The Effect of Supplementation of Jackfruit Leaves (*Artocarpus heterophyllus*) and Mashkalai (*Vigna mungo*) Bran to Common Grass on the Performance of Goats

M. Islam[1], S. A. Chowdhury and M. R. Alam[2]
Bangladesh Livestock Research Institute, Savar, Dhaka-1341, Bangladesh

ABSTRACT: The effect of supplementation of Jackfruit (*Artocarpus heterophyllus*) tree leaves and mashkalai (*Vigna mungo*) barn on the intake and digestibility of freshly cut common grass by Black Bengal goats was evaluated. Twelve castrated goats of approximately 5-6 months age were randomly allocated to three dietary treatments: freshly cut common grass *ad libitum*, common grass+100g Jackfruit tree leaves and common grass+100g mashkalai bran. Although digestibilities of dry matter, organic matter, nitrogen and neutral detergent fibre were very similar in the grass alone and mashkalai bran supplemented goats but the values were significantly ($p < 0.01$) higher than those observed in the Jackfruit leaves supplemented goats. Supplementation of mashkalai bran promoted higher ($p < 0.05$) digestible nutrients intake with the consequent higher daily live weight gain (75 g) than those fed grass alone (31 g) or supplemented with Jackfruit tree leaves (30 g). It could be concluded that mashkalai bran could be a suitable supplement for goats consuming common grass in the tropics and subtropics.
(**Key Words**: Goats, Supplementation, Jackfruit Tree Leaves, Mashkalai Bran)

INTRODUCTION

Goats live on naturally grown vegetation especially grasses, bushes and shrubs. Among these, common grasses are the main sources of feeds for goats. These grasses are available mostly on crop field ridges, fallow land, harvested land, road sides and embankments. In the tropical and sub-tropical regions, these grasses are deficient in protein and can not support higher level of ruminant production. Tree leaves supplementation with grass diets had been shown to increase dry matter intake and improve animal performances (Alam and Akbar, 1989). Tree leaves and cereal by-products are available to the village goat raisers and have the potential to improve the productivity of ruminants (Khan and Tareque, 1977; Saadullah, 1989). It is therefore, essential to investigate the effect of feeding goats with common grasses and also when supplemented with tree leaves or cereal by-products on intake digestibility and body weight gain

MATERIALS AND METHODS

Animals

Twelve castrated Black Bengal goats of approximately 5-6 months age with and average body weight of 11 kg were used as experimental animals. These animals were purchased from the local market, were dewarmed and divided randomly into three groups A, B, and C of four goats each. The animals were kept in individual pens made of bamboo slated floor through out the trial period.

Feeds and feeding

Three groups of animals were randomly allocated to three experimental diets i.e., common grass, common grass + 100g Jackfruit tree leaves and common grass + 100g mashkalai bran. Fresh jackfruit tree leaves were collected daily in the morning. Animals were given mashkalai bran followed by feeding freshly cut common grass. In all treatments, common grass were supplied *ad libitum* (at the rate of 120% of the fresh intake of previous day) twice daily, half in the morning (7:00 h) and the rest in the afternoon (16:00). Refusals of common grass were collected every morning. The animals had free access to fresh water. The feeding trials were continued for 60 days after the initial 15 days adjustment period.

Digestibility trial

Two digestibility trials were conducted during the 3rd and 6th weeks of feeding trials according to the methods described by Swift et al. (1950). During digestibility trials

[1]Address reprint requests to M. Islam, Dept of Animal Science, University Pertanion Malaysia 43400 UPM. Serdang, Selanger DE MALAYSIA.
[2]Department of Animal Science, Bangladesh Agricultural University, Mymansingh, Bangladesh.
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feed offered, feed refused, faeces voided were recorded daily.

Growth measurements

The animals were weighed at weekly intervals during the whole experimental period. The animals were weighed in the morning before feeding.

Chemical and statistical analysis

The samples of feeds, refusals and faeces were analyzed for dry matter (DM), organic matter (OM), nitrogen (N) according to the methods of AOAC (1975). Neutral detergent fibre (NDF) was determined after Georging and Van Soest (1970). All the data were analyzed by statistical method using analysis of variance (Steel and Torrie, 1980) in completely randomized design (CRD) and mean values were tested for differences between treatments with Duncan's New Multiple Range Test (DMRT) using Statistical Analysis System (SAS, 1982).

RESULTS AND DISCUSSION

Nutrient content

Nutrient content of common grass, jackfruit tree leaves and mashkalai bran used in this experiment are presented in table 1. DM content of this grass is similar to that of monsoon grass as reported by Ranjhan and Katiyar (1969) and other tropical grasses (Sarker and Alam, 1990 and Rahman et al., 1991). The N content was also similar to the value shown by Alam et al. (1991) but higher than value reported by Akin and Burdik (1975). The N content of common grass is also similar to high yielding grasses (Mahtab et al., 1982). The lush growth of these grass may have resulted in the increase of N content. These grass appears to have adequate N to meet body tissue maintenance requirement by goat (Amin and Alam. 1990).

