



# Effect of dietary incorporation of ksheerabala residue on growth performance in wistar rats

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## Abstract

*Ksheerabala residue is a by-product obtained during the preparation of ksheerabala oil which is made by incorporating bala (Sida cordifolia), cow milk and gingelly oil (Sesamum indicum). This residue is available in considerable quantity and many farmers use this byproduct for feeding livestock. But the level of incorporation and the effect of Ksheerabala residue on growth in rats are not yet well studied. Hence, the present study was planned to evaluate the effect of dietary incorporation of Ksheerabala residue as a feed resource in the diet of Wistar rats on their performance. Twenty-four male Wistar albino rats weighing  $80 \pm 5g$  were used as experimental animals and were allotted randomly to two treatments of six replicates each. Group 1 was fed basal diet as per BIS specification (control-T<sub>1</sub>) and other group was fed a diet containing 5 per cent Ksheerabala residue (T<sub>2</sub>). The average body weight, body weight gain, dry matter intake, haematological and biochemical parameters were found to be similar in both the groups ( $P > 0.05$ ). The results of the present study indicate that Ksheerabala residue can be included in the rat ration up to five per cent level without any adverse effect on their growth performance.*

**Key words:** Ksheerabala residue, Rat, Blood, Growth

In normal production systems, it has been traditional to feed conventional feeds notably cereals, oil cakes and meals to both ruminants and non-ruminants. But increases in feed ingredient prices and the scarcity of grains and plant protein supplements are the most important constraints hampering the animal production sector in India. Additionally, inadequate production of farm crops to meet the needs of both humans and their domestic animals had led to competition between man and livestock for these feed ingredients. This has forced animal nutritionists to intensify research into the feeding values of potentially useful, attractive, cheaper and non-conventional

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feed resources (NCFR). Dafwang *et al.* (2001) reported that non-conventional feedstuffs could be considered as the best alternative to produce cheaper feed and ultimately lower the cost of meat and other animal products. Many of the NCFR which were designated as waste could be utilized and converted by animals into valuable products for human benefit to alleviate the problem of existing limited feed resources (Vasta *et al.*, 2008). Major constraints in the utilization of NCFR for animal feeding include high nutritional variability, low digestibility, seasonal production and presence of undesirable contaminants of organic or inorganic origin (Al-Masri, 2005; Weinberg *et al.*, 2008). Use of agro industrial by-products and crop residues in animal nutrition has been successfully adopted as a strategy to reduce feeding costs. But still a lacuna exists and the time has come to explore and utilize more unconventional feeds, even available in small quantities, so that they can be incorporated in the feeds of livestock and thus can reduce the competition between humans and livestock for common food grains.

The World Health Organization has encouraged the use of medicinal herbs and plants to minimize or substitute the use of chemicals through the global trend to go back to nature (Allam *et al.*, 1999) and utilization of medicinal plants as growth promoters in animal feeds has increased over the last few years due to prohibition of most of the antimicrobial growth promoters because of their residual effects (Acamovic and Brooker, 2005). Kerala, famous for Ayurveda, has various ayurvedic pharmaceuticals and by-products from these pharmaceuticals which are mainly composed of residues of medicinal herbs. Ksheerabala residue is an ayurvedic by-product obtained during the preparation of ksheerabala oil which is made by incorporating *Bala* (*Sida cordifolia* Linn., belongs to Malvaceae family), *Ksheera* (cow milk) and *Tila Taila* (Sesamum oil). This residue is available in considerable quantity and many farmers use this byproduct to feed domestic animals. But the feeding value of these residues as potential non-conventional feed resources are yet to be explored. Hence as a pilot study this research work was undertaken to evaluate the nutritive value of Ksheerabala

residue and to assess the effect of dietary incorporation of Ksheerabala residue as a feed resource in the diet of Wistar rats on their performance.

### Materials and Methods

Twenty four male Wistar albino rats weighing  $80 \pm 5g$ , selected from Small Animal Breeding Station, College of Veterinary and Animal Sciences, Mannuthy, formed the experimental subjects for the study. They were allotted randomly to two treatments of six replicates each for a period of one month. Rats belonging to group 1 were fed on a basal diet ( $T_1$ ) (as per BIS specification) and animals of group 2 were fed on a diet ( $T_2$ ) containing 5 per cent ksheerabala residue. Both the rations were made isonitrogenous and isocaloric. Proximate composition of Ksheerabala residue and ingredient and chemical composition of experimental rations were analysed. A weighed quantity of feed was given in the morning. Clean, fresh drinking water was provided *ad libitum* to all animals. Animals were maintained under normal ambient conditions. Data on quantities of feed offered daily were recorded. The left over portion of the feed was weighed daily and moisture content of feed given and balance feed were analyzed to calculate the daily dry matter intake. Body weights of all the rats were recorded at weekly intervals. Based on the body weight, feed requirements was reviewed fortnightly.

