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Influence of dietary probiotic (Biomin IMBO) on performance of laying hen

Asghar Mohammadian[1], Seyed Mozafar Mehdizadeh[2*], Hooshang Lotfollahian[2], Farhad Mirzaei[3], Hosein Noroozian[2]

[1]Department of Animal Science, College of Agriculture, Islamic Azad University, Karaj, Iran
[2]Animal Nutrition, Animal Science Research Institute of Iran, Karaj, Iran; [*]Corresponding Author: seyedmozafar@yahoo.com
[3]Animal Production Management, Animal Husbandry Economics, Animal Science Research Institute of Iran, Karaj, Iran

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ABSTRACT

240 laying birds were procured and distributed randomly into four treatments and four replicate (15 birds each) which was fed one of the following experimental diets containing different levels of probiotics (Biomin IMBO) for seven weeks. 1-Basel diet (control groups), 2-Basel diet + 250 g/t, 3-Basel diet + 500 g/t, 4-Basel diet + 750 g/t feed respectively. As results was revealed, feed efficiency were improved significantly throughout the production periods ($p < 0.01$). Supplementations of diet with probiotics at 750 g/t feed improved feed efficiency during experimental periods significantly as compared to control groups ($p < 0.01$). Feed intake was kept constant at the levels of 110g/day/hen throughout the experimental period. Egg production and Egg mass weight (g/hen/day) was shown an increasing trend during 2nd phase production by increasing the dietary levels of probiotics ($p < 0.01$). Nevertheless, egg production at 10th week remained non significant. Egg quality and quantity as well as blood cholesterol were not influenced by dietary supplementations of probiotics.

Keywords: Probiotic (Biomin IMBO); Performance; Egg Characteristics; Laying Hen

1. INTRODUCTION

Antibiotics were used world wide in poultry industry, to prevent poultry pathogens and disease so as to improve meat and egg production. However, dietary supplementations of antibiotics resulted in common problems such as development of drug-resistant bacteria, drug residues in the birds tissues [1], and imbalance of normal micro flora [2] As consequences, it has become necessary to develop an alternative using beneficial live microorganisms that enhance microbial growth in the host digestive tract. In recent years, the use of probiotic and prebiotic in poultry diet has become popular as an alternative substances to antibiotic for animal production which is concerned to human health [3,4]. In case of probiotics, lactic acid bacteria such as lactobacilli streptococci and bifido bacteria are the most common organisms used. The mechanism of action of probiotics is not known precisely although there are several hypotheses. The mechanism of actions has not been fully explained. Shams *et al*. [5] reported that the reductions of blood cholesterol level were due to dietary inclusions of using symbiotic in meat chickens. Liong and Shah [6] achieved the results by dietary supplementations of symbiotic will cause regulation the concentration of organic acids and reduction of blood cholesterol level broiler. Shahin *et al*. [7] reported that symbiotic in quail ration will meaningfully affect blood cholesterol and total protein. Dibaji *et al*. [8] reported that dietary inclusions of probiotics (Biomin IMBO) also did not interfere on blood cholesterol, total protein, blood albumin, HDL and VLDLI, triglyceride, uric acid and glucose levels significantly. Sharifi *et al*. [9] in their experiment by using probiotics in bird's diet, feed efficiency, blood cholesterol and total protein of japans quails were not shown any significant differences. Awaad *et al.* [10] reported that, improvement of feed efficiency was observed by inclusions of probiotics in broiler chick. Hence, due to antibiotic resistance bacteria in poultry product, which will be health hazardous to the human, substitution of antibiotic with use of probiotic as a safe product, to improve laying bird's performance through dietary supplementations of said probiotics. Probiotic Biomin Imbo, is one of beneficial substances with colony numbers such as (cfu/kg *media*, 5×10^{11}) and it contains, 1-*Enterococcus faecium* (keeps away pathogens—a beneficial gut microflora is established and maintained), 2-Prebiotic (fructo-oligosaccharides selectively stimulate the growth of beneficial *Bifi*-

dobacteria in the large intestine (bifidogeniceffect) and thus defeat pathogens, 3-Cell wall fragments strengthen the innate immune system. They modulate important cells of the immune system and therby improve resistance to infections. Cell wall fragments also block specific receptor-binding sites for pathogens and help to prevent pathogen adherence, 4-Phycophytic substances are derived from sea algae. Together with phytogenic matters, they strengthen the anatomic barrier against the invasion of pathogenic bacteria. The objective of this study was to determine if experimental supplementation of different level of probiotic (Biomin IMBO) in laying hen diet may improve the performance and other economic characteristics of studied birds.

