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Effect of *Moringa Oleifera* leaf powder on growth performance of Japanese quail under cage system

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Abstract

The present study was conducted to evaluate the growth performance of quails chicks by substituting the four different levels of *Moringa oleifera* leaf powder (0%, 1.5%, 3% and 4.5%) by weight basis in feed. A total of 108 day old chicks were selected and after two weeks of brooding they were randomly divided into four experimental groups. Each group was further subdivided into 3 replicas containing 9 chicks in each. Different combinations of feed were offered to them for a period upto 12 weeks. The findings of above research work showed that birds fed on diets containing *Moringa oleifera* leaf powder (MOLP) gains significantly higher body weight and having more body weight gain than that of birds feeding on control diet (0% MOLP).

It could be concluded that inclusion of MOLP at 1.5%, 3% and 4.5% in quails diets improves the growth performance than control diet however, the best result on growth performance was shown by the birds fed on 1.5-3% MOLP.

Keywords: *Moringa oleifera* leaf powder (MOLP), Japanese quail, Growth performance

Introduction

Japanese quail (*Coturnix coturnix japonica*) is the most efficient biological machine for converting feed into animal protein of high biological value and hence is the cheapest source of animal protein for human diets. The Japanese quails serve as a good source of food and provide good animal protein in many underdeveloped areas of world (Chaturvedi, 1973) [1]. Many of the Asian countries are suffering from deficiency of animal protein which can be obtained from milk, meat, fish, eggs and from the poultry species.

In feed supplementation, herbal plant addition has an added advantage as it lacks any residual contamination effect. It has been observed that the production and other performances of animals vary under different managemental condition. As a herbal plant *Moringa oleifera* (The miracle plant) is having several properties, Which can enhance the growth and reproductive performance and immune status. Thus can act as enhancer of overall growth performance. India is the largest producer of Moringa. Best climatic requirement for growing Moringa is tropical or subtropical. Thus Jharkhand is suitable for production of Moringa and is widely distributed in different hilly and plane regions of Jharkhand. Moringa is grown in the home gardens of West Bengal and Odisha too.

One such plant is commonly known as the drumstick tree (Makker and Becker, 1997). The leaves of the trees have been reported to have an antioxidant activity due to higher amount of polyphenols (Mayo *et al.*, 2012) and are a rich source of vitamins. Its leaf meal may be a promising source of natural antioxidant for broiler meat. It also possesses antimicrobial activity due to its principle component pterygospermin. There are numerous uses of *Moringa oleifera* as medicine.

The pantropical cultivation and easy propagation of Moringa tree justify more intensive research into its biological and economic possibilities, particularly as useful feed ingredients and medicine. The essential nutrient contents of Moringa leaves/twigs such as Vit A and Vit B, calcium, iron, copper, sulphur and protein and its ability to absorb and neutralize toxic elements in food could justify its significance in developing the plant as one of the major local

feed stuffs.

Materials and methods

The present study was conducted at Avian Research Development Centre, Deptt. Of Livestock Production and Management, Ranchi Veterinary College, Ranchi.

Experimental birds and design

A total of 108 day old unsexed birds of Japanese quail were procured having nearly equal body weights were divided into four treatment groups (T0, T1, T2, T3) contained 27 chicks per group having three replicates of 9 chicks each. All the birds were offered isocaloric and isonitrogenous diets containing approx 24% CP from (0 to 6th weeks of age) and 20 % CP from (0 to 6th weeks of age). MOLP was not included in control diet (T0), while it was included in group T1, T2 and T3 at the rates of 1.5, 3.0 and 4.5 percent by weight substituting soyabean oil cake by same properties. The feed were provided twice daily at 8.30 am in morning and at 5 pm in the evening. Water was provided ad lib. The cages were made of iron wire and provided individually to every treatment groups. Space was provided as per standard in cage system of management.

The body weight of birds was recorded at 0 day, and at weekly interval up to 12 weeks of age in the morning before offering the feed. Residual feeds were collected daily and weighed for the calculation of other parameters during the experimental period.

Data obtained after experiment were analyzed as per the standard statistical methods described by Snedecor and Cochran (2004), applying one way ANOVA by using IBM SPSS (Statistical Package for the Social Sciences) statistics software.

