

***In situ* dry matter digestion of different fodder tree leaves in Pakistan**

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Introduction An insufficient supply and quality of nutrients is a major hindrance to ruminant production in Pakistan. The feed balance sheet reveals that available feed resources provide < two third of the total requirements of crude protein and total digestible nutrients respectively for ruminants. The area under fodder production is continuously reducing indicating high pressure on land for cash crop production. There was a dire need to explore new feed resources such as fodder tree leaves which may supplement the existing feed resources for ruminants and can help to bridge the gap between the demand and supply of nutrients. Tree leaves can be a rich source of supplementary protein, vitamins and minerals to enhance the microbial digestion of ruminant feeds (Singh *et al.*, 1989). The present study was designed with the objective that fodder tree leaves can help to bridge the gap between the demand and supply of nutrients for ruminants. As there was little information about the nutritive value of fodder tree leaves, the present study determined the nutritional values of selected fodder tree leaves for ruminants by using the *in situ* digestion method.

Materials and methods Leaves of *Morus alba*, *Acacia nilotica*, *Ziziphus jujube*, *Szegium cumunii*, *Melia azedarach*, *Leucaena leucocephala*, *Albizia procera* and *Magnifera indica* were collected from two different areas of Pakistan. Composite samples of leaves were prepared and a mature ruminal cannulated buffalo bull (350 kg) was used to study *in situ* digestion kinetics of tree leaves. The bull was fed a blend of berseem fodder and a concentrate along with tree leaves to meet its nutritional requirements. The experiment lasted for 35 days with initial 10 days for adjustment and the next 25 days for the data collection. Nylon bags measuring 10×23 cm with an average pore size of 50 µm were used to determine digestibility, rate of disappearance (Rate), lag time and extent of digestion (Extent) of DM. The bags containing leave samples were placed in the rumen in a reverse sequence for 0, 3, 6, 12, 24, 36, 48 and 72 h of incubations. All bags were removed at the same time to reduce variation associated with the washing procedure. For each time point, there were 3 bags where two bags were used for determining the digestion kinetics and one bag served as a blank. After removal from the rumen, the bags were washed in running tap water until the rinse was clear. These bags were dried in an oven at 60°C for 48 h and weighed. The residues from these bags were collected to estimate the disappearance of DM (DMD) at each time. The DMD values were then used to estimate Lag time, Rate, Digestibility (DMD at 48 h) and Extent (DMD at 72 h) of digestion. The data were analyzed by using analysis of variance in a completely randomized design and means were compared by using the least significant difference test using SPSS software package.

Result Dry matter digestion kinetics are presented in Table 1. The DM digestibility at 48 h was highest (90.2%) for *Morus alba* and lowest (54.8%) for *Szegium cumunii*. The lag time was shortest for *Acacia nilotica* and greatest for *Albizia procera*. The differences in lag times indicated that forages differed in their rates of hydration (Mertens, 1973). The rate of disappearance was highest for *Acacia nilotica* and lowest for *Szegium cumunii* (Table 1). Extent of digestion at 72 h of incubation was lowest for *Magnifera indica* and highest for *Morus alba*. Following the entry of plant material into the rumen, microbial colonization may have varied due to the inherent variations in the cell wall composition of these tree leaves.

Table 1 *In situ* dry matter digestion kinetics of fodder tree leaves

Name of tree	Digestibility(g/kg)	Lag time (h)	Rate (%h)	Extent (g/kg)
<i>Morus alba</i>	902 ^a	0.76 ^c	5.43 ^e	983 ^a
<i>Acacia nilotica</i>	656 ^c	0.63 ^d	6.38 ^a	664 ^c
<i>Melia azedarach</i>	784 ^b	0.66 ^{de}	5.71 ^d	802 ^b
<i>Albizia procera</i>	578 ^d	0.94 ^a	4.86 ^f	775 ^b
<i>Magnifera indica</i>	558 ^d	0.69 ^e	5.97 ^b	572 ^e
<i>Szegium cumunii</i>	548 ^d	0.82 ^b	5.34 ^e	604 ^d
<i>Leucaena leucocephala</i>	564 ^d	0.73 ^c	5.77 ^d	582 ^e
<i>Ziziphus jujube</i>	652 ^e	0.71 ^c	5.82 ^{cd}	679 ^c
Standard error	24.8	0.02	0.09	27.2

Means within a column with the same superscripts are not statistically significant (p<0.05).

Conclusion The DM digestion kinetics of fodder tree leaves indicated that they can be fed to ruminants. Additionally, *Morus alba* is considered the best among the tree leaves evaluated due to its high DM digestibility and it should therefore be able to meet the maintenance requirements of forage consuming ruminants.

References

- Mertens, D. R., 1973. Application of theoretical mathematical models to cell wall digestion and forage intake in ruminants. PhD. Thesis, Cornell University, Ithaca, NY.
- Singh, B., H. P. S. MAKKAR, and S. S. NEG. 1989. Rate and extent of digestion and potentially digestible dry matter and cell wall of various tree leaves. *Journal of Dairy Science* 72, 3233-3239.