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Effect of dietary incorporation of ayurvedic Panchagavya gritham residue on blood parameters in Malabari goats

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Abstract

An experiment was conducted to study the effect of dietary incorporation of ayurvedic pharmaceuticals Panchagavya gritham residue based diet on various haematological parameters in Malabari kids for a period of 90 days. Fifteen healthy male kids were selected and divided into three groups of five each. The dietary treatments were T1 control diet (kid starter alone), T2 and T3 kid starter with 10 and 20 per cent of ayurvedic pharmaceuticals Panchagavya gritham residue, respectively. Haemato-biochemical parameters of the kids were analysed at the beginning (1st day) and end (90th day) of the trial. On 1st day all the blood parameters were similar between the treatments. On 90th day Panchagavya gritham had no effect on haematological parameters, viz., Haemoglobin, RBC, WBC, MCH and MCV and Biochemical parameters, viz., total protein, AST, ALT, total cholesterol and total triglycerides are similar among the treatment and unsupplemented control group.

Keywords: Ayurvedic pharmaceutical Panchagavya gritham residue, Malabari kids, haematological parameter and Biochemical parameter

1. Introduction

India is principally an agricultural country, where livestock and agriculture are closely associated with each other. In spite of 2 per cent of geographical area, India has the pride of place on the livestock map of the world due to enormity of livestock wealth with amazing genetic diversity. It is well known that goat is superior to other ruminants in efficiency of nutrient utilization. Increased feed cost and shortage of feed and fodder is the major constraint hindering the animal production system in India. Hence, there is a need for incorporation of cheaper and locally available agro-industrial by-products and crop residues which usually go as a waste as energy sources in feed to reduce the feed cost. Ruminants can effectively utilise this fibre as energy source without competing for human feed resources. Even then the potential of by-products from ayurvedic pharmaceuticals has not been explored widely.

Goat farming is one of the important sustainable livestock livelihood ventures among the farming communities in Kerala. The total population of goats in Kerala is 1.20 million (GOI, 2019) [8] and Malabari is the most popular goat breed of Kerala. Malabari goats are renowned for their high prolificacy, excellent growth rate, adaptability to hot humid areas and are principally reared in Kerala for meat. Kerala, a state renowned for its ayurvedic tradition has various ayurvedic pharmaceuticals (Kajagar, 2019) [10]. By-products from these pharmaceuticals mainly include waste products of medicinal herbs which are rich in fibre (Roshma, 2014) [14]. Panchagavya gritham residue is a byproduct obtained during the preparation of Brahmi gritham oil which is made from five different cow residues such as cow milk, urine, dung, butter and ghee. This residue is available in plenty and due to lack of knowledge regarding nutritional qualities the usage is limited. The feeding value of these residues as potential non-conventional feed resource (NCFR) is not much explored. Hence the present study is planned to evaluate the effect of dietary incorporation of ayurvedic pharmaceutical Panchagavya residue as a NCFR in the diet of Malabari kids to assess the effect of it on haematological parameter in kids.

Materials and Methods

Fifteen healthy Malabari kids of three months age were selected from Goat Farm, ILFC, Pookode. They were divided into three groups of five animals in each, on the basis of their

body weight, age and sex, following completely randomised design. These animals were maintained for two weeks on a standard diet which consisted of kid starter and green grass, before the start of the actual experiment. The kids were housed in a well ventilated sheds having facilities for individual feeding and watering. All the kids were dewormed before the start of experiment and subsequently at regular intervals. Clean drinking water was provided *ad libitum*.

The kids in the three experimental groups were fed with a kid starter containing 24 per cent crude protein and 70 per cent TDN for the entire feeding period of 90 days.

The three experimental kid starter were formulated as per BIS (2012)

T1- kid starter alone (control)

T2- kid starter containing 10 per cent of panchagavya gritham residue selected from *in vitro* study

T3- kid starter containing 20 per cent of panchagavya gritham residue selected from *in vitro* study.

