



## DRY SEASON FODDER

Crop residues, the typical dry season fodder used in tropical countries, are of very low feeding value. Dairy animals especially suffer from being fed inadequately, which results in low milk production, reduced fertility, low calving or kidding rate, low birth weight, high calf or kid mortality, low growth and weaning weight, and reduced mature body size of young animals. The negative effects on household income and food security are obvious!

Crop residues should form only a smaller part of the diet of dairy animals. The larger part should come from more valuable sources like fresh Napier grass and hay or silages. They should always be supplemented with leguminous plants, leaves from fodder trees and dairy concentrates.

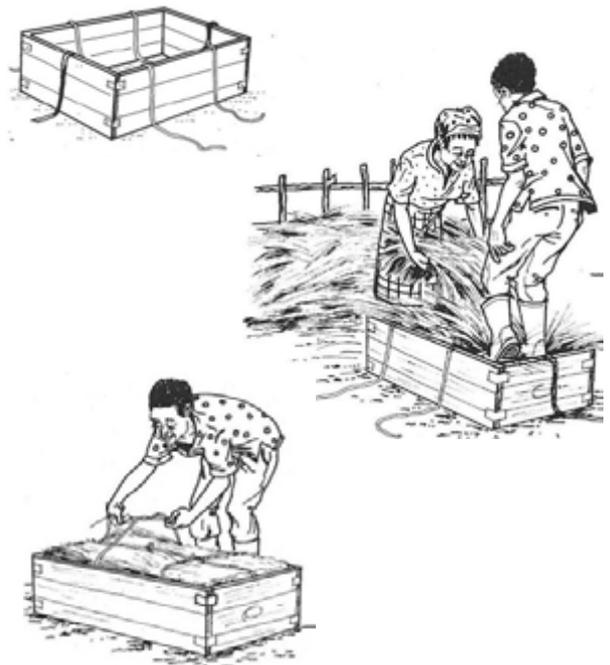
### Hay preparation

Drying grass and other fodders is a very good, cheap and simple way of conserving feeds. The main requirements: clean grass and three days without rain. Hay may also be sold to improve income. Rhodes grasses, Congo signal grass, Guinea grass, Kikuyu grass, but also legumes like lucerne and green lablab make very good hay.

- Cut the grass when it starts to flower, or 4 to 6 weeks after the last grazing or cutting.
- Cutting is done best in the morning of a dry day.
- Leave a stubble height of 5 cm (2 inches)
- Spread the grass evenly on the ground or on a dry and clean surface where drying is not prohibited.
- Use a rake to turn the grass once a day to prevent rotting.
- Allow to dry for two or three days without rain.
- When the hay is dry, collect it and store it safely in a shed to protect it from the sun and rain.
- Store as a loose heap or in bales.
- You may mix hay prepared from grasses with hay of a protein source forage like lucerne to boost quality.
- Making bales: A simple baler is a rectangular box with an open top and bottom (3 ft x 2 ft. and 1.5 ft high). Put the hay into the box and trample on it (with clean shoes) until it cannot be compacted further. Then bind the hay together and push it out of the frame.

### Feeding dry fodder: never forget the water!

The volume of dry fodder is much smaller than fresh green material. One bale of 15 kg of good hay is the equivalent of 75 kg fresh fodder and can feed a high-yielding dairy cow for one day. But the digestion of dry fodder also requires large amounts of water, or milk production will be restricted by insufficient water intake.



### Fodder trees

Leguminous fodder trees provide protein rich material that improves milk production of dairy animals. But because growth is reduced during the dry season, the leaves are not as nutritious as during the rainy season when they are young. Be careful not to feed more than 12 kg of fresh leaves per day to a cow (or 2 kg to a goat or sheep) as they contain substances which disturb digestion. Always mix them with grasses, hay, or silage.

