# EFFECT OF PHYTASE ENZYME SUPPLEMENTATION IN LOW ENERGY AND LOW PROTEIN DIETS ON THE PRODUCTION PERFORMANCE OF LAYER CHICKEN

P. Ponnuvel, K. Narayanankutty and P. Anitha
Centre for Advanced Studies in Poultry Science
College of Veterinary and Animal Sciences,
Kerala Veterinary and Animal Sciences University,
Mannuthy- 680651.

Received 14-2-2014 Accepted 7-3-2014

Corresponding Author : ponnuvelpalanivel@gmail.com

## ABSTRACT

A production trial was carried out using 140 Single Comb White Leghorn hybrid Athulya layers to study the effect on phytase supplementation at three different levels in low energy and low protein diets on the production performance in comparison with standard layer ration for a period of 20 weeks. Phytase was supplemented at 0, 500 and 1000 units/kg in low energy and low protein layer diets containing available phosphorus of 0.30 per cent from 21 to 40 weeks of age. Egg production, feed efficiency and egg weight improved significantly ($P<0.01$) among phytase supplemented dietary treatments whereas feed intake and livability were not affected.

**KEYWORDS**: Phytase, layer diet, egg production

## INTRODUCTION

In the last three decades, Indian poultry industry has changed from a small scale backyard to large commercial farms. Increasing feed cost is one of the most challenging constraints faced by layer farmers. Availability of grains and oil cakes also limited due to several factors like export, human consumption and monsoon failures etc. Grain by products (wheat bran and rice bran) are available plenty at cheaper cost. Use of these by products in chicken feed is limited due to high fibre content and presence of phytate, an anti-nutritional factor. Phytate prevents utilisation of several nutrients by birds. Supplementation of exogenous phytase enzyme in poultry feed will hydrolyse the phytate and releases phytate bound nutrients. In the present study, an attempt was made to evaluate the production performance of Athulya hybrid layer fed with low energy and low protein diets supplemented with different levels of exogenous phytase enzyme.

## MATERIALS AND METHODS

One hundred and forty Single Comb White Leghorn hybrid Athulya layer chicken of 20 week old were distributed at random into seven treatments viz., T1, T2, T3, T4, T5, T6 and T7 with four replications in each treatment and each replicate having five birds. The production trial was carried out from 21 to 40 weeks of age. Three types of rations viz., standard layer ration (SLR) as per BIS (1992), low energy (LER) and low protein (LPR) layer rations with 0.30 per cent available phosphorus were used in this study. The birds were housed in individual cages. Feed and water were supplied *ad libitum* throughout the experimental period of 20 weeks. The details of treatment particulars were as follows: T1: Standard layer ration (SLR), T2: low energy layer ration (LER) without phytase, T3: LER with phytase 500 units/kg, T4: LER with phytase 1000 units/kg, T5: low protein ration(LPR) without phytase, T6: LPR with phytase 500 units/kg, T7: LPR with phytase 1000 units/kg.

Individual egg production record of all the birds was maintained throughout the experimental period. From this data, per cent hen housed egg production was calculated. Feed intake was recorded replicate-wise in each week. From this data daily feed intake per bird and feed efficiency (feed per

dozen egg) were calculated. Data on egg weight was obtained by weighing all eggs collected during the last three consecutive days of each 28-day period. Data collected on various parameters were statistically analyzed by Completely Randomized Design (CRD) as described by Snedecor and Cochran (1994).

**RESULTS AND DISCUSSION**

The data on per cent hen housed egg production, daily feed intake, feed efficiency and egg weight as influenced by supplementation of phytase enzyme are presented in Table.

**Table : Effect of phytase supplementation in low energy-protein diet on hen housed egg production+**

| Treatments | Parameters | | | |
|---|---|---|---|---|
| | Hen housed egg production | Feed intake(g) | Feed efficiency (per dozen egg) | Egg weight (g) |
| | Overall Mean** ± SE | Overall Mean ± SE | Overall Mean** ± SE | Overall Mean** ± SE |
| T1 | $91.50^{bc}$ ± 0.55 | $113.22^{a}$ ±1.14 | $1.49^{a}$ ± 0.01 | $52.77^{b}$ ± 0.66 |
| T2 | $86.50^{ab}$ ± 0.89 | $116.37^{a}$ ± 1.11 | $1.63^{c}$ ±0.01 | $52.49^{bc}$ ± 0.33 |
| T3 | $94.18^{cd}$ ± 0.38 | $115.05^{a}$ ± 0.65 | $1.47^{a}$ ± 0.01 | $53.42^{cd}$ ± 0.40 |
| T4 | $93.75^{cd}$ ± 1.10 | $115.00^{a}$ ± 0.26 | $1.48^{a}$ ± 0.03 | $53.08^{cd}$ ± 0.45 |
| T5 | $87.85^{b}$ ± 1.53 | $115.18^{a}$ ± 1.04 | $1.58^{b}$ ± 0.02 | $51.33^{ab}$ ± 0.53 |
| T6 | $94.53^{cd}$ ± 0.77 | $114.95^{a}$ ± 0.23 | $1.46^{a}$ ±0.02 | $52.81^{c}$ ± 0.23 |
| T7 | $94.64^{d}$ ± 0.87 | $114.10^{a}$ ± 0.47 | $1.45^{a}$ ±0.01 | $52.99^{cd}$ ± 0.45 |
| P-value | 0.00 | 0.233 | 0.00 | 0.00 |

