

COMPARATIVE UTILIZATION OF *PARKIA FILICOIDEA*,
TEPHROSIA BRACETEOLATA AND *GMELINA ARBOREA*
LEAVES BY GOATS

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Target Audience: Animal Scientists, nutritionists, feed toxicologists and farmers.

ABSTRACT

Twelve West African dwarf goats were used to compare the utilization of *Parkia filicoidea*, *Tephrosia bracteolata* and *Gmelina arborea* leaves by goats. Goats fed *Tephrosia* leaves had significantly ($P<0.05$) higher dry matter intake, followed by goats fed *Gmelina* and *Parkia* leaves respectively. Values recorded for dry matter, crude protein, Crude fibre and energy digestibility for goats fed *Parkia* leaves were significantly ($P<0.05$) lower than values recorded for goats fed *Tephrosia* and *Gmelina* leaves. The highest weight gains (45 g/days) was recorded by goats fed *Tephrosia* leaves while those fed *Gmelina* leaves were consistently lost weight (-42g/day). Goats fed *Tephrosia bracteolata* had the best performance, so, this leaf can be fed sole supplementation is however, necessary for goats fed *Parkia filicoidea* and *Gmelina arborea* leaves.

Key words: *Parkia*, *Tephrosia*, *Gmelina*, leaves goats.

DESCRIPTION OF PROBLEM

Seasonal variation in the supply of forage is one of the major problem facing ruminant production in Nigeria. There are two main seasons, the wet and the dry season. The wet season witnesses sprouting of fresh green succulent grasses, legumes and browse plant of high nutritive value for ruminants. It is apparently a time of plenty. In the dry season, the grasses and most browse plants dry up and there is dehydration with a high degree of lignification, as a result, grazing animals lose weight. This calls for a search for plants that can withstand the long period of drought and can be used as feed for ruminants. Reports of studies (1,2) have shown that browse plants such as *leucaena* and *Gliricidia* have potential to contribute significantly to improved year-round feed supply and increased productivity of sheep and goats. However, there are varieties of

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legumes and non-legumes existing about which very little is known with regards to their feeding potentials.

Parkia filicoidea and *Tephrosia bracteolata* are common perennial leguminous trees in Nigeria (3). *Gmelina arborea* on the other hand is a non-leguminous tree which is notable for its fast growth, large green leaves and very high dry matter yield. It possesses a high coppiceability and is drought resistant. Their leaves are relished by goats.

Information on use of these plants as feed for ruminants is still scanty, despite their inherent potentials as feed for ruminants. The study was therefore designed to compare the utilization of *Parkia filicoidea*, *Tephrosia bracteolata* and *Gmelina arborea* as feed for goats

MATERIALS AND METHODS

Twelve female, non-pregnant, non-lactating West African dwarf goats weighing 5.2 - 6.4 kg were used for the study. They were dewormed and dipped as a routine exercise. The animals were randomly assigned to three equal groups (4 animals per group) and allotted each to *Parkia*, *Tephrosia* and *Gmelina* leaves respectively.

The goats were group-fed in pens at 5 percent of their body weights for 14 days.

The feed allowance was offered twice daily at 8.00 hours and 14.00 hours. Fresh leaves of the browse plants were harvested from the plants without regards to the age of the leaves and offered to the goats.

On the 15th day, the goats were transferred to metabolic crates. They were allowed a week, in order to adjust to the crates. This was then followed by a 7-day period of faeces collection. Faeces voided, were weighed, bulked, milled and preserved in air - tight plastic containers for chemical analysis.

Samples of the leaves, faeces were analysed for their proximate constituents by standard methods (4). Data collected were subjected to analysis of variance and the treatment means separated using the Duncan's Multiple Range Test (5).

RESULTS AND DISCUSSION

The chemical compositions of *Parkia filicoidea*, *Tephrosia bracteolata*, and *Gmelina arborea* leaves are shown in Table 1. The crude protein content of *Gmelina* leaves was significantly ($P < 0.05$) higher than that of *Tephrosia* leaves which was in turn higher than *Parkia* leaves. The values recorded for crude protein for the leaves are in agreement with values reported by other workers for *Parkia* and *Tephrosia* leaves (3) and *Gmelina* leaves (5). The crude fibre contents of *Parkia* and *Tephrosia* leaves were not significantly ($P > 0.05$) different giving an overall mean value of 18.45 ± 0.7 . This is however higher ($P < 0.05$) than that of *Gmelina* leaves. The value observed for crude fibre content of the *Gmelina* leaves (10.70 %) was lower than the 28.6 and 38.4 (%) recorded (6) for *Gmelina* leaves. This may be attributed to the differences in

the stage of maturity of the plants, as the leaves used in this study appear to be younger, and more succulent as evident by the low dry matter content of 25.0% compared to the values of 31.5 and 39.6 % reported for dry matter content (6). Gmelina leaves contained significantly ($P < 0.05$) higher ash (8.30%) than Parkia (3.42%) and Tephrosia (1.34%) leaves. The high ash content of Gmelina leaves tends to suggest that it as a potential source of minerals for goats.