### Leaf drying

Dried leaves of leguminous fodder trees are a protein rich dry season supplement. Cut twigs when there is abundant growth during the rainy season. Dry them on a clean surface for three days in the same way as hay. When they are crispy and dry, they can be stored in bags. Feed not more than 3 to 4 kg of dried leaves per day to a cow, or not more than 0.5 kg to a goat.

**Calculate young stock as half the amount of a mature animal on average.** Don't forget young animals when calculating how much feed to store for the dry season. They need sufficient nutrients for a healthy development!

## Preparation of silage

Where drying grass is a problem because of too frequent rains, silage may be an option. It can be prepared from excess grasses, fodder legumes, maize, sorghum, or sugar cane tops. Plants have to be green and of good quality. If the fermentation succeeds, silage is the best dry season preparation for dairy cattle, while goats may not like it. Addition of molasses (2 to 10% of the fodder weight) improves preservation and quality. If you mix up to 30% legumes into the fodder grass, the silage will contain more proteins and increase milk yields. But preparing silage includes the risk that the fermentation process fails. In this case, the fodder has to be thrown away.

<b>Grass for silage must be wilted</b>	Cut grass for silage at a young age, when it starts flowering. Then spread it in the field to wilt for about one dry day to reduce water content. Fine, short young grass should be wilted in the sun only for about 3 to 5 hours. Turn the grass once during the wilting process.
<b>Molasses and silage moisture</b>	If you use molasses, it is important that the silage material is rather dry. If you take a hand full of it and squeeze it, there should be only a slight feeling of moisture in your hand. Otherwise the silage may seep too much after addition of the molasses solution.
<b>Coarse plants must be chopped</b>	Napier grass, maize plants, sorghum plants etc. need to be chopped. Try to organize a chaff-cutter, as it provides the finer material than if you use a panga.

## How to prepare bag or bucket silage

Bag silage has the advantage that labour can be distributed, and in case of failure only small quantities of fodder must be disposed of. For this method, plastic tubing (1.5 metres, 1000 gauge) has to be available. But bag silage can also be prepared in drums, buckets, or with smaller bags, provided they are clean and can be sealed airtight. If the material is thin, several layers may be used.

- Spread a big sheet (chandarua) or canvas onto a flat surface.
- Solve 2 - 3 litres of molasses in 3 litres of water.
- Chop the forage finely to pieces not longer than one inch. Fine, soft, short grass must not be chopped.
- Place 2 or 3 gunny bags of the fodder (about 100 kg) on the sheet and spread the material evenly.
- Sprinkle the diluted molasses evenly onto the forage and mix well.
- Tie one end of 2.5 metres plastic tubing tightly to make a large bag. If available, you could also use large firm re-usable plastic drums which can be sealed tightly.
- Place the mixed forage into the polythene bag and compact it as much as possible.
- Always be very careful not to make holes into the bag. Making silage only works when the bag is air tight.
- Repeat point 2 to 7 two to three times. Try to compact the forage thoroughly within the bag.
- When you tie the bag tightly, as little air as possible should remain inside.



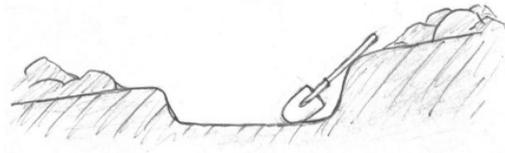
## Storage and use of silage

- Store silage in a safe place, away from rodents, direct sunlight or rain.
- The silage will be ready for use after one month. It can be stored for as long as the bag is air tight.
- The silage should have a quite pleasant smell of fermented material.
- Once you opened a bag, you have to use it up immediately, as it deteriorates quickly.
- If the silage looks and smells mouldy, the material was too dry, or the bag was not airtight. If the silage has a very unpleasant, foul or rancid smell, it may have been too wet. In either case, the silage has to be composted.
- Each time you extract silage from the bag, expel the air from it and tie it tightly again to avoid spoilage.
- A dairy cow can eat up to 35 kg of silage per day. To ensure that the milk has no smell of silage, feed it after milking or at least 3 hours before milking. Feed fresh grass, hay, legumes and concentrates before and during milking.

