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Comparative Study on the Growth, Feed Consumption and Egg Laying Fed with Different Qualities of Feed in Japanese Quail, *Coturnix coturnix japonica*

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Abstract: ***Different formulated feed namely formulated feed starter type I, II and III, layer mash type I, II, III and marketed feed starter and layer mash (Control) were given to day old Japanese quails. The parameters were growth rate, food consumption, maturity and egg laying. The body weight of birds fed with formulated feed type II (203.61 ± 14.70 gm/bird) and III (222.67 ± 11.32 gm/bird/week) showed significant value (P<0.05) when compared to the body weight of birds fed with marketed feed (228.65 ±11.95 gm /bird). Birds fed with type II & III feed showed significantly similar food consumption 12.71± 0.30 (P<0.001) but lesser consumption compared to control group15.97 ± 0.26. Fish waste, snail and oil cake were the main protein source for the formulated feed.***

Keywords: Japanese quail, Formulated feeds, Food consumption, Body weight, Egg laying

1. Introduction

The general objective of poultry nutrition is to maximise the economic production and performance of birds. Diets are formulated to specific level of nutrients that are needed for optimum performance. Poultry plays an important role in poultry production economy. It constitutes about 60-70% in cost production of eggs and poultry meat (North and Bell, 1990). There is increasing tendency for feed manufacturers due to the increasing number of people venturing into poultry business and the consequent high demand for commercial feed to produce substandard feeds. Most of the commercial poultry farmers depend on commercial feed for their stock, (Addass *et.al.*, 2010). The primary reason for keeping poultry is to accomplish the transformation of vegetable, animal and mineral matter into human food in the form of egg and meat. Japanese quail (*Coturnix coturnix japonica*) are small bodied birds of *galliformes* family. They are highly prolific and less susceptible to common poultry diseases. Japanese quail in the wild fed on insects, grains, grass and various seeds. They have also been found to thrive well and grow efficiently in captivity when fed with high protein diet (NVRI, 1996). Poultry feed of different grades are marketed from different farm to support the chick, grower and layers. At the time of paucity of feed, due to unforcasted reasons, feed can be prepared if we know the daily requirement or the composition of food needed daily.

The objective of this study is to determine the important biochemical of some ingredients use in feed formulation and compare the performance by feeding marketed feed and formulated feed on the food consumption, growth rate and egg laying of Japanese quail in laboratory condition.

2. Materials and Methods

The animals used for this experiment were collected from Central Avian Research Institute, Izatnagar, U.P. A total of 48 one day old pullets of Japanese quail were randomly divided into 4 groups having 12 birds in each group. They were housed in quail cages 40″ x 30″ x 25″.The animals were provided with formulated feed starter type I, II & III. The sources of animal protein used were fish waste, snail. The fish waste and snail were collected from market. The whole snails are dried and powdered. The ingredients for feed formulation included rice, maize, rice bran, till cake, fish waste, snail, limestone, common salt, mineral premix. The proximate composition of the ingredients were analysed by using AOAC method (AOAC, 2000). The feed formulation was done according to National Research Council (NRC, 1994). Two types of feed as starter type I, II and III, layer mash type I, II and III were formulated. One group fed with marketed feed starter and layer mash served as control. The starter I, II, III were fed to the experimental groups from 1st day to 41st day. From the 42nd day onwards the birds were fed with layer mash type I, II and III and marketed layer mash (control). They were fed with known amount of feed and water was provided ad-libitum throughout the growing and laying period. Observations on body weight, food consumption, maturity and egg laying was recorded in both formulated feed and marketed feed fed groups.

The experiment was conducted for 90 days. Body weight and food consumption were recorded in weekly basis in gram/bird. Statistical analysis was done by using ANOVA followed by Tukeys multiple comparison test (P<0.05).

3. Results and Discussion

The proximate composition of feed ingredients and formulation of the feed are presented in Table 1 and Table 2 (a, b). The proximate analysis of the different ingredients shows:

Protein-til cake (36.5%), maize (11.75%), snail (19.10%), rice brand (11.49%), rice (8.92%) and fish waste (40.26%).

Lipid-til cake (12.00%), maize (0.22%), snail (1.59%), rice brand (4.62%), rice (1.20%) and fish waste (17.34%).

Fibre-til cake (0.53%), maize (6.62%), snail (0.92%), rice brand (3.40%), rice (0.94%) and fish waste (1.90%).

Ash -til cake (12.50%), maize (2.00%), snail (62.10%), rice brand (4.80%), rice (1.20%) and fish waste (19.50%).

Carbohydrate-til cake (30.92%), maize (72.43%), snail (14.29%), rice brand (70.68%), rice (84.47%) and fish waste (14.99%).