The experimental rations were prepared at Feed Mixing Plant, ILFC, Pookode. The ingredient composition of experimental kid starters of T1, T2 and T3 are presented in Table 2. Kids were maintained under uniform management conditions and were fed on isonitrogenous and isocaloric rations (ICAR, 2013) [9]. They were maintained on their respective feeding regimen for a period of three months. Data on daily feed and fodder intake and fortnightly body weight will be recorded during the course of the experiment. Blood samples were collected at the beginning and end of the experiment to estimate haemoglobin (cyanomethemoglobin method), plasma protein (direct Biuret method), triglycerides (peroxidase coupled method), total cholesterol (CHOD-PAP method), aspartate aminotransferase (AST) and alanine transaminase (ALT) using standard kits supplied by Agappe Diagnostics, Maharashtra, India. All the haematological parameters listed above were determined using the Auto analyser (Merck, Microlab 300).

Statistical Analysis

All the data were analysed statistically and presented in the table as mean with standard deviation with $P < 0.05$.

Results and Discussion

Haematological parameter

Haematological parameter of the kids were analysed beginning (1st day) of the experiment, results are presented in Table 2 and graphically represented in Figure 1. No significant difference was observed between the treatment groups. The values are observed at the end (90th day) the experiment, results are presented in the Table 3 and graphically represented in Figure 2. No significant difference was observed between the treatment groups.

Haemoglobin

Mean haemoglobin values are similar in within the groups values are 8.88, 10.40 and 9.36 g per 100 ml in T1, T2 and T3, respectively. No significant difference in the values obtained at the end of the experiment compared to initial values, similar results were observed by Chaturvedi *et al.* (2013) [6] in goats, Roshma (2014) [14] and Kajagar (2019) [10] who observed in Malabari kids.

Red blood cells (RBC)

The initial and final values of mean Red blood cells (RBC)

were found similar among the treatment and control groups of the experiment. At the beginning of the experiment the values are ranged from 17.82 to 18.64 million per μl and at the end of the experiment the values are ranged from 15.91 to 17.01 million per μl . On statistical analysis of the values showed no significance difference among the experimental groups as well as between initial and final values in experimental kids fed of 0, 10 and 20 per cent level. Panchagavya gritham residues in their diets, this residue not affect the RBC counts in experimental kids. The values of the present study are similar to Kajagar (2019) [10] and values are higher than results of Ocheja *et al.* (2014) [11] who observed that values are ranged from 11.95 to 10.37 million per μl in West African dwarf goats.

White blood cells (RBC)

The initial and final values of mean White blood cells (RBC) were similar in among the treatment and control groups of the experiment. At the beginning of the experiment the values are ranged from 13.84 to 21.02 thousands per μl and at the end of the experiment the values are ranged from 12.90 to 15.16 thousands per μl . On statistical analysis of the values were similar among the experimental groups as well as between initial and final values in experimental kids fed of 0, 10 and 20 per cent level Panchagavya gritham residues in their diets, this residue not affect the WBC counts in experimental kids. Experiment results are comparable with Kajagar (2019) [10] who observed that WBC counts in Malabari kids are ranging from 14.20 to 20.36 thousands per μl . The results are higher than Ocheja *et al.* (2014) [11] who observed that values are ranged from 6.98 to 10.74 million per μl in West African dwarf goats.

Mean corpuscular volume (MCV)

The initial values of mean mean corpuscular volume (MCV) were similar among the treatment and control groups of the experiment. At the beginning of the experiment the values are ranged from 15.54 to 16.54 fl and at the end of the experiment the values are ranged from 15.32 to 16.36 fl, with values being similar ($P > 0.05$) and all the values were in the normal range for kids. The values of the present study are lower than that of Sunder *et al.* (2011) [16] who reported MCV values of 42.30 and 40.70 fl, respectively in Teresa male and female goats. The values of the present experiment are similar to Kajagar (2019) [10] who who reported MCV values ranging from 16.40 to 17.46 fl in Malabari kids.

Mean corpuscular haemoglobin (MCH)

The mean corpuscular haemoglobin (MCH) were similar within the treatment and control groups of the experiment. At the beginning of the experiment the values are ranged from 5.38 to 5.76 pg and at the end of the experiment the values are ranged from 5.20 to 5.24 pg, in the groups, T1, T2 and T3, respectively, with values being similar ($P > 0.05$) and all the values were in the normal range for kids. The values of the present study are in agreement with Kajagar (2019) [10].

