



Growth Performance and Digestibility of Japanese Quail (*Coturnix Japonica*) with Supplementation of Commercial Phytase Enzyme.

S. A. PIRZADO⁺⁺, A. H. SHAH, M. TARIQ*, D. H. KALHORO^{**}, G. S. BARHAM, Y. M. JALBANI,
G. A. MUGHAL^{****}, A. KAKA^{*****}, M. Z. PIRZADO^{***}

Department of Animal Product Technology, Agriculture University Tandojam-Pakistan

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Abstract: Present research was conducted to investigate the response of commercial phytase enzyme on growth performance of Japanese quail. Total 135 day old quail baby chicks were purchased and randomly divided into 4 groups i.e. S1, S2, S3 and S4. S1 served as control whereas, commercial phytase was given at the ratio of 0.3, 0.6 and 0.8 g/kg feed in S2, S3 and S4, respectively. Feed consumption, total weight gain and FCR was significantly ($P < 0.05$) higher in treatment groups. However, dry matter & crude protein was significantly ($P < 0.05$) improved in supplemented groups except, ether extract which showed no significant effect. Furthermore, dressing percentage was linearly improved in supplemented groups. Whereas, relative weight of liver and heart was not significantly ($P > 0.05$) effected by phytase addition. It was concluded from this study that commercial phytase enzyme has beneficial effect on overall performance of Japanese quail.

Keywords: Phytase; Growth; Digestibility and Japanese Quail.

1. INTRODUCTION

The plant based ingredients are the basic components use for poultry nutrition which come especially from cereal crops which contain all essential nutrient required for all species of animals. In last several years enzymes are frequently used in poultry feed which enhance the growth performance of birds. For growth of plants and animals Phosphorus play vital role and it is also essential to achieve optimal production from poultry (Powell *et al.*, 2008). The total content of phosphorus about two-third in plants, which is main component of poultry diet in the form phytate (Punna and Roland, 1999, Vivero *et al.*, 2000), simple stomach animals & humans are poorly utilized because of its unavailability, due to its unavailability these animals have poor endogenous phytase activity (Pallau *et al.*, 1994). For that reason, the diet supplemented with source of phosphorus (P) to fulfill the phosphorus (P) requirements of the animals. However, in phytic acid contain approximately 75% phosphorus (Boling *et al.*, 2000). Phytate is an anionic acid that binds P and other cationic substances, the bird does not permit them to be totally used. For getting more production from broilers and laying hen's phytase is commonly used to enhance the phytic acid bioavailability in the poultry diet to protect the phosphorus sources and to the pollution of environment (Bertechini *et al.*, 2006, Broz *et al.*, 2007)

Bioavailability of phosphorus estimates from corn and soya bean meal for pigs and poultry ranges from 10-30% (Nelson, 1967, Jongbloed and Kemme, 1990). In good health dietary supplement with sources of bacterial phytase as an effective and applied technique which improve digestibility of phytate in animal production. During hydrolyzing process phytase enzyme hydrolyze phytate to inorganic phosphate and inositol. This enzyme releases phosphate groups from phytin possibly production this released and available phosphorus to the birds & animal. According to (International Union of Biochemistry, 1979) only phytase is well known enzyme which can start the phosphate free release from the phytin.

Now a day's phytase is a commercially recognized as an enzyme which provide in animal feed industry with a tool to reduce the requirements to animal feed supplement with inorganic phosphorus. The activity of endogenous enzymes, utilization of nutrients and performance of birds can improve by the use of supplementation of enzymes in the diet. Reduce levels of protein minerals and energy in the diet supplemented with phytase enzyme may provide the same growth performance for broilers (Zanella *et al.*, 1999). Most of the investigations work was phytase are on chickens, whereas quails were not much considered. Hence, the purpose of present study is to explore the different

⁺⁺ Corresponding author Shoaib Ahmed Pirzado Email: dr.pirzado@gmail.com

*Department of Veterinary Pathology,

**Department of Veterinary Microbiology,

***Department of Poultry Husbandry,

****Department of Livestock Management,

*****Department of Animal Reproduction, Faculty of Animal Husbandry and Veterinary Sciences, Sindh Agriculture University Tandojam.

levels of phytase enzyme on growth performance and digestibility of Japanese quail (*Coturnix japonica*).

2. MATERIALS AND METHODS

Present study was conducted at Poultry Multiplication Center Poultry Production Hyderabad. The total of 135 day old Japanese quail baby chicks (average body weight 8.4 ± 0.55 g) were purchased from the local market and birds were randomly distributed in four groups consist of (three replication with 15 birds per replicate). Temperature of farm was maintained at 35°C for the first week & then slowly & gradually decreased up to the 22°C. 24 hrs continuously lighting was given during the entire research trial. The nutritional treatments were consist of S1 as control basal diet, S2, S3 and S4 phytase given at the level of 0.3, 0.6 and 0.8 g/kg of feed. The nutrient composition of feed for quails during 1 to 42 days of age was formulated on the basis and reference of (NRC, 1994). showed in (Table 1). Balanced diets were given in once in a day for all treatment groups in whole period. Daily feed intake was recorded of every group of birds. At the completion of research trial 42 days the final body weight and feed efficiency of quail birds of each group was measured. After the slaughtering of the quail birds the only weight of liver & heart was calculated of each bird separately. Carcass yield was acquired by expressing the weight of carcass as a percentage (%) of live body weight. Moreover digestibility can be determined by measuring feed intake and fecal out. At the completion of research experiment Carcass yield (dressing %) was obtained by expressing the dressed carcass weight as a percentage of live body weight. Digestibility can be determined by accurately measuring feed intake and fecal output. Before the end of research experiment, feces were collect for determination of digestibility. The feces were kept in hot air oven at 105 °C for 2-4 hours. Digestibility was determined through the method mentioned by (Rajput *et al.*, 2013).