2. MATERIALS AND METHODS

2.1. Birds and Experimental Design

240 LSL hybrid laying birds were procured and distributed randomly into four treatments and four replicate (15 birds each) which was fed one of the following experimental diets containing different levels of probiotics (Biomin IMBO) for twelve weeks. 1-Basel diet (control groups), 2-Basel diet + 250 g/t, 3-Basel diet + 500 g/t, 4-Basel diet + 750 g/t feed respectively. Specifications of procured probiotics were: 1-Type of bacteria: Lactobacillus, 2-Carrier: Oligosaccharide, 3-Active ingredients: entero coco fasium, fructo oligosaccharides, phycophytic, particles of cell wall, 4-No. of microbial colony: Entro coco fasium 3×10^9 cFu/g.

2.2. Analytical Methoids

Different production parameters such as egg production, egg weight, egg-mass and feed efficiency were recorded throughout the experimental periods. Immune responses were also studied through injections of 0.5 cc (0.5%) sheep red blood cell (SRBC) at 45 days after commencing the experimental periods. Blood was drown from wings of 2 birds (randomly selected from each group) to determine levels of blood cholesterol, hetrophil, lymphocyte, monocyte, eosinophil, total protein, white blood cells). All data were statically analyzed by ANOVA using the SAS system [11]. Significant differences between the treatment means were compared by using Duncan Multiple Range test [12]. The statistical model used was

$$Y_{ij} = \mu + T_i + E_{ij}$$

Y_{ij} = Observation in block I and treatment j, μ = Overall sample mean,

T_i = Effect of treatment I, E_{ij} = Error.

3. RESULTS AND DISCUSSION

All birds Feed ingredients and its chemicals compositions and the effect of different levels of probiotic on egg production, feed efficiency and egg mass during the experimental period is shown in **Table 1**. A significant increase in egg production was recorded in laying birds which was fed diets supplemented with probiotics ($p < 0.01$). As result was revealed, birds fed with probiotics at different levels performed well at the commencement of the experiment. While, with advancing age of birds, probiotics had an increasing trend on overall performance of birds. The highest and the lowest egg production was observed in diets supplemented with probiotics at the levels of 750 g/t feed and control groups respectively and

Table 1. Feed stuff and chemical composition of experimental base ration.

Feed stuff	Percent	Chemical composition	Amount
Yellow corn	63.14	Metabolisable energy (Kcal/Kg)	2850
Wheat	0.77	Crud protein (%)	17.00
Soy meal	17.05	Crud fat (%)	8.08
Fish meal	5.50	Crud fibers (%)	2.70
Oil	2.17	Calcium (%)	4.00
Oyster Shell	9.30	Available phosphor (%)	0.42
Di-calcium phosphate	0.93	Sodium (%)	0.20
Common salt	0.29	Linoleic acid (%)	1.86
Vitamin premix*	0.25	Argenine (%)	1.08
Mineral premix**	0.25	Lysine (%)	1.09
DL-methionine	0.15	Methionine (%)	0.49
L-lysine	0.25	Methionine + Cystine (%)	0.74
		Tryptophan (%)	0.20

*Each kg of this premix contains the following amounts: Vitamin A 3,520,000 IU, Vitamin D_3 1,000,000 IU, Vitamin E 4400 IU, K_3 800 mg, B_1 591 mg, B_2 3136 mg, B_5 13,860 mg, B_6 985 mg, B_9 200 mg, B_{12} 4 mg, H_2 60 mg, Colin Chloride 120,000 mg, and Antioxidant 400 mg. **Each kg of this Premix contains the following amounts: magnesium 29,760 ppm, Zinc 25,870 ppm, Iron 30,000 ppm, Copper 2400 ppm, Iodine 351 ppm, Selenium 80 ppm, and Colin Chloride 60,000 mg.

