

Original Research Article

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## Impact of Feeding and Utilization of Tree Leaves and Green Forage on Growth Performance of Goat Kids

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### ABSTRACT

#### Keywords

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The present experiment was carried out to assess the effect of feeding leaves, forage on nutrient utilization & the effect of supplementary inorganic mineral mixture on the growth performance of goats with fifteen healthy goat kids of 4-6 month of age and divided into three groups. Experimental feeding was done for 90 days during which a metabolic trial was conducted. At the end of 45 days feeding of tree leaves *Albezia lebbek*, *Ficus glomerata* and *Sorghums sudanense*. The DM digestibility was 55.15±0.949, 54.188±0.980, 59.34±0.735; Crude Protein was 69.47±1.10, 68.67±0.42, 69.63±0.84 and Crude Fiber was 35.19±0.83, 32.44±1.31, 55.91±1.84 respectively for group I, II and III. The feed conversion efficiencies were, 3.2, 2.6 and 4.6 kg per kg weight gain in for group I, II and III. Mean daily gain in body weight of animals in group I, II and III was 21.78 ±0.44, 21.78 ±0.44 and 25.78 ±0.54 gram/day respectively showing significant difference among the three groups.

### Introduction

Farmers maintain their animals on community lands & vicinity of forest land and supplementation of concentrate mixture or any other cereal grains or pulse by products or cakes at stall is almost negligible. Some of the farmers in the region supplement Stover and cereal straws to animals however, these resources are known to be poor in essential minerals. To bridge the gap between demand and supply of high protein forage, tree leaves

and forage has been extensively propagated in tropical and subtropical countries. The traditional farming system suffers from seasonal fluctuations in forage availability, with severe shortage of herbage during the long cold seasons. However, in many regions of the world, much of the pasture herbage, which makes up the majority of ruminant diets, cannot completely satisfy the requirements of grazing ruminants. The role of fodder trees & shrubs in the diets of ruminants is considered to be important in

India and other South Asian countries where small land holdings and large ruminant densities result in severe problem of fodder availability from conventional sources. *Albizia lebbek* is the major tree in semi-arid regions of India but lesser known about its use in animal feeding (Tripathi *et al.*, 2006). A wide variety of multi-purpose tropical trees grown at the farmers' field or in forest or nearby villages can be used as nitrogen & other nutrient sources as supplementary feeds (Davendra, 1990). These tree forages not only provide a cheaper source of Nitrogen, energy & micronutrients but also have advantages like their widespread on-farm availability with easy accessibility, their laxative influence on the alimentary system, low degradability of nitrogen in the rumen & provision of variety in the diet. The replacement of conventional fodders by tree leaves will make the ration cheaper (Ondiek *et al.*, 2000). The success of livestock farming is greatly dependent on the continuous assured supply of good quality balanced feeds at competitive price. Hence, there is a need to test the potential of locally available tree leaves at different level in various combinations to broaden the base of alternative quality feed resource for the feeding of livestock. The present investigation which was carried out to find out the potential feeding value of the tree leaves and to compare them with the forage by feeding the growing kids with the following objectives-a. To study the Digestibility –Coefficient of tree leaves & forage by kids.

To study the nutrient utilization of tree leaves & forage grass by kids.

To evaluate the rate of growth pattern & feed conversion ratio by feeding tree leaves and forage to the kids.

## **Materials and Methods**

For the present study fifteen healthy kids of about 4-6 months of age with a body weight

ranging from 10-15 kg were selected. The kids of I and II were fed with adlib *Serias Albizia lebbek* and Dumer *Ficus glomerata* tree leaves respectively whereas the kids of group III were fed with sudan grass *Sorghum sudanense*. All the goats were treated with anthelmintics before the start of study and repeated at two months interval. A quantity of 20 gms mineral mixture was supplemented. The feeding of kids was continued for a period of 90 days. At the end of 45 days feeding a metabolic trial was conducted for 6 days on all the kids to study the intake, utilization of nutrients and balance of nitrogen, calcium and phosphorus. The representative samples of the feed offered and the residue left during the metabolism trial were collected for six days for the determination of dry matter intake, proximate principles as per the methods of AOAC. The kids were weighed at weekly interval, average of three days weight was considered for calculating daily gain.

