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Effect of low energy - protein and low phosphorus diets on the production performance of layer chicken

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Abstract

A production trial was carried out using 80 Single Comb White Leghorn hybrid Athulya layers to study the effect of low energy, low protein and low energy-protein diets on the production performance in comparison with standard layer diet for a period of 20 weeks. Layer diets containing low energy, protein, energy-protein and available phosphorus (0.30 per cent) were fed from 21 to 40 weeks of age. Egg production, feed efficiency and egg weight differed significantly (P<0.01) among dietary treatments where as feed intake was not affected. Net profit per egg was higher in groups fed with low protein and low energy-protein layer diets when compared with birds fed on standard layer and low energy diets.

Keywords: Energy, Protein, layer diet, egg production

Introduction

Indian poultry industry has changed from a small scale backyard to large commercial farms. Egg production potential of layer bird also increased to a tune of 330 eggs per annum. The estimated growth of layer industry is 5 to 7 per cent per annum. Increasing feed cost is one of the major challenging constraint faced by layer farmers. Layer feed formulation is also a challenging task with available feed ingredients. In the present study, an attempt was made to evaluate the production performance of Athulya hybrid layer fed with low energy, protein and low energy-protein diets with low level of available phosphorus.

Materials and Methods

Eighty Single Comb White Leghorn hybrid Athulya layer chicken of 20 week old were distributed at random into four treatments viz., T1, T2, T3 and T4 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. Four types of diets viz., standard layer diet (SLD) as per BIS (1992), low energy (LED), low protein (LPD) and low energy-protein (LEPD) layer diets 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. Ingredient composition of SLD, LED, LPD and LEPD was presented in Table 1. The proximate principles of diets were analyzed periodically (AOAC, 1990). The details of treatment particulars were as follows: T1: Standard layer diet , T2: low energy layer diet T3: LPD and T4: LEPD.

Individual egg production record of all the birds was maintained throughout the experimental period. From this data, per cent hen housed and hen day egg production were 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 the 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

Egg production

The data on per cent hen housed egg production as influenced by different dietary regimen are presented in Table 1. Overall mean per cent hen housed egg production was 91.50, 86.50, 87.85 and 83.71 for the treatment groups T1, T2, T3 and T4 respectively. Birds fed with SLD (T1) produced significantly ($P<0.01$) more mean per cent hen housed eggs when compared with other dietary treatments. Significantly, more mean per cent hen housed egg production observed in T1 birds that received SLD when compared to all other diets fed birds. However, the maximum increment in egg production was only 6.79 percent only.

Table 1. Per cent ingredient composition of experimental diets

Ingredients	SLR	LER	LPR	LEPR
Yellow maize	58	46	58.5	47
Soya bean meal	28.35	27	22.1	21
Wheat bran	2	4.1	4	5.1
De oiled rice bran	2	13	5.5	17
Dicalcium phosphate	2	0.75	0.75	0.75
Shell grit	7	8.5	8.5	8.5
Salt	0.2	0.2	0.2	0.2
Merivite[1]	0.015	0.015	0.015	0.015
DL-methionine	0.1	0.1	0.1	0.1
Tefroli[2]	0.1	0.1	0.1	0.1
Meriplex[3]	0.015	0.015	0.015	0.015
Choline chloride[4]	0.12	0.12	0.12	0.12
Ultra TM[5]	0.1	0.1	0.1	0.1
Total	100	100	100	100

Merivite[1]: A+B2+D3+K (Wockhardt Ltd., Mumbai) : Composition per kilogram: Vitamin A: Each gram contains : 82,500 IU, Vitamin B2:52 mg, Vitamin D3:12,000 IU, Vitamin K: 10mg, Calcium: 166 mg, Phosphate: 395 mg. (Vetroquinol India Animal Health Pvt.Ltd. Mumbai.)Tefroli[2] : Liver tonic powder. Dr. Herbs India, Vellore, Tamil Nadu. Meriplex[3] : Each gram contains: Vitamin B1: 8mg, Vitamin B6: 16mg, Vitamin B12: 80mcg, Vitamin E: 80mg, Niacin: 120mg, Folic acid: 8mg, Calcium pantothenate : 80mg, Calcium: 86mg. (Vetroquinol India Animal Health Pvt.Ltd. Mumbai.). Choline chloride[4] : NB group Co-Ltd. Mumbai. Ultra TM[5]: Each gram contains: Manganese: 54mg, Zinc: 52 mg, Iron: 20mg, Copper: 2mg, Iodine: 2mg, Cobalt: 1mg,

