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*Research Article*

# Effect of Sukumara Gritham Residue Based Diet on Haemato-Biochemical Parameters of Malabari Goat Kids

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**ABSTRACT**

*Eighteen Malabari kids of three to six months of age were divided into three dietary treatments (T1, T2 and T3) of six animals each, based on age, sex and body weight to study the effect of dietary incorporation of Sukumara gritham residue on their blood biochemical profile. The animals in treatment T1 (control) were given standard kid starter ration as per ICAR (2013) while in group T2 and T3, Sukumara gritham residue was included to the level of 10 and 20 per cent, respectively. The heamatological parameters viz., haemoglobin and biochemical parameters, viz., total protein, AST, ALT, total cholesterol, total triglycerides, blood urea nitrogen, creatinine and albumin were found to be similar in all the groups after 90 days of feeding trial. Hence, Sukumara gritham residue could be safely included in the kid starter ration up to 20 per cent level without any adverse effect on blood biochemical parameters.*

***Keywords:*** *Blood biochemical, Kid starter, Malabari goat kids, Sukumara gritham residue.*

## INTRODUCTION

Goat rearing is an obligate source of income for the small landless and marginal farmers of India. According to the 20th livestock census, India holds second in goat population in the world with 148.88 million goats, thus making 27.80 per cent of the total livestock population of the nation (GOI, 2019).

The productivity of goats nowadays, is lower than their genetic potential, mainly due to inadequate nutrition. The needy farmers are often failing to meet the nutritional requirements of these small ruminants with the prevailing zero input system.

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The usual feeding management of goats includes feeding of concentrate mixtures, oil cakes, straws, and green fodders. These situations transparently point an animal nutritionist to do more research on the dietary incorporation of non-conventional feed resources (NCFR's) in animal feeds beyond the available traditional feeds.

Gritham (medicated ghee) is an ayurvedic medicinal preparation in which ghee is treated with a certain amount of herbal paste and herbal extracts. Sukumara gritham is one such ayurvedic preparation used mainly for treating gynaecological disorders in humans. Ghee is its base along with natural herbs like Punarnava (*Boerhaavia diffusa*), Ashwagandha (*Withania somnifera*), Eranda (*Ricinus communis*), Shatavari (*Asparagus racemosus*), Darbhamoola (*Erianthus arundinaceum*) and Ikshumoola (*Saccharum officinarum*); the other ingredients include Guda (Jaggery), Eranda taila (Castor oil), Yashti (Liquorice – *Glycyrrhiza glabra*) and Nagara (Ginger - *Zingiber officinale*). The huge amount of residue after preparation of it is usually wasted. Hence, the present study is to assess the effect of dietary incorporation of ayurvedic pharmaceutical Sukumara gritham residue on haematological parameters of kids.

## MATERIALS AND METHODS

Eighteen healthy Malabari goat kids of about three to six months of age were selected from Goat farm, College of Veterinary and Animal Sciences, Pookode . Following completely randomized design (CRD), the kids were divided into three groups of six animals in each, on the basis of body weight. Before the start of the actual feeding trial, these animals were maintained for two weeks as an adaptation period on a standard diet comprised of the formulated concentrate mixture and green grass.

The kids were housed in sheds of Goat farm, ILFC, Pookode, individually in well ventilated, clean and dry pens with provision of individual feeding. All the kids were dewormed before the start of the experiment and subsequently at regular intervals. Clean drinking water was provided *ad libitum.* The kids in the three experimental groups were fed with a diet containing 24 per cent crude protein and 70 per cent total digestible nutrients (TDN) for the entire feeding period of 90 days.

The three experimental rations were

T1 – kid starter (control)

T2 - kid starter containing 10 per cent Sukumara gritham residue

T3- kid starter containing 20 per cent Saraswathi gritham residue

All the experimental rations were isonitrogenous with 24 per cent crude protein and isocaloric with 70 per cent total digestible nutrients, as per recommendations of ICAR (2013) and was prepared at the School of Animal Nutrition and Feed Technology (SANFT), Mannuthy. Table 1 shows the ingredient composition of experimental kidstarters. Clean drinking water, good quality green grass and formulated kidstarter were made available to all kids throughout the experiment. The feeding trial was conducted for a period of 90 days after giving an adaptation period of 15 days. Data on daily feed and fodder intake and fortnightly body weight were recorded during the course of the experiment.