## **Results and Discussion**

The digestibility coefficient of the experimental animals in all the three groups of DM was  $55.15 \pm 0.949$ ,  $54.188 \pm 0.980$ ,  $59.34 \pm 0.735$  present in group I, II and III respectively from original the treatment was found to be highly significant. The digestibility of organic matter was  $55.35 \pm 2.69$ ,  $54.05 \pm 4.08$ ,  $64.66 \pm 0.83$  percent in group I, II and III respectively. There was a highly significant difference in the Digestibility coefficient of organic matter among all the 3 groups. The Digestibility of crude protein was  $69.47 \pm 1.10$ ,  $68.67 \pm 0.42$ ,  $69.63 \pm 0.84$  in group I, II and III respectively with a non significant difference among the 3 groups. There was no significant difference in the Digestibility of Ether extract and the values were  $56.81 \pm 0.80$ ,  $53.61 \pm 1.17$ ,  $56.91 \pm 1.44$  percent in group I, II and III respectively. The corresponding values for the Digestibility of TCHO were  $51.68 \pm 1.17$ ,

51.11±1.58, 64.38±0.62 percent in group I, II and III respectively showing highly significant difference in group III as compared I and II. The digestibility coefficient of crude fiber was 35.19±0.83, 32.44±1.31, 55.91±1.84 in group I, II and III respectively, being highly significant. The digestibility coefficient of NFE was 62.03±1.68, 54.49±2.15, 68.52±2.02 percent in group I, II and III respectively showing highly significant difference among the groups. The mean dry matter intake (gram) during experimental feeding was 489.28 ±72.86, 401.96 ±47.88 and 827.55 ±72.38 in group I, II and III respectively which was found to be highly significant difference among the three groups. The organic matter intake was 455.66 ±68.17, 325.50 ±39.14, 757.84 ±66.36 gram/day in group I, II and III respectively have significant difference among the three groups. The mean intake of ether extract in group I, II and III was 30.74 ±4.52, 16.50 ±1.96, 17.63 ±1.55 gram/day respectively. The data revealed that there was a highly significant difference in the mean intake of ether extract. The mean intake of total carbohydrates was 339.27 ±51.12, 254.56 ±30.79, 674.39 ±58.77 gram/day in group I, II and III respectively and the difference was found to be highly significant among the three groups. The intake of crude fibre in group I, II and III was 131.85 ±20.96, 45.32 ±5.85, 264.918 ±23.20 gram/day respectively and there was highly significant difference among the three groups. Similarly the mean NFE intake was 207.41 ±30.15, 206.17 ±25.01, 405.37 ±52.44 gram/day in group I, II and III respectively which was observed to be a highly significant difference among groups (P<0.01). The result of study indicated daily body weight gain in goats with supplementation of 20 gms mineral mixture per goat per day with leaves and green forage.

The average body weight of kids at the beginning and at the end of experiment as

well as the total body weight gain along with weekly and daily gain of the experimental animal has been presented in table 3.

Total weekly weight mean of gain in body weight in the three groups (Series) *Albizia lebbek* (group I), Dumer *Ficus glomerata* (Group II and sudan grass *Sorghum sudanense* ( group III) was found to be 152.52 ±3.12, 152.52 ±3.12 and 180.54 ±3.82 gram/week respectively showing significant difference between the groups I, II and III. Mean daily gain in body weight of animals in group I, II and III was 21.78 ±0.44, 21.78 ±0.44 and 25.78 ±0.54 gram/day respectively showing significant difference among the three groups. Average digestibility coefficient% of Experimental animals.