Serum biochemical parameter

The serum biochemical parameter of the treatment kids were analysed beginning (1st day) of the experiment, results are presented in Table 3. The values are observed at the end of the experiment (90th day) results are presented in the Table 3. On statistical analysis no significance difference ($P > 0.05$) in between the treatment groups.

Total protein

The average serum total protein levels of kids at the beginning (1st day) were 5.61, 5.47, 5.54 g per dl and end of the experiment (90th day) the values were 5.91, 5.70, 5.77 g per dl, in the groups, T1, T2 and T3, respectively. Statistical analysis of the data revealed that there was no significant difference ($P>0.05$) between the groups and the values were within the normal range of kids. Present results are similar with Pirmohammadi *et al.* (2014) ^[12] who reported total protein values in the range of 6.42 to 6.30 g per dl in pre-partum Mahabadi goats and Roshma (2014) ^[14] who reported total protein values in the range of 6.28 to 6.33 g per dl in Malabari kids. Present results are statistically in contrast with Babeker and Bdalbagi (2015) ^[4] who observed that the total protein values were significantly higher ($P<0.05$) in Sudan Nubian goats

AST

The average serum AST levels of kids at the beginning (1st day) were 88.47, 105.29, 130.35 IU/l and end of the experiment (90th day) the values were 93.23, 93.07, 100.89 IU/l in the groups, T1, T2 and T3, respectively. Statistical analysis of the data revealed that there was no significant difference ($P>0.05$) between the groups and the values were within the normal range of kids. Present results are similar with Kajagar (2019) ^[10] who reported that there is no significance difference among the groups in Malabari kids fed with Brahmi gritham residue at the rate of 0, 10 and 20 per cent in their diets and Al-Sherwany (2015) ^[1] who reported that the values of serum AST of Hamdani ewes fed on crushed fenugreek seed at the rate of 0.6 and 1.2 g per kg live body weight were similar to each other and also with unsupplemented control group.

ALT

The average serum ALT levels of kids at the beginning (1st day) were 13.99, 19.31, 19.80 IU/l and end of the experiment (90th day) the values were 15.73, 13.72, 18.50 IU/l in the groups, T1, T2 and T3, respectively. Statistical analysis of the data revealed that there was no significant difference ($P>0.05$) between the groups and the values were within the normal range of kids. The values of the present study are similar to Aruwayo *et al.* (2011) ^[3], Kajagar (2019) ^[10] and do not agree with Roshma (2014) ^[14] in goats. Present experiment values are similar with Aruwayo *et al.* (2011) ^[3]. This results are not agree with Roshma (2014) ^[14].

Total cholesterol

The average total cholesterol levels of kids in groups, T1, T2 and T3 at the beginning (1st day) of the experiment were 86.40, 86.00, 88.60 and end of the experiment (90th day) were 58.00, 67.20, 79.60 mg per dl, respectively. The above data revealed that the values were similar ($P>0.05$) between groups. Similar results were observed by Roshma (2014) ^[14], Kajagar (2019) ^[10] but contrast with Pirmohammadi *et al.* (2014) ^[12] and Babiker *et al.* (2017) ^[5].

Total triglycerides

The serum triglyceride levels of kids in groups T1, T2 and T3, at the beginning of the experiment (1st day) were 36.20, 32.40 and 36.60 mg per dl, respectively. The values at the end of the study (90th day) in kids of groups T1, T2 and T3 were 11.40, 12.40 and 19.40 mg per dl. Statistical analysis found that the values were similar ($P>0.05$), between treatments. Similar results are observed by Roshma (2014) ^[14], Kajagar (2019) ^[10] and present values are higher than the sunder *et al.* (2011) ^[16].

