Available online at www.ijpab.com

DOI: http://dx.doi.org/10.18782/2582-2845.8945

ISSN: 2582 – 2845

Ind. J. Pure App. Biosci. (2022) *10*(6), 45-52

Indian Journal of Pure & Applied Biosciences

Peer-Reviewed, Refereed, Open Access Journal

Research Article

Effect of Dietary Incorporation of Saraswatha Gritham Residue on Haemato-Biochemical Parameters of Malabari Kids

G. Seshidhar[1*], Biju Chacko[2], Senthil Murugan S[3], Deepa Ananth[4], Balusami C.[5], Sunanda C.[6], Ajay. P. Kuriakose[7], Ambili K.[7]

[1]MVSc Scholar Department of Animal Nutrition, CVAS, Pookode, Wayanad,

[2]Associate Professor and Head Department of Animal Nutrition, CVAS, Pookode, Wayanad,

[3]Assistant Professor Department of Animal Nutrition, CVAS, Pookode, Wayanad,

[4]Assistant Professor Department of Animal Nutrition, CVAS, Mannuthy, Thrissur,

[5]Professor Department of Livestock Production Management, CVAS, Mannuthy, Thrissur,

[6]Former Assistant Professor and Head Department of Statistics,

[7]MVSc Scholar Department of Animal Nutrition, CVAS, Pookode, Wayanad

*Corresponding Author E-mail: seshidravidian@gmail.com

Received: 17.09.2022 | Revised: 29.11.2022 | Accepted: 12.12.2022

ABSTRACT

A study was conducted to assess the effect of dietary incorporation of Saraswatha gritham residue on growth performance, nutrient utilisation and techno economics of production in Malabari kids. A feeding trial of 90 days duration was conducted in fifteen Malabari kids, divided into three groups of five each, as uniformly as possible with regard to body weight, sex, age, randomly allotted to three groups and fed on isonitrogenous and isocaloric rations, T1 (control), T2 and T3, without and with 10 and 20 per cent Saraswatha gritham residue, respectively. Haematobiochemical parameters of the experimental kids were analysed at the start and end of the feeding trial. On 1st day all the blood parameters were similar among treatment groups. On 90th day Saraswatha gritham residue had significant effect on the concentration of cholesterol which was significantly higher (P<0.05) in T3 than T1 and T2, with T1 and T2 being similar (P>0.05). All the remaining blood parameters, viz., RBC, WBC, Hb, MCH, MCV and serum biochemical parameters viz., total protein, AST, ALT and total triglycerides were similar between the treatments.

Keywords: *Ayurvedic pharmaceuticals, Saraswatha gritham residue, Malabari kids, Haematobiochemical parameters.*

Cite this article: Seshidhar, G., Chacko, B., Senthil Murugan, S., Ananth, D., Balusami, C., Sunanda, C., Kuriakose, A. P., & Ambili, K. (2022). Effect of Dietary Incorporation of Saraswatha Gritham Residue on Haemato-Biochemical Parameters of Malabari Kids, *Ind. J. Pure App. Biosci. 10*(6), 45-52. doi: http://dx.doi.org/10.18782/2582-2845.8945

INTRODUCTION

India's rural economy heavily depends on goat rearing, especially in the arid and semi-arid regions of the country. Goat farming has always been one of the most profitable livestock enterprises. The total goat population in India was 148.88 million in the year 2019, which constituted 27.80 per cent of the nation's total livestock population (GOI, 2019).

Goats are mostly raised for meat. In India, 95 percent of the goat meat, is consumed locally, demonstrating its enormous domestic demand (Devi et al., 2014). Chevon is highly nutritious and contains 0.60 to 2.60 percent fat and 20.60 to 22.30 per cent protein (Devendra, 1988). Goat meat lowers the risk of coronary heart disease because it includes a high amount of polyunsaturated fatty acids and a low amount of saturated fatty acids.

Ruminants like cattle, sheep, and goats were fed concentrate feeds like cereal grains, oil cakes, and brans as well as roughages like grass and/ or straw. However, the major challenges that limit the goat production sector in developing countries like India are the lack of feed supplies primarily due to escalating cost of conventional concentrate feed ingredients. This paved the nutritionist to focus more on the utilisation of non-conventional feed resources (NCFR), which are cheaper and locally available agro-industrial by-products.

