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RESEARCH ARTICLE

EFFECT OF FEEDING DRUMSTICK (*MORINGA OLEIFERA*) TREE LEAVES AT DIFFERENT LEVELS ON BLOOD BIOCHEMICAL PARAMETERS IN BROILER RABBITS

*Siddeswara, N.C., Guruprasad, R., Y.B. Rajeshwari, Shivakumar, R., Abdul Mateen, K.W.,
Uday Kumar and J. Shilpa Shree

Dept. of Livestock Production and Management, Veterinary College, Bengaluru-24

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ABSTRACT

Numbers of population studies have linked elevated concentration of Total Cholesterol or Low density lipid (LDL) cholesterol in plasma with increased incidence of atherosclerotic events. In India, for instance the leaves of *Moringa oleifera* Lam are claimed to possess cholesterol-reducing effect and are used to treat patients with heart disease and obesity. In this direction, leaves of *Moringa oleifera*, a leguminous forage tree can be a good unconventional feed supplement for animals and its effect on blood parameters was studied in this experiment. The mean serum total cholesterol (mg/dl) values during feeding trial ranged between 84.25 ± 3.17 (T₃) and 117.30 ± 1.55 (T₂). This shows that inclusion of *M.oleifera* leaves have hypolipidaemic effect. The blood glucose concentration in rabbits was significantly depressed at 10% level of Moringa incorporation because Moringa is known to possess anti-hyperglycemic effect or hypoglycemic effect. The hypoglycemic effect and hypolipidaemic effect was noticed in the groups fed with *Moringa oleifera* leaves, thus we may recommend the inclusion of *Moringa oleifera* leaves in the diet of human beings those suffering with high blood sugar level and higher blood cholesterol / lipid levels. And also further studies are desirable to know the maximum level of inclusion of *Moringa oleifera* leaves in broiler rabbits diet.

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INTRODUCTION

In India, the human population is tremendously increasing that directly creates a greater demand for food in general and protein in particular. To meet the demand, the production of animal source protein is concentrated mainly on large animals, which is not sufficient enough. Rabbit production for meat in this direction could make a substantial contribution to animal protein supplies in many developing countries including India (Owen et al., 1977). So rabbit meat has great potential in meeting world needs in general and developing countries in particular (Cheeke, 1980). Food and Agricultural Organisation has projected small or micro-livestock like rabbits as perfect answer to demand for sustainable development schemes and one third of the global meat requirement would be met from rabbit meat alone. Many biological and managerial attributes associated with micro-livestock include small body size, short generation interval, utilization of unconventional feeds, rapid growth rate, potential for genetic improvement and production of high quality meat with less cholesterol content.

Numbers of population studies have linked elevated concentration of Total Cholesterol or Low density lipid (LDL) cholesterol in plasma with increased incidence of atherosclerotic events (Goldstein et al., 1973; Keys, 1975). It has further been shown that the clinical complications of atherosclerosis could be diminished and the life is prolonged when plasma lipids are lowered by hypocholesterolemic agents (Lipid Research Clinics Program, 1984a, 1984b; Helsinki Heart Study, 1987). In many cultures of the world, herbal remedies are increasingly being employed in an attempt to achieve the same purpose. In India, for instance the leaves of *Moringa oleifera* Lam are claimed to possess cholesterol-reducing effect and are used to treat patients with heart disease and obesity. In this direction, leaves of *Moringa oleifera*, a leguminous forage tree can be a good unconventional feed supplement for animals and its effect on blood parameters was studied in this experiment.

MATERIALS AND METHODS

Feeding trial on six to eight weeks old broiler rabbits was carried out to know the nutritional quality and digestibility of *Moringa oleifera* leaves. The trial was carried out during

*Corresponding author: *Siddeswara, N.C.,
Dept. of Livestock Production and Management, Veterinary College,
Bengaluru-24.

October and January for the period of 90 days. The feeding trial was aimed to assess the growth performance and Hematological parameters, where the total dry matter intake was fixed at six percent of body weight, with *Moringa oleifera* leaves at different levels (0, 5 and 10%). Twenty-four broiler rabbits such as Russian grey giant chinchilla and cross-bred of six to eight weeks old with comparable weight were obtained from small animal house, Department of Livestock Production and Management, Veterinary College, Hebbal, Bangalore. Twenty-four rabbits were randomly allotted to three groups comprising of eight (4 male and 4 female) in each treatment group. Three iso-nitrogenous and iso-caloric complete diets based on their chemical composition were formulated as per NRC (1977). Diets containing concentrate, Rhodes hay and *Moringa oleifera* fresh leaves. Rhodes hay was chopped and ground to 1to2mm size before it was incorporated into concentrate mixture to make compound diet. The *Moringa oleifera* fresh leaves in the diets were incorporated as supplement to form three diets as described in the Table 1.