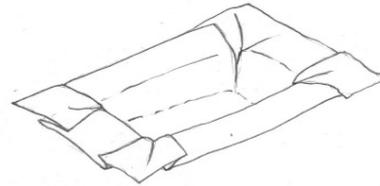
## How to prepare pit silage

To conserve larger amounts of fodder for several large animals, you can prepare silage in pits. For a silage volume of 1.5 cubic meters (1 m x 2 m and 0.75 m high) you need about 1000 kg of fodder, or 20 big bags of fresh, chopped material, 20 to 50 litres of undiluted molasses and about 7 x 3 m polythene sheeting.

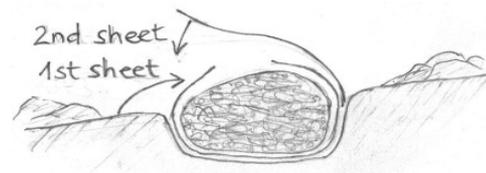
- Prepare a level pit about 1 x 2 meters wide and 1 to 2 feet deep, preferably on slightly sloping ground for better drainage of rain water.
- Place a big polythene sheet on the floor and walls of the pit and cover also about one meter of the ground on all sides so that the forage does not come into contact with soil.
- Chop the forage to lengths of about 1 inch, using either a panga or a chaff cutter.
- Empty the chopped material (4 to 5 bags or 200 kg) into the plastic lined pit, and spread it evenly.
- Dilute 5 to 10 litres of molasses with 5 to 10 litres of water. Use a garden sprayer to sprinkle and distribute the solution evenly over the forage.
- Compact the forage by trampling on it (use clean boots!) to force out as much air as possible. This will prevent fungi growth and spoilage.
- Add four other bags of the chopped feed, sprinkle it with another 5 to 10 litres molasses diluted with 5 to 10 litres of water and compact the forage again. Repeat this process of adding four bags of forage, diluted molasses and compacting until the pit is filled in a dome shape.
- After a final pressing, wrap the polythene sheet around the silage and cover it with a second sheet to prevent water from running into the silage.
- Then cover the heap with a thick layer of soil (at least two feet) to keep the air out and to prevent damage of the polythene by rain, birds and rodents.
- With good sheeting and enough soil on it, the silage can be kept for more than one year.
- For feeding, the pit is opened from the lower side of the slope. Remove enough material for one day's feeding, and cover the open end again. Once the pit is opened, use the silage as quickly as possible.



Prepare a pit and line it with polythene sheeting.



Chop and fill the fodder inside, sprinkle it with molasses and compact it well.



Wrap the fodder and cover the heap with a second polythene sheet and with a thick layer of soil



The more molasses you add the faster and better the acidification and preservation process will be!

## Feeding crop residues

Crop residues, if not fed while still green, can only provide nutrients for body maintenance, but not for milk or meat production. They should at least be well conserved when fed to dairy animals, because poor storage and poor processing add to rapid quality decline during the dry season. A number of options can improve their forage quality. Early harvest, at best while still green, improved conservation and storage, addition of more valuable feeds, using additives, and treatment before feeding are the most important means.

## Intercropping grains with legumes

Maize or sorghum can be intercropped with various legumes for human consumption, but also with forage legumes. Climbing varieties are especially well suited.

Suitable legumes include lablab, cowpea, pigeon peas, runner beans, desmodium, centro, siratro, velvet beans (*Mucuna*).

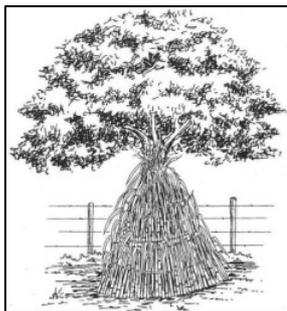
The legumes can be undersown when the main crop is already established. Sow forage legumes after the last weeding of the grain crop.

