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Effect of Feeding Different Levels of Moringa Leaf Powder on Immune Response in Raja II Broiler Chicken

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A B S T R A C T

An experiment was conducted to study the effect of feeding different levels of Moringa leaf powder on immunological response 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). Blood samples will be collected from two birds from each replicate on 42nd day. Serum will be separated and antibody titer against Newcastle disease virus and Infectious bursal disease virus will be estimated by HI and ELISA test, respectively. At the end of the experiment, two birds from each replicate in each treatment groups will be slaughtered to record the weights of lymphoid organs viz., thymus, bursa fabricius and spleen. Results revealed no significant improvement on immune response against Newcastle disease and Infectious bursal disease on the 42nd day of the experiment and also non-significant difference on immune organ weight.

Introduction

Chickens are important source of animal protein and can be raised in situations with limited feed resources (Olwande *et al.*, 2010). In other hand poultry industry is highly dependent on feed cost which accounts the major cost of poultry production. The bulk of the feed cost arises from protein concentrates such as soybean Meal (SBM), groundnut cake and fish meal. Prices of these conventional protein sources have soared so high in recent times that it is becoming uneconomical to use them in poultry feeds. There is a need

therefore, to look for locally available and cheap sources of feed ingredients. One possible source of cheap protein is the leaf meal of tropical legumes. Many studies have been conducted using various sources of leaf meal proteins for poultry (Iheukwumere *et al.,* 2008; Wude and Berhan, 2009; Onyimonyi *et al.,* 2009).

Leaf meals do not only serve as source of protein but also provides some necessary vitamins, minerals and oxycarotenoids (D'Mello *et al.,* 1987; Opara, 1996). One plant that can serve as source of leaf meal in the diet of poultry is *Moringa olifera* tree (Kakengi *et al.,* 2007; Olugbemi *et al.,* 2010). *Moringa oleifera* has been claimed to boost immune systems (Fuglier, 1999), such property of the plant most likely might be contained and restricted to the pods and leaves which possesses lectin, a substance that modulates body defence system.

Allam *et al.,* (2016) reported that Moringa leaf extract act as antibacterial growth promoter, antioxidant, claimed to boost immune systems and hemato-biochemical parameters in broilers. The average HI titre revealed non significant ($P > 0.05$) differences among the experimental groups. The supplementation of moringa leaf powder in broiler diet could not exert significant changes in antibody titre against Ranikhet disease in broilers.

El-Deep *et al.,* (2019) found that mRNA expression of IL2 and IL6 significantly increased at 5 per cent *Moringa oleifera* leaf meal inclusion in broilers under normal and heat stress condition. The cell-mediated immune response to phytohaemagglutinin phosphate was not influenced, but the antibody titre and humoral immune response against Newcastle disease (ND) vaccine was significantly ($P < 0.05$) improved and reduced the lipid peroxidation in the liver of commercial broilers by supplementation of MOLM up to1000 mg/ kg of diet in broiler diet at 42 days of age (Rao *et al.,* 2019).

Sugiharto *et al.,* (2020) studied the effect of feeding fermented mixture of cassava pulp and *Moringa oleifera* leaf meal on immune responses and antioxidative status and revealed that higher serum superoxide dismutase activity, lower malondialdehyde biomarker and better haematological values in the group fed with fermented mixture of cassava pulp and *Moringa oleifera* leaf meal than control indicates better antioxidative status of broilers.

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 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 T_1fed with basal diet as per Indian council of agricultural research (2013) standards. The treatment groups T_2, T_3, T_4 and T_5 fed with basal diet containing different levels (T_2 - 2.5 %, T_3 - 5 %, T_4 – 7.5 % and T_5 -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 will be collected from two birds from each replicate on 42nd day. Serum will be separated and antibody titer against new castle disease virus and infectious bursal disease virus will be estimated by HI and ELISA test, respectively.

At the end of the experiment, two birds from each replicate in each treatment groups will be slaughtered to record the weights of lymphoid organs viz., thymus, bursa fabricius and spleen.

Results and Discussion

The results of the effect of feeding different levels of Moringa leaf powder on antibody titers against Newcastle disease and Infectious bursal disease during 42nd day in Raja II broiler chicken were presented in Table 1 and lymphoid organ weights in Table 2.There was no significant difference (P > 0.05) on lymphoid organ weight and immunological response against Newcastle disease and Infectious bursal disease of birds in the groups fed with Moringa leaf powder compared to the control group at the end of the experiment (6th week).

At the end of 42ndday, the antibody titers against Newcastle disease in groups T_1, T_2, T_3, T_4 and T_5 were1.361, 1.386, 1.407, 1.404 and 1.391 and the antibody titers against Infectious bursal disease were 2560.34, 2431.65, 2489.78, 2514.56 and 2526.17, respectively.