Blood samples will be collected at the end of the experiment to estimate BUN (Archibald, 1945), plasma protein (Jong & Vegeter, 1950), haemoglobin (International committee for standardization in haematology, 1967), albumin (Doumas et al., 1971), creatinine (Lustgarten, 1972) total cholesterol (Lie et al., 1976), triglycerides (McGowan et al., 1983), AST (Bergmeyer et al., 1986a) and ALT (Bergmeyer et al., 1986b) using standard kits. All the haematological parameters listed above will be determined using the Auto analyzer (Merck, Microlab 300).

**Statistical Analysis:** Data of blood biochemical parameters was analyzed through one-way ANOVA as per Snedecor and Cochran (1994) using statistical package for social sciences (SPSS) version 21.0.

**Table1. Ingredient composition of kid starter (%)**

| Ingredients | T1 (Control), kg | T2, kg | T3, kg |
|---|---|---|---|
| Maize | 37 | 10 | 5 |
| Soybean meal | 38 | 35 | 31 |
| De-oiled rice bran | 22 | 42 | 41 |
| Calcite | 2 | 2 | 2 |
| Salt | 1 | 1 | 1 |
| Gritham residue | 0 | 10 | 20 |
| Total | 100 | 100 | 100 |

*To every 100 kg of the kid starters, 100g toxin binder (TOXFIA), 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.

## RESULTS

**Table2. Haemato-biochemical parameters[1] of kids maintained on the three experimental rations, at the beginning and end of the experiment**

| Parameters | T1 | T2 | T3 | F-value (P-value) |
|---|---|---|---|---|
| Haemoglobin, (g/dL) | 9.77 ± 0.36 | 9.53 ± 0.41 | 9.58 ± 0.21 | $0.132^{ns}$ (0.878) |
| Plasma protein (g/dL) | 5.87 ± 0.15 | 6.09 ± 0.23 | 5.57 ± 0.25 | $1.509^{ns}$ (0.253) |
| Albumin (g/dL) | 3.92 ± 0.05 | 3.90 ± 0.06 | 3.77 ± 0.09 | $1.412^{ns}$ (0.274) |
| BUN (mg/dL) | 26.46 ± 6.02 | 27.28 ± 3.51 | 26.61 ± 2.54 | $2.006^{ns}$ (0.169) |
| Creatinine (mg/dL) | 1.70 ± 0.03 | 1.62 ± 0.04 | 1.64 ± 0.03 | $1.622^{ns}$ (0.230) |
| Triglycerides (mg/dL) | 35.50 ± 2.45 | 41.80 ± 9.91 | 37.88 ± 3.30 | $0.264^{ns}$ (0.772) |
| Cholesterol (mg/dL) | 77.34 ± 4.28 | 88.59 ± 5.07 | 84.06 ± 4.12 | $1.576^{ns}$ (0.239) |
| AST (U/L) | 90.53 ± 2.59 | 91.21 ± 5.71 | 98.16 ± 7.59 | $0.551^{ns}$ (0.587) |
| ALT (U/L) | 17.25 ± 2.13 | 21.52 ± 2.61 | 17.34 ± 2.08 | $1.138^{ns}$ (0.347) |

ns non-significant (P>0.05)