Digestibility coefficient of DM, NFE, CF, OM and TCHO were found to be highly significant whereas digestibility coefficient of ether extract and crude protein was non significant among the three groups of Series (*Albizia lebbek*), Dumer (*Ficus glomerta*) and Sudan (*Sorghum sadananse*), when compared with others<sup>1</sup> they have reported that the digestibility coefficient of DM, OM, CP and CF were higher in T2 (30: 70) as compared to T1 15: 85 and T2 45: 55 having Series (*Albizia lebbek*) ± mature dry gran (*Sehima – Heteropogon*) in 3 different ratio. He also concluded that the crude fiber digestibility was lower in T3 and attributed that this might be due to the presence of pipercolic acid derivative and legnin in Series (*Albizia lebbek*) leaves at higher level. "The range of digestibility coefficient of digestibility coefficient leaves in the present study DM 55.15±0.94, OM 55.358±2.69, CP 69.474±1.10, EE 56.81±0.80, Total carbohydrate 51.68±1.17, CF 35.194±0.83, NFE 62.03±1.68 respectively were in agreement with the results of others<sup>2 & 3</sup>. *Ficus glomerata* leaves under study have the digestibility coefficient of DM 54.18±0.98

CP68.67±0.42 CF 32.44±1.31 NFE 54.49±2.15 EE 53.61±1.17 TCHO 51.11±1.58 OM 54.05±4.08 The results of digestibility coefficient of DM 51.0±0.94 OM 53.39±1.21 and were found to be well comparable with the reported values as reported by others<sup>4</sup> in bullocks fed with *Ficus nemoralis* leaves while lower digestibility coefficient of CP 56.37±2.78 EE 42.59±2.60 and higher CF digestibility of 57.92±1.92 is observed. This might be due to high tannic acid content which reduces its palatability. *Sorghum sudanense* grass have digestibility coefficient

of DM 59.34±0.73 CP 69.93±0.84 CF 55.91±1 NFE 68.52±2.02 TCHO 64.38±0.62 OM 64.66±0.83. Scientist<sup>5</sup> reported digestibility coefficient of DM, CP, TCHO, OM which was found to be lower than the present study 48.55±3.59, 43.21±2.79, 53.41±3.39, 59.93±3.14 respectively which might be due to the stage of harvesting while EE and EF content were in the comparable range 55.19±3.95, 55.09±4.29 respectively and concluded that the mature guinea grass (Table 1–3).

**Table.1** Average digestibility coefficient % of experimental animals

Attributes Improved	Goat Groups		
	I	II	III
Dry matter Digestibility	55.15±0.94	54.18±0.98	<b>59.34±0.735</b>
Organic matter Digestibility	55.35±2.69	54.05±4.08	<b>64.66±0.83</b>
Crude protein	69.47±1.10	68.67±0.42	<b>69.63±0.84</b>
Ether extract	56.81±0.80	53.61±1.17	<b>56.91±1.44</b>
Crude fiber	35.19±0.83	32.44±1.31	<b>55.91±1.84</b>
Nitrogen free extract Digestibility	62.03±1.68	54.49±2.15	<b>68.52±2.02</b>
Total Carbohydrate Digestibility	<b>51.68±1.17</b>	<b>51.11±1.58</b>	<b>64.38±0.62</b>

**Table.2** Average nutrient intake gram/day of experimental animals

Attributes	Group I	Group II	Group III
Dry matter intake	489.288 ±72.86	401.96 ±47.88	827.55 ±72.38
Organic matter intake	455.66 ± 68.17	325.50 ±39.14	757.84 ±66.36
Crude protein intake	85.77 ±12.57	54.48 ±6.43	66.04 ±6.07
Ether extract intake	30.74 ±4.52	16.50 ±1.96	17.63 ±1.55
Crude fibre intake	131.85 ±20.96	45.32 ±5.85	264.91 ±23.20
Nitrogen free extract intake	207.41 ±30.15	206.17 ±25.01	405.37 ±52.44
Total carbohydrate intake	339.27 ±51.12	254.56 ±30.79	674.39 ±58.77

