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ALTERNATIVE ROUGHAGES TO USE DURING DROUGHTS

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Droughts are a feature of the South African climate. During droughts of long duration, roughage supply is limited and becomes increasingly expensive as the drought continues. Livestock producers are forced to look at alternative sources of roughage to see their animals through the drought.

During droughts most alternative roughages are low in quality with regard to energy, protein and digestibility. Low-quality roughage must be fed in conjunction with other energy feeds. It is important to note that with feeds of low digestibility (less than 45%), providing an animal with sufficient gut fill will not necessarily prevent loss of condition. In such cases, stomach volume restricts adequate intake of feed. Animals are not able to consume sufficient nutrients to meet their requirements for energy and hence survival. Apart from starvation, other problems arising from feeding alternative, low-quality feeds include impaction, stock losses from metabolic diseases and reconception problems. When feeding rations that differ appreciably from the usual, it is more important than ever to test forages and obtain guidance with feed programming.

Bagasse

Bagasse is the fibre remaining after the extraction of the sugar-bearing juice from sugarcane. It is so poor in terms of feed value it is only considered useful as an inexpensive source of fibre. Bagasse mixes well with molasses and is sometimes used as a cattle feed base. The moisture content of bagasse varies. Spraying ensiled bagasse with a 30% solution of sodium hydroxide increases its digestibility from 30 to 55%.Treated bagasse fed at 10% of the total diet and supplemented with protein, energy and minerals has

been successfully fed in commercial feedlots in Australia, but weight gains have been lower than normal (0.7kg/day). Trials with pelleted bagasse rations fed to dairy cows have shown that at levels of 20 - 22% of the diet, cost effective production largely depended on the additional supplements, i.e. grain, protein concentrates and minerals.



Figure 1: Bagasse, 91.8% dry matter (DM), 1.19% crude protein (CP), 4.27 MJ kg⁻¹ metabolisable energy (ME)

Oat hulls

Oat hulls are a high-fibre source but are a poor source of protein and energy. Oat hulls are the least abrasive of the hulls when compared with sunflower and cause digestive problems when fed in large quantities. Feed no more than 1 kg per head per day and feed to adult cattle only. Oat hulls are generally not used as a cattle feed. However, they can be used in extreme circumstances, when other roughage sources are expended. It is best to mix them with other roughages during the build-up stages.



Figure 2: Oat hulls, 91.8% DM, 5.8% CP, 4.97 MJ kg⁻¹ ME Photo: University of Iowa

Cotton-seed hulls



Figure 3: Cotton-seed hulls, 92.3% DM, 3.88% CP, 5.7 MJ kg⁻¹ ME

Although virtually a waste product and low in energy and protein, cotton-seed hulls are an excellent source of effective fibre for ruminants. They are an excellent filler in high-grain, low-roughage diets and can boost drymatter intake. Cotton-seed hulls can be used as the main fibre fraction in a total mixed ration system (TMR), or to replace part of the forage.

Cane tops

Sugar cane tops are a by-product of sugarcane harvesting, comprising green leaves, the leaf bundle sheath and some immature cane.



Figure 4: Cane tops, 85% DM, 6% CP, 7 MJ kg⁻¹ ME

The nutritive value can vary significantly, depending on the background of the material. It is recommended that any cane tops purchased be analysed to allow for appropriate supplementation. During severe droughts there is often a high proportion of non-millable cane with less than 400 mm of stalk, no green leaves and a high eldana count. To reduce eldana and save the roots, sugar farmers on the KwaZulu-Natal south coast cut their cane using a rotary slasher. The shredded material is baled and sold to stock farmers. The palatability to hungry animals is acceptable whether or not the sugarcane was burnt (burnt material will have a lower nutritive value). The tops are milled for dairy animals to reduce wastage and encourage greater intake.

Sugar cane tops are protein deficient and, at best, cane tops will act as low-quality roughage. They should therefore be supplemented with a grain and/or a protein source. There have been no reports of cane top bales fermenting or going mouldy. The quantities of each will depend on the type of livestock and the nutritional value of the cane tops. It was found that a daily ration of 9kg milled sugar cane leaves and tops supplemented by 1kg lucerne hay and 250 g crushed maize per cow was satisfactory for the purpose of over-wintering cows of approximately 450 kg that were heavy in calf.

Crop residues

When crops are reaped, residues become available. For example, when reaping cabbages, discarded leaves comprise up to six tons of edible dry matter per hectare. Although almost any crop residue can be fed to livestock, the residues of maize, sugar cane, grain sorghum, soybean, wheat and vegetables are most often used.

 Maize residues provide the major crop residue source in the summer rainfall areas. As a general rule, one ton of residue is available for every ton of grain harvested. The quality of maize residues varies. On average, they contain 3 - 6% CP and the ME content is between 3.9 and 9 MJ kg⁻¹ DM. Cattle will eat approximately 10 kg (DM) of maize residues daily.

 Soyabean residues are available for grazing during April / May and can be useful in bridging the autumn gap until maize residues become available in late May / June. Palatability problems may occur and up to two weeks is required for adaptation. The residue is best suited to the feeding of dry, adult animals.



