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Effect of different levels of Azolla meal on growth performance of Osmanabadi kids

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ABSTRACT : : Eighteen Osmanabadi kids of 3 months age were selected and distributed into three treatments *viz.*, T_1 (control), T_2 (15% concentrate was replaced with Azolla meal), T_3 (25% concentrate was replaced with Azolla meal). The feeding was carried out for 3 months keeping roughages to concentrate ratio 67:33. The results observed on DMI, body weight during the experimental period were found significantly ($P<0.05$) superior in T_2 treatment and apparent digestibility was higher in treatment T_1 followed by T_2 and T_3. The total cost per kg live weight gain for T_1, T_2 and T_3 were found to be Rs. 40.49, 39.27 and 81.68, respectively. From the results it may be concluded that Azolla (*Azolla pinnata*) meal can be included upto 15 per cent of total concentrate requirement of growing kids.

KEY WORDS : : Azolla meal, Osmanabadi kids, Growth performance

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INTRODUCTION

Goat (*Capra hircus*) is poors man's cow in India. Osmanabadi and Sangamneri are important breeds of Maharashtra. Osmanabadi breed is reared mainly for meat and milk purposes. The goat is a browsing animal and its feed consists of young leaves of trees and bushes. Farmers usually practise grazing in these animals without supplementing concentrates .

Azolla is important among aquatic plants due to the occurrence of both photosynthesis and nitrogen fixation in the leaves and also because of its growth habbit it appears a greater potential than tree leaves as a source of protein minerals and vitamins for animals. Of their species the water fern, Azolla which groups in association with blue green algae *Anabaena azollae*, is perhaps the most promising from the point of view of else of cultivation, productivity and nutritive value (Lumpkin and Pluck Nett, 1982; Van Hove and Lopez, 1983).

The water fern Azolla consists of various varieties *viz.*, *Azolla pinnata, A. maxicana, A. nilotica*. Among them, *Azolla pinnata* is an important variety which can be grown easily with less initial investment cost. It is commonly found in tropics and subtropics. It grows naturally in stagnant water of drains, canals, ponds, rivers and marshy lands. *Anabaena azollae* living in the cavity of Azolla leaf can fix amount of atmospheric dinitrogen due to presence of symbiotic algae in the leaves (Becking, 1979). Azolla has been used for centuries in Asia as a green manure fertilizer for rice fields and supplements in livestock diet. Some strains of Azolla can fix as much as 1-3 kg of nitrogen/ha/day and its annual yield is 730 tonnes/ha as a green Azolla for feeding animals (Gaikwad, 2006). It grows in aquatic habitats and absorbs nutrients mainly from water. In shallow water the plant roots attach to the soil and absorb nutrients from the soil.

Azolla as a good protein source, can partially replace the concentrate for livestock feeding so present investigation was undertaken in goat project Mahatma Phule Krishi Vidyapeeth, Rahuri, Ahmednagar.

MATERIALS AND METHODS

Eighteen Osmanabadi kids of approximately similar weight irrespective of sex of three months age were randomly divided into three groups *viz.*, T_1, T_2 and T_3 as treatments consisting 6

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animals in each and each animal in the treatment was considered as replication. The kids subjected to different groups were fed for three months duration. The experimental concentrate feeds of T_1, T_2 and T_3 treatment groups prepared for feeding the respective treatments group animals were as below. The concentrate mixture was prepared by using 90 parts pelleted concentrate feed and 10 parts of groundnut cake. The proximate composition of feed ingredients used in Appendix.

Appendix

T_1 (control)	:	Consisting of prepared concentrate mixture (100%) without Azolla meal
T_2	:	Consisting of prepared concentrate mixture (85%) adding 15 % by weight Azolla meal
T_3	:	Consisting of prepared concentrate mixture (75%) adding 25 % by weight of Azolla meal

The observations were recorded on feed intake, body weight and proximate analysis during the experimental period and were subjected to statistical analysis in RBD.