The goat population in Kerala was 1.20 million in the year 2019, which accounted for 46.73 per cent of the total livestock population of the state (GOI, 2019). Malabari, the breed which is native to Kerala, possessing high fertility and growth rate, as well as the ability to thrive in hot, humid environments, is generally reared for meat. Chevon is the most widely consumed meat and is in high demand in Kerala, as it is, all over India and is currently being sold at a price of above Rs. 760/- per kg, in the state.

The state of Kerala, known for its ayurvedic legacy, produces a variety of ayurvedic medicines. The majority of the waste products from these medications are rich in fibre. Ruminants can efficiently use this fibre as a source of energy. One of the most popular ayurvedic pharmaceutic residues are gritham residues. Gritham is a product prepared from plant extracts containing ghee. Saraswatha gritham is an ayurvedic medicine having ghee as its base and containing ingredients such as pepper (*Piper nigrum*), ginger (*Zingiber officinale*), drum stick (*Moringa oleifera*), laghupatha (*Cissampelos pareira*) and ugragandha (*Acorus calamus*). Saraswatha gritham residue which is available in plenty is a good source of energy and fibre. Hence the present study is planned to evaluate the potential of Saraswatha gritham residue as an unconventional feed in the ration of Malabari kids to assess the effect of it on haematological parameters in kids.

MATERIALS AND METHODS

Fifteen healthy Malabari kids of three months of age were selected from the Goat and Sheep Unit of ILFC, Pookode. They were divided into three groups of five animals in each, on the basis of their body weight, age and sex, following a 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 in the three experimental groups were fed with kid starters, formulated as per ICAR (2013), containing 23 per cent crude protein and 70 per cent TDN for the entire feeding trial period of 90 days, as follows:

T1 - kid starter (control)

T2 - kid starter containing 10 per cent of Saraswatha gritham residue

T3 - kid starter containing 20 per cent of Saraswatha gritham residue

The kids were housed in well ventilated sheds having facilities for individual feeding and watering. Strict management and hygienic practices were adopted throughout the experimental period. All the kids were dewormed before the start of the experiment and subsequently at regular intervals. Clean drinking water was provided *ad libitum*.

The experimental rations were prepared at the School of Animal Nutrition and Feed Technology (SANFT), Mannuthy. The ingredient composition of experimental kid starters of groups T1, T2 and T3 are given in Table 1. Kids were maintained under uniform management conditions and were fed on isonitrogenous and isocaloric rations (ICAR, 2013). 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 were recorded during the course of the experiment.

Blood samples were collected at the beginning and end of the experiment to estimate plasma protein by direct Biuret method (Jong & Vegeter, 1950), haemoglobin by cyanomethemoglobin method (International committee for standardisation in haematology, 1967), total cholesterol by CHOD-PAP method (Lie et al., 1976), triglycerides using peroxidase coupled method (McGowan *et al*., 1983), AST (Bergmeyer *et al*., 1986a) and ALT (Bergmeyer et al., 1986b) by IFCC method, using standard kits supplied by Agappe Diagnostics, Maharashtra, India. The Auto analyser determined all the hematological parameters listed above (Merck Microlab, 300).

Statistical analysis

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

RESULTS AND DISCUSSION

Haematological parameters

Blood parameters of the experimental kids were analysed at the start of the feeding trial, results are presented in Table 2 and graphically presented in Figure 1. The values were similar among treatment groups at the beginning of the experiment. The values that are observed at the end (90 th day) of the experiment are presented in Table 3 and graphically depicted in Figure 2. No significant difference was observed between the treatment groups.

Haemoglobin

Malabari kids grouped under T1, T2 and T3, had average haemoglobin (Hb) levels of 8.70, 9.56, 8.54 g per dL and 11.28, 10.86, 10.62 g per dL, respectively, at the beginning (day 1) and end (day 90) of the experiment, with the values being similar ($P>0.05$) and within the normal range of kids. Similar results were observed by Anugna et al. (2020), Kajagar et al. (2020) and Febina (2022) in Malabari kids.