Table 1: Ingredient composition of kid starter* (%)

Ingredients	T1 (Control – without Panchagavya gritham residue) kg	T2 (Treatment – with Panchagavya gritham residue 10%) kg	T3 (Treatment – with Panchagavya gritham residue 20%) kg
Maize	37	10	0
Soyabean meal	38	26	15
Deoiled rice bran	22	51	62
Calcite	2	2	2
Salt	1	1	1
Gritham residue	0	10	20
Total	100	100	100

* To every 100 kg of kid starter, 10g of Vitamin AD₃E supplement (containing 10,00,000 IU of Vitamin A, 2,00,000 IU of Vitamin D₃ and 1,00,000 IU of Vitamin E), 50g of trace mineral mixture (KERAMIN FORTE) and 50g of toxin binder (CURATOX) were added.

Table 2: Haematological parameters¹ of experimental goats

Parameter	Treatment	1st day	90th day
Hb	1	9.88 ± 0.21	8.88 ± 0.98
	2	10.50 ± 0.49	10.40 ± 0.25
	3	10.74 ± 0.36	9.36 ± 0.50
	F value	1.43 ^{ns}	1.41 ^{ns}
	p value	0.27	0.28
RBC	1	17.82 ± 0.73	15.92 ± 2.26
	2	19.82 ± 0.51	19.30 ± 0.23
	3	18.64 ± 0.87	17.01 ± 0.68
	F value	1.97 ^{ns}	1.59 ^{ns}
	p value	0.18	0.24
WBC	1	13.84 ± 1.11	12.90 ± 1.63
	2	17.70 ± 2.45	17.16 ± 1.75
	3	21.02 ± 4.76	15.16 ± 2.15
	F value	1.29 ^{ns}	1.31 ^{ns}
	p value	0.30	0.30
MCH	1	5.38 ± 0.33	5.20 ± 0.07

	2	5.38 ± 0.19	5.26 ± 0.22
	3	5.78 ± 0.21	5.24 ± 0.47
	F value	0.77 ^{ns}	0.01 ^{ns}
	p value	0.48	0.99
MCV	1	15.54 ± 0.63	15.32 ± 0.40
	2	15.42 ± 0.45	15.32 ± 0.37
	3	16.54 ± 0.56	16.36 ± 0.75
	F value	1.25 ^{ns}	1.25 ^{ns}
	p value	0.32	0.31

1- Values are mean ± SE

ns- non- significance

Table 3: Serum bio-chemical parameter¹ of experimental goats

Parameter	Treatment	1st day	90th day
Total protein	1	5.61± 0.20	5.91± 0.28
	2	5.47±0.46	5.70± 0.38
	3	5.54±0.39	5.77± 0.36
	F value	0.03 ^{ns}	0.09 ^{ns}
	p value	0.96	0.91
SGPT	1	13.99±2.40	15.73±1.78
	2	19.31±2.42	13.72±1.70
	3	19.80±1.57	18.50±1.47
	F value	2.21 ^{ns}	2.09 ^{ns}
	p value	0.15	0.16
SGOT	1	88.47±7.41	93.23±15.23
	2	105.29±10.99	93.07±6.12
	3	130.35±25.34	100.89±12.39
	F value	1.62 ^{ns}	0.14 ^{ns}
	p value	0.23	0.86
Total cholesterol	1	86.40±3.75	58.00±2.24
	2	86.00±4.21	67.20±9.58
	3	88.60±3.14	79.60±7.21
	F value	0.14 ^{ns}	2.35 ^{ns}
	p value	0.87	0.13
Triglycerides	1	36.20±7.66	11.40±4.58
	2	32.40±5.81	12.40±2.11
	3	36.60±6.93	19.40±4.58
	F value	0.11 ^{ns}	1.95 ^{ns}
	p value	0.89	0.18

