Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2019; 8(2): 2425-2428
Received: 26-01-2019
Accepted: 29-02-2019

VC Kedaree
Department of Animal Husbandry and Dairy Science. College of Agriculture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Dist. Ratnagiri, Maharashtra, India

PB Khirari
Department of Animal Husbandry and Dairy Science. College of Agriculture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Dist. Ratnagiri, Maharashtra, India

SM Jadhav
Department of Animal Husbandry and Dairy Science. College of Agriculture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Dist. Ratnagiri, Maharashtra, India

Correspondence
VC Kedaree
Department of Animal Husbandry and Dairy Science. College of Agriculture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Dist. Ratnagiri, Maharashtra, India

Performance of growing goats fed paddy straw supplemented with graded levels of *Thespesia Populnea*

VC Kedaree, PB Khirari and SM Jadhav

Abstract
A study was carried out to examine the effect of supplementing paddy straw with incremental levels of *Thespesia Populnea* (Portia) forage on dry matter (DM) intake, digestibility and live weight changes. Twelve crossbred bucks were used in a randomized block design for duration of 4 weeks. The treatments comprised of a Portia tree leaves and paddy straw supplemented with in 15:85, 30:70 and 45:55 for the treatment groups T_1, T_2 and T_3, respectively. Concentrate @ 200 g/buck were offered to meet the nutritional requirement of the experimental animals on a dry matter basis. All animals were allowed *ad libitum* access to water and mineral lick. Supplementing paddy straw with Portia resulted in increased total DM intake from 636.83(T_3), to 681.13 (T_1), and 753.98 (T_2) g/day. Intake of straw with Portia tree leaves significantly ($p>0.05$) influence the intake of straw in between the treatments T_1, T_2 and T_3. DM digestibility increased with supplementation with T_2 recording the highest value of 57.90% which was not far higher than the T_1 and T_3 and shows the non-significant variation. Supplementation of straw with Portia tree leaves in T_2significantly increased daily weight gains ($p<0.05$). T_2 had the highest ADG (75.00 g/day).Feed conversion efficiency showed the significant difference among the treatment groups ($p<0.05$). Nutritive ratio shows the significant variation among the treatment groups T_1, T_2 and T_3. It is concluded that incorporation of Portia tree leaves with paddy straw in 30:70 proportion for optimum production, digestibility, ADG, FCR and nutritive ratio in goats.

Keywords: Digestibility, Intake, live weight, paddy straw and Portia leaves.

Introduction
Due to religious faiths and socioeconomic conditions goat is loved by rural masses. However, the organized rearing of goats can create excellent employment opportunities for farmers who hail from dry lands and are below the poverty line, especially small and landless farmers. Small ruminants like goats are very important species of livestock in India, mainly due to their short generation interval, high prolificacy and the ease with which they can be marketed.

In ruminants paddy straw constitutes a major part of their diet due to its ease of avail, cheaper than other feed resources and serves to be an appetite satisfier. Supplementation of paddy straw based diet is often necessary as these are low in protein and energy so as to meet the nutrient requirements even for maintenance. But due to its poor nutritive value there exist a need to fulfill this nutrient deficiency with the other resources. This calls for identification and screening of alternative tree leaves and shrubs as a strategy towards overcoming feed resource base for utilization by ruminant animals.

Tree legumes and shrubs that persist during the dry season when pasture is either scarce or of poor quality have been extensively used to provide protein rich forage for ruminant production (Norton, 1994) [11]. There exists extensive and diverse literature on the effects of tree leaves supplementation on the productivity of cattle, sheep and goats. Foliage from tree legumes and shrubs still offers cheaper alternative to supplementation of poor quality roughage's. This is because commercial concentrates are expensive and sometimes unavailable to the small-scale resource poor farmers.

