



Effect of feeding complete diets containing spent cumin (*Cuminum cyminum*) seeds on serum biochemical parameters of Malabari kids#

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Abstract

A feeding trial of three months was conducted in goat kids to study the effect of feeding complete diets containing spent cumin (*Cuminum cyminum*) seeds on haematological and serum biochemical parameters. Eighteen weaned Malabari kids of three to four months of age were selected from University Goat and Sheep Farm and randomly allotted to three dietary treatments. T1 (Control)- Complete feed containing 16 per cent CP and 60 per cent TDN, T2- Complete feed incorporating 10 per cent spent cumin seeds and T3 – Complete feed incorporating 20 per cent spent cumin seeds. All the dietary treatments were isocaloric and isonitrogenous and the kids were fed as per ICAR standards (ICAR, 2013). The haematological and serum biochemical parameters like haemoglobin, serum total protein, calcium, phosphorus, albumin, alanine aminotransferase (ALT), aspartate aminotransferase (AST), blood urea nitrogen (BUN) and creatinine were analysed at the end of feeding trial and the values were similar between the treatment groups. But the AST concentration was significantly higher in T3 compared to T1 and T2; however, the values were within the normal range reported for species. Therefore, it could be concluded that spent cumin seeds can be included in complete feed ration without having any adverse effects on serum biochemical parameters of Malabari kids at 10 or 20 per cent level.

Keywords: Complete diets, spent cumin seeds, serum biochemical parameters

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India with increasing livestock population and feed ingredient prices, needs a judiciously conceived strategy in order to meet the demand for feed and fodder. Moreover, dwindling grazing lands is a concern for livestock sector in Kerala. So, it is preferable to build up sufficient alternative feed resources like ayurvedic pharmaceutical by-products as the replacement for conventional feed sources whose potential has not yet been explored. The dietary incorporation of these by-products, which have good nutritive value and also available at low price may reduce cost of production.

One such by-product is obtained from cumin seed which is an annual herb and a commercial seed spice, known for its medicinal properties. It contains various volatile phytochemicals including terpenes and flavonoids, which are responsible for its antioxidant, antimicrobial and immunomodulatory effects (El-Sawi and Mohamed, 2002).

Spent cumin seeds are obtained after the cumin oil (with active principles) extraction from cumin seeds. Spent cumin seeds are available in plenty and are a good source of protein and energy (Ramadevi *et al.*, 2018). Also, the bioactive compounds are retained in this by-product after extraction of active principles (Arun *et al.*, 2014) and may improve palatability due to flavouring effect. But the level of incorporation and the effect of spent cumin seeds on health status of kids are not yet studied. Hence the present study aims to assess the effect of dietary incorporation of spent cumin seeds in Malabari kids on serum biochemical parameters.

Materials and methods

This study was conducted at the University Goat and Sheep Farm, College of Veterinary and Animal Sciences, Mannuthy, Kerala, India.

Experimental animals

Eighteen Malabari kids of three to four months of age were selected from University Goat and Sheep Farm, Mannuthy. The kids were

divided into three groups of six animals each as uniformly as possible with regard to age, sex and body weight. Kids were weaned and housed individually in well ventilated, clean and dry shed with facilities for feeding and watering. All the kids were dewormed at first week of the trial followed by once in every month during the experimental period of three months. All the experimental kids were maintained under uniform managemental conditions throughout the experimental period.

Experimental feed

The three iso-caloric and iso-nitrogenous experimental rations viz: T1- Control, Complete feed with 16 per cent CP and 60 per cent TDN, T2- Complete feed incorporating 10 per cent spent cumin seeds and T3- Complete feed incorporating 20 per cent spent cumin seeds were prepared. Kids were fed as per ICAR standard (ICAR, 2013) and maintained on their respective feeding regimen for a period of three months.

Complete feed was prepared in mash form as a mixture of processed ingredients (prepared by selection of ingredients followed by grinding and mixing process) including concentrate, roughage and supplementary nutrients in desirable proportions (Table 1).

Representative samples of experimental feed were analysed for proximate principles as per the methods of the Association of Official Analytical Chemists (AOAC, 2016). The ingredient and chemical composition of rations are depicted in Table 1 and Table 2, respectively.

Haematological studies

Blood samples were collected from the kids at the end of the experiment to estimate haemoglobin (cyan-methemoglobin method), total protein (Biuret method) (Jong and Vegeter, 1950), albumin (Bromocresol green method) (Dumas *et al.*, 1971), blood urea nitrogen (BUN) (Berthelote method), creatinine, aspartate amino-transferase (AST) and alanine amino-transferase (ALT) (Reitman and Frankel, 1957). Calcium and phosphorus (AOAC, 2016) were assessed using standard kits in separated

Table 1. Ingredient composition of the complete feeds

Ingredients	Parts		
	T1	T2	T3
Maize	30	25	24
De-oiled rice bran	20	20	20
De-oiled coconut oil cake	8	6	5
Alfa-alfa pellet	11	10	7
Rice polish	2	2	2
Black gram husk	16	14	9
Spent cumin seeds	0	10	20
Straw	10	10	10
Common salt	1	1	1
Calcite	1.5	1.5	1.5
Mineral mixture	0.5	0.5	0.5
Total	100	100	100

