

EFFECT OF ORAL SUPPLEMENTATION OF BHUMI AMLA (*PHYLLANTHUS NIRURI* L.) ON RUMEN PARAMETERS IN BEETAL GOATS

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ABSTRACT

The present study was conducted to study the effect of Bhumi Amla (*Phyllanthus niruri* L.) on the various rumen liquor parameters in the Beetal goat kids. Eighteen Beetal kids of either sex after weaning were selected and randomly distributed in three treatments groups (6 kids in each group) viz. T_c (control; supplemented with 5 ml of normal saline), T₁ (supplemented with 2.5 ml fresh juice of herb + 2.5 ml normal saline) and T₂ (supplemented with 5.0 ml fresh juice of herb). Different physical parameters (pH, color, odor and consistency) and fermentative parameters (total volatile fatty acids, ammonia-nitrogen, total nitrogen, total bacterial count and total protozoal count) of rumen liquor were observed at 90, 105 and 120 days of age of kids. The data were analyzed using one-way ANOVA. The results revealed that no significant difference was found in physical parameters of rumen liquor though pH value was significantly higher (P<0.01) in control group as compared to *P. niruri* L. supplemented groups (T₁ and T₂). Fermentative rumen liquor attributes such as total nitrogen, TVFA, total bacteria and total protozoa were found significantly higher in groups supplemented with *P. niruri* L. (P<0.01). However, NH₃-N was significantly (P<0.05) higher in control group. Therefore, the herb can be used as growth promoter in Beetal kids as it accelerates the ruminal activity by enhancing ruminal micro-flora and fermentative activity.

Keywords: Beetal, *Phyllanthus niruri* L., Rumen liquor

Herbal supplements are effective in promoting growth and health (Lillehoj *et al.*, 2007) by stimulating the secretion of various digestive enzymes and by helping in proliferation of favorable micro-flora in the gut, which in turn may improve the feed intake and nutrients utilization in ruminants. One of such herb is *Phyllanthus niruri* L., which is widely distributed tropical plant, belonging to the family Phyllanthaceae (Euphorbiaceae). It contains various bioactive compounds such as saponins, phenolics, peptides, polysaccharides, alkaloid, lignans and poly-acetylenes. In Ayurveda, Maharshi Charak has considered effectiveness of this herb in the treatment of asthma, increasing appetite, improving digestion, stimulating liver, and producing laxative effects. In Punjab, this herb is available in ample amount as a weed in the rainy season. Only few reports are available on the use of *Phyllanthus niruri* L. in ethno-veterinary practices by the tribal people of various states of India for the increase body weight as growth promoter (Salave *et al.*, 2011; Sunder *et al.*, 2014) in ruminants. No scientific research has been found/available on the effect of use of this herb as supplement or as feed additive on growth, production and the health of ruminants. Hence, the study was carried out to find the effect of oral supplementation of *P. niruri* L. on rumen activity in Beetal goat kids.

MATERIALS AND METHODS

The experiment was conducted on weaned Beetal kids from 90 to 120 days of age. At the start of experiment,

the body wt. of the kids was approximately similar and non-significantly variable among the various groups (12.96±1.57 kg for T_c, 12.78±0.69 kg for T₁ and 10.92±1.61 kg for T₂ group). Total eighteen kids of either sex were divided into three treatment groups with 6 animals in each group viz. T_c (control group; orally supplemented with 5 ml of normal saline), T₁ (orally supplemented with whole plant fresh juice of *Phyllanthus niruri* L. @ 2.5 ml + 2.5 ml of normal saline) and T₂ (5.0 ml fresh juice of whole plant of *Phyllanthus niruri* L.), respectively. Supplementation of herb was started 15 days prior to weaning of all the experimental kids at 8:30 am to 9:00 am to standardize the protocol. Concentrate feed was offered to kids for ad-lib. feeding at 9:00 am to 10:00 am and green fodder was offered to kids for ad-lib. feeding at 10:00 am to 12:00 pm. Rumen liquor samples were collected with the help of Rumen Fluid Extraction Pump from the kids of different treatment groups 3 hours after the feeding of green fodder (as reported by Singh (2017) the sampling 3 hours postprandial had the highest number of the micro flora in the rumen). After that rumen liquor was filtered through four layers of muslin cloth and designated as strained rumen liquor (SRL). The rumen liquor was collected at 90, 105 and 120 days of age of kids. The physical parameters recorded were pH, color, odor and consistency of rumen liquor as described by Garry (2002) immediately at time of sample collection. The ruminal metabolites (total volatile fatty acids (TVFAs), ammonia-nitrogen (NH₃-N), total nitrogen) liquor samples were preserved by adding few drops of saturated mercuric chloride solution and for

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Table 1
Effect of oral supplementation of *Phyllanthus niruri* L. on physical characteristics of rumen liquor of kids of different treatment groups

Particulars	Days	T _c	T ₁	T ₂
Colour	90	Brownish	Brownish	Brownish
	105	Greenish brown to greenish	Greenish brown to greenish	Greenish brown to greenish
	120	Brownish green to green	Brownish green to green	Brownish green to green
Consistency	90	Viscous	Viscous	Viscous
	105	Slightly viscous	Slightly viscous	Slightly viscous
	120	Slightly viscous	Slightly viscous	Slightly viscous
Odour	90	Slightly aromatic	Slightly aromatic	Slightly aromatic
	105	Aromatic to slightly ammoniacal	Aromatic to slightly ammoniacal	Aromatic to slightly ammoniacal
	120	Slightly aromatic to ammoniacal	Slightly aromatic to ammoniacal	Slightly aromatic to ammoniacal
pH*	90	6.62±0.20 ^a	6.62±0.09 ^a	6.27±0.09 ^b
	105	6.90±0.10 ^a	6.50±0.14 ^b	6.47±0.08 ^b
	120	7.12±0.04 ^a	6.87±0.04 ^b	6.72±0.04 ^b
	Overall mean	6.90±0.05 ^a	6.62±0.08 ^b	6.50±0.06 ^b

*Means with different superscripts in a row differ significantly (P<0.01)

microbial count, rumen liquor samples were preserved in equal volume of 10% formalin solution. The samples were stored at -20 °C until analyzed for different parameters. Themicro-flora evaluation included total bacterial count by using the method of Gall *et al.* (1949) and total protozoal count as per the method described by Naga and El-Shazly (1969). The data was statistically analyzed by using one-way ANOVA as described by Snedecor and Cochran (1994), with the help of IBM's Statistical Package for

Social Sciences (SPSS-22). The significant differences between the means of different treatment were compared by Tukey's test.