Thespesia populnea (Malvaceae) is a large tree found in tropical regions and coastal forests of Konkan and all over the India. The bark leaves, and flowers are useful in cutaneous infections such as scabies, psoriasis, eczema, ringworm, guinea worm and the leaves of this plant used as anti-inflammatory for poultice as a folk medicine (Chang *et al*., 2002). Various parts of *T. populnea* are found to possess useful medicinal properties, such as antifertility, antimicrobial, anti-inflammatory, antioxidant, purgative and hepatoprotective activity (Arthanari *et al*., 2009).

The most important attributes of Thespesiaare its ability to re-sprout vigorously and repeatedly aftercutting, ease of establishment vegetatively from cuttings and high leaf yield. The Nitrogen

contents are between 3 to3.5%, depending on the age, season, part of the plant andphysiological state (before and after flowering). Littlestudy has been done to evaluate scientifically, it'spotential in a feeding trial. The objective of the study was to evaluate the effect of feeding incremental levels of *Thespesia populnea*forage onintake; digestibility and live weight changes of growing goats offered a basal diet of paddy straw.

Materials and Methods

The experiment was conducted at the Agricultural College, Dapoli in Ratnagiri District, Maharashtra state of India. The area lies in Konkan region normally described as the coastal zone. It has an altitude of 280 m above sea level, temperature during the experimental period were of 20-22°C.

Animals and feeds

Twelve bucks (Crossbred) of same age and body weight were used for the experiment measuring the intake, digestibility and live weight changes. Paddy straw was collected from the college farm and used for the experiment. Portia leaves were collected from nearby areas and planted as a fence to demarcate land within the farm. The foliage was offered on as such basis to the experimental animals.

Experimental design and procedures

The goats were allocated to three treatment diets according to a randomized block design with four goats per treatment. The three experimental diets in the combination were as follows; Portia tree leaves and paddy straw in 15:85 proportion in treatment T_1;Portia tree leaves and paddy straw in 30:70 proportion in treatment T_2 and Portia tree leaves and paddy straw in 45:55 proportion in treatment T_3. 200 g concentrate were offered commonly to all the treatment groups. Whole paddy straw was manually chopped into sizes of about 30-40 mm prior to feeding. Feeding was done daily at approximately 8.00 am and 16.00 pm. Portia foliage was fed in two equal portions in the morning after paddy straw and in the afternoon. This was followed at both times with paddy straw. Water and mineral lick were available at all times. Feed offered and refused was weighed every day to determine intake and samples taken weekly for dry matter determination, while the live weights were taken on weekly basis early in the morning before feeding.

Analytical methods

The dry matter (DM) of feed and faeces was determined by drying the samples in an oven at 55°C for 48 h, ash bashing at 550°C, and crude protein (CP) by the official methods of the Association of Analytical Chemists (AOAC,1990).

Statistical analysis

Data from the experiment was subjected to analysis using the randomized block design.

Results and Discussion

Table 1: Chemical composition of Portia leaves, paddy straw and concentrates (% on dry matter basis)

Attributes	Portia leaves	Paddy straw	concentrates
Organic matter	92.57	85.30	94.81
Dry matter	34.18	89.40	91.59
Crude protein	18.49	5.41	17.44
Ether extract	7.63	1.24	6.14
Crude fibre	16.51	31.38	7.71
Nitrogen free extract	49.94	47.27	63.52
Total ash	7.43	14.70	5.19
Acid insoluble ash	2.62	4.73	3.27
Tannin	0.68	---	---
Calcium	1.73	0.62	0.32
Phosphorus	0.52	0.16	0.48

The chemical composition of the feeds is shown in Table 1. Portia had notably high levels of CP. Paddy straw on the other hand was characterized by the lowest CP levels. While in the concentrate there had a sufficient level of CP.

Table 2: Mean daily feed intake and live weight changes and feed conversion efficiency in goats.