Red blood cells (RBC)

Malabari kids grouped under T1, T2 and T3, had mean Red blood cells (RBC) levels of 18.36, 19.29, 17.43 million per µl and 20.20, 19.94, 18.70 million per µl, respectively, at the beginning (day 1) and end (day 90) of the experiment, with the values being similar ($P>0.05$). The present results are similar and values are higher than those observed by Kajagar et al. (2020) who observed that values ranged from 15.43 to 17.06 million per µl at the end of the experiment.

White blood cells (WBC)

Malabari kids grouped under T1, T2 and T3, had mean White blood cells (WBC) levels of 19.14, 17.04, 23.48 thousands per µl and 15.76, 18.76, 17.34 thousands per µl, respectively, at the beginning (day 1) and end (day 90) of the experiment, with the values being similar ($P>0.05$) among the three experimental groups. The findings of the present study are in agreement and values are comparable to Kajagar et al. (2020) who reported that Malabari kids fed on diets incorporated with 0, 10 and 20 per cent levels of Brahmi gritham residue had similar WBC counts, with the values being in the range of 14.20 to 20.36 thousands per µl. The results of the present investigation are higher than Ocheja et al. (2014) who reported that the values ranged from 6.98 to 10.74 thousands per µl in West African dwarf goats fed on graded levels of cashew nut shell based diets.

Mean corpuscular volume (MCV)

The results of mean corpuscular volume (MCV) were similar among experimental groups at the start and end of the experiment, with the values being 13.46, 14.62, 14.82 fl and 16.10, 15.94, 16.82 fl, respectively. The values of the present study are comparable to those of Anugna et al. (2020) who reported MCV values of 15.54 to 16.54 fl. The findings of the present study are in agreement and

values are comparable to Febina (2022) who reported that MCV values were similar among treatment groups, with values being in the range of 17.14 to 16.82 fl in Malabari kids.

Mean corpuscular haemoglobin (MCH)

The results of mean corpuscular haemoglobin (MCH) were similar among experimental groups at the start and end of the experiment, with the values being 4.70, 4.92, 4.84 pg and 5.40, 5.40, 5.54 pg, respectively. The findings of the present study are in agreement with those observed by Anugna et al. (2020), Kajagar et al. (2020) and Febina (2022).

Serum biochemical parameter

The serum biochemical parameters of the Malabari kids were analysed at the beginning (1 st day) and at the end of the experiment (90 th day) are presented in Table 3. On statistical analysis, the values were found similar (P>0.05) among treatment groups except for total cholesterol.

Total protein

The average serum total protein levels of kids at the beginning (1st day) and end of the experiment (90th day) were 5.28, 5.49, 5.49 g per dL and 6.47, 6.87, 7.00 g per dL, in groups, T1, T2 and T3, respectively. Statistical analysis of the data indicated that there was no significant difference (P>0.05) between experimental groups.

The total protein content of kids in this study are in agreement with that of Anugna (2019), Kajagar (2019) and Febina (2022) who found that incorporation of Panchagavya, Brahmi and Tiktaka gritham residue, respectively, at 0, 10 and 20 per cent level, in kid starters resulted in similar total protein levels, with the values being in the range of 5.70 and 5.77 g per dL (Anugna, 2019); 6.44 and 6.57 g per dL (Kajagar, 2019) and 5.69 and 6.10 g per dL (Febina, 2022), which were all comparable to that of the present experiment.

The findings of the present investigation are in contrast and the values are lower than those of Galbat et al. (2014) who reported that dietary incorporation of polyherbal mixture containing cumin (*Cuminum cyminum),* Fenugreek *(Trigonella foenumgraceum*) seeds, (*Carum carvi*) and (*Nigella sativa*) seeds in goat rations in equal ratio significantly improved the total protein value when compared to the control group, with values being 9.25 and 7.33 g per dL, respectively.