3. RESULTS AND DISCUSSION

Growth performance:

Effect of phytase enzyme with various levels on growth performance of Japanese quail are illustrated in (Table-2). Overall, phytase addition improved growth performance in the form of feed intake, weight gain and FCR. Statistical analysis showed significantly ($P < 0.05$) that more feed intake was recorded in treated diet. Analysis of variance indicated significantly ($P < 0.05$) more weight gain and better feed efficiency/FCR was noted in supplemented groups.

Findings of current research are in agreed with (Gracia *et al.*, 2003, Lazaro *et al.*, 2003).), who noted that body weight of broilers were increased by the addition of the fungal enzyme in bird's diet. They illuminated that performance of broilers was decreased without supplementation of enzyme due to improve in the thickness of intestinal content. Addition of enzymes in the diet break the anti-nutritional elements present in the plant cell wall and results in the better nutrient utilization and birds performance (Graham *et al.*, 2002, Costa *et al.*, 2011, Walk *et al.*, 2012). These findings are in line with (Savietto *et al.*, 2012), who stated that feed consumption was significantly affected by the addition of phytase enzyme in laying hens.

Nutrient digestibility:

Apparent digestibility of dry matter (DM), crude protein (CP) and fat (EE) are showed in Table-3. Dry matter and crude protein statically ($P < 0.05$) increased in supplemented groups. However, there were no significant ($P > 0.05$) effect of treatment on ether extract was noticed.

These findings are in contrast with (Noy, and Sklan, 1995, Vukic and Wenk, 1996).). Zanella *et al.*, (1999) described that dry matter; crude protein and energy were increased by the addition of exogenous enzyme in the feed of broilers. These researchers clarified that the addition of enzyme in the diet solubilize and disrupt the grains endosperm cell wall which results the better digestibility. (Myashkauskese *et al.*, 1984) noted that use of these enzymes in broiler diet results in better proteolytic activity of the duodenum which ultimately enhance the digestibility. According to (Penz *et al.*, 1993) enzyme activity can be improved by the lower in GIT pH, thus increasing dietary nutrient retention and results in better performance of animal.

Carcass characters:

Higher carcass yield was noted in treatment groups. Statistical analysis indicated significant ($P < 0.05$) influence of phytase on dressing percentage. Whereas, there was statically non-significant ($P > 0.05$) impact on liver and heart weight (Table-4).

(Abbas *et al.*, 1998) found that addition of enzyme in fibrous diet as supplement which improved the total body growth rate, which subsequently increasing the percentage of dressing. Relatively more weight of liver and heart was achieved from feed supplemented with these enzymes.

Table-1 Feed Formulation

Sr. No.	Feed Ingredients	Starter (1-21 days)	Finisher (22-42 days)
1	Maize, yellow	36.00	45.00
2	Soybean meal	47.00	35.00
3	Sorghum	8.00	7.00
4	Corn Gluten 60%	5.00	8.00
5	DCP	1.0	2.00
6	Lime Powder	1.50	2.00
7	Mineral Mixture	0.5	0.40
8	Multi Vitamin & feed supplements	0.5	0.25
9	Vegetable Oil	01	0.5
Total		100.00	100.00
Calculated CP and M. Energy			
CP (%)		27.13	24.18
M.E. Kcal / Kg		2749	2788

Table-2: Effect of feeding different levels of Phytase enzyme on feed consumption (g), body weight (g) and Feed efficiency of Japanese quail.

Parameter	Groups of broilers fed with phytase			
	S1	S2	S3	S4
Feed intake (g/bird)	469±10.14 ^b	471.33±7.31 ^{ab}	487.66±4.51 ^a	482.66±7.63 ^a
Body weight (g/bird)	194.33±4.5 ^b	198.33±7.5 ^{ab}	219.33±6.11 ^{ab}	204.66±8.14 ^{ab}
FCR	2.41±0.013 ^a	2.37±0.083 ^{ab}	2.22±0.054 ^{ab}	2.36±0.119 ^{ab}

Super scripts with different letters showed significant level (P<0.05). FCR= Feed conversion ratio.

Table-3: Effect of different levels of Phytase enzyme on digestibility percentage of Japanese quail.

Parameter	Groups of broilers fed with phytase			
	S1	S2	S3	S4
DM	65.9±3.7 ^b	70.1±3.01 ^{ab}	74.8±3.1 ^a	71.16±2.85 ^{ab}
C.P	73.43±4.5 ^b	80.6±3.6 ^a	82.33±3.14 ^a	79.33±2.51 ^{ab}
E.E	70.66±4.72	77.23±3.6	75.56±3.07	73.1±5.59

Super scripts with different letters showed significant level (P<0.05). DM=Dry matter, E.E=Ether extract and C.P=Crude protein

Table-4: Effect of feeding different levels of Phytase enzyme on carcass characters of Japanese quail.

Parameter	Groups of broilers fed with phytase			
	S1	S2	S3	S4
Dressing %	61.2±2.18 ^b	66.43±1.18 ^a	74.8±3.1 ^a	63.24±2.36 ^{ab}
Liver	3.26±0.3	3.8±0.74	3.91±0.5	3.7±0.32
Heart	1.71±0.3	1.97±0.2	1.94±0.42	2.01±0.07

Super scripts with different letters showed significant level (P<0.05).

4. CONCLUSION

It was concluded from present study that commercial phytase enzyme has positive influence on growth performance and nutrient digestibility.

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