Results and discussion

Effect of MOLP shows (Table no.1) significantly ($P \leq 0.05$) higher body wt. at 5th weeks of age onwards upto 11th weeks except at 7th weeks of age. At 5th, 6th, 8th, 9th and 10th weeks of age the average body weight of T1 and T3 groups are significantly higher ($P \leq 0.05$) than T2 and control group, where as in case of 11th weeks of age average body wt. of all the treatments group were significantly ($P \leq 0.05$) higher than control group. In 7th weeks of age average body weight. were not significantly different and the lowest average body wt. was observed for T2 group (107.50 ± 12.93) g. In 12th weeks of age effect of MOLP was not found significant ($P \leq 0.05$) on average body wt. of quails and the lowest body wt was observed for control group (185.67 ± 3.63) g. Overall highest body wt. was found in T3 group (126.55 ± 17.83) g than other treatment groups, however it was not significantly ($P \leq 0.05$) different from other treatment groups (T1 and T2).

The results of present experiment are in tune with the reports of Banjo (2012)^[5] who revealed that the inclusion of *Moringa oleifera* leaf meal with 1,2 and 3% levels in the diet of the broilers significantly ($P < 0.05$) increased their weight at 1% level which was significantly higher than the control. Similarly, the findings of Dey and De (2013)^[6] are also in accordance, they reported that 0.25 or 0.40 % MOLM in

broiler diets shows a significant ($P < 0.01$) improvement in body weight in comparison to control group. The present results are also in agreement with the findings of Tete et al. (2013)^[7] was observed that overall chick weights was increased significantly with age ($P < 0.05$) using 1 and 2 % MOLM in comparison to the control group.

On the other hand findings of Makanjuola et al. (2014)^[8] are not in harmony with the above findings, They found no significant changes in final body wt of broiler chickens when fed with 0.2, 0.4 and 0.6% MOLM to the diets for 28 days. Similarly, Paguia et al. (2014)^[9] also reported non significant changes in body wt when 0.20%, 0.30%, 0.40% and 0.50% MOLM were incorporated into the diets of broiler chicken.

The results of above research works were might be due to the more protein content higher digestibility of MOLP and low movement of birds under cage.

Effect of MOLP shows (Table no.2) significantly different body weight gain ($P \leq 0.05$) at 9th and 12th weeks, and also at 5th, 6th, 7th, 8th, 10th and 11th ($P \leq 0.01$) weeks of age. At 5th and 12th weeks of age highest body weight gain were found for T3 group. In case of 6th, 7th, 9th and 11th weeks of age highest body wt. gain were found in T1 group. At 8th weeks of age highest body wt. gain was found in T2 group (14.67 ± 1.45)g. At 10th weeks of age highest body wt. gain was found in control group (12.78 ± 0.61)g.

The results are in accordance with the finding of Ebenebe et al. (2012)^[10] who found that chicks fed on Moringa based diets performed significantly ($P < 0.05$) better than the birds under control group in term of their higher weight gain. The results of present experiment are also in tune with the reports of Banjo (2012)^[5] who revealed that the inclusion of *Moringa oleifera* leaf meal with 1,2 and 3% levels in the diet of the broilers significantly ($P < 0.05$) increased their weight gain at 1% level which was significantly higher than the control. Similarly, the findings of Dey and De (2013)^[6] are also in accordance, they reported that 0.25 or 0.40 % MOLM in broiler diets shows a significant ($P < 0.01$) improvement in Body weight gain in comparison to control group. The present results are also in agreements with the findings of Tete et al. (2013)^[7] who observed that overall chick weights was increased significantly with age ($P < 0.05$) using 1 and 2 % MOLM in comparison to the control group.

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The results of above research works were might be due to the more protein content and high nutritive value of MOLP.

Conclusion

On the basis of above finding it could be concluded that inclusion of *Moringa oleifera* leaf powder (MOLP) at levels of 1.5%-3% of the quail's diet improved the growth performance.

Table 1: Effect of MOLP on Average Body Weight (gm) of Japanese Quail under Cage System of Management.

