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Article

Effects of ipil ipil and calcium dietary sources on egg and growth performances of Japanese quail

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Abstract: This study was carried out in the Department of Physiology and Pharmacology at Hajee Mohammad Danesh Science and Technology University to evaluate the effect of ipil ipil and calcium supplementation on egg production and live body weight of Japanese quail. Forty two days old "Japanese Quail" were divided into four groups (n=10 birds in each group). Group T_0 was considered as control, fed only with commercial layer ration. Group T_1 was additionally supplemented with 2 g grinded ipil ipil leaves, Group T_2 with 2 g Dietary Ca sources and Group $T_3$with 2 g grinded ipil ipil leaves with 2 g dietary Ca sources per kg feed. Observations were recorded for growth performance, egg production and egg quality of Japanese quail. Body weight (g) was increased significantly ($p<0.05$) in all treated groups in compared to control and best gain was recorded in combined action of ipil ipil and dietary Ca sources supplemented groups (155.6±2.59). In all treatment groups there were significantly increased in egg production, compare to control group. Best result was found in combination of ipil ipil and dietary calcium supplementation. The present study reveals that combine supplementation of ipil ipil and dietary Ca sources gives better effects over other groups in respect to growth performance, egg production and egg quality without any health hazard of Japanese quail.

Keywords: ipil ipil; calcium; egg and growth performances; Japanese quail

1. Introduction

Poultry is one of the best growing segments of the agricultural sector in Bangladesh. It plays a vital role in the subsistence economy and contributes 1.6% in GDP (SAEDF, 2008) in Bangladesh. It is sometimes used as the first investment for a livestock ladder (in the sense that one can move from poultry to goat/sheep to cattle etc.) to increase income and get out of poverty. Therefore, Government, as well as the NGO sector in Bangladesh has pursued poultry production as a tool for poverty alleviation. The poultry sector in Bangladesh is very important for the reduction of poverty and creation of employment opportunities. The livelihoods of a substantial section depend directly on this industry. Poultry feedstuffs are expensive, thereby limiting the growth of poultry industry in the tropics. Most of the developing countries are situated in tropical areas, and there is lack of the necessary funds to import the ingredients for human and livestock feeding (Atawodi *et al.*, 2008). The current acute short supply of animal protein in developing countries justifies. The research into the potentials of some novel local produced feed resources for productive animals such as leaf meals, which could be included into the poultry diets in order to sustain the poultry enterprises and to improve the profit margin through reducing the use of the conventional protein sources (D'Mello and Devendra, 1995; Reddy and Qudratullah, 2004; Nworgu and Fasogbon, 2007).

A major feed additive that has been extensively used is in poultry feed is antibiotics. Antibiotics use in poultry and livestock is the use of antibiotics for any purpose in the husbandry of livestock, which include not only the treatment or prophylaxis of infection but also the use of sub-therapeutic doses in animal feed to promote growth and improve feed efficiency in contemporary intensive animal farming (Sarker *et al.,* 2018). As a result, each and every quail is a depot of antibiotics and other inorganic substances. When these quails are consumed by human these antibiotic and other inorganic residue enters into human body and causing serious human health hazards with drug resistance (Kibria *et al.,* 2009).

Natural medicinal products originating from trees, herbs and spices have been used as feed additives for poultry and farm animals (Talukder *et al.,* 2017). The efficacy and importance of a particular feed ingredient in poultry production is evaluated from its effect on the production performance/traits of the birds.So, scientists are again concentrating on the use of our ancient medicinal system to find beneficial herbs and plants which can be safely used to increase the production. Such plants, ipil ipil (*Leucaena leucocephala) is* common plant which can be used as an alternative source of phytase.Leucaena leucocephala is among the leaf meals that could be used as feed alternatives in commercial livestock and poultry in the tropics (Agbede and Adegbola, 2003).

Leucaena leucocephala is available and spread almost world-wide and it is estimated that Leucaena covers 2-5 million worldwide (Tangendjaja *et al.,* 1990). The *Leucaena leucocephala* is distinguished by their high protein contents, which ranges from 20 to 34% CP on dry matter basis. Also, they have average metabolizable energy content for poultry ranges from 700 to 1365 kcal/kg on dry matter basis, in addition to an appreciable profile of essential amino acids, vitamins and minerals (Kurtoglu *et al.,* 2004). Also, it has been reported that hens are capable of finding and utilizing a considerable amount of nutrients from forages (Shelton and Brewbaker, 1994). The utilization of *Leucaena leucocephala* leaf meals is expected to be a sustainable resource for commercial egg production in the tropics, as they are easily available and contain a considerable amount of nutrients. Ravindran *et al.* (1994) stated ipil ipil as a promising source of phytate phosphorus.