differences were significant ($p < 0.01$). Whereas, different levels of dietary inclusions of probiotics did not show any significant differences among them in egg productions. This result was in accordance to the finding of Shivani *et al*. [13] and Chen and Nakthong [14]. It is assumed that, lactobacillus in probiotics will enhance nutrient availability and absorptions in the bird's digestive tract which will increase egg production. The increased egg productions will be assumed by influence of lactobacillus in probiotics Whereas, this findings were in contrast to the reports of Zarei and Ehsani [15]. Feed intake was considered as constant (at the levels of 110 g/hen/day) through out the experimental period. Egg mass was affected by dietary inclusions of probiotics within on set of 2nd phase production (*i.e*. 6th week onwards). Probiotics at 750 g/t feed increased egg mass drastically as compare to control and other experimental groups ($p < 0.01$). These findings were in accordance with Haddadin *et al*. [16]. In which they assumed more number of lactobacillus in probiotics will boost and improve the digestibilities of nutrients which finally interfere in enhancing egg mass significantly. Nevertheless, some results were in contrast with the present reports. Zareei, *et al*. [15] reported that, dietary probiotics did not influence on egg mass. As **Table 2** indicated that, feed efficiency of the laying hens in different treatment groups were significantly different with the presence of probiotics ($p < 0.01$). According to the results presented in **Table 2**, the highly improved feed efficiency (1.93) was observed in diets containing probiotics at levels of 750 g/t feed, as compare to other experimental groups ($p < 0.01$). These findings were in accordance with the reports of Awad *et al*. (2009). Nevertheless, Zareei *et al*. [15], reported that, probiotics did not show any influence on improvement of feed efficiency of the chickens. Overall results indicated that, birds fed diets with different levels of probiotics had 11.40%, 13.16% and 13.13% had higher mean feed efficiency, mean egg production and mean egg mass respectively. In case of egg quality, during 30 d of egg productions, yolk color and hugh unit were affected significantly by dietary inclusions of probiotics at the levels of 750 g/t feed as compare to other experimental groups ($p < 0.05$). Though, on set of experiment, probiotics did not show any significant differences. Other criteria such as, egg shell thickness, egg yolk and blood serum cholesterol, did not alter by dietary inclusions of probiotic at various levels significantly, but as numerically egg yolk cholesterol were reduced by dietary probiotics at 500 g/t feed as compare to control groups. The results of this experiment were in contrast with the findings of previous studied works [5-7], but it was in agreement with the findings of other studies [8,9,15].

Even though, dietary probiotics did not effect significantly on It is assumed the hygiene and ideal environmental conditions of farm influenced on effects on multiplications of lactobacillus present in probiotic in birds digestive tracts, caused uncertainty of disease conditions to be occur in the farms. As **Table 3** indicates, data were observed in concerned parameters such as WBC, Monocyt, Aozenophyl, lymphocyt and Heterophyl which are related to immune responses and also blood cholesterol of laying birds did not show significant differences by feeding diets supplemented with probiotics. Results of this experiment were in agreement of other scientist's reports [8,9,15]. They reported that, the ideal conditions of productions, beneficial bacteria in probiotic will not interfere in immune responses of birds. Nevertheless, some of reports are in contrast with these findings, which have been delighted significant effect of probiotics on reducing levels of cholesterol in bird's blood [5-7], whereas, other reports were in agreement of this result [15].

As shown in **Table 3**, the levels of blood total proteins were increased numerically as levels of probiotics in diets were increased. The higher and lower blood total proteins were owed to diets containing probiotics at the levels of 750 g/t feed and control groups respectively and differences were not significant. These results were in

Table 2. Effects of experimental diets on performance of laying hen.

Experimental diets	Feed efficiency	Egg production (%)	Egg mass (g)
T1 = Control (without probiotics)	2.17^{b}	79.75^{b}	50.35^{b}
T2 = Basel diet + 250 g/t feed	2.00^{a}	86.75^{a}	54.73^{a}
T3 = Basel diet + 500 g/t feed	1.95^{a}	89.00^{a}	56.22^{a}
T4 = Basel diet + 750 g/t feed	1.93^{a}	90.25^{a}	56.96^{a}
MSE	0.033	2.293	0.886
p-value	**	**	**

**Mean bears not common superscript are different significantly ($p < 0.01$).

Table 3. Effects of experimental diets on blood parameters of laying hen.

Experimental diets	Blood cholesterol (mg/dl)	Blood total protein (%)	WBC (No./μl)	Lymphocyt (%)	Monocyte (%)	Heterophyls (%)
T1 = Control (without probiotics)	104.625	3.77	24000.00	73.37	3.00	23.50
T2 = Basel diet + 250 g/t feed	124.750	4.10	26225.00	72.50	2.25	24.50
T3 = Basel diet + 500 g/t feed	123.375	4.17	25000.00	70.87	2.25	26.50
T4 = Basel diet + 750 g/t feed	129.375	4.17	26437.50	72.00	2.37	24.87
MSE	16.375	0.233	1395.52	1.616	0.313	1.666
p-value	ns	ns	ns	ns	ns	ns

ns = Mean bears not common superscript are not different significantly ($p < 0.05$).

contrast with the findings of Shahin *et al*. [7], whereas, it was in agreement with the reports of other Iranian research observations [8,9].

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