The stover and the still green legumes may be cut after the harvest of the cereal or legume grains and fed together. This will increase the protein content of the fodder and stover digestibility.

Another option is to prepare hay or silage from a mixture of leguminous plants and grasses or fodder maize, sorghum or sugar cane toppings.

## Stover conservation

Maize stover should at least be conserved in pyramidal stacks in the field, or better in the shade of trees to reduce penetration by rain water and for protection from direct sun light. However, insect and rodent attacks are frequent with this method.



Chopping or grinding of dry stalks improves their intake, and storing the material in bags prevents losses due to pests. The bags must be stored in a dry and shaded place. Never feed forage from bags if there are any signs of mould or rotting!

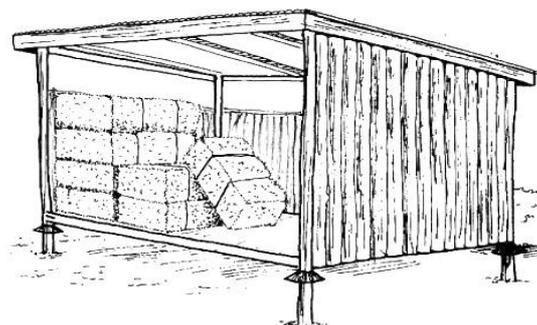
A completely different suggestion worth being considered comes from conservation agriculture (TOF-leaflet No 7):

Because stalks are almost indigestible for animals anyway, they are left in the field and only the leaves are stripped and fed to animals. The stalks protect the soil from erosion and add organic matter, improving soil fertility effectively. The stripped leaves may be baled and stored.

## Improved storage

Fodder storage under a roof and protected from rodents is always preferable to outdoor storage as nutrients are better conserved. The store may be integrated into the animal unit.

- Make sure the place is well ventilated to prevent moulds and rotting.
- An elevated floor is a real improvement. Apply an organic insecticide to the floor to protect the feeds from termites.
- Baling reduces the volume which has to be stored.



## Additives to stover and straws

- Leguminous fodders are rich in minerals and proteins and increase digestibility of crop residues. They should be supplemented at a rate of not more than 30% of the ration. This corresponds to 10 to 15 kg of fresh leaves (or 3 to 5 kg of dried leaves).
- Concentrates like dairy meals or seed cakes improve protein and energy content of the ration and support milk production.
- Crop residues are poor in minerals. To sprinkle them with mineral salt is therefore useful and increases intake.

## Treatment of stover and straws

- Chopping increases acceptability of residues
- Soaking in water increases residue intake, especially when sprinkled with mineral salt
- Soaking in diluted molasses overnight increases intake and provides energy.
- By treating crop residues with urea, a protein source for ruminants is added. This technique is potentially dangerous. Urea is in fact not used in organic farming. Please get expert advice before you adopt this method which we do not recommend. Beneath is a description to prevent the worst mistakes.

## Crop residue treatment with urea

For this method, it is essential to know the exact weight of the fodder. If your estimate is wrong, an overdose of urea may actually kill your cow!

- Chop up dry maize stalks, rice and other grain straw. Prepare silage as advised on page 2 and 3. Instead of using diluted molasses, prepare the silage with urea solution or a solution with urea and molasses.
- For every kilogram of dry fodder, one litre of water and 50 grams of urea are applied. For 100 kg of residues, dissolve 5 kg of urea in 100 litres of water.
- Dissolve up to 10 kg of molasses (for 100 kg stalks) in the solution. This provides an additional energy source and improves the fermentation process.
- Compact the mixture well, and then tie the bag tightly. When using the pit method, cover the compacted heap with a plastic sheet and with a thick layer of soil.
- The silage is ready after three to four weeks.
- Start feeding this silage in small portions only and watch your animals well for any signs of sickness.
- Do not feed more than 6 kg per day to one cow, and never feed this preparation to goats.

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