1-Average of six values with SE

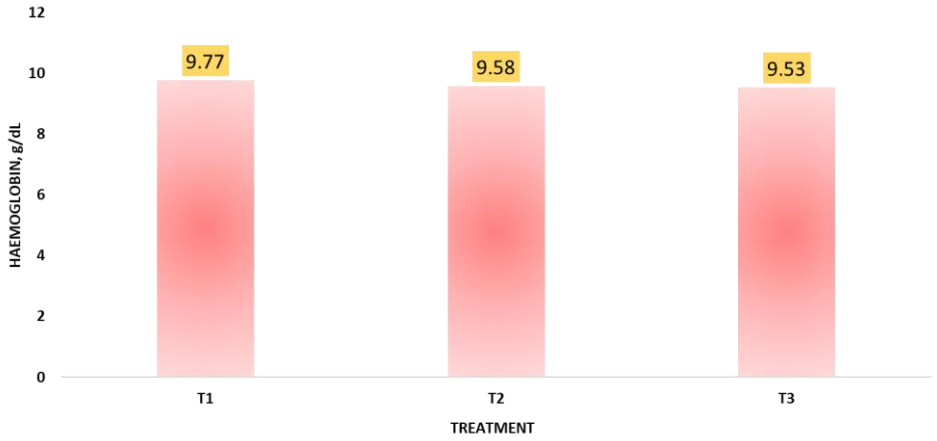


**Fig1. Haemoglobin concentration of kids maintained on the three experimental rations, g/dL**

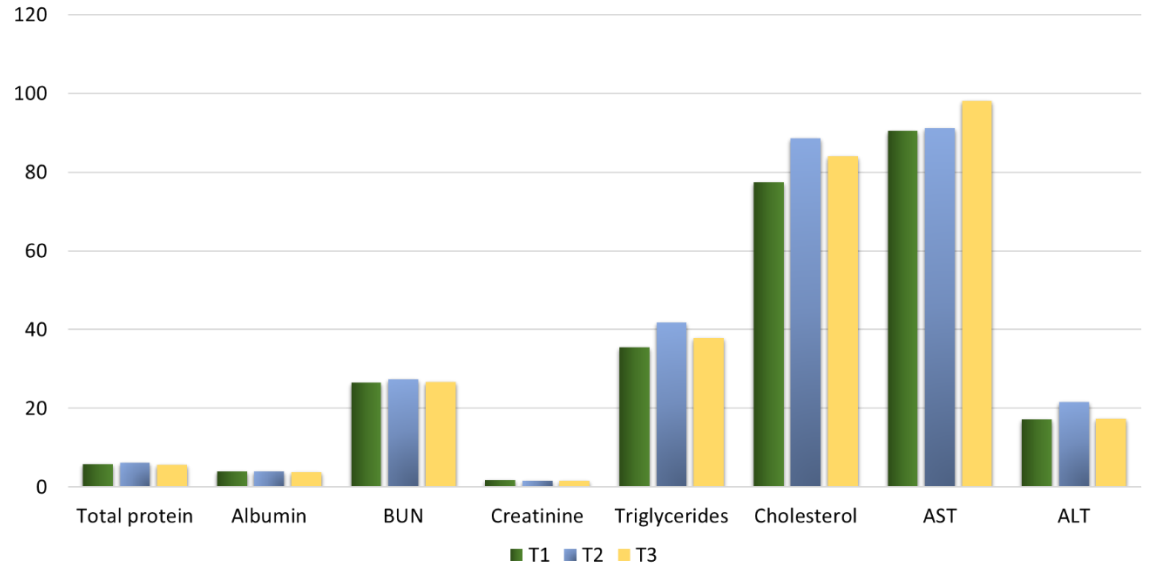


**Fig2. Serum biochemical parameters of kids maintained on the three experimental rations**

## DISCUSSION

### Haemoglobin

The haemoglobin concentration of the experimental kids were analyzed at the end 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 end of the experiment. No significant difference was observed between the treatment groups. The average haemoglobin (Hb) levels of kids at end (90th day) of the experiment were 9.77, 9.53 and 9.58 g per dL, for kids in groups, T1, T2 and T3, respectively, with values being in the normal range for kids and was found to be statistically similar (P>0.05).

The values of concentration of haemoglobin of kids in the current study are comparable and findings show a similar trend as that of Anugna et al. (2020) and Kajagar et al. (2020) who concluded that Malabari kids fed of diet incorporated with Panchagavya and Brahmi gritham residue, respectively, at 0, 10 and 20 per cent level, at the end of feeding trial had resulted in similar levels of haemoglobin concentration, with the values being in the range of 8.88 to 10.40 g per dL (Anugna et al., 2020) and 9.88 to 9.12 g per dL (Kajagar et al., 2020b).

### Serum biochemical parameters

The serum biochemical parameters of the Malabari kids were analyzed at the end of the experiment (90 th day) are presented in Table 2 and graphically represented in figure 2. On statistical analysis, the values were found similar (P>0.05) among treatment groups.

### Total protein

The average serum total protein levels of kids at the end of the experiment (90th day) were 5.87, 6.09 and 5.57 g per dL, in groups, T1, T2 and T3, respectively. Statistical analysis of the data revealed that there was no significant difference (P>0.05) between the three experimental groups and the values were within the normal range of kids.

The values of the present study are also comparable and the findings are in agreement to those of Kaur et al. (2023), who concluded that total protein concentration of goat kids supplemented with *Tinospora cordifolia* at two per cent of DMI, at the end of feeding trial were identical to those of the control group with values being 6.98 and 6.72 g per dL, respectively for control group and supplemented group.

Nevertheless, the results of the present study tend to be divergence with Abu et al. (2018), who concluded that Ossimi ewes fed on rations supplemented with three per cent each of garlic, fenugreek and onion had resulted in significantly higher values of total protein compared to those fed on the unsupplemented control.

