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Effect of feeding bamboo (*Dendrocalamus strictus*) leaves on growth performance of Osmanabadi goats

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Abstract

The study entitled “Effect of Feeding of Bamboo (*Dendrocalamus strictus*) Leaves on Growth Performance of Osmanabadi Goats” was conducted for period of 84 days. Twelve goats were divided into four groups on the nearness of age and weight. Four feeding treatments were studied namely T1- Control (Dry roughages *ad lib.* + 100% green hybrid napier), T2- Dry roughages *ad lib.* + green fodder (80% hybrid napier + 20% bamboo leaves), T3- Dry roughages *ad lib.* + green fodder (60% hybrid napier + 40% bamboo leaves), T4- Dry roughages *ad lib.* + green fodder (40% hybrid napier + 60% bamboo leaves) was fulfilled the requirement of goats in all treatments.

Daily DM intake differed significantly between the treatments. The average daily intake was 891.9, 902.55, 964.37 and 1023.8 g/day/goat in T₁, T₂, T₃ and T₄ groups respectively but gradual increase in DMI was observed 4.11, 4.15, 4.33 and 4.43 kg/day/100kg BW in T₁, T₂, T₃ and T₄ groups respectively. This trend thus indicated that there was increase in the daily DM intake when bamboo leaves was incorporated as feed in the rations of goats.

All the goats exhibited satisfactory growth rate 26.80 to 37.50 g per day and differences were significant. Per kg gain of body weight was higher in group (T₄) 60% bamboo leaves fed.

In experimental result, the treatment (T₄) 60% bamboo leaves fed showed better and desirable result as compared with T₁, T₂ and T₃ treatment.

Keywords: Osmanabadi, growth performance, bamboo leaves, green fodder, roughages

Introduction

Livestock is an integral part of agriculture and also plays a pivotal role for future growth and development of the agricultural sector. Adequate provision of feed is essential for the survival of livestock and its scarcity has been one of the major limiting factors in improving livestock productivity in developing countries like India.

Nearly 72.2% population of India is living in 6.38 lakh villages, mostly dependent upon agriculture and livestock for their livelihood. Crop productivity is largely restricted by uncertain and erratic rainfall, scarcity of water for irrigation and deterioration of soil-health. Out of the 138 million Indian rural households, 33.01 million (24%) are maintaining goats. Households cultivating less than 2.0 ha of land (marginal and small) are the custodian of more than 76% of the total goats in the country. Goats has been playing multiple roles in livelihood of the rural people by providing income, employment, nutrition, supporting crop production and risk aversion in case of crop failure. Landless men and women are increasingly relying on goat keeping for their socio-economic upliftment (Singh *et al.*, 2018) [16].

Goat (*Capra hircus*) is a poor man's cow in India. It is the first ruminant animal kept by human for production of milk, meat, skin, mohair and manure (Gall, 1981). In Maharashtra, osmanabadi and sangamneri are important goat breeds. Osmanabadi is for meat, while sangamneri for meat and milk. In the present socio-economic system, goat is an important source of livelihood for landless laborers.

In India requirement and availability of green fodder is 1061.00 million MT and 395.20 million MT whereas in case of dry fodder requirement is 589.00 million MT and availability is 451.00 million MT. (Ministry of Agriculture, 2015). It indicates that there is deficit gap between the requirement and availability of green and dry fodder. Feed and fodder availability is not sufficient to meet even dry matter requirement of growing ruminant population, there is need to explore new feed resources which do not compete with human food chain. The scarcity of feed and fodder, escalating demand and cost of concentrate feed ingredients necessitates the role of animal nutritionists for supplying balanced nutrient to maintain optimum productivity potentials (Srinivasulu *et al.*, 1998) [17].

Bamboo (Family: Poaceae, subfamily: Bambusoideae) is a group of broadly distributed large grasses, including more than 100 genera and at least 1400 species. They contribute to both traditional and developing technologies needed to provide important resources throughout the world.

Bamboo species are integral components of agroecosystem and they can also be grown on variety of soil types and are a fast-growing plant species. Bamboo is used for human and animal food, fuel, pharmaceuticals, building materials, chemicals and also provide wildlife habitat, stream bank stabilization and erosion control. In addition, the potential importance of bamboo as a biofuel and means for carbon sequestration has received recent attention (Halvorson *et al.* 2010) [7].

Material and Methods

The present investigation entitled “Effect of feeding bamboo (*Dendrocalamus strictus*) leaves on the growth performance of Osmanabadi goats” was carried out at Livestock Instructional Farm, Department of Animal Husbandry and Dairy Science, College of Agriculture, Nagpur for a period of 84 days. The experiment was undertaken with a view to know the palatability and nutrient utilization of bamboo leaves in Osmanabadi goats.