Table 1. Description of various experimental diets

Treatment	Description of diets
T ₁	Control with compound feed mixture
T ₂	5% DM in the compound feed mixture replaced by <i>Moringa oleifera</i> fresh leaves
T ₃	10% DM in the compound feed mixture replaced by <i>Moringa oleifera</i> fresh leaves

The blood samples were collected from marginal ear vein of each rabbit at 30th, 60th and 90th day of the experiment. The blood was collected in three separate sterile glass tubes, one with EDTA (1 mg/ml) and other without EDTA and another with sodium pruside. Blood collected in EDTA tubes was used for haemoglobin estimation. Tubes without EDTA and sodium pruside were kept in slant position for four to six hrs to separate out the serum. Serum from tubes without EDTA was then subjected for analyzing serum total protein fractions, serum total cholesterol and serum triglycerides, and serum from tubes with sodium pruside for use for estimation of blood glucose using colorimetric methods.

RESULTS AND DISCUSSION

The estimation of blood biochemical components will be a useful and sensitive index for assessing the effect of incriminating principles in the feed. The average blood biochemical values of broiler rabbits at different periods of time (starting from day one, at an interval of 30 days) during feeding trial was depicted in the Table 2 and described under the following headings:

a. Haemoglobin

The mean cumulative Haemoglobin (g/dl) values of treatment groups were 14.34±0.38 (T₁), 14.69±0.57 (T₂) and 14.90±0.56 (T₃). There was no significant difference ($P \geq 0.05$) among treatment groups at each period of blood collection and cumulative mean values. The present study observations were higher than the reports of Dhanapal *et al.* (2001) (12g/dl), Vasanthkumar *et al.* (2001), Rajanna (2004) and Giridhar (2005). And present study values are comparable with the reported values of Fanimio *et al.* (2003), who fed with cashew apple waste to rabbits. However, the higher Haemoglobin values observed in T₂ and T₃. This may be attributed to the inclusion of *Moringa* Leaves.

Table 2. Average blood biochemical values of Broiler rabbits at different Periods of Time during Feeding Trial

Day	Treatments		
	T1	T2	T3
Haemoglobin (g/dl)			
0	13.20 ± 0.14	13.00 ± 0.18	13.25 ± 0.22
30	14.70 ± 0.53	14.95 ± 0.36	15.15 ± 0.17
60	14.60 ± 0.29	15.30 ± 0.34	15.65 ± 0.22
90	14.85 ± 0.35	15.50 ± 0.24	15.55 ± 0.21
Cumulative	14.34 ± 0.38	14.69 ± 0.57	14.90 ± 0.56
Serum total protein (g/dl)			
0	6.55 ± 0.27	6.30 ± 0.18	6.50 ± 0.26
30	6.15 ± 0.18	6.28 ± 0.28	6.55 ± 0.18
60	6.00 ± 0.18	5.88 ± 0.27	6.35 ± 0.21
90	5.95 ± 0.23	6.30 ± 0.27	6.40 ± 0.29
Cumulative	6.26 ± 0.17	6.20 ± 0.11	6.44 ± 0.04
Serum total cholesterol (mg/dl)			
0	116.50 ± 3.12	117.30 ± 1.55	115.50 ± 3.12
30	116.30 ± 3.09	111.00 ± 4.14	112.30 ± 2.66
60	113.50 ± 8.03	108.30 ± 4.82	95.75 ± 2.36
90	115.30 ± 3.20 ^a	101.50 ± 6.61 ^{ab}	84.25 ± 3.17 ^b
Cumulative	115.40 ± 0.68	109.50 ± 3.26	100.40 ± 6.72
Serum triglycerides (mg/dl)			
0	123.30 ± 3.04	120.80 ± 3.40	121.80 ± 2.87
30	127.80 ± 3.57	127.80 ± 2.06	123.30 ± 2.39
60	124.50 ± 3.30	121.80 ± 1.38	122.80 ± 2.96
90	125.00 ± 3.54	121.30 ± 3.35	119.30 ± 1.97
Cumulative	125.10 ± 0.95	122.90 ± 1.64	121.80 ± 0.89
Serum glucose (mg/dl)			
0	84.75 ± 2.39	87.00 ± 2.27	83.75 ± 2.14
30	86.75 ± 1.65	86.75 ± 1.75	85.25 ± 2.69
60	87.00 ± 3.08	85.75 ± 2.50	82.75 ± 2.18
90	88.50 ± 1.85	87.25 ± 2.59	82.50 ± 2.33
Cumulative	86.75 ± 0.77 ^a	86.69 ± 0.33 ^{ab}	83.56 ± 0.62 ^b