Table 1: Chemical composition (%) of the leaves of *Parkia filicoidea*, *Tephrosia bracteolata* and *Gmelina arborea* fed to goats

	<i>Parkia filicoidea</i>	<i>Tephrosia bracteolata</i>	<i>Gmelina arborea</i>
Dry matter (On DM basis)	86.14 ^a	84.56 ^a	76.65 ^b
Crude Protein	10.39 ^a	14.62 ^b	22.40 ^c
Crude fibre	19.01 ^a	17.90 ^a	10.70 ^b
Ether extract	6.34 ^a	1.44 ^b	3.30 ^c
Nitrogen-free extract	55.82 ^a	60.18 ^b	54.70 ^a
Ash	3.42 ^a	1.34 ^b	48.30 ^c
Gross energy (Kcal/g)	4.19 ^a	3.91 ^a	2.43 ^b

Values along the same row with different superscripts are significantly ($P < 0.05$) different.

The dry matter intake by the goats was significantly different ($P < 0.05$). For the different treatments. Goats fed Tephrosia leaves had higher dry matter intake, followed by goats fed Gmelina and Parkia leaves respectively. This result tends to suggest that the animals prefer Tephrosia and Gmelina leaves than Parkia leaves. Also the low level of crude protein of Parkia leaves compared with Tephrosia and Gmelina leaves could have limited its intake. (3). The values recorded for dry matter intake by the goats fed Tephrosia and Gmelina leaves are in agreement with values (g/day) of 295.0 and 331.1, reported for dry matter intake for goats (7) and (3) who fed goats with leaves of *gliricidia* and Tephrosia respectively. The values were however lower than the 638g and 453g reported (6) for dry matter intake for goats fed Gmelina leaves.

Table 2 shows the summary of nutrient digestibility by goats. Values recorded for goats fed Parkia leaves were significantly ($P < 0.05$) lower than values recorded for goats fed Tephrosia and Gmelina leaves. Values recorded for nutrient digestibilities in this study are comparable to values reported earlier (3) for Parkia and Tephrosia leaves. The low nutrient digestibility values observed for goats fed Parkia leaves as compared with animals fed Tephrosia and Gmelina leaves in spite of the lower dry matter intake, tend to suggest the possible presence of some anti-nutritional factors in the leaves of *Parkia filicoidea*. It is therefore imperative that these leaves be examined for the presence of anti-nutritional factors.

Table 2: Feed intake weight changes and apparent digestibility or nutrient by WAD goats fed *Parkia filicoidea*, *Tephrosia Bracteolata* and *Gmelina arborea* leaves.

Parameters	<i>Parkia filicoidea</i>	<i>Tephrosia bracteolata</i>	<i>Gmelina arborea</i>	SEM
DM intake (g/day)	150.14 ^a	324.52 ^b	295.30 ^c	4.15
DM intake(as% of body wt)	2.58 ^a	4.99 ^b	5.57 ^b	1.40
Initial live-weight (kg)	5.80 ^a	6.50 ^b	5.30 ^a	1.13
Final live-weight (kg)	5.81 ^a	7.07 ^b	4.12 ^c	1.10
Av.daily wt gain (g/day)	0.35 ^a	45.0 ^b	-42.0 ^c	0.41
Apparent digestibility (%)				
Dry matter	43.72 ^a	70.52 ^b	73.12 ^b	1.06
Crude protein	55.74 ^b	74.40 ^b	57.97 ^a	1.28
Crude fibre	36.22 ^a	75.76 ^b	74.01 ^b	1.08
Ether extract	44.63 ^a	46.67 ^a	54.92 ^b	1.79
Nitrogen free extract	86.81 ^a	61.40 ^b	75.35 ^c	0.94
Energy	47.13 ^a	70.77 ^b	80.04 ^c	2.14

*Means along the same row with different superscripts are significantly (P<0.05)

Animals fed the leaves of *Tephrosia* recorded the highest weight gain. (45g/day) while those fed *Gmelina* consistently lost weight (- 42 g/day). This probably had to do with the energy intake by goats fed *Gmelina* leaves which was not enough to meet their maintenance requirements. Weight losses by goats fed 100 percent browse have been attributed to inability to meet their energy requirements for maintenance (8). The results of this study further underscore the need for supplementation with energy based diets or feeds when forage crops are fed to ruminants in order to ensure optimal performance of stock.

CONCLUSION AND APPLICATIONS

1. Goats fed leaves of *Tephrosia* had the best performance in terms of feed intake, nutrient digestibilities and weight gains.
2. The leaves of *Tephrosia*, *Parkia* and *Gmelina* have excellent potential as feed for goats, especially in the dry season when fed as supplement to grass or other energy-based feeds.

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