Figure 5: Cow eating maize stover. Photo: V. Roberts

- Chopped sweet potato roots can substitute for silage or be fed as part of the grain ration.
- Carrots contain 8 9 % CP and have an ME value of 8 – 9 MJ kg⁻¹ DM. Fed whole or chopped, they can make up to 30% of the ration.
- Pumpkins have a high moisture content (90%) and protein / energy values about half that of sorghum silage.
- Potato tubers are high in moisture (80%) and have an ME content of 11.5 MJ kg⁻¹ DM, about 9% CP and 2% crude fibre. Cows can eat 12 – 15 kg daily of raw potatoes on an as-fed basis. They are best fed in combination with a fibrous feed such as hay.

It is very important to determine what was applied to the crop, such as herbicides or insecticides, as these may result in stock losses due to poisoning. Toxins produced by moulds and fungi may also result in poisoning and livestock farmers should make an effort to find out if the residues were exposed to moisture for any length of time. Animals fed crop residues may also suffer from problems resulting from the toxic effects of some crops. Many crops are prone to regrowth and the young shoots cause prussic acid poisoning. Sorghum is an example of a crop that may cause prussic acid poisoning. This can be prevented by feeding a sulphur-containing lick to the animals or putting sodium thiosulphate in their drinking water. The brassicas (cabbage, cauliflower, brussels sprouts) all produce substances that prevent the uptake of iodine, so animals should not be fed residues of these crops over an extended period of time. Some crops produce toxins, which include the trypsin inhibitors of soybeans (not a problem for ruminants) and solanin, which is present in the leaves of many plants, especially potatoes. Feeding of potatoes should only be undertaken in times of major food shortage as even feeding less than toxic quantities of potato leaves can suppress production. It is recommended that the usual licks be fed to animals and, for certain cases, especially for animals on low quality feeds, supplementation is essential.

Old man saltbush

Old man saltbush (*Atriplex nummularia*) is an erect shrub that is grown as a fodder plant in drier areas because of its drought- and salt-tolerance and its disease resistance. It is adapted to a wide climatic range and a range of soil types. Old man saltbush can be an effective fodder component in mixed diets for livestock. It is relatively high in protein but is low in available carbohydrates.



Figure 6: Atriplex nummularia (old man saltbush) 74% DM, 18.2% CP

The digestibility of saltbush is fairly high due to the salt concentration in the leaves, dry matter digestibility averaging 73.5%. Consumption of saltbush is accompanied by an increased water requirement in animals due to its high salt content. Intake can be

improved by restricting the crop to low salt-content soils, by providing the animals with salt-free drinking water and by utilising the crop in conjunction with veld, so that the animals can gradually become accustomed to the a supplementary saltbush. As fodder. it is recommended that old man saltbush should not make up more than 25 - 30% of a sheep's diet. It has been observed that, although animals may maintain live weight while grazing saltbush, they invariably lose condition. Supplementation with a source of energy is therefore necessary for producing animals. A realistic stocking rate is reported to be 4 to 7 sheep/ha/annum in areas with a minimum rainfall of 240 mm per annum

"Standover" crops

Various drought-affected and frosted crops may be available as stock feed, such as cereals and grain legume crops. In the western parts of the summer rainfall cropping area many of the summer crops such as maize, sunflower, grain sorghum, groundnuts and dry beans wither at a young stage under drought conditions. Wheat, barley, oats and triticale can make reasonable quality hay or silage and are a good source of roughage for livestock. Stressed cereal crops should be cut before the quality of the standing crop begins to decline. The quality of the hay or silage made from failed crops depends on the growth stage of the crop and the management of the material from time of cutting to feeding. Well-managed hay or silage made from failed crops can be of high quality.

 Table 1. Average nutritional values of selected withered crops

Crop	ME (MJ/kg)	CP (%)
Maize	8.6	9.0
Grain sorghum	8.5	10.0
Groundnuts	8.3	14.0
Dry beans	8.4	14.0
Cereal hay	4.2 - 9.7	1.2 - 13.4
Cereal silage	5.4 - 10.9	3.2 - 24.0

It is important to be aware that there are large variations in quality. Feed should therefore be analysed before being bought or fed.

Edible bushveld trees

The leaves and pods of many bushveld trees (e.g. *Acacia tortillis, Combretum apiculatum* and *Acacia caffra*) are eaten by livestock, especially in times of drought, when farmers cut the lower branches for cattle to browse on. Research has shown, however, that cattle cannot be kept alive on unsupplemented twigs or dry leaves. A minimum of 25% good quality hay (e.g. *Eragrostis teff*) is required to sustain life if no other supplements are fed. Supplementation with molasses is strongly recommended, both for continued reasonable feed intakes as well as for normal functioning of the digestive tract. Grain supplementation of a ration consisting of Acacia twigs treated with molasses and urea resulted in daily weight gains of 0.7kg in cattle for a period of six weeks.



Figure 7: Combretum apiculatum (red bushwillow). Photo: B. Wursten, www.zimbabweflora.co.zw

It must be noted that heavy-duty hammermills and tractors are prerequisites should a farmer consider utilising bushveld trees in drought periods. Also, milling of twigs is a time-consuming operation and reports indicate that it would not be easy to process sufficient material for a day if a hundred or more cattle needed feeding.

For further information

Information on fodder varieties suitable for your area can be found in the pasture production guidelines produced by the KZN Department of Agriculture and Environmental Affairs. The Grassland Science Section at Cedara can be contacted on 033 355 9252 and the Animal Science Section can be contacted on 033 355 9262.