**Albumin**

The average serum albumin levels of kids at the end of the experiment were 3.92, 3.90 and 3.77 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 and the values were within the normal range of kids.

The numerical values of the present work are akin and the results are in compliance to the inference of Faryabi et al. (2023), who reported that the concentration of albumin in growing male lambs fed of *Artemisia sieberi* leaves in the diet at 0, 25 and 50 per cent of forage source, replacing alfalfa hay was statistically similar among themselves with values being 3.46, 3.36 and 3.18 g per dL, respectively.

**Blood Urea Nitrogen (BUN)**

The average BUN concentration of kids in groups T1, T2 and T3 at the end of the experiment ($90^{th}$ day) were 26.46, 27.28 and 26.61 mg per dL, respectively. Statistical analysis of the data revealed that the total cholesterol value at the end of the experiment was similar (P>0.05) among the groups and within the normal range.

These results were in conformity and the values were comparatively lower to those of Faryabi et al. (2023), who reported that dietary inclusion of *Artemisia sieberi* leaves in the diet of growing male lambs at 0, 25 and 50 per cent of forage source, replacing alfalfa hay did not produce any significant difference in the BUN concentration with values being 61.00, 62.60 and 71.50, respectively.

The findings of the present investigation are in contrary and the values are higher than those of Bhat et al. (2018) who reported that dietary supplementation of *Artmisia absinthium* leaves in sheep ration up to four per cent level had significantly increased the BUN concentration in blood with values being 19.68 and 23.24 mg per dl, respectively for unsupplemented control group and supplemented group with four per cent *Artmisia absinthium* leaves.

**Serum creatinine**

The mean serum creatinine concentration of kids in groups, T1, T2 and T3 at the end of the experiment ($90^{th}$ day) were1.70, 1.62 and 1.64 mg per dL, respectively. Statistical analysis of the data revealed that the total cholesterol value at the end of the experiment was similar (P>0.05) among the groups and within the normal range.

The values of the current study were comparatively lower but showed a similar trend as that of Kaur et al. (2023), who pointed out that Beetal goat kids of the treatment group when supplemented with *Tinospora cordifolia* at two per cent of DMI for 60 days did not show any significant difference in the concentration of serum creatinine than the Beetal goats in control group, with values being 0.74 and 0.82 mg per dL, respectively.

**Total cholesterol**

The average total cholesterol levels of kids in groups T1, T2 and T3 at the end of the experiment ($90^{th}$ day) were 77.34, 88.59 and 84.06 mg per dL, respectively. Statistical analysis of the data revealed that total cholesterol value at the end of the experiment was similar (P>0.05) among the groups and within the normal range.

The findings of the present investigation are in agreement with the findings of Anugna et al. (2020) and Kajagar et al. (2020) who reported that the incorporation of Panchagavya and Brahmi gritham residue, respectively at 0, 10 and 20 per cent levels in the rations of Malabari kids, resulted in similar total cholesterol at the end of the experiment. However, the results of the present study are in contrast to the findings of Febina et al. (2022) and Seshidhar et al. (2022), who studied the effect of Tiktaka and Saraswatha gritham residue, respectively at 0, 10 and 20 per cent levels in Malabari kids and both of them 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.

**Serum triglycerides**

The serum triglyceride levels of kids in groups T1, T2 and T3, at the end of the study ($90^{th}$ day) were 35.50, 41.80 and 37.88 mg per dL, respectively. Statistical analysis revealed that

the values were similar (P>0.05) between treatments and within the normal range.

The similarity between values of serum triglyceride concentration tends to be in agreement with the research works of Anugna et al. (2020), Kajagar et al. (2020b), Febina et al. (2022) and Seshidhar et al. (2022). At the same time, the results of the present study are in disagreement with the results of Ahmed et al. (2022), who observed that the concentration of serum triglycerides was significantly higher for goats in the unsupplemented control group than that of the group with *Nigella sativa* seeds supplementation at 5 and 10 per cent levels, which was similar among themselves.

**Serum AST and ALT**

The mean serum AST and ALT values of kids in groups T1, T2 and T3 at the end of the experiment ($90^{th}$ day) were 90.53, 91.21, 98.16 IU/L and 17.25, 21.52, 17.34 IU/L, respectively. Statistical analysis of the data revealed that the values of serum AST and ALT, were similar (P>0.05) among the groups and within the normal range (Opara et al., 2010).