Attributes	T_1	T_2	T_3
Dry matter intake (DMI)			
DM intake (g/d)	681.13^{b}±13.58	753.98^{a}±15.34	636.83^{b}±9.80
DMI % (BW)	5.16^{b}±0.06	5.74^{a}±0.11	4.85^{b}±0.07
DMI/kg ($W^{0.75}$)	98.37^{b}±1.28	109.26^{a}±2.04	90.38^{c}±0.94
Live weight changes (kg)			
Initial BW	13.20^{a}±0.18	13.14^{a}±0.03	13.51^{a}±0.10
Final BW	14.78^{b}±0.24	15.24^{a}±0.08	15.43^{a}±0.14
Gain in BW (kg)	1.58^{b}±0.07	2.10^{a}±0.06	1.92^{a}±0.03
Gain in BW (g/d)	56.43^{c}±2.41	75.00^{a}±2.03	68.40^{b}±1.16
Feed conversion efficiency			
FCE (%)	8.29^{a}±0.24	9.95^{b}±0.08	10.77^{c}±0.06
Feed required for 1 kg BW	12.06^{b}±0.35	10.05^{a}±0.09	9.29^{a}±0.05

[ab]Mean values with different superscripts with in row differ significantly

The level of supplementation with Portia foliage significantly affect the intake of the dry matter ($p>0.05$) (Table 2). 15% and 45% levels of Portia inclusion seemed to be at par with each other, while effect on consumption of paddy straw and Portia leaves in treatment T_2 showed the significant difference among the other treatments.

The total dry matter intake (TDMI) increased (Table 2) with supplementation ($p<0.05$) of Portia leaves and paddy straw in treatment T_2. Total dry matter intake may increase or decrease depending on ability of a particular diet to provide required nutrients for maintenance and other functions.

The average daily dry matter intake per 100 kg body weight (kg) was higher in T_2 as compared to the T_1 and T_3. The recommended level of dry matter intake per 100 kg body weight was 3.0 to 4.0 (ICAR, 1985) in goats.

It was also found that average daily dry matter intake per kg metabolic body weight ($W^{0.75}$) was significantly higher in T_2 than T_1 and T_3.

At the start of experiment, average body weights of animals fed on treatments T_1, T_2 and T_3 were nearly equal, and final

body weights i.e. at the end of experiment were higher in T_3 than T_2 and T_1. Treatment T_3 and T_2 were at par with each other. The average daily gain in body weights of animals 75.00± 2.03 g/day in goats feds with treatment $T_3$was significantly higher ($P<0.05$) than that of animals fed with treatment T_1 and T_3. Similar trend was observed in case of daily body weight gain was 66 ± 2.6, 81 ± 1.2, 71 ± 1.2 and 58 ± 1.2 g/day for complete ration 1-4 respectively in sheep (Murthy and Prasad, 2000).

An average total gain in body weight throughout the experimental period of animals fed with treatment T_1, T_2 and T_3 shows significant variation ($P<0.05$). The average feed conversion efficiency was recorded as 8.29 ± 0.24, 9.95 ± 0.08 and 10.77 ± 0.06 per cent for treatment T_1, T_2 and T_3 respectively. However the quantity of feed required for 1 kg gain in body weight were higher in T_1 than T_2 and T_3. Significant variation was noticed between all the treatments with respect to feed conversion efficiency.

Table 3: Mean digestibility coefficient, nutritive value and mineral balance in goats

Attributes	T_1	T_2	T_3
Digestibility coefficient (%)			
DM	53.46^{a}±0.26	57.90^{a}±0.38	54.72^{a}±0.20
CP	53.48^{c}±0.14	57.55^{a}±0.15	55.43^{b}±0.35
EE	52.66^{c}±0.28	55.15^{a}±0.33	53.60^{b}±0.38
CF	53.78^{c}±0.21	57.16^{a}±0.18	54.91^{b}±0.17
NFE	52.64^{b}±0.20	57.87^{a}±0.18	52.44^{b}±0.21
Nutritive value (%)			
DCP	7.37^{b}±0.02	7.93^{a}±0.02	7.57^{ab}±0.06
TDN	51.39^{a}±0.20	55.74^{a}±0.11	51.86^{a}±0.12
Nutritive ratio	5.97^{ab}±0.02	6.03^{a}±0.02	5.86^{b}±0.06
Mineral balance (g/d)			
N	4.75^{b}±0.07	6.09^{a}±0.30	5.05^{b}±0.07
Ca	2.65^{b}±0.10	3.41^{a}±0.18	2.88^{ab}±0.07
P	1.05^{b}±0.03	1.35^{a}±0.06	1.17^{b}±0.02

