

## **Effect of enzyme (*Chaetomium thermophile*) Supplementation on the Production Performance of White Leg Horn Layers.**

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### **Abstract**

The study was conducted to investigate the effect of enzyme (*Chaetomium thermophile*) on the production performance of layers. One hundred fifty white leghorn single comb commercial layers having uniform body weight were randomly divided into 15 experimental units of 10 hens each and reared under standard managemental conditions. Five treatment (each having three replicates) i.e. control A (commercial layer mash), B (commercial layer mash+1X enzyme), C (commercial layer mash+2X enzyme), D (commercial layer mash+3X enzyme), E (commercial layer mash+4X enzyme) were randomly allotted to the experimental units. Feed consumption, egg production and mortality were recorded for eight weeks. Egg mass, feed conversion ratio per dozen egg and feed conversion ratio per kg egg mass was also calculated. The effect of treatments on egg production and feed consumption was found to be non significant. There was significant ( $P<0.01$ ) improvement in egg mass production with enzyme supplementation. Non significant effect on FCR/ dozen egg and FCR/ kg egg mass was observed. No mortality was found in any treatment during the experiment. Maximum profit (Rs.) per bird was calculated in group C (63.16) followed by B (60.99), D (60.54), A (59.54) and E (57.37).

### **Introduction**

The main objective of commercial layer farming is to get high productivity, which can be achieved by obtaining maximum nutrient utilization from feedstuffs. Primary dietary energy sources in poultry diets are cereal grains mainly corn, wheat and rice etc.

Cereal grains are rich in starch and also contain non-starch polysaccharides (NSP). The NSP compound primarily of xylose, arabinose, mannose, galactose and glucuronic acid are very large complexes that absorb water into a viscous mass within chyme from which nutrients are not readily absorbed. As chyme viscosity increases, the rate of diffusion of digestive enzymes and nutrients decreases, thus impairing the nutrient absorption by the enterocyte. Fat micelle formation and absorption also decrease as chyme viscosity increases thus impairing absorption of many of the fat-soluble compounds, including the fat-soluble vitamins, pigments and lipids (Ferket and Veldkamp, 1999). Some ingredient present in the feed

bind other feed components such as phosphorus, calcium and trace mineral. Therefore use of the appropriate enzyme will increase the availability of the feed components, many of which influence the egg shell quality (Hurwitz, 1987).

Enzymes occupy a central role in health and diseases without them life would not be possible. They are biocatalysts and regulate the rates at which all physiological processes take place (Murray *et al.*, 2003). Enzymes eliminate the effects of the non-nutritive, non-starch, water-soluble polysaccharides. Addition of exogenous enzymes to the ration resulted in increased efficiency of feed utilization and growth rate while it reduced environmental pollution due to a decreased output of manure and gasses such as ammonia (Zhang *et al.*, 1997). The use of enzyme in commercial layer diets has become more common in recent years. The benefits obtained by adding enzyme to feed appears to be related, at least in a large part, to the ability of the enzyme to reduce the viscosity of the intestinal contents although this may not be the only mechanism operating (Choct *et al.*, 1999).

*Chaetomium thermophile* enzyme was prepared and analyzed for its activity in laboratory conditions at NIBGE, Faisalabad. This enzyme product is reported to have Xylanase (30 U/ml), Endoglucanase (2.5 U/ml) and  $\beta$ -glucosidase (1.5 U/ml). It needs to be tested on birds as feed additive. For this purpose current study was planned with collaboration of National Institute for Biotechnology and Genetic Engineering (NIBGE) Faisalabad to estimate its effect on production performance of layer flock.

### **Materials and Methods**

The study was conducted at Poultry Research Center, University of Agriculture Faisalabad. The house and cages were disinfected and fumigated before the start of experiment. The birds were given oxytetracycline @ 125g/bag feed before the start of experiment for one week to reduce the chances of disease outbreak. One hundred and fifty (150) White Leghorn Single Comb commercial laying hens 40 weeks of age having uniform body weight i.e.; 1500 gm were selected. These birds were leg-banded for identification and were shifted to disinfected cages. Each cage comprised of four units with specification of 2 birds/unit having length, width and height of 16.5, 15.5 and 14.5 inches respectively. The birds were divided at random into 15 experimental units of 10 hens each. Five treatments (having three replicates) i.e. control A (commercial layer mash), B (commercial layer mash+1X enzyme), C (commercial layer mash+2X enzyme), D (commercial layer mash+3X enzyme) and E (commercial

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layer mash+4X enzyme) were randomly allotted to the experimental units. The composition of 1X enzyme (*Chaetomium thermophile*) prepared at Nuclear Institute of Biotechnology and Genetic Engineering, Faisalabad, Pakistan was Xylanase (30 U/ml), Endoglucanase (2.5 U/ml) and  $\beta$ -glucosidase (1.5 U/ml). The birds were offered the experimental ration @ 110g/bird/day. However in groups where no refusal was observed, the feed offered was increased @ 20 g/bird/day until refusal was observed. During the experiment, chicken were vaccinated against New Castle Disease (N.D.) according to recommended schedule. Fresh and clean water was provided round the clock. A lighting regime of seventeen hours was followed during the experimental period.