No significant improvement in egg production due to different dietary regimen were observed by Cunningham and Morrison, 1977; and Jalaludeen and Ramakrishnan, 1989; Yang Ding *et al*., 2016.

Feed intake

From the table 2, it could be observed that the mean daily feed intake per bird of standard layer diet fed group (T1) was lower than that of birds fed with LED, LPD and LEPD. Statistical analysis of mean daily feed intake of birds fed different dietary regimen revealed no significant difference among various dietary treatment groups. However, birds fed with SLD revealed numerically lower mean daily feed intake when compared with other treatments. However, the magnitude of difference is not enough to exhibit any statistical difference.

The present results confirm the observations of Jalaludeen and Ramakrishnan, 1989; Yang Ding *et al*., 2016

Feed efficiency

The data calculated for feed per dozen eggs (FCR) for the different dietary treatment groups are set out in Table 2.

Table 2. Effect of low energy-protein diet on production performance of Athulya layers

	Treatments			
Parameters	**T1**	**T2**	**T3**	**T4**
Egg production* (per cent HH)	$91.50^{a} \pm 0.55$	$86.50^{b} \pm 0.89$	$87.85^{b} \pm 1.53$	$83.71^{b} \pm 2.16$
Egg production* (per cent HD)	$91.50^{a} \pm 0.55$	$86.50^{b} \pm 0.89$	$87.85^{b} \pm 1.53$	$86.15^{b} \pm 0.39$
Feed intake (g)	$113.22^{a} \pm 1.14$	$116.37^{a} \pm 1.11$	$115.18^{a} \pm 1.04$	$116.40^{a} \pm 0.98$
Feed conversion ratio*	$1.49^{a} \pm 0.01$	$1.63^{c} \pm 0.01$	$1.58^{b} \pm 0.02$	$1.64^{c} \pm 0.01$
Egg weight* (g)	$52.77^{a} \pm 0.66$	$52.49^{a} \pm 0.33$	$51.33^{b} \pm 0.53$	$51.08^{b} \pm 0.28$
Cost of Production of an egg* (Rs.)	$2.01^{ab} \pm 0.01$	$2.05^{b} \pm 0.01$	$2.00^{ab} \pm 0.02$	$1.97^{a} \pm 0.02$
Net profit per egg (Paise)	$69^{a} \pm 0.02$	$65^{a} \pm 0.01$	$70^{a} \pm 0.02$	$73^{a} \pm 0.01$

a,b-Means within a row with no common superscript differ significantly *($P<0.05$)

Significantly ($P<0.01$) higher mean FCR values were noted for birds in T2 (1.63) and T4 (1.64) when compared to T1 (1.49) and T3 (1.58). However, the mean FCR of birds in T1 (1.49) was significantly ($P<0.01$) lowest to all. An intermittent value was observed in birds fed with LPD (T3) which was significantly lower than LED and LEPD fed birds. The present results confirm the observations of Jalaludeen and Ramakrishnan, 1989; Yang Ding *et al*., 2016

Egg weight

Significantly ($P<0.01$) lower mean egg weights were noted in T3 and T4 treatment groups (Table.2) when compared with all other treatments. However, mean egg weight of birds in T1 was comparable with T2. Lowering of protein content in the layer diets significantly reduced the egg weights. The present results confirm the observations of Jalaludeen and Ramakrishnan, 1989; Yang Ding *et al*., 2016

Net profit per egg

Birds fed with LEPD (T4) revealed significantly lower production cost than T2 and was comparable with T1 and T3. Net profit per egg ranged from 65 to 73 paise. Birds fed with low energy-protein and low phosphorus diet yielded higher profit per egg.

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