4. Storage

Bagged silage - It is important to store bags of silage in a room near the milking parlor or feed troughs. The room must be sealed from rodent s and insects that can puncture the bags. Every year before ensiling begins, the room should be checked if its secure from rodents and other conditions which may compromise safe storage of silage bags.

The surface area selected for storage of silage bags has a large impact on silage quality and ease of feeding from the bag. Concrete padding provides excellent surface for silage bags, as it enables easy removal of feed with little or no damage, can achieve exceptional drainage of water away from bags, discourages pests and makes inspection for damaged bags very easy.

Compacted gravel surfaces are also ideal for placing silage bags because they make weed and pest control easy—as long as they have good drainage.

Pit –silos - Safe storage in pit silos is ensured by proper pit siting. A proper pit site is one which drains freely to avoid soil moisture from contaminating silage, resulting in rotting. Good covering of silage pit is essential after silo filling. It enables water to run off in the event of rainfall. Silage is normally ready for feeding out after 2– 3months of fermentation.

When opening the pit at feeding out, care must be taken to expose as little of the surface area as possible on a daily basis to elements of the weather. The exposed areas should be covered immediately after collecting enough silage for the day, to minimize spoilage.

5. Silage to feed other livestock

Silage can also be used to improve the body condition of high value beef cattle in market oriented production systems, so as to obtain higher market prices.

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PRINCIPLES OF SILAGE MAKING

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1. What is silage?

Silage is fodder that is developed when fresh herbage, that contains sufficient water soluble sugar (WSC) content, is fermented in "air tight" (or anaerobic) conditions until enough acidity to keep the forage from rotting, is produced by sugar fermenting bacteria that occur naturally on the surface of the forage (epiphytic bacteria). The desirable epiphytic bacteria (predominantly lactic acid type) converts the WSC in the plant material into pleasant smelling lactic acid (LA), which prevents spoilage of silage by other bacteria or moulds (fungi). Ideally, forage should have WSC concentration of 13 –16% of DM before ensilage. Wrongly fermented silage is dominated by butyric acid, which smells badly and causes silage to be unpalatable and toxic.

Good quality silage must meet the following standards: pH < 3.9-4.2, LA 3-13% of DM, butyric acid <0.2% (v/v), ammonia nitrogen (NH_3-N) <11% of total N content. However, pre-wilted grass silage can preserve at higher pH (4.5-4.7) and lower LA content and LA:acetic acid ratio. Legumes usually require supplementary WSC to preserve well.

2. Why Silage ?

Owing to the seasonal nature of rainfall in the subtropics, rangeland and planted pasture only supply high quality green forage for a quarter of the year, leaving animals to struggle with poor quality forage for the rest of the year. At a high producing farm, there is need to conserve high quality forage in large quantities and quality, sufficient to last an entire 5-6 months of dry season. Silage provides a means to conserve forage in as near a form to the original forage as possible. Due to its high production costs, it is mostly used on high return enterprises, e.g. dairying.

3. Method

Forage used in silage making is chopped to small pieces (ideally 15-25mm long) to expose as much plant sugar as possible to fermentation bacteria. Then, it is placed in a silo and compacted (i.e. packed together) so that as much air as possible is driven out to create anaerobic conditions. Exclusion of air also helps to ensure that the plant material does not continue to breath / live. Harvesting, chopping and compaction has to be done very quickly and the silo sealed immediately to avoid losses of water soluble sugars that are fermented by the lactic acid bacteria. The silo can be a pit covered with plastic sheeting, a drum or a plastic bag.

For economic reasons, forage species that yield highly per unit area, such as maize, sorghum and Napier grass, are normally used to make silage. Cereal crops such as Maize and sorghum should be harvested at milk dough stage, and Napier at 6-8 weeks, when their WSC content is highest. Other crops, such as *Lablab purpureus* and Velvet bean (*Mucuna pruriens*), should be ensiled at flowering, for optimum nutritive value.

3.i. Bag silo

Farmers can use plastic bags that can carry 15—25 kg of chopped forage. The chopped forage can then be sealed in the bag, after compaction, to exclude all the air and to retain all the products (acids) of fermentation.

Bagged silage is often preferred because it reduces the hard work of digging out the silage at feeding time. Small bags are also ease to store and portable. This makes it easy to feed all the contents once bag is opened. It also helps to avoid left-over silage that will spoil once a portion of the bag contents are removed..

3.ii. The Pit silo

This involves digging a pit in the ground. On smallholder farms with 1 or two cows, the pit could be 2m in depth and 1.5m wide and 3m long with one end sloping to allow easy entry and exit while loading and offloading the pit. The farmer must ensure that 400 - 450 kg of plant material are compacted in every $1m^3$. Thus a pit of this size will store 4 to 5 tonnes of silage.

Compaction can be done by rolling a 200ltr drum (filled with water) over each 10-20cm layer of herbage, during silo-filling.

It is important to ensure that the pit is dug where water table is low, e.g. on an upward slope. The side walls of the pit should slope slightly inwards towards bottom so that settling of the silage will not produce pockets of air at the sides, which causes spoilage. Sides must be completely smooth with no rocky outcrops or bumps.

Pit must be filled as quickly as possible and sealed with plastic sheeting, which must flow beyond the borders of the pit on all sides, to avoid rain-water damage. A thin (30 cm) layer of soil can be spread over the sheet to protect the plastic sheet and the ensiled crop.