The weight of thymus (%) on 42ndday of the experiment in groups T_1, T_2, T_3, T_4 and T_5 were 0.306, 0.317, 0.324, 0.312 and 0.320; weight of bursa of fabricus (%) were 0.132, 0.138, 0.133, 0.139 and 0.141 and weight of spleen (%) were 0.164, 0.181, 0.174, 0.186 and 0.180, respectively.

In similar to the present study Eze *et al.,* (2013) who studied immune boosting potential of crude methanolic extract of *Moringa oleifera* in broilers experimentally challenged with Newcastle disease (ND) virus reported increases in total and differential cell numbers and haemagglutination inhibition (HI) titre in the extracts of *Moringa oleifera* treated groups did not correlate with total protection against ND. The present study is in agreement with (Laxman *et al.,* 2016) who conducted the experiment in which the average HI titre revealed non-significant (P > 0.05) differences among the experimental groups. The supplementation of moringa leaf powder in broiler diet could not exert significant changes in antibody titre against Ranikhet disease in broilers.

The results of present study are similar with Allam *et al.,* (2016) who reported that Moringa leaf extract act as antibacterial growth promoter, antioxidant, claimed to boost immune systems and hemato-biochemical parameters in broilers.

The average HI titre revealed non significant (P > 0.05) differences among the experimental groups. The supplementation of moringa leaf powder in broiler diet could not exert significant changes in antibody titre against Ranikhet disease in broilers.

The present study is in agreement with Laxman (2016) who conducted the experiment, in which immune organs revealed non-significant (P > 0.05) differences among the experimental groups. In similar to the present study Eze *et al.,* (2013) conducted the experiment, in which immune organs revealed non-significant difference among the experimental groups when compared to the control group.

The present study is in contrary with Didacus *et al.,* (2013) who observed that *Moringa oleifera* extract increased ND HI titre and the total and differential leukocyte counts in MOLM treated and unvaccinated group I much more than those of MOLM treated and vaccinated group II, hence it could be recommended as a prophylactic treatment against ND in non-vaccinated birds.

Table.1 Effect of feeding different levels of *Moringa oleifera* leaf powder on antibody titers against Newcastle disease (log_{10} HI titer) and Infectious bursal disease (ELISA) on 42nd day in Raja II broiler birds.

Experimental group	Description of the treatment	NDV	IBDV titer
T1	**Basal Diet**	1.361 ± 0.168	2560.34 ± 277.40
T2	**2.5 % *Moringa oleifera* leaves powder in basal diet**	1.386 ± 0.154	2431.65 ± 281.94
T3	**5 % *Moringa oleifera* leaves powder in basal diet**	1.407 ± 0.093	2489.78 ± 213.06
T4	**7.5 % *Moringa oleifera* leaves powder in basal diet**	1.404 ± 0.139	2514.56 ± 369.71
T5	**10 % *Moringa oleifera* leaves powder in basal diet**	1.391 ± 0.176	2526.17 ± 163.80

Table.2 Effect of feeding different levels of *Moringa oleifera* leaf powder on Lymphoid organs weight (% live weight) (Mean ± SE) in Raja II broiler birds

Experimental group	Description of the treatment	Lymphoid organs weight (g/100g body weight)		
		THYMUS	BURSA	SPLEEN
T1	**Basal Diet**	0.306 ± 0.017	0.132 ± 0.015	0.164 ± 0.037
T2	**2.5 % *Moringa oleifera* leaves powder in basal diet**	0.317 ± 0.023	0.138 ± 0.033	0.181 ± 0.021
T3	**5 % *Moringa oleifera* leaves powder in basal diet**	0.324 ± 0.012	0.133 ± 0.010	0.174 ± 0.024
T4	**7.5 % *Moringa oleifera* leaves powder in basal diet**	0.312 ± 0.028	0.139 ± 0.012	0.186 ± 0.012
T5	**10 % *Moringa oleifera* leaves powder in basal diet**	0.320 ± 0.022	0.141 ± 0.010	0.180 ± 0.015

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The findings of present study are disagreement with Rao *et al.*, (2019) who observed cell-mediated immune response to phyto-haemagglutinin phosphate was not influenced, but the antibody titre and humoral immune response against Newcastle disease (ND) vaccine was significantly ($P < 0.05$) improved and reduced the lipid peroxidation in the liver of commercial broilers by supplementation of MOLM up to1000mg/ kg of diet in broiler diet at 42 days of age. Based on the above results inclusion of different levels of moringa leaf powder in basal diet had no significant improvement on immune response against Newcastle disease and Infectious bursal disease on the 42nd day of the experiment and also showed non-significant ($P > 0.05$) difference on immune organs weight of birds fed with different treatment groups compared to control at the end of the experiment (42nd day).

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