Table 2. ¹Chemical composition of the complete feeds (on DM basis)

Nutrients (%)	Composition		
	T1	T2	T3
Dry matter (DM)	93.92±0.16	92.67±0.44	93.94±0.21
Crude protein (CP)	16.11±0.26	16.07±0.19	16.01±0.33
Crude fibre (CF)	15.89±0.04	16.88±0.02	17.89±0.66
Ether extract (EE)	2.53±0.25	2.29±0.05	2.21±0.81
Total ash (TA)	10.04±0.04	11.26±0.18	10.98±0.31
Nitrogen Free Extract (NFE)	55.43±0.19	53.5±0.23	52.91±0.38
Acid insoluble ash (AIA)	5.21±0.02	4.89±0.04	4.67±1.01

¹Mean values are based on six replicates

Table 3. Haematological and serum biochemical parameters¹ of experimental kids

Parameters	T1	T2	T3	p value
Blood haemoglobin (g/dL)	10.73±0.05	10.76±0.06	11.07±0.18	0.101 ^{ns}
Total protein (g/dL)	7.25±0.18	7.11±0.09	6.88±0.09	0.156 ^{ns}
Calcium (mg/dL)	9.04±0.26	9.11±0.42	9.32±0.13	0.793 ^{ns}
Phosphorus (mg/dL)	5.70±0.17	5.49±0.18	5.48±0.09	0.534 ^{ns}
Albumin (mg/dL)	3.44±0.06	3.54±0.05	3.55±0.07	0.405 ^{ns}
ALT (IU/L)	83.60 ^b ±2.03	83.55 ^b ±1.46	89.62 ^a ±0.60	0.016 [*]
AST (IU/L)	24.01±2.47	24.74±1.70	21.61±2.08	0.561 ^{ns}
Creatinine (mg/dL)	0.77±0.03	0.84±0.01	0.83±0.02	0.080 ^{ns}
BUN (mg/dL)	12.85±0.34	13.20±0.35	12.39±0.45	0.343 ^{ns}

¹Mean values are based on six replicates

ns-non significant ($p>0.05$)

^{*}Means bearing different superscripts (a,b) within a row differ significantly ($p<0.05$)

serum by using Semi Automated Biochemical Analyser. Data obtained on various parameters were analysed statistically by using SPSS 21.0 software.

Results and discussion

The total body weight gain of kids belonging to dietary treatments T1, T2 and T3

were 2.78, 3.41 and 3.88 kg, respectively and it was revealed that T3 had significantly higher weight gain compared to other groups. This may be attributable to the ability of spent cumin seeds to reduce intestinal concentrations of undesirable microbial metabolites (ammonia and biogenic amines), which relieved intestinal difficulties, stabilised the digestive system, and eventually improved weight gain (Franz *et al.*,

2010). The feed cost per kg body weight gain of kids belonging to dietary treatments T1, T2 and T3 were Rs. 164.87, 136.09 and 133.12, respectively.

The haematological and serum biochemical parameters of the experimental kids such as haemoglobin, serum total protein, calcium, phosphorus, albumin, alanine aminotransferase (ALT), aspartate aminotransferase (AST), blood urea nitrogen (BUN) and creatinine (estimated at the end of the experiment) are listed in Table 3.

Statistical analysis of data revealed that the values of haematological and serum biochemical parameters (haemoglobin, serum total protein, calcium, phosphorus, albumin, alanine aminotransferase (ALT), aspartate aminotransferase (AST), blood urea nitrogen (BUN) and creatinine) recorded in the present study were similar between the treatment groups and were within the normal range reported for the species (Kaneko *et al.*, 2008). The values of AST were higher in kids fed T3 ration compared with those fed T1 and T2 ($p < 0.05$), but the values were within the normal range.

Similarly, Jasmine *et al.* (2018) reported that the values of haemoglobin, total protein, calcium, phosphorus, ALT, creatinine and BUN were not influenced by the supplementation with spent rosemary meal in Malabari kids except AST concentration which was significantly higher in spent rosemary meal supplemented group (at 10 per cent level) compared to control and 20 per cent supplemented group. Awad and Shwayel (2020) reported that the black local goats fed with cumin seeds at the level of 10 and 20 g per day did not show any significant difference in serum total protein and blood urea nitrogen than those fed with control diet. Modi *et al.* (2022) reported that the haemoglobin, total protein, albumin, blood urea and creatinine concentrations were not altered between the cumin seed supplemented group (10g/day/animal) and control group in Mehsana goats.

In contrast, El-Naggar and Ibrahim (2018) reported that the total protein concentration in Barki lambs was significantly

higher in groups fed with cumin or garlic powder (two per cent of concentrate mixture) when compared to control group. El-Essawy *et al.* (2019) reported that plasma creatinine concentration had significantly increased in lambs supplemented with two millilitre/day of anise, clove and thyme essential oils (0.93, 1.21 and 1.55 mg/dL, respectively) compared with control lambs.

Conclusion

It could be implied that, inclusion of spent cumin seeds up to 20 per cent level in complete diets had no adverse effect on serum biochemical parameters in kids upto 7 months of age and the values were within the normal range reported for the species. Also, inclusion of spent cumin seeds up to 20 per cent level was cost effective in complete feed ration without compromising growth performance of goat kids.

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