**Table.3** Weekly and daily body weight gain, feed gain ratio of experimented kids (Mean± SE)

Groups	Initial body Weight	Final body Weight	Weight gain (gm.)	Weekly gain (gm.)	Daily gain (gm.)	Feed/ gain ratio
<b>I</b>	12.200	14.16	1.96	152.52±3.12	21.78±0.44	<b>3.22</b>
<b>II</b>	11.72	13.96	1.96	152.52±3.12	21.78±0.44	<b>2.62</b>
<b>III</b>	<b>11.880</b>	<b>14.00</b>	<b>2.32</b>	<b>180.54±3.82</b>	<b>25.78±0.54</b>	<b>4.61</b>

The mean dry matter intake during the present experimental feeding of *Albizia lebbek* leaves was  $489.28 \pm 72.86$  gram/day. *Albizia lebbek* leaves was fed in three different proportion in goats viz 85:15 T1, 70:30 T2 and 55:45 T3 with dry grass *Sehima heteropogon* and reported the dry matter intake gram/day T1  $426.83 \pm 30.24$ , T2  $443.79 \pm 38.7$  and T3  $426.10 \pm 9.81$  for the three treatments and concluded that the supplementation of *Albizia lebbek* leaves depressed the intake of mature dry grass in goats. The mean dry matter intake of *Ficus glomerata* tree leaves was  $401.96 \pm 47.88$  as reported by others<sup>1</sup>. Dry matter intake of *Ficus nemoralis* (Dudhilo) was  $1.6 \pm 0.06$  kg/day in calves, which is quit low. They opined that high tanic acid content in Dudhilo leaves might be responsible for reduced palatability reported by other workers<sup>2</sup>. The mean dry matter intake of sudan grass (gram/day) *Sorghum sudanense* under experimental feeding was  $827.55 \pm 72.38$ . The findings were in close agreement with the other workers<sup>3</sup>. The dry matter intake of goats fed with (Sola grass) *Aexhynoner indica* is gram/day  $1021.67 \pm 61.83$ . The higher dry matter intake was probably due to the selective feeding habit of goats especially due to the selective feeding habit of goats especially for the tenderous apical parts of the plant. It can be concluded that goats can be reared on (Sola grass) without any deleterious effect on their health.

### Daily body weight gain

The result in the present study of mean daily gain in body weight of animals in group I, II, and III was  $21.78 \pm 0.44$ ,  $21.78 \pm 0.44$ , 21 and  $25.75 \pm 0.54$  respectively showing significant difference among three groups. The result in the present study are in agreement with the observation made by workers<sup>3</sup>, reported  $25 \pm 6.45$  change in body weight gain/day of goats fed on (Sola grass) *Aexhynoner indica* which might be due to higher digestibility of

nutrients. The nutritional evaluation of Guinea grass *Penicum maximum* in goats reported lower DM, CP, EE, Ash 35.42%, 3.65%, 1.50%, 7.49% and higher CF and TCHO 39.13%, 87.36% respectively while OM values were comparable 92.51% against the corresponding reported values 64.1%, 8.24%, 2.14%, 8.36%, 32.04%, 81.26%, 91.64% by others<sup>4</sup>. The daily voluntary DM intake of mixed Jungle grass was fed to the goats was  $52.68$  gram/kg  $W^{0.75}$ . The mixed Jungle grass met the maintenance requirement of goats in terms of DCP, calcium and phosphorus but could not provide enough DM and TDN, thus requiring supplementation with energy rich feeds as reported by many workers<sup>5</sup>. In the era of shrinking feed resources, leaves are better alternative to conventional green fodder without affecting health & economics of feeding (Ravikala *et al.*, 1995; Talpada *et al.*, 2002).

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