EFFECT OF DIETARY INCORPORATION OF KSHEERABALA RESIDUE ON NUTRIENT DIGESTIBILITY AND BLOOD BIOCHEMICAL PROFILE IN MALABARI KIDS*

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Abstract

An experiment was conducted with eighteen weaned Malabari kids of three months of age for 90 days to assess the effect of dietary incorporation of Ksheerabala residue on nutrient digestibility and blood biochemical profile in goats. Kids were divided into three groups (T_1, T_2 and T_3) as uniformly as possible with regard to age, sex and body weight and were offered kid starter containing Ksheearabala residue at 0, 10 and 20 per cent, respectively. Kid starters were made isonitrogenous and isocaloric (24 per cent CP and 70 per cent TDN). Kids were fed as per ICAR standards (Ranjhan, 1998). Green grass was offered as the sole source of roughage. Data on digestibility of nutrients and haematologcal parameters like haemoglobin, plasma protein, serum calcium, serum phosphorus, serum cholesterol and triglycerides were the criteria employed for evaluation and they did not show any significant difference (P >0.05) among the groups. It could be inferred that digestibility of nutrients and haematological parameters of kids were not influenced by the inclusion of Ksheerabala residue in kid starter.

Key words: Blood parameters, Digestibility, kid starter and Ksheerabala residue

Kerala has various ayurvedic pharmaceuticals and byproducts composed of residues of medicinal herbs. Ksheerabala residue is a byproduct obtained during the preparation of ksheerabala oil which is made by incorporating Sida cordifolia, cow milk and gingelly oil. This residue is available in considerable quantity locally, around 800-1000 kg per week (Kottakkal Aryavydiasala , kottakkal, Kerala) and many of the farmers are using for feeding goats. The feeding value of these residues as potential non conventional feed resource (NCFR) are yet to be explored. The main problem with residues from ayurvedic products are their impalatability and probable

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cumulative toxic effects. The microflora of goats' rumen can utilize the fibrous residues in the byproducts of ayurvedic preparations and can possibly detoxify the intrinsic factors present in these residues to some extend (Abreu et al.2004) Hence the present study is planned to evaluate the effect of dietary incorporation of Ksheerabala residue as a NCFR in the diet of kids on nutrient digestibility and blood biochemical profile.

Materials and Methods

Eighteen healthy kids of three months of age around 8.25 kg body weight , selected from University Goat and Sheep Farm, College of Veterinary and Animal Sciences, Mannuthy, formed the experimental subjects for the study. Kids were weaned and housed individually in well ventilated, clean and dry shed with facilities for feeding and watering. They were divided into three groups of six animals each as uniformly as possible with regard to age, sex and body weight and were allotted randomly to one of the three groups, T_1 (kid starter) , T_2 (kid starter containing 10 per cent ksheerabala residue) and T_3 (kid starter containing 20 per cent ksheerabala residue). All the rations were made isonitrogenous and isocaloric (24 per cent CP and 70 per cent TDN). Good quality green grass and clean drinking water were offered from first week of age. Ksheerabala residue available after extraction of oil from the pharmaceutical firm (Kottakkal Aryavydiasala, Kerala) was procured freshly as a firm solid block of around 35-40 kg weight. Proximate composition of Ksheerabala residue is presented in Table 1.The ingredient and chemical composition of experimental rations are presented in Table 2.

The experimental animals were maintained on the respective treatments for a period of 90 days. Daily records of concentrate and grass given and balance if any were maintained throughout the feeding trial. Data on daily dry matter intake was maintained throughout the experimental period. A digestibility trial involving five days collection period was conducted at 12th week of the study period to assess the digestibility coefficient of nutrients. Representative samples of kid starter and green grass offered were taken daily during the digestion trial for chemical analysis. The balance of feed and grass samples were collected from individual animals and their moisture content was determined daily. At the end of the collection period feed samples collected daily were pooled and subjected to chemical analysis. The dung was collected manually as and when it was voided. All precautions were taken to collect the dung quantitatively, uncontaminated with urine, feed residue or dirt. The dung collected each day was weighed accurately and were kept in double lined air tight plastic bags and stored fresh in deep freezer during the entire collection period. At the end of collection period daily samples stored from each animal were pooled and used for chemical analysis. Kid starter, fodder and dung samples were analyzed for proximate principles (AOAC, 2012). The acid detergent fiber (ADF) was estimated by the method suggested by Van Soest (1963) and neutral detergent fiber (NDF) by the method suggested by Van Soest and Whine (1967).