RESULTS AND DISCUSSION

It was observed from Table 1, that the Azolla meal had higher CP and EE (24.98 and 3.35 %, respectively) than lucerne green (22.53 and 2.60 %, respectively) and concentrate mixture (19.04 and 2.78 %, respectively). Crude fibre content was lower in Azolla meal (9.07 %) than lucerne green (24.38 %). TA content was more in lucerne green (11.08 %) than Azolla meal (10.15 %) while less in concentrate mixture (6.34 %). Nitrogen free extract was more in concentrate mixture (61.38 %) than Azolla meal (52.46 %) while less in lucerne green (39.40 %).

The CP, EE, CF, TA were more in T_2 and T_3 feeds (20.72, 2.86, 11.90, 7.38, 57.96 and 21.85, 2.92, 12.63, 8.45, 55.65%, respectively), while NFE was less than T_1 feed (57.96 and 55.56 %, respectively). Parthasarathy *et al.* (2001) reported CP present in Azolla to be in between 24.91 to 27.22 per cent which agrees with the present investigation. Becera *et al.* (1995) reported EE in Azolla to be more than 4.5 per cent which is more than obtained in present investigation. Reddy and Reddy (1979) reported more than 50 per cent of NFE in Azolla meal that agrees with the results which was obtained in the present investigation.

It is observed from the data presented Table 2 that average daily DM intake of experimental kids under different treatments differed significantly ($P< 0.05$).

The average daily DM intake was significantly more in T_2 (0.35 kg) followed by T_1 (0.34 kg) and comparatively less in T_3 (0.33 kg). The feed intake was found to be significantly decreased in T_3 than T_2 indicating that Azolla meal feeding was effective upto 15 per cent in concentrate mixture which may be due to more fibre fraction in Azolla meal.

From the perusal of data of Table 3, it revealed that the DM digestibility was significantly higher in T_1 (82.46 %) than T_2 and T_3 (81.4 and 79.59%, respectively). It means DM digestibility was decreased as the percentage of Azolla increased, indicating negative effect on digestibility. The CP digestibility was significantly higher in T_1 (80.44 %) as compared to T_2 (78.21 %) and T_3 (76.50 %) indicating that the protein from Azolla was less digestible due to high per cent of lignin. The ether extract digestibility in treatment T_1, T_2 and T_3 was 80.56, 79.5 and 78.42 per cent, respectively. These differences in ether extract digestibility were significantly different from the each treatment. The CF digestibility in treatment T_1, T_2 and T_3 was 73.29, 73.32 and 70.28, per cent, respectively. These differences in CF digestibility were significantly different from each treatment.

The NFE digestibility in treatment T_1, T_2 and T_3 was 76.35, 77.15 and 74.28 per cent, respectively. These differences in NDF digestibility were significantly different from each other. The NDF digestibility in treatment T_1, T_2 and T_3 was 70.47, 69.35 and 67.29 per cent, respectively. These differences in NDF digestibility were significantly different from each other. The ADF digestibility in treatment T_1, T_2 and T_3 was 61.47, 60.42 and 59.17 per cent, respectively. These differences in ADF digestibility were significantly different from the each other. The cellulose digestibility in treatment T_1, T_2 and T_3 was 56.39, 55.49 and 53.43 per cent, respectively. These differences in cellulose digestibility were significantly different from the each treatment. The hemicellulose digestibility in treatment T_1, T_2 and T_3 was 51.52, 50.63 and 48.50 per cent, respectively. These differences in hemicellulose digestibility were significantly different from the each other. The lignin digestibility in treatment T_1, T_2 and T_3 was 22.47, 19.39 and 18.66 per cent, respectively. These differences in lignin digestibility were significantly different from the each treatment Tamang *et al.* (1992) reported digestibility of CP and CF of

Table 1: Chemical composition of feeds, fodder and treatments concentrate feeds fed to kids on (% on DM Basis)

Particulars	Concentrare mixture	Azolla meal	Lucerne green	Experimental feeds		
				T_1	T_2	T_3
CP	19.04	24.98	22.53	19.04	20.72	21.85
EE	2.78	3.35	2.60	2.78	2.86	2.92
CF	10.45	9.07	24.38	10.45	11.90	12.63
TA	6.34	10.15	11.08	6.34	7.38	8.45
NFE	61.38	52.46	39.40	61.38	57.96	55.56

