

A simple silage store can be constructed using a one ring silo, consisting in two metal semicircles that are joined and opened through a hinge. One silo of 1.90 m diameter and 0.6 m high will store 3.2 t of silage with adequate compaction achieved through human foot stamping which then guarantees a good anaerobic environment once the mold is formed by the ring, the ring is withdrawn and the silage covered with polyethylene and made airtight by tying. (Améndola *et al.*, 2008).

Meal from trees

The production of meals from dehydrated foliages of trees is an available resource that can easily be introduced to livestock. Their protein contents are higher than cereal-based concentrates, with the advantage that they are produced from renewable sources.

The process consists in having young regrowths (60 days in the rainy season, 90 days in the dry season,) which are spread over a surface where they are not contaminated with dirt and exposed to sunlight until they reach between 85 and 90% dry matter.

The speed of this process depends on the plant: *Morus alba* is dehydrated in 12 hours under sunlight and the leaves can be separated passing the stems through a gloved hand. The dried leaves of *Leucaena leucocephala* are separated by beating the branches. In the case of *Gliricidia sepium* and *Albizia lebbbeck*, it is best to separate the leaves from the stems to accelerate drying.

Due to the low density of these meals it is recommended to feed them wet by adding 5% molasses. This prevents their powdery nature from upsetting the animals and also improves palatability and the energetic value of the supplement (Savon *et al.*, 2006).

Table 1 Chemical composition and quantity of nutrients for one ton of tree meal or cereal concentrate

Tree species	DM %	CP %	CF %	ME MJ/kg MS	Quantity of nutrients for one ton			
					DM (t)	CP (t)	CF (t)	ME 10 ³ (MJ)
<i>L. leucocephala</i>	90.4	20.1	18.5	8.88	0.90	0.18	0.17	8.05
<i>Gliricidia sepium</i>	97.7	24.7	28.5	9.26	0.98	0.24	0.28	9.05
<i>Albizia lebbbeck</i>	95.7	23.9	26.6	8.92	0.96	0.23	0.26	8.55
<i>Morus alba</i>	96.7	24.9	13.1	10.17	0.97	0.24	0.13	9.84
Cereal concentrate	86.2	18.2	5.6	11.55	0.86	0.16	0.05	9.97

Conclusions

To best utilize the feed resources available in the tropics is both a need and a challenge. Both are complementary and it is up to researchers and farmers to match the two.

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Investigations into the value and use of local indigenous trees/plants as feed for goats in the semi-arid areas of Zimbabwe

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Introduction

Smallholder goat keepers in the semi-arid tropics rarely use conventional concentrate feeds in livestock production systems as they are expensive. Non-conventional feeds need to be considered for this sector. (Smith *et al.*, 2005). Small ruminants, particularly goats, depend

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largely on natural rangelands for their feed requirements, a situation unlikely to change in the foreseeable future. Goats are increasingly popular in most communities as “cash cows”, rather than a “poor man’s cow” as in the past. Tropical rangelands are endowed with flora that are rich in protein. Most rangelands in Zimbabwe are dominated by *Acacia* species and other pod or fruit bearing trees, including *Dichrostachys cinerea*, genera of *Piliostigma* and *Guibortia*. Also the rangelands products can be supplemented by grown forages such as *morus alba* and sweet sorghum cultivars (*Sorghum bicolor*). In the past decade attempts have been undertaken to evaluate the value of local indigenous plants as feed supplements for goats during the dry season. The dry season period in Zimbabwe extends from six to nine months, and this is the time when livestock experience serious shortages of feed, which in turn causes pressure on the rangelands, resulting in degradation. The utilisation of protein rich trees and shrubs as feed supplements can counter the seasonal shortage of good quality forage for livestock.

Research activities

Studies were conducted to investigate the potential of commonly occurring tree species: *A. nilotica*, *A. tortilis*, *A. erioloba*, *A. erubescens*, *D. cinerea*, *P. thonningii* and *G. coleosperma*. Feeding trials were undertaken to assess the performance of different groups of goats to tree fruits or pods supplements. The pods were collected when ripe and then crushed before feeding. Positive responses observed in animal performance, included enhanced growth rates in kids. Chemical analysis of the pods showed that crude protein ranged from 11 to 20 per cent. Intake ranged from 511 to 843 g/DM/day. Low intakes were ascribed to anti-nutritional factors (tannins) and attempts to deactivate the influence of tannins were undertaken. Mixing of wood ash with crushed pods was found to be effective.

On going studies include the evaluation of *morus alba* leaves and sweet sorghum cultivars as feed for small ruminants. Preliminary analysis show that *morus alba* leaves and stover from sweet sorghum cultivars have a crude protein content of about 22 and 5 per cent respectively.

Conclusion

Tree fruits, or pods, are high in protein and can be collected and stored to be fed when required to goats of all ages. Pods crushed (by grinding or pestle and mortar) can be mixed with hay or crop residues for feeding to all domestic ruminants, including goats. Throughout the developing world a wide range of trees still need to be fully evaluated in order to reduce the cost of feed. For example, fallen leaf litter from browse trees containing about 11% crude protein) can be used as a feed supplement to livestock. Increasing the base for feed options (forages) with high quality feed will support the ever increasing demand for livestock products. Feed is the most important factor influencing livestock production in the developing countries. Efficient utilisation of the available feed resources is a key factor in smallholder goat production. Goats are now being used as means of improving livelihoods of resource-poor communities and increase opportunities for the provision of animal protein in the forms of meat and milk. Cheap protein sources will be a prerequisite for viable and sustainable goat production enterprises.

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Integration of *Enterolobium cyclocarpum* Jacq. Griseb tree with hair sheep production in the dry tropics

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Introduction

Foliages and pods (whole fruits, seeds plus hull) of tropical trees and shrubs have good nutritive value (crude protein, NDF, digestibility) and hold potential for sheep feeding in tropical regions under small-commercial farmer conditions. Ground pods of the legume tree *Enterolobium cyclocarpum* Jacq. Griseb, have been used for sheep feeding with modest weight gains (125 g/d) when included at 30% of ration DM. The purpose of this work was to assess nutritive value and potential of *E. cyclocarpum* ground pods for sheep feeding when included at 50% of ration DM, under commercial farming conditions.

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