Serum AST and ALT

The mean serum AST and ALT values of kids in groups T1, T2 and T3 at the beginning (1st day) were 114.20, 95.15, 112.78 and 14.58, 14.43, 13.25 U/L, respectively. The AST and ALT values at the end of the experiment (90th day) in kids of T1, T2 and T3 were 103.59, 98.29, 128.80 and 21.87, 22.45, 23.07 U/L, respectively. Statistical analysis of the data revealed that the values of serum AST and ALT, were similar (P>0.05) among the groups. The findings of AST and ALT of kids, at the beginning and end of the experiment, follow a similar trend as that of Anugna (2019), Kajagar (2019) and Febina (2022) who found that incorporation of Panchagavya, Brahmi and Tiktaka gritham residue, respectively, at 0, 10 and 20 per cent level, in the rations of Malabari kids resulted in similar AST and ALT values. The numerical value of AST ranging from 93.07 to 100.89 U/L (Anugna, 2019) and 93.07 to 100.89 U/L (Kajagar, 2019) are slightly lower and that of Febina (2022), ranging from 99.56 to 113.46 U/L are comparable those of the present study. The serum ALT values ranging from 13.72 to 18.50 U/L reported by Anugna, (2019) are slightly lower while the ALT values in the range of 16.22 to 21.34 U/L observed by Kajagar (2019) and 16.89 to 18.81 U/L obtained by Febina (2022) are comparable to this experiment.

Total Cholesterol

The average total cholesterol levels of kids in groups, T1, T2 and T3 at the beginning (1st day) and end of the experiment (90th day) were 53.57, 58.93, 76.91 and 58.65, 56.93, 89.98 mg per dL, respectively. Statistical analysis of the data revealed that total cholesterol value at the end of the experiment was significantly higher (P<0.05) for Malabari kids fed on T3 than T1 and T2, with T1 and T2 being similar (P>0.05) among themselves. The results of the present study are in agreement with Febina

(2022) who studied the effect of Tiktaka gritham residue at 0, 10 and 20 per cent levels in Malabari kids and reported that the total cholesterol value at the end of the experiment was significantly higher for the group fed on 20 per cent residue than those fed on 10 per cent level and the unsupplemented control, with values being in the range of 66.78 to 88.48 mg per dL for the 0, 10 and 20 per cent groups, respectively, which were comparable to those of the present study.

The findings of the present investigation contradict the findings of Anugna (2019) and Kajagar (2019) who reported that incorporation of Panchagavya and Brahmi gritham residue at 0, 10 and 20 per cent levels in the rations of Malabari kids, resulted in similar total cholesterol, both at the beginning and end of the experiment.

Total triglycerides

The serum triglyceride levels of kids in groups T1, T2 and T3, at the beginning of the experiment (1st day) were 111.91, 66.67 and 109.68 mg per dL, respectively. The values at the end of the study (90th day) in kids of groups T1, T2 and T3 were 46.59, 47.92 and 86.76 mg per dL. Statistical analysis revealed similar values (P>0.05) between treatments.

Serum triglyceride values lower than those of the present study, with similarity in triglyceride levels between treatments as recorded in this study, tend to agree with the findings of Roshma (2014), Anugna (2019), Kajagar (2019) and Febina (2022) who found that Malabari kids fed on kid starters incorporated with Ksheerabala, Panchagavya, Brahmi and Tiktaka gritham residue, respectively, at 0, 10 and 20 per cent level in kid starter had similar triglyceride concentrations, with the values being in the range of 40.69 to 40.53 mg per dL (Roshma, 2014); 11.40 to 36.60 mg per dL (Anugna, 2019); 21.60 to 31.25 mg per dL (Kajagar, 2019) and 25.92 to 28.69 mg per dl (Febina, 2022).

Table 1: Ingredient composition of Kid starter (%)

Ingredients	T1 (Control – without Saraswatha gritham residue) kg	T2 (Treatment – with Saraswatha gritham residue 10%) kg	T3 (Treatment – with Saraswatha gritham residue 20%) kg
Maize	37	10	5
Soybean meal	38	35	30
De-oiled rice bran	22	42	42
Calcite	2	2	2
Salt	1	1	1
Gritham residue	0	10	20
Total	100	100	100

To every 100 kg of all the kid starters, 10 g of Vitamin AD3E supplement (containing 10 lakh IU of Vitamin A, 2 lakh IU of Vitamin D3 and 1 lakh IU of Vitamin E) and 50 g of trace mineral mixture