1- Values are mean ± SE

ns- non- significance

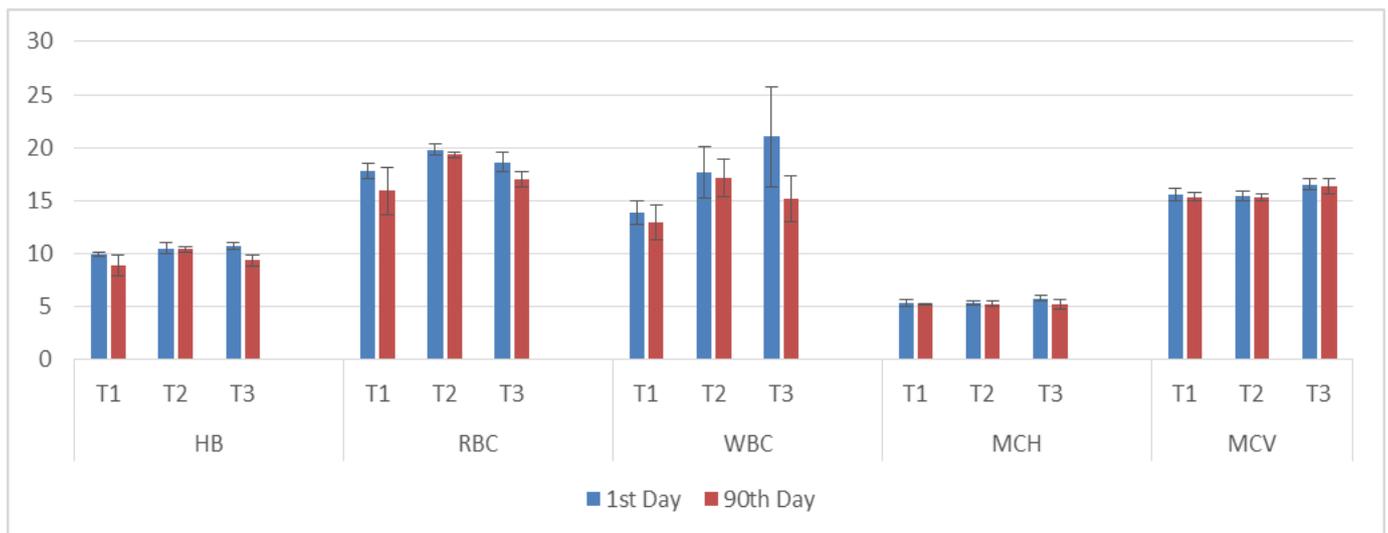


Fig. 1: Haematological parameters of experimental goats

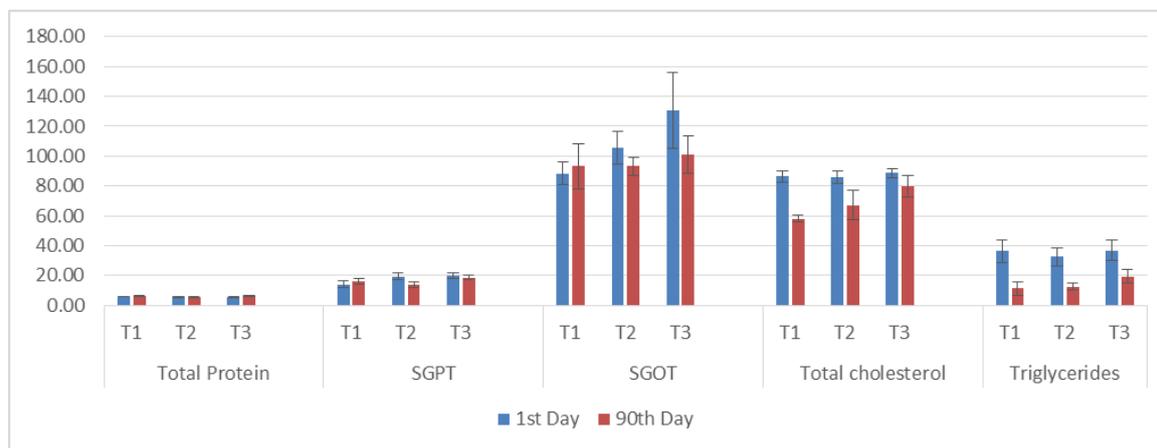


Fig. 2: Serum bio-chemical parameters of experimental goats

Conclusion

All the haematological and serum biochemical values are within the normal range for kids and no deviations in the treatment groups compared to control group. This suggests that the test diet is not harmful for feeding and hence it can be incorporated upto 20 per cent level in Malabari kid starter diet without affecting the haematological parameter.

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