Blood samples were collected from all animals at the end of the experiment. These samples were used to determine haemoglobin, plasma total protein (Jong and Vegeter, 1950), calcium, phosphorus (Bernhart and Wreath, 1955), plasma cholesterol(Lie *et al.,* 1976) and triglycerides (McGowan *et al.,*1983) Blood haemoglobin was estimated by cyanomethaemoglobin method using reagents from Agappe diagnostics Ltd, Ernakulam, India. Plasma protein, calcium, phosphorus, serum cholesterol and serum triglycerides were determined using the blood analyzer (Mispa plus, SEAC radim group) and kits supplied by same suppliers. Data gathered on various parameters were analyzed statistically using Analysis of Variance (Snedecor and Cochran, 1994).

Results and Discussion

From the data collected on daily dry matter intake, the weekly average daily dry matter intake of the kids were 0.24, 0.24 and 0.22 kg , respectively in T_1, T_2 and T_3 initially and the corresponding values at the end of feeding trial were 0.56, 0.48 and 0.52 kg, which were similar.

Table 1. Proximate composition of Ksheerabala residue (%on dry matter basis)

Dry matter	92.55
Crude protein	29.52
Ether extract	13.26
Crude fibre	6.39
Total ash	8.42
Nitrogen Free Extract	42.41
Acid insoluble ash	0.06

Nutrient digestibility

Digestibility of dry matter, crude protein crude fibre, ether extract, nitrogen free extract, NDF and ADF observed in the present study were 77.34, 76.43 and 75.28, 81.97, 81.36 and 79.66, 64.47, 64.29 and 61.61, 81.33, 82.78 and 84.65, 84.04, 82.58 and 81.65, 59.77, 58.20 and 57.86, 55.58, 55.23 and 52.78 per cent in T_1, T_2 and T_3 kids, respectively and statistical analysis did not reveal any significant difference between the groups (Table 3). In agreement with the present result, Rani *et al.* (2006) reported that digestibility of DM, CP, NDF and ADF were similar in buffalo calves supplemented with two herbs namely bringraj (*Eclipta alba*) and kutki (*Kutaki picorrhiza*) at the rate of 0.4 per cent of dry matter intake. Verma *et al.* (1995) who also found that inclusion of water washed neem seed kernel cake at 0, 15 and 25 per cent levels in goat ration had similar effect on digestibility of DM, CP, EE and NFE.

Obeidat and Gharaybeh (2011) observed that the digestibility coefficient of DM and CP were similar in kids fed with diet containing 0, 10 and 20 per cent of sesame hull whereas the EE digestibility was significantly higher in treatment groups compared to control. Tufarelli *et al.* (2012) also reported that digestibility of CP and EE were similar in lambs fed with partly destoned exhausted olive cake

Table 2. Ingrediet and chemical composition of kid starters

Ingredients	Percentage composition of calf starter		
	T_1	T_2	T_3
Maize	35	29	23
Wheat bran	25	26	28
Soya bean meal	28	23	17
Dried fish	9	9	9
Ksheerabala residue	0	10	20
Salt	1	1	1
Calcite	2	2	2
Total	100.00	100.00	100.00
Vitamin Supplement g/100 kg feed	25	25	25
Trace mineral mix g/100 kg feed	25	25	25
Toxin binder g/100 kg feed	100	100	100
Salinomycin sodium g/100 kg feed	50	50	50
Chemical composition*			
Dry matter	92.19	91.73	91.93
Crude protein	23.74	23.99	24.51
Ether extract	4.95	5.38	6.04
Crude fibre	5.43	5.71	6.08
Total ash	9.72	10.07	10.41
Nitrogen free extract	55.65	54.84	52.87
Acid insoluble ash	1.11	1.23	1.28
Neutral detergent fibre	22.34	22.83	25.84
Acid detergent fibre	6.61	7.81	9.48
Calcium	1.03	1.12	1.18
Phosphorus	0.65	0.70	0.86

