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Effect of feeding different levels of moringa leaf powder on serum biochemical parameters in Raja II broiler chicken

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Abstract

An experiment was conducted to study the effect of feeding different levels of Moringa leaf powder on serum biochemical parameters in Raja II broiler chicken. A total of 150 one day old Raja II broiler chicks were distributed into five treatment groups with three replicates in each group and ten chicks in each replicate. Basal diet (T1) prepared following Indian council of agricultural research (2013) standards and the experimental diets were prepared by incorporating moringa leaf powder at 2.5 per cent (T2), 5 per cent (T3), 7.5 per cent (T4) and 10 per cent (T5). Results revealed that significant reduction in serum cholesterol and triglycerides in experimental diet containing 5, 7.5 and 10 per cent of moringa leaf meal compared to 2.5 per cent moringa leaf meal and control group whereas rest of the serum biochemical parameters viz., low density lipoproteins and high density lipoproteins showed no significant difference among different treatment groups when compared to control group.

Keywords: moringa, serum biochemical parameters and Raja II broiler chicken

Introduction

Moringa oleifera is the most widely cultivated species of the genus *Moringa*. It is a fast-growing, drought-resistant tree native to the Himalayas in northwestern India and widely cultivated in tropical and sub-tropical areas of India. It possesses important medicinal properties which include antibacterial and antifungal activities (Nickon *et al.*, 2008) [6].

Moringa oleifera is an important food commodity which has had enormous attention as the 'natural nutrition of the tropics. These are traditionally used for different purposes, but leaves are generally the most used. In particular, they are used in human, livestock and poultry nutrition and in the traditional medicine. Leaves contain significant amounts of protein, vitamin C, calcium and potassium, beta-carotene and act as a good source of natural antioxidants (Leone *et al.*, 2015) [8].

Bolu *et al.* (2013) [3] supplemented MOLM at 0, 2.5, 5 and 7.5 per cent to broiler diets and inferred that the LDL decreased as the level of MOLM increased and recommended MOLM up to 5 per cent inclusion level.

Dey and Parthasarathi (2013) [4] studied the influence of *Moringa oleifera* leaves as a functional feed additive on serum lipid profile of broiler chickens. Results revealed that there was reduction ($P<0.01$) in triglycerides, total cholesterol and LDL-cholesterol levels and increase ($P<0.01$) in HDL-cholesterol levels in MOL supplemented birds. However, no difference ($P>0.05$) was observed between the MOL supplemented birds.

Akinola and Ovotu (2018) [2] concluded that the inclusion of MOLM in layers diet favoured the good cholesterol, HDL of the fresh eggs at levels of 0.5 and 1.0 per cent inclusion and stored eggs at the end of first week. However, an indication of possible negative effect was shown in haematological parameters which decreased in haemoglobin, packed cell volume, mean corpuscular haemoglobin and mean corpuscular volume.

Sugiharto *et al.* (2020) [7] studied the effect of feeding fermented mixture of cassava pulp and *Moringa oleifera* leaf meal on immune responses and antioxidative status and revealed that the level of serum total triglycerides was lower in the group fed with fermented mixture of cassava pulp and *Moringa oleifera* leaf meal than the control group.

Materials and Methods

A total of one hundred and fifty, day-old Raja II broiler chicks were procured from the Department of Poultry Science, Veterinary College, Hebbal, Bengaluru. All the chicks were

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weighed and wing banded individually. The chicks were allocated to five different treatment groups each consisting of three replicates with 10 chicks each (30 chicks per treatment). Each of the treatment groups fed with different types of experimental diets. The control group T₁ fed with basal diet as per Indian council of agricultural research (2013) standards. The treatment groups T₂, T₃, T₄ and T₅ fed with basal diet containing different levels (T₂ - 2.5%, T₃ - 5%, T₄ - 7.5% and T₅ - 10%) of *Moringa* leaves powder. The chicks were reared in deep litter system and maintained under standard managemental practices till 6 weeks of age. Standard vaccination schedule followed for immunizing the birds. Birds were fed with diets as per the ICAR (2013) specifications. Feed and water provided *ad libitum* throughout the experimental period. Blood samples were collected from two birds from each replicate at the end of the trail. Serum will be separated and analysed for biochemical parameters viz., serum cholesterol, low density lipoprotein (LDL), high density lipoprotein (HDL) and triglycerides by auto analyser.

Results and Discussion

The results of the effect of feeding different levels of moringa leaf powder on serum biochemical parameters at 42nd day in Raja II broiler chicken are presented in Table 1. There was significant difference ($P \leq 0.05$) in serum cholesterol and triglycerides but no significant difference ($P > 0.05$) in low density lipoprotein (LDL) and high density lipoprotein (HDL) of birds in the groups fed with *Moringa* leaf powder compared to the control group at the end of the experiment (42nd week day).