Selection of animals

Twelve Osmanabadi goats were selected from Livestock Instructional farm, Section of Animal Husbandry and Dairy Science, College of Agriculture, Nagpur on the basis of nearness of age and body weight. Selected goats were divided into 4 groups of 3 goats in each treatment. The details of selected goats are tabulated in table 1 in each treatment.

Table 1: Details of experimental goats

Groups	Tattooing No.	Age of goats at start of experiment (Month and Days)	Body weight at start of experiment (kg)	Average body weight (kg)
I	G337	12 Month 25 Days	22.10	19.43
	G336	14 Month 09 Days	27.00	
	G324	5 Month 18 Days	9.20	
II	G313	9 Month 20 Days	17.30	19.50
	G328	10 Month 06 Days	18.20	
	G318	11 Month 15 Days	23.00	
III	G315	8 Month 02 Days	13.10	19.56
	G331	9 Month 26 Days	17.95	
	G325	14 Month 11 Days	27.65	
IV	G311	10 Month 09 Days	19.00	19.95
	G316	5 Month 28 Days	10.20	
	G338	19Month 11 Days	30.65	

Allotment of treatments

The present experiment was conducted by randomized block

design used with four treatments as detailed below in Table 2.

Table 2: Details of allotment of treatments in feeding trials

T1	Control (Dry roughages <i>ad lib.</i> +100% green hybrid napier).
T2	Dry roughages <i>ad lib.</i> + green fodder (80% hybrid napier+20% bamboo leaves).
T3	Dry roughages <i>ad lib.</i> + green fodder (60% hybrid napier+40% bamboo leaves).
T4	Dry roughages <i>ad lib.</i> + green fodder (40% hybrid napier+60% bamboo leaves).

Concentrate was fed to meet out DCP and TDN requirement as per standard.

Management practices

All the four groups of goats were kept under identical standard management practices. The goats were groomed twice daily at 9.30 a.m. and 3.30 p.m. They were washed daily at 9.30 a.m. after watering and grooming, the goats were kept free in open paddock for an hour.

Watering and housing of goats

Fresh and clean water were offered *ad lib* three times in a day. The goats were housed in disinfected, well ventilated permanent shed covered with tiles. The stall, where goats housed during period of experiment were clean daily.

Health and sanitation

The floor and surrounding area were disinfected with BHC powder. The visits of veterinarian were undertaken whenever necessary.

Feeding

Fresh bamboo leaves were made available from the agro forestry, College of Agriculture, Nagpur. All the twelve goats

were stall fed and offered fresh bamboo leaves at 8.00 a. m., 1.00 p.m. and 5.00 p.m. and left over was measured on next day morning.

Daily dry matter (DM) consumption

This was done at the start of the experiment and at week interval till the completion of experiment feed samples were collected at fortnightly interval for estimating DM content.

Water intake and Body weight

Water intake of individual animal was recorded once in a week. Body weights of the experimental animals were recorded before feeding and watering at the start of experiment and later on at weekly interval on weighing balance.

Analysis of feeds and fodder

The sample of the bamboo leaves were analysed for the Dry matter intake. (A.O.A.C., 1995) [1].

Results and Discussion

1. Feed intake

Dry matter intake

The dry matter is the most important component of the feeds and fodder. It excludes the moisture content of feed and fodder. The feed requirement of animal is based on the DM

content of feed.

The average daily DM intake as shown in table 3 in treatment groups T₁, T₂, T₃ and T₄ were 891.9, 902.55, 974.37 and 1025.8 g respectively. The weekly dry matter intake in treatment group T₁, T₂, T₃ and T₄ were 6.24, 6.31, 6.75 and 7.116 kg respectively.

Table 3: Mean daily, weekly and DMI as % of body weight of different feed stuff fed to goats under different groups

Treatments	Average body weight (kg)	Daily DMI/day (g)				Daily total DMI(g)	Weekly DMI (kg)	Daily DMI/100 kg body weight
		Gram straw	Bamboo leaves	Hybrid napier	Concentrate mixture			
T ₁	21.68	365.4	-	312.2	214.30	891.9	6.24	4.11
T ₂	21.91	392.6	53.73	241.92	214.30	902.55	6.31	4.15
T ₃	22.27	448.02	112.62	189.43	214.30	964.37	6.75	4.33
T ₄	23.10	487.06	197.9	124.6	214.30	1023.8	7.16	4.43
F test						Sig	Sig	Sig
S.E.(m) ±						31.56	0.22	0.08
C.D.						95.75	0.67	0.24

The corresponding values when express as per cent live weight base were 4.11, 4.15, 4.33 and 4.43 kg per 100 kg body weight in treatment groups T₁, T₂, T₃ and T₄ respectively.