^{ab}Mean values with different superscripts with in row differ significantly

There was no statistical difference in the diet DM digestibility ($p>0.05$), as the level of supplementation increased the diet digestibility increased with the highest values recorded at T_2 (Table 3). The average digestibility coefficient of dry matter in treatment T_1, T_2 and T_3 found at par with each other.

The digestibility coefficient of crude protein in treatment T_2 was highly ($P<0.05$) significant over the treatments T_1 and T_3. While the digestibility coefficient of ether extract, crude fibre and nitrogen free extract were higher in treatment T_2 than T_1 and T_3.

The nutritive values in respect to the DCP and TDN of the experimental feeds were calculated from the average digestibility coefficient of various nutrients. Both DCP and TDN values found under present investigation were higher in treatment T_2 in comparison with the treatment T_1 and T_3. The treatment T_2 containing Portia tree leaves in 30:70 proportion recorded maximum DCP and TDN content, may be because of the treatment T_2 given encouraging results (i.e. higher daily gain in body weight) than treatment T_1 and T_3. Further, it was observed that the DCP values in T_2 and T_3 and T_1 and T_3 at par with each other. Whereas with respect to TDN values, all the treatments are at par with each other.

The nutritive ratio in the treatment T_2 were found to be significantly higher than treatment T_3 while it is at par with the treatment T_1.

Statistical analysis showed that the average retention of nitrogen in treatment T_2 was highly significant ($P<0.05$) over the average retention of nitrogen in treatment T_3 and T_1. Further, it was observed that the nitrogen retention differed were at par in treatments T_1 and T_3.

The phosphorus retention was observed significantly higher ($P<0.05$) in treatment T_2 than in treatment T_3 and T_1. The results obtained under this study were in close agreement with the findings recorded earlier by

Table 4: Mean plane of nutrition and cost of feeding in goats.

Attributes	T_1	T_2	T_3
Plane of nutrition			
DCP intake (g/day)	50.22^{b}±1.08	59.81^{a}±1.26	48.16^{b}±0.58
TDN intake (g/day)	350.15^{b}±8.32	420.32^{a}±9.36	330.20^{b}±4.66
DCP intake/kg $W^{0.75}$ (g)	7.25^{b}±0.10	8.67^{a}±0.17	6.84^{b}±0.06
TDN intake/kg $W^{0.75}$ (g)	50.56^{b}±0.82	60.91^{a}±1.25	48.48^{b}±1.79
Cost of feeding (Rs./kg)			
Portia leaves	1.00	1.00	1.00
Paddy straw	1.00	1.00	1.00
Concentrate	15.60	15.60	15.60
Cost of feed/kg gain	71.63	56.56	58.88

^{ab}Mean values with different superscripts with in row differ significantly

The DCP and TDN consumption of animals per day and per metabolic body weight were found significantly higher in treatment T_2 than T_1 and T_3, whereas treatment T_1 and T_3 were found to be at par with each other.

The average cost of feed required for 1 kg weight gain calculated as Rs. 71.63, 56.56 and 58.88 for treatments T_1, T_2 and T_3, respectively. The cost of feed required for 1.0 kg gain in live weight was higher in treatments T_1 and T_3 than in T_2.Hence, feeding animals with treatment T_2containing Portia tree leaves and paddy straw in 30:70 proportion was observed as more economical than other two groups.

It is thus concluded that use of Portia foliage greatly improved the intake, diet digestibility and ADG of growing goats. Portia therefore has great potential as a protein supplement to poor quality roughages and can be included at 30% in diets of goats.