Egg breakage still represents a major economic loss to the poultry industry. It was estimated that 13 to 20% of total egg production was cracked or lost before reaching their final destination (Mills *et al*., 1997; Roland, 1988). So, laying quail should be given proper calcium rich feed in their diet not only for the formation of egg shell but also for the high quality of egg shell, necessary for the prevention of breakage during handling and hatching (Lambert, 1970; Barilani *et al.,* 2005). A number of calcium sources are being used to meet up the requirement of dietary calcium for birds. Among these, egg shell and oyster shell are the excellent sources of calcium and are extensively used in poultry diet (McNaughton *et al.,* 1974; Gerry, 1980 and Roland, 1989).

Although problems associated with shell quality have been studied extensively in the hen, very limited information is available in quails. As in the case of quail a deficiency of calcium in the diet of quails cause decline in egg production. The optimum level of dietary calciumforhigh egg production and hatchability appears to be 2.5 to 3 percent, while higher level caused reduced hatchability (Buchwalder and Wechsler, 1997).To do so; they have to select good quality and cheap dietary calcium source. There are lots of calcium sources available to choice as dietary supplement to boost up shell quality but still confrontation sometimes arises that which one to be most effective.

Moreover, many works have been done only viewing shell quality. Very limited works have been under taken regarding overall egg quality and egg production of laying quail. Therefore the present research project is aimed to see the egg and growth performances of quail by providing ipil ipil leaves and Ca supplement in feed.

2. Materials and Methods

2.1. Experimental design

The experiment was conducted at the Department of Physiology and Pharmacology, Hajee Mohammad Danesh Science and Technology University, Dinajpur. A total of 40 quails are randomly selected and divided into 4 groups (T_0, T_1, T_2 and T_3) for assessing the effect of ipil ipil and dietary Ca sources supplementation on feed conversion, growth performance and egg production of quail. Group T_0; considered as control, fed only with commercial layer ration, group T_1; supplemented with formulation of 2 g grinded ipil ipil leaves per kg feed, group T_2; supplemented with formulation of 2 g calcium dietary sources per kg feed and group T_3; supplemented with formulation of 2 g grinded ipil ipil leaves with 2 g calcium dietary sources per kg feed. All the quail of control and treated groups wear closely observed for 4 week and following parameter were studied.

2.2. Collection and management of quails

At 6 week days of age, Japanese layer quails were collected from A. R. Enterprise (quail hatchery and farm), Bogra. Body weights of assigned quails were taken with digital weight balance and the data were recorded. The finally selected 40 quails were housed under normal husbandry condition and reared quail in quail cage. All the

birds were fed with commercial crumbled and mesh feed at the rate of 30 g per bird per day and fresh water ad-libitum. Measurement of body weight was performed with the help of digital balance.

2.3. Collection and preparation of experimental diet

Ipil ipil leaves were collected from the Khaja Nursery, Thakurgaon. Egg shells were used as a source of calcium. The egg shells were washed thoroughly, dried and grinded into powdered form.The ipil ipil leaves was grinded and mixed with Ca dietary sources. The grinded leaves were added with commercial quail ration and served to recommended groups.

2.4. Egg production record

Egg production was recorded for each quail at the same time each day during laying period. The incidence of broken eggs and soft-shelled eggs were identified and recorded. The number of eggs laid on successive days by a particular quail determined the length of each sequence and the number of pauses in each quail's oviposition determined the number of sequences. For each quail, the length of laying sequence was determined on the day the last egg of the quail was laid.

2.5. Observation of egg quality

Egg qualities wear measured from those eggs laid by quails of different treatment group. Measured egg qualities were egg weight, shell dry weight, fresh albumin weight, fresh yolk weight, egg shell thickness, height of the thick albumin, height of the yolk, width of the yolk, width of the egg, and diameter of the egg albumin. For quality determination egg weight was recorded by an electric weighing balance. The length of egg was measured by a slide calipers. The width was also estimated by slide calipers. The eggs were then carefully broken down on a glass plate (40 × 20 cm) to determine the internal egg qualities.

2.6. Weight of different egg component

The method outlined by Chowdhury (1988) was followed for partition in different egg components. At first, egg was broken on glass plate. Then the yolk was separated carefully from albumin with the help of a spatula and transferred to a previously weighed petridish by a spatula and weighed. Precautions wear taken at all stages to avoid rupture of yolk. The shell of the broken eggs wear rinsed and washed thoroughly in tap water keeping the membranes intake. The washed shells with membrane were immersed in a beaker of water for removal of the shell membranes. The shell and shell membranes were oven dried separately at 105°C over night keeping them in a glass petridish. On the following day, oven dried shell and shell membranes were taken. Finally the following calculations were made for different components suggested by Chowdhury (1988).
Fresh yolk weight: (weight of yolk + weight of petridish) - weight of petridish.
Fresh albumin weight: (Weight of wet albumin + weight of petridish) - weight of petridish.

2.7. Shell thickness

After removing of shell membrane, shell thickness (mm) was measured by screw gauge.

2.8. Statistical analyses

Data were analyzed by analysis of variance using Completely Randomized Design with factorial arrangement of time and treatments (Steel and Torrie, 1986). All analyses wear performed by MSTATC and SPSS program.

3. Results and Discussion

This study investigated the effect of ipil ipil and dietary sources of Ca supplementation on growth, egg production performances of quail.

