



Fig 5. Bags of silage being taken to the storeroom at the milking shed.

In a good season, as many as 400 15kg bags of silage can be made from a third of a hectare of intercropped forage and legume. In a drought year, as many 100 bags can be made and can keep three cows alive for the last two months before the next rains.



Fig 6. This farmer has built her storeroom next to her milking shed.

- The bags should be taken as soon as they are ready to be kept in a storeroom which is rodent-proof. The storeroom can be next to the milking shed or close by for ease of management.
- The silage will be ready to feed any time after three weeks and will keep for many months so that it can be fed in the driest months of



Fig 7. This cow was fed silage over the dry period and is in good condition

August, September and October if there is not enough to feed any earlier. One 15kg bag will be enough to feed two cows per day. If 400 bags are produced, then two cows can be fed for six months or four cows can be fed for three months.

If a cow is fed silage every day for at least three months over the dry season, she will be in good condition by the time the rains come again and she will be fertile. This means she will give a calf every year and will produce milk every year. One bag should also feed six goats a day and keep them in good condition and fertile. If two oxen are fed one bag of silage every day for two months in the dry season, they should be in good condition for ploughing.

**Unused silage will keep for a further year providing the silage was made properly and the 'silo' remain air tight.**

# DRY SEASON FEEDING OF SMALLHOLDER LIVESTOCK

## FORAGE CONSERVED AS SILAGE



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## What is the importance of conserved forage for the dry season?

In the semi-arid areas of Southern Africa, grazing is sparse and of poor quality in the dry season. As a result, farmers are unable to offer enough feed to livestock to enable them to grow, produce milk, stay in good condition for good fertility, produce meat and at times, in drought years, to survive.

**However, to overcome this deficiency, farmers can use forage, grown in the wet season and conserved as silage.**

## What is silage?

Forage which has been grown in the wet season then harvested while still green and nutritious can be conserved through a natural 'pickling' process. Lactic acid is produced when the sugars in the forage plants are fermented by bacteria in a sealed container ('silo') with no air. Forage conserved this way is known as 'ensiled forage' or '**silage**' and **will keep for up to three years without deteriorating**. Silage is very palatable to livestock and can be fed at any time during the dry season.

**Our research has shown that a smallholder livestock farmer, even in semi-arid areas, can produce enough silage to feed the livestock over the driest months and keep them in good condition.**

## Why silage and not hay?

Silage preserves the forage material in a much better state than hay because it is protected against the damaging effects of the sun, insects, fire, animal damage and mould while hay is not. Some forages such as bana grass are difficult to dry as hay because they are so bulky but they are not difficult to ensile.

## What forages can be grown for silage in low-rainfall and drought-prone areas?

There are many but our research proved that **forage sorghum** and **Bana grass** were successful as forages for silage in the semi-arid area of Southern Africa.

These are what we call the "**cereal forages**" because they contain enough plant sugars for good fermentation. However, they are low in protein.

Legumes such as cowpea and dolichos bean have high protein content but their sugar content is inadequate for good fermentation for silage. **We can ensile cereal forages and legumes together, to produce good silage with high nutrient content of both carbohydrate and protein.**

Two legumes which grow in low-rainfall and drought-prone areas are: **cowpea** and **Dolichos bean** and **Forage legume trees (e.g. leucaena, acacia)**

The legumes can be intercropped with forages (see forage agronomy leaflet or forage manual\*) or grown as a separate crop and mixed in during ensiling.

Leaves from the forage legume trees can also be mixed with the forages .



Fig 1. A farmer with his intercropped forage and legumes, ready for harvest

## Producing low-cost silage

There are some essential processes in making silage.

- The crop must be harvested only when it is at the right stage of maturity (see forage manual). Forage sorghum should have seed which is at hard-dough stage, while bana grass should be at about a metre high. The legumes should be in young bean stage.
- The crop must be chopped as soon as possible after harvesting to short lengths of no more than 25 to 50 mm (one to two inches). Harvesting can be done by hand. Chopping can be done by hand but this is tedious so that it is better if a petrol-driven chaffer is used. This chaffer can be produced by any good engineering company. It must sit on a strong platform which is supported by an axle and wheels and needs to be constructed so that it can be drawn by vehicle and oxen. The petrol driven chaffer can be hauled from one centre to another by oxen. It can be kept by a local business or government centre and leased out to each farmer group, with a trained operator to run it.



Fig 2. A petrol driven chaffer ready for action



Fig 3. Fertilizer bags being filled after the forage has been chopped.

- The forage must then be put into a silo (silage container) and compacted so that as much air as possible is driven out. A silo can be a pit or a drum or a plastic bag. It has been found that pits are not adequate to prevent spoilage of much of the silage, while it can be difficult and expensive to find enough drums. Our research showed that plastic bags such as 50 kg-size fertilizer bags are not expensive and are good not only as sealed containers or silos, but are easy for women and children to carry from storage areas to feed the livestock. The plastic bags will last for at least three seasons if they are looked after carefully.
- The plastic bag (or other silo) must then be sealed tight so that no air can get in.



Fig 4. A child can carry one bag of silage from the storeroom for feeding out to the livestock.