** Means bearing same superscript did not differ significantly ($P \geq 0.01$)

b. Serum Total Protein

The mean cumulative serum total protein (g/dl) values were 6.26±0.17 (T₁), 6.20±0.11 (T₂) and 6.44±0.04 (T₃). The present study serum total protein values were comparable with findings of Meena (1998), Fanimio *et al.* (2003), Rajanna (2004), Giridhar (2005), But lower than the reports of Ghasi *et al.* (2000), Vasanthkumar *et al.* (2001). Thus feeding of graded levels of *Moringa* leaves did not influence total serum protein. Serum protein and Haemoglobin concentrations showed that the health status of the animals was normal. Because serum protein and Haemoglobin tend to be positively correlated with protein quality and level (Eggum, 1970; Onifade and Abu, 1998), thus there appears to be no adverse influence on feed quality owing to *Moringa oleifera* leaves addition to the rabbit's diet.

c. Serum Total Cholesterol

The mean serum total cholesterol (mg/dl) values during feeding trial ranged between 84.25±3.17 (T₃) and 117.30±1.55 (T₂). The statistically significant difference ($P \leq 0.01$) was observed between the T₁ and T₃ at 90th day of blood collection. This shows that inclusion of *M.oleifera* leaves have hypolipidaemic effect. This observation was similar to the observation made by Ghasi *et al.* (2000) and Komal *et al.* (2003). In general plant sterols inhibit the absorption of dietary cholesterol, but the resulting decrease in serum cholesterol has been slight (Lees *et al.*, 1977, Grundy *et al.*, 1969). *M.oleifera* has been shown to contain β -sitosterol (Saluja *et al.*, 1978). This may be responsible for cholesterol lowering effect by inhibition in reabsorption of cholesterol from endogenous sources in association with a simultaneous increase in its excretion into faeces in the form neutral steroids

(Ghasi *et al.*, 2000 and Komal *et al.*, 2003). So this may be the reason for lower serum total cholesterol values in Moringa fed groups.

Serum Triglycerides

The mean cumulative serum triglyceride (mg/dl) values were 125.10±0.95 (T₁), 122.90±1.64 (T₂) and 121.80±0.89 (T₃). There was no statistical significant difference (P>0.05) between treatment groups. However, lower mean serum triglyceride values observed in Moringa leaves fed groups (T₂ and T₃). This may be suggestive of the reason stated for serum total cholesterol.

e. Blood Glucose

The mean cumulative serum / blood glucose (mg/dl) values were 86.75±0.77 (T₁), 86.69±0.33 (T₂) and 83.56±0.62 (T₃). There was significant difference between T₁ and T₃ with respect to the mean cumulative blood glucose values. The blood glucose concentration in rabbits was significantly depressed at 10% level of Moringa incorporation because Moringa is known to possess anti-hyperglycemic effect or hypoglycemic effect (Makonnen, 1997). The present study observations were comparable to findings of Vasanthkumar *et al.* (2001) who fed neem seed kernel cake to rabbits.

Conclusion

The present study was conducted to observe the effect of feeding drumstick (*Moringa oleifera*) tree leaves at different levels on blood biochemical parameters in broiler rabbits which revealed that the mean serum total cholesterol (mg/dl) values during feeding trial ranged between 84.25±3.17 (T₃) and 117.30±1.55 (T₂). This shows that inclusion of *M.oleifera* leaves have hypolipidaemic effect. The blood glucose concentration in rabbits was significantly depressed at 10% level of Moringa incorporation because Moringa is known to possess anti-hyperglycemic effect or hypoglycemic effect. The hypoglycemic effect and hypolipidaemic effect was noticed in the groups fed with *Moringa oleifera* leaves, thus we may recommend the inclusion of *Moringa oleifera* leaves in the diet of human beings those suffering with high blood sugar level and higher blood cholesterol / lipid levels. And also further studies are desirable to know the maximum level of inclusion of *Moringa oleifera* leaves in broiler rabbits diet.

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