Among the ingredients the highest amount of protein and lipid was recorded in fish waste (40.26%), (17.34%) lowered by til cake (36.05%), (12.00%). Maize had the highest content of fibre (6.62%) as it contains considerable amount of digestible proteins. Highest content of carbohydrate is found in rice (84.47%) among all the ingredients. Rice is also known as queen among cereals due to its nutritional value and high digestibility. Snail has got highest value of ash (62.10%) which may be due to the fact that the shell of snail has hard and highly calcified structure.

The growth and feed consumption of Japanese quails fed with formulated and marketed feed (control) are presented in Table 3 (a, b). The body weight of quails fed with feed type III has highest body weight (222.67 ± 11.32 gm/bird/week) followed by feed type II (203.61±14.70 gm/bird/week) and feed type I (97.32 ± 6.10 gm/bird/week) compared to marketed feed (228.65 ± 11.95 gm/bird/week). The body weight of feed type III and II has significant value ($P<0.05$) compared to marketed feed but type I has insignificant value ($P>0.001$) which is lower than marketed feed (control).

Food consumption in both feed type I (10.35 ± 0.20 gm/bird) and II (12.71 ± 0.30 gm/bird) shows significantly lower value ($P>0.001$) when compared to marketed feed (17.67 ± 0.39 gm/bird) but feed type III has comparable value (15.97 ± 0.26 gm/bird) with control ($P<0.01$).The total number of eggs collected in feed type III is 39 whereas type I and II group birds could not lay eggs during the study period. Volume of egg ranges from 9.78 mm^3 to 13.69 mm^3 (with an average value 11.29 ± 0.16). In the control group the volume of eggs ranges from 9.32mm^3 to 14.32mm^3 (with an average value 12.28 ± 0.10) and total number of eggs laid are 75 (Table 4). The body weight of birds in type III is higher than type I and II, which is due to the fact that feed type III has fish waste as the main protein source, Table 2(a, b). As fish meal constitutes a substantial part of formulated feed for diverse poultry birds that are commercially used, we have added more quantity of fish waste in type II and III feed and the result was found to be satisfactory this could be due to the high content of digestible protein in fish waste. This shows that the fish waste provided in the formulation can support the need of protein. Halley and Soffee 1988 reported that fish meal contains between 59-72% crude proteins. Less food consumed in both feed type I and II might be due to poor taste and less digestibility which result in retarded growth and delay of sexual maturity. Attainment of sexual maturity (age at first egg laid) was on 71st day in formulated feed (type III), 60th day in marketed feed. Sexual maturity of marketed feed in the present work was similar with the works reported by Odunsi *et. al.*, 2007. The commencement of egg laying by ten days delay is observed in formulated feed type III may be compared to the report of Odunsi *et.al.* There was no egg laying in feed type I and II. No egg laying in feed type I and II could be due to less food consumption, presence of fewer amounts of mineral and proteins. Protein of high quality with adequate amino acid balance is one of the most important nutrients for quails. Murakami *et.al.*,1993 reported that four crude protein levels (20%, 22%, 24% & 26%) were evaluated for Japanese quails and it was concluded that lysine and methionine + Cystine requirements were appropriate by 20% crude protein level which resulted in best performance from 1 to 42 days of age. It is not only that calcium and phosphorus are required in sufficient quantity but also in correct proportions. Laying quails needs about 2.5% to 3% calcium since this is the main constituent of egg shell. The body weight of feed type III fed birds which has fish waste as animal protein source has a comparable weight with marketed feed (222.67±11.32, 228.65±11.95) given birds.

In conclusion, fish waste can be used as a main protein source of poultry feed formulation which can substitute the marketed feed. Marketed feeds are costly due to transportation. Ingredients of protein supplements for feed formulation are easily available with a cheaper rate in the state. Thus the locally available feed ingredients can be used as ingredients of feed formulation for quail rearing with low cost and as a substantial protein source from quail for egg and meat supplement.