Table 2: Haematological parameters of experimental kids

Variable	Day	T_1	T2	T3	F-value (P-value)
Hb, g/dL	Day 1	8.70 ± 0.41	9.56 ± 0.34	8.54 ± 0.42	1.966^{ns} (0.183)
	Day 90	11.28 ± 0.86	10.86 ± 0.43	10.62 ± 0.76	0.224^{ns} (0.803)
RBC, millions/µl	Day 1	18.36 ± 0.97	19.29 ± 0.90	17.43 ± 0.58	1.248^{ns} (0.322)
	Day 90	20.20 ± 1.34	19.94 ± 0.66	18.70 ± 1.76	0.362^{ns} (0.704)
WBC, thousands/µl	Day 1	19.14 ± 1.75	17.04 ± 1.69	23.48 ± 2.77	2.38^{ns} (0.135)
	Day 90	15.76 ± 1.42	18.76 ± 1.41	17.34 ± 1.66	1^{ns} (0.396)
MCH, pg	Day 1	4.70 ± 0.03	4.92 ± 0.11	4.84 ± 0.19	0.775^{ns} (0.482)
	Day 90	5.40 ± 0.14	5.40 ± 0.10	5.54 ± 0.09	0.521^{ns} (0.607)
MCV, fl	Day 1	13.46 ± 0.07	14.62 ± 0.53	14.82 ± 0.51	2.912^{ns} (0.093)
	Day 90	16.10 ± 0.40	15.94 ± 0.51	16.82 ± 0.6	0.835^{ns} (0.457)

ns Non-significant (P>0.05)

Table 3: Serum biochemical parameters of experimental kids

Variable	Day	Dietary treatments			F-value (P-value)
		T1	T2	T3	
Total protein, g/dL	Day 1	5.28 ± 0.36	5.49 ± 0.22	5.49 ± 0.50	0.101^{ns} (0.904)
	Day 90	6.47 ± 0.27	6.87 ± 0.24	7.00 ± 0.24	1.225^{ns} (0.328)
AST, U/L	Day 1	114.20 ± 36.97	95.15 ± 9.90	112.78 ± 26.86	0.155^{ns} (0.858)
	Day 90	103.59 ± 24.82	98.29 ± 12.56	128.8 ± 28.98	0.494^{ns} (0.622)
ALT, U/L	Day 1	14.58 ± 1.33	14.43 ± 1.49	13.25 ± 1.83	0.215^{ns} (0.809)
	Day 90	21.87 ± 0.97	22.45 ± 2.12	23.07 ± 1.68	0.132^{ns} (0.878)
Cholesterol, mg/dL	Day 1	53.57 ± 15.55	58.93 ± 9.82	76.91 ± 9.75	1.035^{ns} (0.385)
	Day 90	58.65 ± 5.42^{b}	56.93 ± 2.37^{b}	89.98 ± 12.56^{a}	5.384* (0.021)
Triglycerides, mg/dL	Day 1	111.91 ± 7.11	66.67 ± 18.12	109.68 ± 18.83	2.66^{ns} (0.111)
	Day 90	46.59 ± 14.36	47.92 ± 10.48	86.76 ± 9.90	3.772^{ns} (0.054)