Table 2: Average daily DM intake by kids during experimental period (kg)

Forth night	Treatments			S.E.±	C.D. at (P=0.05)
	T_1	T_2	T_3		
1	0.274 [b]	0.265 [a]	0.283 [c]	0.001	0.004
2	0.331 [b]	0.370 [c]	0.321 [a]	0.001	0.005
3	0.359 [b]	0.375 [c]	0.352 [a]	0.002	0.006
4	0.360 [b]	0.375 [c]	0.352 [a]	0.002	0.006
5	0.361 [b]	0.375 [c]	0.354 [a]	0.002	0.006
6	0.361 [b]	0.375 [c]	0.354 [a]	0.002	0.006
Mean	0.34 [b]	0.35 [c]	0.33 [a]	0.001	0.005

Table 3: Average digestibility coefficients of proximate nutrients of treatment feeds

Treatments	Apparent digestible coefficients				
	Dry matter	Crude protein	Ether extract	Crude fibre	Nitrogen free extract
T_1	82.46[c]	80.44[c]	80.56[c]	73.29[b]	76.35[b]
T_2	81.40[b]	78.21[b]	79.5[b]	73.32[b]	77.15[c]
T_3	79.59[a]	76.50[a]	78.42[a]	70.28[a]	74.28[a]
S.E. ±	0.093	0.082	0.113	0.098	0.09
C.D. (P=0.05)	0.294	0.259	0.356	0.309	0.283

Table 4: Gain in body weight of kids during experimental trial

Treatments	Initial body weight (kg)	Final body weight (kg)	Total gain in body weight (kg)	Daily gain in weight (kg)
T_1	7.90	14.56[b]	6.65[b]	0.068[b]
T_2	6.60	13.30[b]	6.70[b]	0.074[b]
T_3	6.60	9.81[a]	3.21[a]	0.035[a]
Mean	7.03	12.56	5.52	0.059
S.E. ±	0.835	0.625	0.579	0.006
C.D. (P=0.05)	N.S.	1.968	1.824	0.019

NS= Non-significant

Table 5: Cost of feeding of kids in experimental trial

Sr. No.	Item of expenditure	Treatments		
		T_1	T_2	T_3
1.	Roughage (Rs. 0.50 kg)	375	375	375
2..	Concentrate feed (concentrate mixture Rs. 7/kg) (dry Azolla Rs. 5/kg)	700	664	637
3.	Labour charges (Rs. 1/animal/day)	540	540	540
4.	Total Cost (Rs.)	1615	1579	1552
5.	Total weight gain (kg)	39.88	40.20	19.00
6.	Cost per kg gain in weight (Rs.)	40.49	39.27	81.68

Azolla in goats to be 56.60 and 41.53 per cent, which was less than obtained in present investigation

It is seen from data presented in Table 4 that there was significant effect on the average gains in body of the kids. The highest total gain in body weight was noticed in T_2 (6.70 kg) followed by T_1 (6.65 kg) and comparatively less in T_3 (3.21 kg). The differences were statistically significant. It showed that the inclusion of Azolla did not exert any adverse effect on growth upto 15 per cent replacement of concentrate. The results of present investigation agree with Dolberg *et al.* (1981) who have reported 140 to 330 g daily gain in body weight per day in heifers and 43.6 g daily gains in body weight of kids Dhage *et al.* (2007).

It was observer from Table 5, that the total expenditure incurrent in T_1, T_2 and T_3 were Rs. 1615.00, 1579.00 and 1552.00, respectively. The total cost per live weight gain for T_1, T_2 and T_3 were found to be Rs. 40.49, 39.27 and 81.68, respectively. It was seen from results that the total cost per kg gain for T_2 was comparatively less than T_1 indicating that Azolla meal feeding was beneficial to kids. The per kg gain cost in T_3 was found to

be significantly more than T_1 and T_2 which indicated that Azolla meal feeding was beneficial to kids up to certain limit *i.e.* 15 per cent of concentrate mixture beyond which it has detrimental effect on feed intake and utilization of kids which was indicated through growth rate of kids.

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