Table 1: Proximate composition of feed ingredients

Type	Protein%	Lipid%	Fibre%	Ash%	Carbohydrate%
Til cake	36.05	12.00	0.53	12.50	30.92
Maize	11.75	0.22	6.62	2.00	72.43
Snail	19.10	1.59	0.92	62.10	14.29
Rice brand	11.49	4.62	3.40	4.80	70.68
Rice	8.92	1.20	0.94	1.20	84.47
Fish waste	40.26	17.34	1.90	19.50	14.99

Table 2(a): Rations for feed formulation using local ingredients (in Kg.) for quail starter

Ingredients	Level of inclusion		
	Feed type 1	Feed type 2	Feed type 3
Maize	35.00 (in kg)	35.00 (in kg)	35.00 (in kg)
Rice	8.00	8.00	8.00
Rice bran	4.00	4.00	4.00
Til cake	40.00	40.00	40.00
Fish waste	-	6.00	12.00
Snail	12.00	6.00	-
Limestone	0.30	0.30	0.30
Common salt	0.20	0.20	0.20
Mineral Premix	0.50	0.50	0.50
	100kg	100kg	100kg

Table 2(b): Rations for feed formulation using local ingredients (in Kg.) for laying quail

Ingredients	Level of inclusion		
	Feed Type I	Feed Type II	Feed Type III
1. Maize	35.00 (in kg)	35.00 (in kg)	35.00 (in kg)
2. Rice	8.00	8.00	8.00
3. Rice bran	4.00	4.00	4.00
4. Til cake	40.00	40.00	40.00
5. Fish meal	-	3.00	6.00
6. Snail	6.00	3.00	-
7. Limestone	6.30	6.30	6.30
8. Common salt	0.20	0.20	0.20
9. Mineral Premix	0.50	0.50	0.50
	100kg	100kg	100kg

Table 3(a): Body weight in gm/bird fed with feed type I, II and III marketed feed control

Weeks	Body wt.gms (control)	Body wt. gm. (feed type I)	Body wt. gm. (feed type II)	Body wt. gm. (feed type III)
1st Week	14.79±0.61(n=12)	14.19±0.53(n=12)	14.93±1.28(n=12)	14.93±1.28(n=12)
2nd week	51.94±2.19	19.96±1.10	25.63±1.40	32.11±2.80
3rd week	91.71±3.01	28.47±1.60	37.71±3.12	52.15±4.55
4th week	143.63±3.47	36.67±2.70	56.76±6.60	74.14±6.37
5th week	177.29±4.44	46.53±3.92	80.34±5.32	102.80±10.11
6th week	185.03±4.97	57.16±4.90	104.89±12.18	129.41±5.58
7th week	208.87±7.22	61.23±5.00	116.82±10.71	133.99±4.69
8th week	230.01±9.50	65.35±6.19	120.32±10.28	140.00±6.72
9th week	245.13±12.36	67.39±6.80	124.20±10.17	148.83±7.55
10th week	235.48±13.89	79.62±5.32	128.20±10.35	167.79±15.59
11th week	237.20±12.04	82.43±7.22	184.19±14.30	189.34±11.67
12th week	244.30±12.79	89.49±6.27	200.11±15.22	208.30±10.69
13th week	228.65±11.95	97.32±6.10	203.61±14.70	222.67±11.32

*****Values are mean of six replicates of paired quail

Table 3(b): Food consumed in gm/birdfed with feed type I,II and III and control

No. of Weeks	Food consumed gm. (Control)	Food consumed gm. (Feed type I)	Food consumed gm. (Feed type II)	Food consumed gm. (Feed type III)
1st Week	1.61±0.11(n=12)	1.47±0.11(n=12)	1.71±0.10(n=12)	1.43±0.7(n=12)
2nd week	6.53±0.48	2.62±0.10	2.80±0.09	4.21±0.23
3rd week	10.37±0.77	2.79±0.08	3.71±0.19	5.35±0.23
4th week	14.08±0.49	2.90±0.10	4.89±0.28	6.89±0.29
5th week	14.99±0.55	3.59±0.17	6.95±0.30	8.66±0.18
6th week	16.29±0.13	3.77±0.13	8.50±0.11	9.26±0.19
7th week	16.68±0.49	4.65±0.25	8.06±0.37	8.49±0.32
8th week	16.19±0.61	5.21±0.14	8.30±0.34	8.37±0.11
9th week	17.22±0.15	5.45±0.17	7.97±0.19	8.53±0.19
10th week	17.87±0.31	7.03±0.29	8.11±0.34	9.71±0.13
11th week	16.89±0.20	7.72±0.40	12.44±0.60	14.24±0.19
12th week	17.88±0.20	10.59±0.50	13.35±0.14	14.39±0.12
13th week	17.67±0.39	10.35±0.20	12.71±0.30	15.97±0.26

*****Values are mean of six replicates

Table 4: Volume and number of eggs collected during 90 days

Observations	Control	Feed type I	Feed type II	Feed type III
Starting date of experiment	Zero day	Zero day	Zero day	Zero day
Initial day of egg laying	60th day	Nil	Nil	71 day
Termination of experiment	90th day	90th day	90th day	90th day
Volume of eggs	12.28±0.10	Nil	Nil	11.29 ±0.16
No. of eggs	75	Nil	Nil	39

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