** Significant at 0.05 level; ns non-significant*

Means having different letter as superscript differ significantly

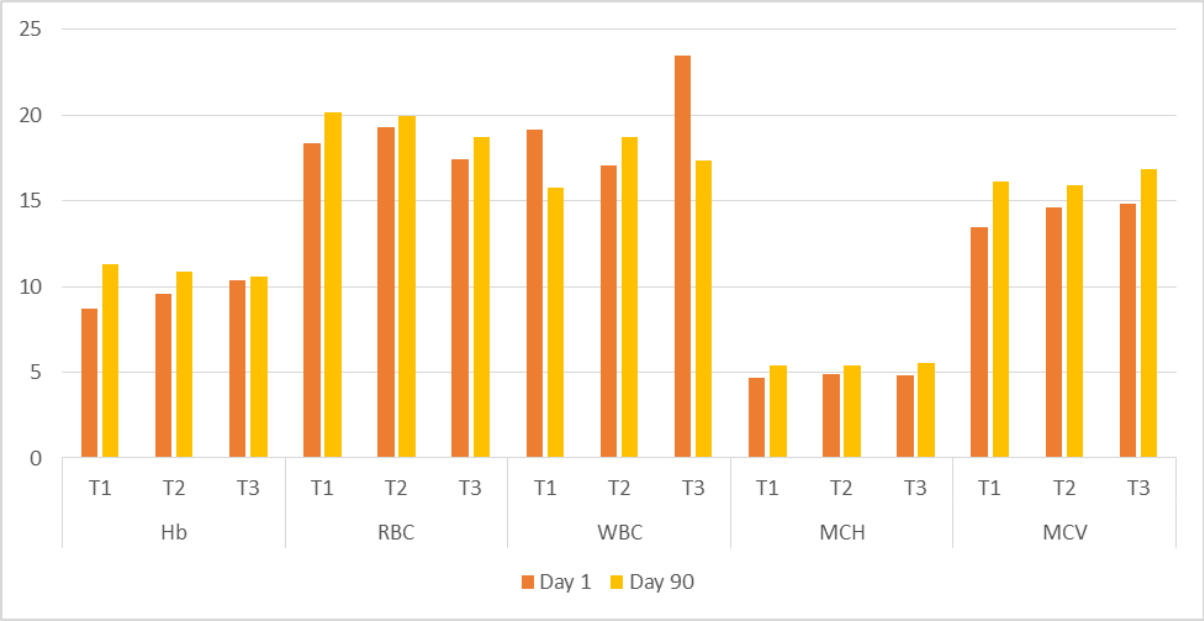

Fig 1: Haematological parameters of experimental kids

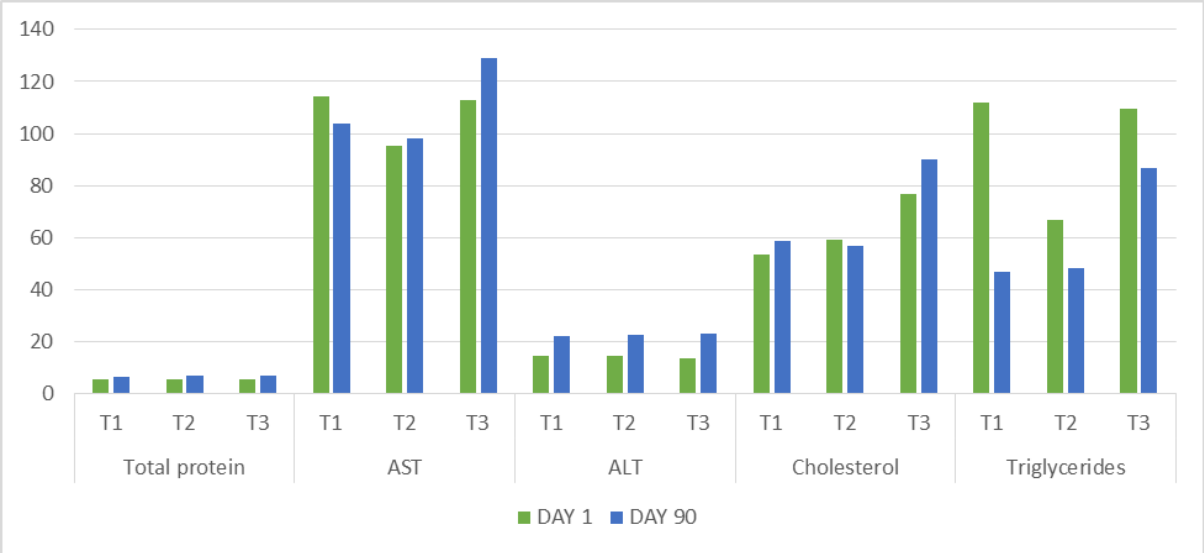

Fig 2: Serum biochemical parameters of experimental kids

CONCLUSION

All the haemato biochemical values are within the normal range and all parameters except total cholesterol were similar in the treatment groups compared to control group. From the study, it is evident that Saraswatha gritham residue can be safely incorporated in the rations of Malabari kids without affecting haematobiochemical parameters.

Acknowledgement:

The authors express their gratitude to the Kerala Veterinary and Animal Sciences University, Pookode, Wayanad for providing the necessary fund and facilities required for the study.

Funding:

Funded by Kerala Veterinary and Animal sciences university, Pookode

Conflict of Interest:

The authors declare that they have no conflict of interest

Author Contribution:

Study conception and design: G. Seshidhar and Biju Chacko, Data collection: G. Seshidhar, Analysis and interpretation of result: G. Seshidhar, Sunanda C and Biju Chacko, Original manuscript preparation: G. Seshidhar and Biju Chacko, Manuscript review and editing: Senthil Murugan S, Deepa Ananth and Balusami C. All authors reviewed the results and approved the final version of the manuscript.