*On dry matter basis

Table 3. Digestibility coefficient of nutrients in experimental ration*

Item	Dietary treatments		
	T_1	T_2	T_3
DM	77.34 ± 0.21	76.43 ± 1.11	75.28 ± 1.26
CP	81.97 ± 0.85	81.36 ± 1.57	79.66 ± 1.03
CF	64.47 ± 0.84	64.29 ± 2.55	61.61 ± 1.56
EE	81.33 ± 0.97	82.78 ± 1.23	84.65 ± 0.94
NFE	84.04 ± 0.26	82.58 ± 1.19	81.65 ± 1.83
NDF	59.77±0.61	58.20±3.01	57.86±1.57
ADF	55.58±1.05	55.23±2.67	52.78±1.64

*on dry matter basis

Table 4. Haematological parameters of experimental kids

Parameters	T_1	T_2	T_3
Haemoglobin, g/dl	11.88 ± 0.31	12.00 ± 0.46	11.94 ± 0.57
plasma protein, g/dl	6.38 ± 0.19	6.33 ± 0.2	6.28 ± 0.25
Calcium, mg/dl	10.30 ± 0.11	10.31 ± 0.15	10.24 ± 0.32
Phosphorus, mg/dl	6.02 ± 0.12	6.02 ± 0.13	5.96 ± 0.29
Cholesterol, mg/dl	110.83 ± 2.96	104.03 ± 2.93	108.62 ± 6.23
Triglyceride, mg/dl	40.69 ± 0.41	39.36 ± 0.9	40.53 ± 1.3

at 0, 10 and 15 per cent levels in ration whereas the digestibility of DM was significantly lower in both diets containing olive cake compared to control.

Haematological parameters

Data on haematological studies were documented in Table 4. The average blood haemoglobin and plasma protein concentration at the end of the experiment for group T_1, T_2 and T_3 were 11.88, 12.00 and 11.94, 6.38, 6.33 and 6.28g/ dl, respectively. The average serum calcium values in experimental animals were 10.30, 10.31 and10.24 mg/dl for group T1, T_2 and T_3, respectively. The average serum phosphorus concentrations in the experimental kids were 6.02, 6.02 and 5.96 mg/dl for group T_1, T_2 and T_3, respectively. The average serum cholesterol and triglyceride values recorded at the end of the experiment were 110.83, 104.03 and 108.62, 40.69, 39.36 and 40.53 mg/ dl, respectively for group T_1, T_2 and T_3. There was no significant difference (P >0.05) in any of the haematological parameters between the three groups.

Verma *et al*. (1995) studied the effect of dietary inclusion of water washed neem seed kernel cake in growing goat ration at 0, 15 and 25 per cent levels and found that haemoglobin and cholesterol concentration were similar in treatment and control groups which is in accordance with the present result but total protein concentration was significantly lower in goats fed with neem seed kernel cake. An *et al.* (2001) found that the total cholesterol level was significantly reduced (113.92 mg/ dl) in broilers fed with ration containing 10 per cent red pepper seed oil meal compared to control diet (137.5 mg/ dl). Jasmine *et al*. (2018) reported similar values for haemoglobin, total protein, serum calcium and phosphorus in growing kids fed with ration containing spent rosemary (*Rosmarinus officianalis*.*L*) leaves

Conclusion

Critical evaluation of the results obtained in the present study revealed that inclusion of Ksheerabala residue in kid starter had similar effect on nutrient digestibility and haematological parameters. On summarizing the overall results of the study, it could be inferred that Ksheerabala residue can be included in the goat ration up to 20 per cent level without any adverse effect on nutrient digestibility and blood biochemical profile.

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