Nutrients contents of jackfruit tree leaves (table 1) are similar to those reported by Kibria et al. (1994), Devasia et al. (1976) and Thirumalai et al. (1989). The average N content of jackfruit tree leaves (19.6 $g \cdot kg^{-1}$ DM) indicated that this leaves may be used as supplement with other forages. This value was also higher than the value reported for jackfruit tree leaves by Alam and Akbar (1989) and Chakrabarti et al. (1988).

DM, OM, N and NDF content of mashkalai (table 1) were similar to the values reported by Mahatab et al. (1987) and Alam et al. (1991). Higher N content of mashkalai bran indicates the potentiality of using it as N supplement on low quality forage diet.

Table 1. Chemical composition of common grass, jackfruit leaves and mashkalai bran

Feeds	DM ($g \cdot kg^{-1}$)	OM ($g \cdot kg^{-1}$ DM)	N ($g \cdot kg^{-1}$ DM)	NDF ($g \cdot kg^{-1}$ DM)
Common Grass	197	912	15.6	682
Jackfruit leaves	341	935	19.4	511
Mashkalai bran	864	912	24.6	513

Intake

The intake of DM, OM, N and NDF expressed as metabolic body weight basis are shown table 2. Intake of DM, OM and NDF was very similar in all three groups but the N intake was signficantly ($p < 0.01$) higher in the mashkalai bran supplemented groups. This might have improve the available N at the tissue level and thus increased the growth rate in mashkalai bran supplemented animals.

Digestibility

The apparent digestibility of the three diets are presented in table 2. Goats fed only on common grass showed higher ($p < 0.01$) DM digestibility than the other groups. N digestibility was higher ($p < 0.01$) in group fed mashkalai bran supplementation. Digestibility of different nutrients were lower ($p < 0.01$) in jackfruit tree leaves supplemented than the other groups, which could be due to the higher tannin content in jackfruit tree leaves. Devasia (1976) reported similar results while feeding jackfruit tree leaves in goats.

Digestible nutrients intake

Intake of digestible nutrients (DDM, DN, DOM and DNDF) are presented in table 3. Digestible nutrients intake (except N and NDF) were similar in different diets. Digestible N intake was higher ($p < 0.01$) in mashkalai bran supplemented group than the others, which obviously due to the higher N intake and digestibility in that group of animals.

Body weight gain

The live weight gain (g/day) is shown in table 3. Supplementation of mashkalai bran resulted in higher ($p < 0.01$) live weight gain (57 g/day) than when fed grass alone (31 g/day) or grass supplemented with jackfruit tree leaves (29 g/day). Higher live weight gain in the former is probably due to higher available rumen degradable N (from mashkalai) required for optimal microbial growth and fermentation.

Table 2. Intake and digestibility of different nutrients of goat fed common grass alone or with jackfruit leaves and mashkalai bran

Parameter	Common grass	Grass + 100g Jackfruit leaves	Grass + 100g Mashkalai bran
Intake			
DM ($g \cdot kg\ W^{0.75} \cdot d^{-1}$)	74[a]	72[a]	70[a]
N ($mg \cdot kg\ W^{0.75} \cdot d^{-1}$)	965[b]	1,000[b]	1,094[a]
OM ($g \cdot kg\ W^{75} \cdot d^{-1}$)	67[a]	66[a]	66[a]
NDF ($g \cdot kg\ W^{0.75} \cdot d^{-1}$)	51[a]	49[a]	46[b]
Digestibility			
DM	0.69[a]	0.66[b]	0.71[a]
N	0.56[b]	0.53[b]	0.64[a]
OM	0.72[a]	0.68[b]	0.74[a]
NDF	0.68[a]	0.65[b]	0.70[a]

[a,b] Values in the same row with different superscripts differ significantly ($p < 0.01$).

Table 3. Digestible nutrients intake and body weight gain of goat fed common grass alone or with supplementation of jackfruit leaves and mashkalai bran

Parameter	Common grass	Grass + 100g Jackfruit leaves	Grass + 100g Mashkalai bran
Intake			
DDM ($g \cdot kg\ W^{0.75} \cdot d^{-1}$)	51[a]	48[a]	49[a]
DN ($g \cdot kg\ W^{0.75} \cdot d^{-1}$)	540[a]	525[b]	694[a]
DOM ($g \cdot kg\ W^{0.75} \cdot d^{-1}$)	48[a]	45[a]	47[a]
DNDF ($g \cdot kg\ W^{0.75} \cdot d^{-1}$)	34[a]	32[b]	32[b]
Live weight gain ($g \cdot d^{-1}$)	31[b]	29[b]	57[a]

[a,b] Values with different superscripts in the same row differ significantly ($p < 0.01$).

CONCLUSION

Based on above findings, it can be concluded that mashkalai bran could be a potential supplement for goat while feeding grasses. How mashkalai bran improved the growth rate of goats when fed green grass, deserve further investigation.

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