REFERENCES

Anugna, R. (2019). Effect of dietary incorporation of ayurvedic pharmaceutical residues on growth performance of Malabari kids. *M.V.Sc. Thesis,* Kerala Veterinary and Animal Sciences University, Pookode, 87p.

Anugna, R., Chacko, B., Sunanda, C., Senthil Murugan, S., Bunglavan, S. J., Ranjith, D., & Kajagar, M. (2020). Effect of dietary incorporation of ayurvedic Panchagavya gritham residue on blood parameters in Malabari goats. *Pharma Innovation. J*. *9*(1), 34-38.

AOAC. (2016). *Official Methods of Analysis* (20th Ed.). Association of Official Analytical Chemists, Virginia, USA, pp. 1-85.

Bergmeyer, H. U., Horder, M., & Rey, J. (1986). Approved recommendation on IFCC methods for the measurement of catalytic enzymes. Part 2: IFCC method for aspartate aminotransferase. *J. Clin. Chem. Clin. Biochem. 24*, 497–510.

Bergmeyer, H. U., Horder, M., & Rey, J. (1986). Approved recommendation on IFCC methods for the measurement of catalytic enzymes. Part 3: IFCC method for alanine aminotransferase. *J. Clin. Chem. Clin. Biochem. 24*, 481–495.

Devendra, C. (1988). Nutritional value of goat meat. *Goat meat production in Asia: Proceedings of a workshop held in Tando Jam, Pakistan, 13-18 Mar. 1988*. IDRC, Ottawa, ON, CA.

Devi, S. M., Balachandar, V., Lee, S. I., & Kim, I. H. (2014). An Outline of Meat Consumption in the Indian Population - A Pilot Review. *Korean J Food Sci Anim Resour. 34*(4), 507-15. doi: 10.5851/kosfa.2014.34.4.507.

Febina, C. (2022). Effect of dietary incorporation of ayurvedic pharmaceutical Tiktaka gritham residue on haemato-biochemical parameters of Malabari kids. M.V.Sc. Thesis. Kerala Veterinary and Animal Sciences University, Pookode. 82p.

Galbat, S. A., El-Shemy, A. M., Madpoli, M. A., Omayma, E. L., Maghraby, E., & Mossalami, L. (2014). Effects of some medicinal plants mixture on milk performance and blood components of Egyptian dairy goats. *Middle East J. Appl. Sci*. *4*(4), 942-948.

Government of India. 2019. 20th Livestock Census-2019.

ICAR [Indian Council of Agricultural Research]. (2013). Nutrient

Requirements of Livestock and Poultry (2nd Ed.) Indian Council of Agricultural Research, New Delhi, 72p.

International committee for standardization in haematology. (1967). Recommendations for haemoglobinometry in human blood. *Br J Haematol. 13*, 71-5.

International Federation of Clinical Chemistry (IFCC).

Kajagar, M. (2019). Effect of dietary incorporation of ayurvedic pharmaceutics gritham residues on growth performance of Malabari kids. M.V. Sc. Thesis. Kerala Veterinary and Animal Sciences University, Pookode. 83p.

Kajagar, M. H., Chacko, B., Sunanda, C., Shyama, K., Murugan, S. S., Ranjith, D., Sudharsan, C., & Satyasooryan, A. M. (2020). Effect of ayurvedic pharmaceutical Brahmi gritham residue based diet on haematological and biochemical parameters of Malabari goat kids. *Ind. J. Pure App. Biosci*. *8*(3), 106-113.

Ocheja, J. O., Alex, B. C., Onoja, S., Usman, G. O., Ocheni, J., & Lalabe, B. C. (2014). Performance, haematological and serum biochemical profiles of weaner West African dwarf goats fed with diets containing graded levels of cashew nut shell. *Int. J Res. Agric. Forestry. 1*(1), 27-33.

Roshma, T. J. (2014). Effect of dietary incorporation of 'Ksheerabala' residue on growth performance in Malabari kids. M.V.Sc. Thesis. Kerala Veterinary and Animal Sciences University, Pookode. 82p.