3.1. Egg Production

Egg production of different groups of quail was recorded from 6 weeks to 10 weeks. The average egg production of different groups of quail was recorded. Quails treated with ipil ipil leaves (group T_1) showed average egg production 20.5±0.33 within 06-10 weeks, Ca supplement treated groups (group T_2) showed average egg production 21.80±0.50 and combined treatment (group T_3) supplementation showed average egg production 22.5 ± 0.47 within 6 weeks to 10 weeks (Table 1). Control group (group T_0) showed average egg production 18.5±0.34. Highest egg production was observed in combined treatment group (22.5 ± 0.47) and lowest in control group (18.5 ± 0.34). In our study it is revealed that ipil ipil and Ca supplementation increase egg production and similar results were observed by Kurtoglu *et al.*, 2004 and Panda *et al.*, 2008.

3.2. Egg quality

The egg qualities demonstrate that there exist a significant (P<0.05) difference among the mean values like of height of the thick albumin (mm), height of the yolk (mm), width of the yolk corresponding to the different level of ipil ipil and dietary Ca source treatment (Table 1). But no significant (P>0.05) difference among the mean values like height of the egg, length of the egg (mm), diameter of albumin (mm), egg cell thickness (mm), Width of the yolk (mm) corresponding to the of ipil ipil and dietary Ca sources treatment. These results indicate that treated with ipil ipil and dietary Ca source had no adverse effect on external and internal qualities of eggs.

Table 1. Effect of dietary ipil ipil and Ca sources on egg production of quail.

Parameter	Group T_0 (Mean ± SEM)	Group T_1 (Mean ± SEM)	Group T_2 (Mean ± SEM)	Group T_3 (Mean ± SEM)
No. of Egg	18.5^{c} ±0.34	20.50^{b} ±0 .33	21.80^{ab} ±0 .50	22.50^{c} ± 0.47
Weight of the Egg (g)	8.80^{a} ±0.74	9.40^{a} ±0.63	10.70^{a} ±0.73	10.00^{a} ±0.63
Width of the Egg (mm)	25.19^{a} ±0.11	25.14^{a} ±0.16	25.04^{a} ±0.13	24.99^{a} ±0.18
Height of Thick Albumin (mm)	3.13^{b} ±0.06	3.23^{b} ±0.06	3.42^{a} ±0.06	3.50^{a} ±0.05
Length of Egg (mm)	32.66^{a} ±0.13	32.33^{a} ±0.29	32.54^{a} ±0.25	32.69^{a} ±0.10
Diameter of Albumin (mm)	45.50^{a} ±0.09	44.44^{a} ±0.09	45.45^{a} ±3.01	41.43^{a} ±0.15
Height of Yolk (mm)	6.80^{a} ±0.10	6.41^{b} ±0.13	6.32^{b} ±0.11	6.88^{a} ±0.08
Egg shell thickness (mm)	0.174^{a} ±0.00	0.168^{a} ± 0.00	0.178^{a} ±0.01	0.176^{a} ±0.01
Width of the yolk (mm)	31.75^{a} ±0.09	32.07^{a} ±0.18	29.48^{c} ±0.11	30.12^{b} ±0.18
Shell dry weight (g)	3.36^{a} ±0.09	3.17^{a} ±0.08	3.30^{a} ±0.08	3.30^{a} ±0.07

N.B: Values followed by different superscript in the same rows indicate statistically significant (P< 0.05).

3.3. Body weight

Body weight of different groups of quails was recorded from 06 weeks to 10 weeks. The average body weight of different group of quails was recorded. Quails treated with ipil ipil leaves showed average Body weight gain 113.5^{a}± 3.44gm to 142.9^{a}±4.28 g within 06-10 weeks dietary source of Ca treated groups showed body weight gain 116.2^{a} ± 4.07 to 143.60^{a} ± 5.00 g and combined treatment supplementation showed body weight 118.3^{a} ± 3.49 to 155.1^{a} ± 2.59g within 06-10 weeks (Table 2). Control group showed average body weight gain 113.3^{a} ± 4.12 to $143.6.9^{a}$ ± 4.85g. No significant body weight variation was found regarding treatment and control group. Similar findings was observed by Saima *et al.* (2014).

Table 2. Body weight of quails at the age of 10 weeks.

Group	Body weight (g) (Mean±SEM)
T_0	143.6^{a} ± 4.85
T_1	142.9^{a} ± 4.28
T_2	143.6^{a} ± 5.00
T_3	155.6^{a} ± 2.59
P-value	0.174

N.B: Values followed by different superscript in the same column indicate statistically significant (P< 0.05).

4. Conclusions

In our research project egg production and body weights were increased in ipil ipil and dietary sources of Ca supplementation. From the present field and laboratory trial, it can be concluded that combined supplementation of grained ipil ipil leaves and dietary sources of Ca is highly beneficial for enhancing egg production without making any hazards of Japanese quail and our formulations could be used as an egg enhancer and growth promoter for layer especially for older quail.

Conflict of interest

None to declare.

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