THE VALUE OF BROWSE AS RUMINANT FEED:

THE CASE OF COLOPHOSPERMUM MOPANE

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INTRODUCTION

Among the various non-conventional feed resources in Botswana, browse is of interest because of its abundance. Bowse plants have three major components for ruminant feed: (1) leaves, (ii) pods + seeds, (iii) twigs. Browse plants are often not considered as feed resources during the normal adequate rainfall periods. However, the short and long-term dry periods, livestock utilize browse plants, and hence browse is considered a feed resource.

Mopane (Colophospermum Mopane) occurs either as a shrub (less than 2.5m) in unfavourable situations or as trees in favourable conditions. The leaves are high in tannins when fresh but are very palatable when dry and are readily picked from the ground and consumed by livestock. In some years, outbreaks of the moth Cronimbrasia belina result in complete defoliation of Mopane.

The purpose of this paper is to elucidate the value of mopane as a ruminant feed. Data on browse yield, canopy cover, plant density and the nutrient content of edible material is summarized.

Materials and Methods

A study was carried out at Impala Ranch 22km east of Francistown to evaluate the mopane as feed for ruminants. Canopy cover was estimated as a percentage of surface area covered by any potion of mopane on a 100-m steel tape stretched between two rods on screen line transects on four paddocks.

The mopane vegetation was classified into shrub (2.5m) and tree categories (2.5m). Density was calculated as the number of plants on a 20 x 10m plot according to the two height categories on each of the four paddocks. Browse production was estimated by matching plants to harvested reference plants. Leaves and pods of reference trees were clipped, weighed and thereafter dried in an oven overnight to determine dry matter production. To estimate browse yield per hectare, the average weight data was multiplied by density of each class category.

Plant portions of leaves and pods were ground to pass 1-mm screen and stored in airtight glass bottles to await analysis. Crude protein was determined by the macro Kjeldahl method, while mineral analysis was done according to AOAC (1984) methods using variantatomic absorption spectrometry. In vitro dry and organic matter digestibility coefficients were determined by the method of Tilley and Terry (1963) as modified by Minson and Mecleod (1972) for tropical forages. The rumen liquor used originated from two steers fed a medium quality cenchrus and lucerne hay.

RESULTS AND DISCUSSION

The average mopane plant density was 391 per hectare (Table 1). Average canopy cover across height classes was 7.64%, and was 5.84% and 9.45% for the middle and upper layers, respectively (Table 1). Average browse production by the upper layer was 386.25kg/ha and varied from 0.39 to 2.88kg dry matter per tree. Total dry matter production in this investigation was an underestimate as it did not include pods/seeds, which were absent. The pods can rang in weight from 75 to 435g per tree. Pods are only formed by the upper layer of trees. Since the pods are above livestock browsing height, these are available only after dropping and drying - out on the ground.

TABLE 1 **Mopane Tree/Shrub Density, Canopy Cover (%) and Browse Yield (Kg/ha**

Paddock Number	Paddock Size	Height Class	Plant Density/Ha	Canopy Cover (%)	Browse Production (Kg/Ha)	Browse Production per plant (Kg)
4 B	138	U	400	8.82	157	0.39
		M	50	7.82	-	
11 B	156	U	171	4.18	493	2.88
		M	157	8.32	-	
11 C	152	U	186	2.71	223	1.19
		M	71	9.46	-	
11 D	133	U	314	7.64	672	2.14
		M	214	12.18	-	-
		U	267.75	5.84	-	
		M	123.00	9.45	-	
		Total	390.75	7.64	386.25	

U = Upper Layer (72.5m)

M = Middle Layer (1 2.5m)

This prolongs the availability of forage to livestock. Growth habit also influences browsing, as shrub are utilized earlier in the dry season by both small and large ruminants, whereas tree fodder is available only later in the dry season after leaf and pod fall. Early rains can sometimes destroy this fodder reserve.

Nutritive Value

Utilization of browse plants is a function of , among other factors relative palatability, growth form and availability. Palatability is also a function of many components and seems to positively correlated to crude protein, mineral content and moisture. Mopane leaves and pods are only palatable after they have dried out. When green, the leaves and pods have characteristics highly inhibitory to consumption by animals, in particular their content of tannis and aromatic substances.

Feeding of highly nutritious young and immature green material may be associated with increased toxicity and low acceptance due to alkaloids and phenolics. Feeding of mature, less nutritious material may reduce intake and lower possibility of toxicity. Since pods are above livestock browsing height, these are available only after dropping and drying out. During drought years livestock seem to lolerate mopane and have been observed to maintain condition feeding on green mopane leaves and pods.

Livestock seems not to be affected by the inhibitory components. Ruminants are also unique because they can detoxify some of these toxic components in the rumen. This may be the case with mopane leaves.

Table 2 Nutrient content of Mopane plant parts 1.

Source	Item	CP	CF	Ca	P
Impala Ranch	Leaves	5.2	28.8	3.7	0.04
Tuli-Block	Leaves	13.07	20.4	1.60	0.12?

Table 2 summarizes data on the nutrient content of edible mopane parts. These values are basically from components of edible mopane parts. These are (i) pods (ii) seeds (iii) leaves and (iv) twigs. All these are utilized according to their availability. The twigs and leaves drop-off attached to each other while the seed remain enclosed by the pods. The analysis show that only the twigs have low crude protein content (4.2%) compared to 8.1%, 8.6% and 19.5% in dropped leaves, and seeds, respectively (Table 2).

Seeds are therefore very high in crude protein. It is important though to note that these analysis have to be distinguished between we and dry material. If the leaves have dropped and dried out, these are likely to be of poor quality because of leaching and other factors. Therefore the protein content of fallen leaves and collected form the ground may be comparable to that of twigs.

Management Implications

The yield and nutrient data presented in Table 1 and 2 indicates the potential value of mopane as browse for ruminants. The value of the mopane is evident during the prolonged dry season when livestock are forced to utilize the plants for survival.

A number of attributes to browse utilization are mentioned below:-

1. The mopane plant breaks dormancy and produces new flush of leaves before the rains begin (Aug/Sept.). This is the time when the herbaceous biomass is in short supply and browse is an important part of the diet for ruminants.
2. Browse plants generally have a higher crude protein content than grasses at all times except during the early growing period.
3. Mopane vegetation has the advantage of extracting moisture at depth the ground andthus is less affected by drought.
4. Because of its growth habit mopane, vegetation is not completely consumed and offers a source of forage for ruminants over an extended period.
5. Mopane leaves, pods and seeds are high in tannins and phenolics and livestock feeding on immature plants will have depressed volutary intake and carbohydrate digestion. These same compounds may act as protectants and so help by-pass protein to the duodenum. Moreover, ruminants have the ability to detoxify certain compounds in the rumen.
6. A complete examination of nutrient content, digestibility, animal intake and production potential is necessary in order to evaluate the potential of the mopane plant for ruminants feed.

Literature

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