+Mean of four values with SE

Means within a column with no common superscript differ significantly **(P<0.01)

**Egg production**

Overall mean per cent hen housed egg production of phytase supplemented groups (T3, T4, T6

and T7) was significantly (P<0.01) higher when compared with T2 ( 86.50) and T5 (87.85). Birds fed with SLR (T1) produced significantly (P<0.01) more mean per cent hen housed eggs when compared with negative controls. Significantly, more mean per cent hen housed egg production was observed in T7 birds that received LPR supplemented with phytase 1000 units/kg of feed when compared to all the control diets fed birds and was statistically comparable with other phytase supplemented diet fed groups. Significant improvement in egg production due to supplementation of phytase in low phosphorus layer diet also reported by Liu et al. (2007), Plumstead et al. (2007), Hughes et al. (2008) and Zaghari et al. (2008).

**Feed intake**

Statistical analysis of mean daily feed intake of birds fed different dietary regimen with or without supplemental phytase revealed no significant difference among various dietary treatment groups. Similar observations are made by Hughes et al. (2008), Zaghari et al. (2008), Alps et al. (2010), Hassanien and Elnagar (2011) and Meyer and Parson (2011).

**Feed efficiency**

Significantly (P<0.01) higher mean FCR values were noted for birds in T2 (1.63) when compared to all other dietary treatments. However, mean FCR of birds in T5 ( 1.58) was intermittent. Addition of phytase to LER and LPR resulted significantly lower FCR values when compared with their negative controls and was comparable with birds fed SLR. Significantly, improved feed efficiency was observed by Plumstead et al. (2007), Ahmadi et al. (2008), Hughes et al. (2008), Zaghari et al. (2008), Ali et al. (2009), Mohammed et al. (2010) and Hassanien and Elnagar (2011).

**Egg weight**

Significantly (P<0.01) lower mean egg weight (51.33 g) was noted in T5 treatment groups when compared with all other treatments and it was statistically comparable with birds in T2 (52.49 g). However, mean egg weight of birds in T1 was comparable with T3, T4, T6 and T7. Supplementation of phytase in different experimental rations significantly improved the mean egg weight when compared with birds fed LPR (T5). The mean egg weight of all phytase supplemented diets fed groups (T3, T4, T6 and T7) was statistically comparable.

Similarly, Um and Paik (1999), Liebert et al. (2005), Liu et al. (2007) and Ahmadi et al. (2008) recorded significantly higher egg weight in phytase supplemented diet fed layer chicken.

**Livability**

The effect of phytase supplementation on mean livability of hens was studied based on the mortality observed in the course of experiment. During the entire experimental period, no mortality was observed in all the dietary treatments irrespective of supplementation of phytase. The per cent livability for all dietary treatment groups were 100. Altogether the livability of Athulya birds was excellent.

**REFERENCES :**

Ahmadi, A., Tabatabaei, M.M., Aliarabi, H., Saki, A.A and Hosseini, S.A. (2008) . *Pakistan. J. Biol. Sci.* **11 (8)**: 2286- 2288.

Ali. A.S., Bassam, A.D and Sultan, A.K. (2009). *J. Anim. Vet. Adv*. **8 (9)**: 1829-1837.

Alps, O.Y., Osman, O and Yusuf. C. (2010). *J. Anim. Vet. Adv.* **9 (1)**: 32-36.

Hassanien, H.H.M and Elnagar, S.H.M. (2011) . *Asian. J. Poult. Sci*. **5 (2)**: 77-85.

Hughes, L., Dahiya, J.P., Wyatt, C.L and Classen, H.L. (2008) . *Poult. Sci*. **87**: 1156–1161.

Liebert, F., Htoo, J.K. and Sunder, A. (2005) . *Poult. Sci*. **84:**1576–1583.

Liu, N., Liu, G.H., Li, F. D., Sands, J.S., Zheng, A.J. and Ru,Y.J. (2007) . *Poult.Sci.* **86(11)**:2337-2342.

Meyer, E and Parsons, C. (2011) . *J. Appl. Poult. Res.* **20 (2)**: 136-142.

Mohammed, K.A., Toson, M.A., Hassanien, H.H.M., Soliman, M.A.H and Sanaa, H.M. E. (2010) . *Egypt. Poult. Sci.* **30 (3)**: (649-659).

Plumstead, P.W., Romero-Sanchez, H., Maguire, R.O., Gernat, A.G and Brake, J. (2007) . *Poult. Sci.* **86**:225–231.

Snedecor, G. W. and Cochran, W. G. (1994) . *Statistical Methods*. 8th edition. The Iowa state University press, Ames, Iowa, 313p.

Um, J.S and Paik. I.K. (1999) . *Poult. Sci.* 78: 75–79.

Zaghari, M., Gaykani, R., Shivazad, M and TaherKhani, R. (2008) . *Asian. J. Poult Sci.* **2 (1)**: 24-29.

❑