Age/Treatment	TO	T1	T2	T3	F Value
0 DAY	5.94±0.04				
1st wk	11.63±0.46(BROODING PERIOD) (108)				
2nd wk	20.85±0.70(BROODING PERIOD) (108)				
3rd wk	36.83±1.97	35.17±1.77	34.00±1.67	37.00±1.91	NS
4th wk	52.17±1.53	51.17±2.72	49.50±2.40	50.17±2.56	NS
5th wk	61.33±1.74 ^a	72.83±2.73 ^b	65.67±4.13 ^a	74.33±3.07 ^b	*
6th wk	86.83±1.19 ^a	107.83±3.57 ^b	88.17±8.59 ^a	111.50±3.94 ^b	*
7th wk	110.67±3.44	130.50±2.30	107.50±12.93	129.83±8.30	NS
8th wk	126.67±2.94 ^a	146.83±4.35 ^b	124.00±8.46 ^a	149.17±3.20 ^b	*
9th wk	142.17±3.60 ^a	161.00±3.18 ^b	146.00±8.53 ^a	163.83±3.73 ^b	*
10th wk	152.50±4.47 ^a	171.83±2.70 ^b	160.67±7.84 ^a	171.50±4.37 ^b	*
11th wk	167.00±5.77 ^a	185.33±2.52 ^b	191.17±7.52 ^b	182.67±3.74 ^b	*
12th wk	185.67±3.63	201.17±7.10	202.17±5.13	195.50±4.78	NS
Overall	112.18±16.21	126.37±18.24	116.88±18.42	126.55±17.83	

Each value is the average of 27 observations.

* P < 0.05, ** P < 0.01, NS = Non-Significant

Table 2: Effect of MOLP on Average Body Weight Gain (gm) of Japanese Quail under Cage System Of Management.

Age/Treatment	TO	T1	T2	T3	SIG.
1st wk	4.95±0.54(BROODING PERIOD) (108)				
2nd wk	9.94±0.98(BROODING PERIOD) (108)				
3rd wk	16.17±0.44	16.83±0.44	16.00±0.28	16.52±0.28	NS
4th wk	20.37±0.42	20.52±0.48	20.27±0.20	20.33±0.33	NS
5th wk	8.95±0.23 ^b	5.51±0.41 ^a	9.69±0.37 ^b	12.64±0.83 ^c	**
6th wk	20.23±0.39 ^a	37.00±0.57 ^c	33.33±0.88 ^b	33.00±1.52 ^b	**
7th wk	18.34±0.59 ^a	24.67±0.88 ^b	18.30±0.35 ^a	16.95±0.53 ^a	**
8th wk	5.32±10.51 ^a	9.02±0.66 ^b	14.67±1.45 ^c	5.39±0.20 ^a	**
9th wk	17.02±0.44 ^b	18.33±0.88 ^b	12.00±1.15 ^a	11.85±0.93 ^a	*
10th wk	12.78±0.61 ^b	11.60±0.76 ^b	4.39±0.76 ^a	5.44±0.47 ^a	**
11th wk	10.65±0.32 ^a	17.85±0.71 ^c	16.00±0.57 ^b	15.00±0.57 ^b	**
12th wk	11.67±0.88 ^a	12.00±1.15 ^a	19.12±0.58 ^b	19.33±1.20 ^b	*
Overall	14.15±1.60	17.33±2.83	16.37±2.41	15.64±2.52	

Each value is the average of 27 observations.

* P < 0.05, ** P < 0.01, NS = Non-Significant

Table 3: Chemical composition of *Moringa oleifera* leaf powder (MOLP)

Constituents	Amount (per 100g)
Moisture	9
Protein	28.65
Lipid	7.09
Ash	10.9
Carbohydrate	44.36
Calcium(mg)	2.97
Magnesium(mg)	1.9
Zinc	1.58

Table 4: Starter and Grower Ration (0 To 6 Weeks of Age)

Ingredients	Control Ration (Cp%=24.81)	Treatment Ration 1 (Cp%=24.53)	Treatment Ration 2 (Cp%=24.25)	Treatment Ration 3 (Cp%=24.41)
Yellow Maize (%)	48	48	48	48
Soyabean Cake (%)	32	30.50	29	27.50
Wheat Bran (%)	6.50	6.50	6.50	6.50
Fish Meal (%)	11	11	11	11
Molp (%)	0	1.5	3	4.5
Min.Mix (%)	2	2	2	2
Salt (%)	0.50	0.50	0.50	0.50

Table 5: Layer Ration (6 Weeks onwards up to Experimental Period)

Ingredients	Control Ration (Cp%=20.95)	Treatment Ration 1 (Cp%=20.67)	Treatment Ration 2 (Cp%=20.40)	Treatment Ration 3 (Cp%=20.12)
Yellow Maize (%)	54.50	54.50	54.50	54.50
Soyabean Cake (%)	25	23.50	22	20.50
Wheat Bran (%)	5.50	5.50	5.50	5.50
Fish Meal (%)	8.50	8.50	8.50	8.50
Molp (%)	0	1.5	3	4.5
Oyster Shell Grit	4	4	4	4
Min. Mix (%)	2	2	2	2
Salt (%)	0.50	0.50	0.50	0.50

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