Acknowledgements

The authors are grateful to the department of Animal Husbandry and Dairy Scienceof the college of agriculture, Dapoli, for providing site of study and logistical assistance.

References

1. AOAC. Official Methods of Analysis. 15th edn. Association of Official Analytical Chemists, Arlington, Virginia, 1990.
2. Chahal SM, Sharma DD. Performance of kids fed ammonia treated Mahua seed cake based complete diet. Indian J Anim. Nutr. 1992; 9(4):214-218.
3. Das MM, Maithy SB, Kundu SS. Evaluation of masoor straw based ration in sheep and goat. Indian J Anim. Nutr. 2005; 22(3):204-205.
4. Dayal SJ, Reddy, Janardhana J, Purushotham NP. Utilization of maize husk in complete rations of goats. Indian J Anim. Nutr. 1995; 12(3):173-175.
5. Dhore RN, Jagdale SD, Dhok AP. Growth performance of weaned kids fed pelleted complete diets of different protein and energy levels. Indian J Anim. Nutr. 2005; 22(3):191-194.
6. Dhuria RK, Purohit GR, Sharma T. Nutritional evaluation of complete feed containing gram (*Cicer*

arientinum) straw in sheep. Indian J Nutr. 2004; 21(2):100-103.
7. Hembade AS, Patel PM. Green banana (*Musca* sps.) leaves in the ration of kids. Indian J Anim. Nutr. 2004; 21(1):5-7.
8. ICAR. Nutrient requirement for livestock and poultry, publishing a d information division, ICAR, New Delhi, 1985.
9. Kuchekar SV, Burte RG, Yadav DN. Utilization of Dhaman (*Grewia tiliafolia*) and umber (*Ficus glomerata*) tree leaves in the complete feeds for goats. M.Sc. (Agri.) Thesis submitted to the Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Dist. Ratnagiri (M.S.), 2004.
10. Murthy KUG, Rama Prasad J. Evaluation of legume hay based complete rations in sheep. Indian J Anim. Nutr. 2002; 19(4):315-319.
11. Norton BW. Tree legumes as dietary supplements for ruminants. In: Tropical Tree Legumes in Tropical Agriculture (Ed. Gutteridge RC, Shelton HM). CAB International, UK, 1994, 177-201.
12. Pathirana KK, Mandalita ULP, Gunaratne SSN. Straw based supplementation of low output system for zebu heifers. In: International Atomic Energy Agency, TEC Document 691 IAEA Viena, Austria, 1992.
13. Prasad PE, Reddy MR. Evaluation of urea treated sorghum straw diet on growth and nutrient utilization on goats, 7th International conference on goats, France, 2000, 15-21.
14. Rao KCH, Janardhana Reddy T, Raghwan GV. Effect of replacing groundnut cake protein by sunflower cake in complete rations for sheep. Indian J Anim. Nutr. 1995; 12(2):97-100.
15. Reddy GVN, Reddy JL. Effect of cotton stalks based complete diet on growth and carcass characteristics in sheep and goats in field condition. Indian J Anim. Nutr. 2003; 20(1):97-100.
16. Rekhate DH, Madavi VB, Dhok AP, Patil JM. Evaluation of arhar and gram straw based pelleted complete feed in goats. Indian J Anim. Nutr. 2004; 21(4):257-260.
17. Swami NP, Parthasarathi M, Krishna N. Evaluation of complete rations containing groundnut haulms, Banyan (*Ficus bengalensis*) tree leaves and red gram straw in growing sheep. Indian J Anim. Nutr. 1990; 7(2):127-130.
18. Thriumalesh T, Surekha Kale, Reddy VVN. Effect of Bajara straw based complete diet on nutrient digestibility and rumen metabolism in sheep. Indian Anim. Nutr. 2003; 20(4):389-394.
19. Yadav SG, Deshmukh SV. Evaluation of complete rations containing black gram straw and wheat straw in sheep. Indian J Anim. Nutr. 2001; 18(2):190-193.