Feed consumption, egg production were recorded for eight weeks. Egg mass, feed conversion ratio per dozen eggs

and feed conversion ratio per kg egg mass was calculated. At the end of the experiment, economics was also calculated.

Data on laying performance was analyzed statistically using analysis of variance technique under completely randomized design. The significance of differences among the treatment means were evaluated by least significance difference test (Steel *et al.*, 1996).

## Results and Discussion

Data on per bird basis regarding feed consumption, egg production, egg mass, feed conversion ratio per dozen egg, feed conversion ratio per kg egg mass and economics is given in Table-1.

**Table-1: Effect of enzyme (*chaetomium thermophile*) supplementation on production performance of layer bird during the experimental period.**

Treatments	Egg Production (No.)	Feed Consumption/h en (kg)	Egg Mass (kg/hen)	FCR/Dozen eggs	FCR/kg Egg Mass	Net profit/bird
A (0 X) (Control)	43.23	6.076	2.59 <sup>c</sup>	1.69	2.35	59.54
B (1X)	44.97	6.311	2.69 <sup>b</sup>	1.68	2.34	60.99
C (2X)	45.79	6.287	2.80 <sup>a</sup>	1.65	2.25	63.16
D (3X)	45.02	6.247	2.71 <sup>ab</sup>	1.67	2.31	60.54
E (4X)	43.60	6.055	2.63 <sup>bc</sup>	1.67	2.30	57.37

Egg production was recorded throughout the experimental period and was expressed in terms of number of eggs per bird. Average egg production of group A, B, C, D and E was 43.23, 44.97, 45.79, 45.02 and 43.60 respectively. Maximum egg production was recorded in group C and minimum in control group. The data revealed non-significant effect of treatments on egg production. These results were in agreement with the finding of the Igbasan and Guenter (1997) and Cowan and Korsbak (1999) who observed non significant effect of enzyme supplementation on egg production. The results of the present study were contrary with the finding of Verma and McNab (1982) who found significant improvement in egg production by enzyme supplementation.

Average feed consumption (kg) per bird was 6.076, 6.311, 6.287, 6.247 and 6.055 for groups A, B, C, D and E, respectively. Maximum feed consumption per bird was in group B while control group showed minimum feed consumption. A non-significant effect of treatments on feed consumption was observed. These results are inline with the findings of Brenes *et al.* (1993) who reported that enzyme supplementation approximately increase feed consumption. These results were not consistent with the

results of Matosic *et al.* (1992), Richer *et al.*, (1991) and Viveros *et al.* (1993) who found decreased in feed consumption by the addition of enzyme.

Weekly egg number per bird and average egg weight was used to calculate the egg mass per hen. Maximum egg mass was produced by group C followed by D, B, E and A (Control). Significant effect of treatments on egg mass production was observed. Group C (2.80) produced significantly ( $P < 0.01$ ) more egg mass and it was non significant with group D (2.71). While group B (2.69) was non significant with group D (2.71) and group E (2.63). Control group (2.59) showed minimum egg mass. Similar findings were recorded by Igbasan and Guenter (1997). Controversial results were reported by Pan *et al.* (1998). There was non significant effect of treatments on FCR/dozen egg. The best FCR/ dozen egg was found in group C (1.65) while control group (1.69) showed the poorest FCR/ dozen egg. Non significant effect of treatments was also found on FCR/kg egg mass. Control group (2.35) showed the poorest FCR/kg egg mass while group C (2.25) showed the best FCR/ kg egg mass. The results of the present study were inline with the finding of Davidson *et al.* (1981) and Brenes *et al.* (1993) who

reported that supplementation of fiber degrading enzyme in the diet of layer have non significant effect on FCR/dozen egg and FCR/kg egg mass. Controversial results were reported by Igbasan and Guenter (1997) who reported that enzyme supplementation significantly effect the FCR/ dozen egg and FCR/kg egg mass. No mortality was found in any experimental unit. The comparative economic picture of different treatments is presented in Table 1. The net profit (Rs.) per bird for group A, B, C, D and E was 59.54, 60.99, 63.16, 60.54 and 57.37, respectively. The results indicated that net profit per bird was maximum in group C (63.16) while control group (59.54) showed less profit per bird. From the results, it was concluded that the supplementation of 3X enzyme may be used in the feed for optimum output from the layer birds.

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