats, green maize or napier grass.

An ideal crop for silage making should:

a. Contain an adequate level of fermentable sugars in the form of water-soluble carbohydrates
b. Have dry matter content in the fresh crop above 20%
c. Possess a physical structure that will allow it to compact readily in the silo after harvesting

Crops not fulfilling these requirements may require pre-treatment such as:

a. Field wilting, to reduce moisture
b. Fine chopping, generally 20–25 mm preferred to allow compaction
c. Use of additives, to increase soluble carbohydrates

a.) Harvesting stages

Different crops have differ in their stage of harvest

a. Napier grass should be harvested at about 1 metre when protein content is about 10%.
b. Maize and sorghum should be harvested at dough stage that is when the grain is milky. The grains will provide water-soluble sugars and molasses is not necessary when ensiling.

When ensiling napier grass, molasses should be added to increase the sugar content. To improve silage quality, poultry waste and legumes like lucerne and desmodium may be mixed with the material being ensiled to increase the level of crude protein.

b.) Silos

A silo is an airtight place or receptacle for preserving green feed for future feeding on the farm. Silos can be either underground or above ground, airtight and allow compaction.

Types of silos are; Tube, pit, above ground, trench and tower.

Silage can be made in large plastic sacks or tubes, which have no holes to ensure no air enters. This is popularly referred to as tube silage. The recommended gauge is 1000.
Silage can also be made in pits that are dug vertically into the ground, filled and compacted with the silage material.

An above ground silo is made on slightly slanted ground. The material is compacted, covered with a polythene sheet and a layer of soil is added at the top.
When finished, it should be dome-shaped so that it does not allow water to settle at the top but rather collect at the sides and drain away down the slope.

The trench silo is an adaptation of the pit silo, which has long been in use. It is much cheaper to construct than a pit silo. Construction is done on sloping land.

A trench is dug and then filled with silage material. This method is ideal for large-scale farms where the tractor is used. Drainage from rain is also controlled to avoid spoiling the silage.

Tower silos are cylindrical and made above ground. They are 10 m or more in height and 3 m or more in diameter. Tower silos containing silage are usually unloaded from the top of the pile.

An advantage of tower silos is that the silage tends to pack well due to its own weight, except for the top few feet.

Qualities of well-prepared silage
To be able to determine the quality of silage produced check for the following

- **a.** Bright or light yellow-green
- **b.** A smell similar to vinegar
- **c.** Firm texture.

Natural microorganisms turn the sugars in the plant material or any added as molasses into weak acids, which then act as a preservative.

The result is a sweet smelling, moist feed that cattle like to eat once they get used to it. Bad silage tends to smell similar to rancid butter or ammonia.

Storage and feeding
Tube silage should be stored under shade, for example in a store. Rodents like rats that could tear the tube need to be controlled.

When feeding, open the tube and scoop a layer and remember to re-tie without trapping air inside. When feeding from the pit, scoop in layers and cover after removing the day's ration, making sure there are no nutrients lost.

Tube silage
There are many methods for silage making but use of plastic tube is among those suitable for a farmer with one-two cows and limited napier acreage, rhodes grass and maize thinning.

Use a standard tube of 2.5 m length/1000 gauge, which has a 450-500 kg capacity Napier.

Silage making procedure

- Cut the material for ensiling and leave it spread in the farm to wilt for 2 to 3 days
- Chop forage (using a chaff cutter or a panga) into chops of 2.5 cm.
- Spread a canvas or plastic sheet of 500 gauge on a flat surface and spread 70kg (about two half sacks of chopped and compacted Napier grass) of the chopped material into a thin layer;
- Take 1lt molasses (about 1lt *Kasuku* tin-full) and dilute with 3lt of water (1lt *Kasuku* tin-full x3). If there is need to improve the Crude Protein content of Napier, add 200 grams of urea into the molasses and dissolve completely;
- Using nursery watering can, or 2-lt *Kasuku* tin perforated at the bottom, spread the molasses/ water mixture on the Napier evenly and mix thorough to ensure an even spread . If the weather is not conducive for Napier wilting or when the molasses is very expensive spread 1.5kg of maize germ on to the chopped Napier and mix as above;
- Tie one end of the 2.5m plastic tube (width 1.5m) to make a large plastic bag. Place the 70kg of forage already mixed with molasses, or maize germ, into the plastic tube and compacted as much as possible.
- Repeat bullet 1-5 as many times as is necessary to fill the plastic bag;
- Tie the top of the plastic bag tightly to ensure air tight;
- Place heavy objects on the tied plastic tube to maintain the compaction.

Note : the filled silage plastic bag is very heavy and it is recommended that its filled at the point of storage : or alternatively use smaller tubes of 1.5m length which will contain less material, will consume more plastic tube to make 2.5m and also double the number of tubes, posing storage problem.

Losses

There are various losses associated with silage making

a. Nutrients may be lost in the in the field during cutting,
b. Respiration losses during wilting will be about 2% per day.
c. Leaching losses caused by rain.
d. Overheating due to poor sealing gives a brown product, which may smell like tobacco and result in severe damage to nutrients e.g. proteins.
e. Effluent losses of 2–10% that occur from moisture seepage contain soluble and highly digestible nutrients; seepage should be avoided by wilting the herbage.

Silage additives

During silage preparation, different types of additives can be added to improve the quality. These include

- Fermentation stimulants. Some crops may not contain the right type or the right number of lactic acid bacteria. Bacterial inoculants and enzymes can hasten and improve fermentation by converting carbohydrates to lactic acid. Most inoculants contain Lactobacillus plantarum.

- Fermentation inhibitors include acids such as propionic, formic and sulphuric. Inorganic acids are more effective but are strongly corrosive thus not recommended. Of the organic acids, formic is more effective than propionic, lactic or acetic.
- Substrate or nutrient sources (grains, molasses, urea or ammonia) are used when there are insufficient soluble carbohydrates in the material to be ensiled (e.g. legumes, Napier grass, crop residues). They are also used to increase the nutritive value of the silage. Molasses can be added at about 9 kg/t of silage. Note: Use of additives is not a prerequisite for making good silage, but it is good for problem crops.

Feeding silage

Silage is fed to dairy cows according to their body weight or 6-15kgs per cow per day. Feeding should be done 3 hours before milking or fed after milking to avoid the milk picking the silage smell.

The feeding troughs should be washed after feeding silage to avoid contamination and infection of the dairy cows.