At the end of 42nd day, the serum cholesterol values were 137.13 (T₁), 130.04 (T₂), 119.76 (T₃), 117.23 (T₄) and 112.75 (T₅) (mg/dl) and triglycerides were 97.57 (T₁), 90.17 (T₂), 71.08 (T₃), 75.92 (T₄) and 77.65 (T₅) (mg/dl). Statistical analysis revealed serum cholesterol and triglyceride contents were significantly different ($P \leq 0.05$) among the dietary treatment groups. The serum cholesterol and triglyceride contents were significantly lower in the treatment groups T₃, T₄ and T₅ compared to control and T₂. There was no significant difference ($P > 0.05$) in the serum cholesterol and triglyceride contents were noticed among T₃, T₄ and T₅ and also among treatment group T₁ and T₂.

In treatment groups T₁, T₂, T₃, T₄ and T₅ the serum high density lipoprotein (mg/dl) values at the end of the experiment were 71.32, 73.52, 74.02, 74.92 and 70.01, respectively and the LDL (low density lipoprotein) were 46.08, 42.52, 40.19, 43.06 and 47.16 (mg/dl). Statistical non-significant difference ($P > 0.05$) was observed in the serum

HDL and LDL among all the treatment groups.

The results of present study are agreement with Aderinola *et al.* (2013) [1] who conducted the experiment with MOLM at 0.0, 0.5, 1.0, 1.5 and 2.0 per cent in broilers and observed that serum biochemical indices were significantly ($P < 0.05$) different with 2.0 having the highest values except total cholesterol and triglyceride. Triglycerides, total cholesterol and Urea in blood serum of broilers were significantly different ($P < 0.05$) among the groups. However, SGPT and SGOT values were not found to be significantly different. The cholesterol value of the group fed without MOLM diet were the highest. The triglycerides and cholesterol level were significantly ($P < 0.05$) decreased as the inclusion level of MOLM increased.

The results of present study are similar with Dey and Parthasarathi (2013) [4] who studied the influence of *Moringa oleifera* leaves as a functional feed additive on serum lipid profile of broilers. Results revealed that there was reduction ($P < 0.01$) in triglycerides, total cholesterol and LDL-cholesterol levels and increase ($P < 0.01$) in HDL-cholesterol levels in MOL supplemented group. However, no difference ($P > 0.05$) was observed between the MOL supplemented groups.

The findings of present study are agreement with Sugiharto *et al.* (2020) [7] studied the effect of feeding fermented mixture of cassava pulp and *Moringa oleifera* leaf meal on immune responses and antioxidative status and revealed that the level of serum total triglycerides was lower in the group fed with fermented mixture of cassava pulp and *Moringa oleifera* leaf meal than the control group.

The significant reduction in the cholesterol and triglycerides in the experimental diets fed with different levels of *Moringa oleifera* leaf meal might be due to hypocholesteric property of *Moringa oleifera*.

The present study is in disagreement with Bolu *et al.* (2013) [3] who supplemented MOLM at 0, 2.5, 5 and 7.5 per cent to broiler diets and interpreted that the LDL decreased as the level of MOLM increased and recommended MOLM up to 5 per cent inclusion level.

The present study is in contrary with Akinola and Ovotu (2018) [2] who indicated that the inclusion of the leaf meal of *Moringa oleifera* in layers diet favoured the good cholesterol, HDL of the fresh eggs at levels of 0.5 and 1.0 per cent inclusion and the stored eggs at the end of day 7 (first week). However, an indication of possible negative effect was shown in haematological parameters which decreased in Hb, PCV, MCH and MCV.

Table 1: Effect of feeding different levels of *Moringa oleifera* leaf powder on Serum biochemical parameters (Mean \pm SE) in Raja II broiler birds.

Experimental group	Description of the treatment	Serum Cholesterol (mg/dl)	Triglycerides (mg/dl)	HDL (mg/dl)	LDL (mg/dl)
T1	Basal Diet	137.13 \pm 3.87 ^a	97.57 \pm 1.27 ^a	71.32 \pm 1.36	46.08 \pm 4.71
T2	2.5% <i>Moringa oleifera</i> leaves powder in basal diet	130.04 \pm 3.92 ^a	90.17 \pm 2.49 ^a	73.52 \pm 2.22	42.52 \pm 3.67
T3	5% <i>Moringa oleifera</i> leaves powder in basal diet	119.76 \pm 3.35 ^b	71.08 \pm 3.93 ^b	74.02 \pm 1.31	40.19 \pm 2.29
T4	7.5% <i>Moringa oleifera</i> leaves powder in basal diet	117.23 \pm 3.34 ^b	75.92 \pm 7.09 ^b	74.92 \pm 2.23	43.06 \pm 2.63
T5	10% <i>Moringa oleifera</i> leaves powder in basal diet	112.75 \pm 6.24 ^b	77.65 \pm 5.15 ^b	70.01 \pm 2.41	47.16 \pm 2.53

^{ab} Means in the same column with no common superscript differ significantly ($P \leq 0.05$)

Conclusion

Based on the above result it was concluded that inclusion of moringa leaf powder at 5, 7.5 and 10 per cent level was beneficial in lowering serum cholesterol and serum triglycerides in Raja II broiler birds but there was no significant difference ($P>0.05$) among 5, 7.5 and 10 per cent level of moringa leaf powder, hence it was concluded that limiting 5 per cent rather than higher per cent of MOLM will be beneficial in lowering serum cholesterol and serum triglycerides in Raja II broiler birds.

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