The values of the present study are comparatively lower but the findings are in a similar trend to those of Kaur et al. (2023), who concluded that mean serum AST and ALT levels of goat kids supplemented with *Tinospora cordifolia* at 2 per cent of DMI, at the end of feeding trial were similar to those of the control group, with serum AST and ALT values being 129.20, 119.40 IU/L and 28.20, 30.40 IU/L, respectively for the control group and supplemented group.

## CONCLUSION

All the haemato-biochemical values were within the normal range and were similar in the treatment groups compared to the control group. From the study it is evident that Sukumara gritham residue can be safely incorporated in the rations of Malabari kids without affecting haematological parameters.

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**Conflict of Interest:**

There is no such evidence of conflict of interest.

**Author Contribution:**

All authors have participated in critically revising of the entire manuscript and approval of the final manuscript.

## REFERENCES

Abu, E. K., El-Hafez, G. A., Mousa, S. M., & Hassan, E. H. (2018). Effect of dietary onion, garlic and fenugreek seeds powder on feed intake, blood metabolites and rumen fermentation in Ossimi ewes. *Assiut J. Agric. Sci. 49*(2), 38-48.

Ahmed, S., Mahmood, R., Muhammad, A. R., Mohsin, I., Chishti, G. A., & Javed, M. Q. (2022). Effect of *Nigella sativa* seeds on growth, nutrients digestibility and some blood metabolites in male beetal goats. JAPS: *Journal of Animal and Plant Sciences. 32*(5).

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.

Bergmeyer, H. U., Horder, M., & Rey, J. (1986a). 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. (1986b). 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.

Bhat, A. R., Ishfaq, A., Ganai, A. M., Beigh, Y. A., Sheikh, G. G., & Masood, D. (2018). Effect of *Artemisia absinthium* (Titween) on nutrient intake, digestibility, nutrient balance and blood biochemical of sheep. *Indian Journal of Animal Research*, *52*(7), pp.1010-1013.

Doumas, B. T., Watson, W. A., & Biggs, H. G. (1971). Albumin standards and the measurement of serum albumin with bromcresol green. *Clin. Chim. Acta. 31*(1), 87-96.

Faryabi, R., Mousaie, A., Bahrampour, J., & Barazandeh, A. (2023). The effect of dietary inclusion of *Artemisia sieberi* leaves on growth performance, feeding behaviors, ruminal fermentation, feed digestibility, and blood hemato-biochemical profile of growing male lambs. *Tropical Animal Health and Production*, *55*(1), p.41.

Febina, C., Chacko, B., Senthil Murugan, S, Bunglavan, S. J., Abraham, J., & Sunanda, C. (2022). Effect of Dietary Incorporation of Ayurvedic Pharmaceutical Tiktaka Gritham Residue on Haemato Biochemical Parameters of Malabari Kids, *Ind. J. Pure App. Biosci. 10(*4), 14-20.

Government of India (2019). 20th *Livestock Census*-2017 *Department of Animal Husbandry, Dairying and Fisheries*. New Delhi. pp 1-29.

ICAR (2013). Nutrient Requirements of Sheep, Goat and Rabbit. *Indian Council of Agricultural Research*, New Delhi. India.

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

Jong, H. H., & Vegeter, J. J. (1950). Determination of serum proteins with the biuret test. *Pharm. Weekbl*. *85*, 755- 764.

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

Kaur, R., Kaur, J., Sethi, R. S., Hundal, J. S., Singh, U., & Nayyar, S. (2023). Effect of supplementation of Tinospora cordifolia on nutrient utilization, blood biochemical profile, cell mediated immune response and rumen microbial profile in beetal goat kids. *Indian Journal of Animal Research*, *57*(4), pp.443-448.

Lie, R. F., Schmitz, J. M., Pierre, K. J., & Gochman, N. (1976). Cholesterol oxidase-based determination, by continuous-flow analysis, of total and free cholesterol in serum. *Clin. Chem*. *22*, 1627-1630.

Lustgarten, J. A., & Wenk, R. E. (1972). Simple, rapid, kinetic method for serum creatinine measurement. *Clin Chem. 18*, 1419–1422.

McGowan, M. W., Artiss, J. D., Strandbergh, D. R., & Zak, B. (1983). A peroxide coupled method for the colorimetric determination of serum triglycerides. *Clin. Chem. 29*(3), 538-542.

Opara, M. N., Udevi, N., & Okoli, I. C. (2010). Haematological parameters and blood chemistry of apparently healthy West African Dwarf (Wad) goats in Owerri, South Eastern Nigeria. *N. Y. Sci. J*. *3*(8), 68-72.

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.