Blood samples were collected from six animals from each group at the end of the experiment. Haematological parameters were analysed with fresh blood samples using a haematological analyzer (Mythic 18 vet). Plasma total protein, plasma glucose (GOP-PAP methodology using standard kits), serum total cholesterol and serum triglycerides were determined by enzymatic colorimetric methods using standard kits supplied by Agappe diagnostics Ltd, Ernakulam, India. Alanine-aminotransferase (ALT) and aspartate-aminotransferase (AST) enzymes were measured according to the method described by Reitman and Frankel (1957).

Feed samples were analyzed for proximate principles (AOAC, 2016). Data were analyzed statistically using Analysis of Variance (Snedecor and Cochran, 1994).

## Results and Discussion

The results obtained during the course of present study are discussed below.

Presented in Table 1 is the chemical composition of Ksheerabala residue. Ksheerabala residue contained 92.55 per cent dry matter, 29.52 per cent crude protein, 13.26 per cent ether extract, 6.39 per cent crude fibre, 8.42 per cent ash, 42.41 per cent nitrogen free extract, 0.06 per cent acid insoluble ash.

Data on the body weight of rats have been presented in the Table 2. There was no significant difference ( $P > 0.05$ ) in body weight between animals fed two dietary treatments. Total weight gain and average daily gain of the rats were similar in both the dietary treatments. These results were in agreement with Ogungbemi *et al.* (2017).

Total dry matter intake during the experimental period was 407.92 and 422.54 g

respectively for animals fed  $T_1$  and  $T_2$ . (Table 2) and statistical analysis of the data did not reveal any significant difference ( $P > 0.05$ ) among the groups. Manjula *et al.* (2016) observed a similar total dry matter intake in rats. Additionally, rats fed with a diet containing 5 per cent Ksheerabala residue had almost similar weight gain and feed conversion efficiency as that of the control group.

Data on haematological and biochemical studies have been given in Table 3 and 4. The values of various haematological and biochemical parameters were similar in both groups indicating that dietary incorporation of Ksheerabala residue did not affect these parameters to any significant effect.

All the physiological and biochemical parameters recorded in the present study fell in the normal range reported for the species. Akpanabiatu *et al.* (2003), in a study of the biochemical effect of *Eleophorbia drupifera*, reported a decreased AST level in treated groups. Similar changes in ALT and AST activities in animals treated with plant extracts were reported by Bumah *et al.* (2005).

**Table 1:** Chemical composition of Ksheerabala residue and experimental feeds

Parameter	Ksheerabala Residue	$T_1$	$T_2$
Dry matter	92.55	91.90	91.98
Crude Protein	29.52	24.38	24.72
Ether extract	13.26	5.23	5.28
Crude fibre	6.39	5.26	5.78
Ash	8.42	6.77	7.85
Nitrogen free extract	42.41	58.36	56.37
Acid insoluble ash	0.06	0.82	0.78

**Table 2:** Body weight (g) and dry matter intake (g) of experimental rats

Parameters	$T_1$	$T_2$
Initial body weight (g)	85.62± 2.82	84.66 ± 3.83
Final body weight (g)	132.56 ± 8.90	137.33 ± 9.07
Total weight gain (g)	46.94 ± 3.52	52.67 ± 4.52
Total dry matter intake (g/animal)	407.92 ± 21.34	422.54 ± 22.16

$T_1$  and  $T_2$ - mean of six values. ( $P > 0.05$ ).

**Table 3:** Haematological parameters of experimental rats

Parameters	T <sub>1</sub>	T <sub>2</sub>
Haemoglobin (mg/dl)	14.78 ± 2.60	14.52 ± 0.34
MCV (fL)	58.04 ± 0.56	58.29 ± 1.20
MCH (pg)	18.20 ± 0.43	18.85 ± 0.39
MCHC (g/dl)	34.15 ± 0.39	33.28 ± 0.57
RBC count ( × 10 <sup>6</sup> /μl)	8.84 ± 0.51	8.08 ± 0.32
WBC count ( × 10 <sup>3</sup> /μl)	10.32 ± 0.14	10.44 ± 0.37

T<sub>1</sub> and T<sub>2</sub>- mean of six values. (P > 0.05).

**Table 4:** Blood biochemical parameters of experimental rats

Parameter	T <sub>1</sub>	T <sub>2</sub>
Albumin, (g/dl)	3.42 ± 0.14	3.88 ± 0.20
Plasma protein, (g/dl)	6.30 ± 0.05	6.33 ± 0.06
Calcium, (mg/dl)	11.23 ± 0.11	11.26 ± 0.23
Phosphorus, (mg/dl)	7.04 ± 0.10	7.05 ± 0.11
Cholesterol, mg/dl	78.34 ± 2.41	74.88 ± 2.63
Triglyceride, (mg/dl)	44.88 ± 5.89	38.33 ± 4.88
Glucose, (mg/dl)	89.78 ± 1.26	87.19 ± 1.71
AST(u/l)	105 ± 8.26	101 ± 9.23
AST(u/l)	21.52 ± 3.24	19.62 ± 2.96

T<sub>1</sub> and T<sub>2</sub> - mean of six values. (P > 0.05).

On summarizing the overall effects of the study, it could be inferred that Ksheerabala residue contains high CP, EE and CF value and can be included in the rat ration up to a level of 5 per cent without any adverse effect on their growth performance.

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