RESULTS AND DISCUSSIONS

The physical attributes viz. color, consistency, odor and pH of the rumen liquor of goat kids have been presented in Table 1. There was no significant change among the physical parameters, except for pH which was

Table 2
Effect of oral supplementation of *Phyllanthus niruri* L. on fermentative characteristics of rumen liquor of kids of different treatment groups

Particulars	Days	T _c	T ₁	T ₂	P value
Total Nitrogen (mg/dl)	90	318.50±9.26 ^c	480.20±12.44 ^b	723.10±7.78 ^a	<0.01
	105	323.05±8.00 ^c	493.15±10.98 ^b	748.30±12.18 ^a	<0.01
	120	336.70±6.98 ^c	507.15±11.57 ^b	766.15±12.84 ^a	<0.01
	Overall mean	326.08±7.94 ^c	493.50±11.38 ^b	745.85±10.89 ^a	<0.01
Total Volatile Fatty Acids (mmol/l)	90	20.25±0.47 ^b	23.00±1.22 ^b	36.75±1.18 ^a	<0.01
	105	23.25±0.47 ^c	29.50±1.55 ^b	43.50±1.32 ^a	<0.01
	120	30.50±0.64 ^c	37.50±1.04 ^b	50.00±1.78 ^a	<0.01
	Overall mean	24.66±0.36 ^c	30.00±1.03 ^b	43.41±0.83 ^a	<0.01
Ammonia-Nitrogen (mg/100ml)	90	55.00±2.38 ^a	46.00±2.44 ^b	39.00±1.29 ^b	<0.01
	105	68.00±6.05 ^a	54.50±2.75 ^{ab}	49.00±0.57 ^b	<0.01
	120	82.00±10.55	61.00±1.29	63.50±2.36	0.08
	Overall mean	68.33±6.28 ^a	53.83±2.04 ^{ab}	50.50±1.16 ^b	<0.05
Total bacterial count (×10 ⁹)	90	12.77±0.21 ^c	13.92±0.20 ^b	15.42±0.28 ^a	<0.01
	105	13.07±0.17 ^c	14.27±0.17 ^b	15.65±0.25 ^a	<0.01
	120	13.65±0.19 ^c	14.82±0.13 ^b	16.02±0.25 ^a	<0.01
	Overall mean	13.16±0.18 ^c	14.34±0.17 ^b	15.70±0.25 ^a	<0.01
Total protozoal count (×10 ⁵)	90	3.05±0.26 ^c	3.90±0.12 ^b	5.12±0.14 ^a	<0.01
	105	3.37±0.24 ^c	4.12±0.14 ^b	5.27±0.12 ^a	<0.01
	120	3.92±0.12 ^c	4.52±0.14 ^b	5.57±0.10 ^a	<0.01
	Overall mean	3.45±0.21 ^c	4.18±0.14 ^b	5.32±0.12 ^a	<0.01

Means with different superscripts in a row differ significantly.

significantly higher in T_c as compared to the groups supplemented with *P. niruri* L. Same results were obtained by Osakwe *et al.* (2000). The decrease in the rumen liquor pH of *P. niruri* L. supplemented groups of kids might be due to improved fermentation and increased utilization of ammonia for microbial protein synthesis.

The fermentative attributes viz. total nitrogen, TVFAs, NH₃-N, total bacterial and total protozoal count of the rumen liquor of kids have been presented in Table 2. The values of total nitrogen (mg/dl) were found significantly (P<0.01) different. The overall mean value of total N₂ of T₂ group was highest, followed by T₁ and T_c group. The total N₂ in strained rumen liquor (SRL) is mainly the expression of solubility of ingested protein in rumen and may also differ in relation of protein intake. The overall mean TVFA production was also found significantly (P<0.01) higher in T₂ group followed by T₁ and T_c group. The higher TVFA in *P. niruri* L. supplemented groups may be attributed to increase in fermentation rate. The finding was in agreement with the findings of Osakwe *et al.* (2000). The overall mean values of NH₃-N in control, T₁ and T₂ groups were 68.33±6.28 mg/dl, 53.83±2.04 mg/dl and 50.50±1.16 mg/dl, respectively. Significant (P<0.05) variation were found between control and T₂ groups. The lower value of NH₃-N in T₂ group was indication of faster and higher utilization of feed and fodder's nitrogen for microbial protein synthesis in rumen. In an experiment, Osakwe *et al.* (2000) also reported similar results. The overall mean value of total bacterial and total protozoal count was significantly higher in T₂ followed by T₁ and control group. The higher count of ruminal micro flora in T₂ group followed by T₁ and T_c group was an indication of accelerated fermentative activity of the rumen due to supplementation of the herb. Therefore, from the study it can be concluded that *Phyllanthus niruri* L. can be used in Beetal kids as growth

promoter as it accelerates the ruminal activity by lowering pH, enhancing ruminal micro-flora (bacteria and protozoa) and fermentative activity.

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