The feeding of experimental feed affects the DM intake and per 100 kg body weight significantly. It indicates that goats in group T₄ consume higher DMI than group T₃, T₂ and T₁ control group.

The increase in DMI was expected because increase in palatability due to incorporation of bamboo leaves.

The present result is similar with Gebreziabhear (2016) [6], Andriarimalala *et al.* (2019) [2], Asaolu *et al.* (2010), Kumawat and Chaudhary (2004) [5], Baruah *et al.* (2005) [4], Jadhav, P. (2005) [8], Niranjan *et al.* (2007) [10] and Maheshwari *et al.* (2008) [9], Patil *et al.* (2009) [14].

2. Water intake

Water intake in animals depends upon the season, environmental condition, physiological condition of animal, type of ration given to the animals and dry matter intake. The average water intakes in goats over an experimental period are depicted in Table 4.

It was observed that average water intake over an experimental period were 912.69, 939.28, 958.99 and 992.63 ml/day/goat in treatment group T₁, T₂, T₃ and T₄ respectively. The corresponding values for water intake per 100 kg body weight were 3.95, 4.21, 4.37 and 4.57 lit respectively in treatment groups T₁, T₂, T₃ and T₄. The differences in water intake were statistically significant and water intake per 100 kg body weight were also found significant.

Table 4: Mean water intake in experiment goats under different treatment

Treatments	Water intake/day (ml.)	Weekly water intake (ml.)	Water intake /100 kg body weight (lit.)	DM to water intake ratio
T ₁	912.69	6388.83	3.95	1:0.96
T ₂	939.28	6574.96	4.21	1:1.00
T ₃	958.99	6712.93	4.37	1:1.01
T ₄	992.63	6948.41	4.57	1:1.07
F-test	Sig	Sig	Sig	-
S.E(M)±	16.83	117.85	0.13	-
C.D.	51.06	357.47	0.39	-

The DM to water intake ratio were 1:0.96, 1:1.00, 1:1.01 and 1:1.07 in T₁, T₂, T₃ and T₄ treatment groups respectively. The water intake was increased in groups under successive period of investigation. It is further noticed that there were significant differences in water intake when Osmanabadi goats were supplemented with bamboo leaves. Feeding of bamboo leaves increases water intake in experimental goats. Water consumption rates were directly correlated with maximum ambient temperature and not with the DM intake.

3. Body weight gain

It was observed from the Table 5 that there was significant difference in weight gain under different treatment groups. It was that feeding of bamboo leaves was beneficial without any adverse effect on body weight gain. The total gain in body weight goat fed with experimental ration T₁, T₂, T₃ and T₄ as

end of 84 days trial were 2.25, 2.41, 2.71 and 3.15 kg respectively. The corresponding values of weekly gain in body weight were 187.50, 200.83, 225.83 and 262.50 g in treatment T₁, T₂, T₃ and T₄ respectively. The average body weight gains per day per goat were 26.80, 28.70, 32.26 and 37.50 g in treatment groups T₁, T₂, T₃ and T₄ respectively.

The average body weight gain per day per goat in treatment group T₄ was higher as compare to other treatment groups.

The present values are nearer to the values reported by Gebreziabhear (2016) [6], Oladepo *et al.* (2016) [11], Sapkale *et al.* (2013) [15], Patel *et al.* (2017) [13] Pachauri *et al.* (2012) [12] and Oladepo *et al.* (2016) [11].

The gain in body weight of animals in the present study indicated that the nutrient availability of bamboo leaves is sufficient to meet the maintenance requirement of the goat.

Table 5: Body weight gain of experimental goats under different treatments (84 days)

Treatments	Initial weight (kg)	Final weight (kg)	Daily weight gain (g)	Weekly weight gain (g)	Total weight gain (kg)
T ₁	19.43	21.43	26.80	187.50	2.25
T ₂	19.50	21.91	28.70	200.83	2.41
T ₃	19.56	22.27	32.26	225.83	2.71
T ₄	19.95	23.10	37.50	262.50	3.15
F-test			Sig	Sig	Sig
S.E(M) \pm			2.35	16.48	0.19
C.D.			7.13	50.00	0.59

Conclusion

Feeding of 60 per cent bamboo leaves with concentrate and roughages improved the growth performance of Osmanabadi goat. The feeding bamboo leaves at 60 per cent level is economical in term of body weight gain.

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